

Research Article

Online education during the pandemic scenario “a boon or bane” – dental academicians and students perspective – A cross-sectional study

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ABSTRACT

Objectives: The coronavirus disease 2019 pandemic has affected educational institutions worldwide. The established face-to-face education has been converted to online education; therefore, this study was conducted to evaluate and compare the perception of dental students and academicians on online education and the challenges they face due to online education. **Materials and Methods:** A cross-sectional questionnaire study was conducted among dental students and academicians of eight dental colleges in the state of Telangana. A self-designed and validated 38-item questionnaire was distributed among dental students and academicians, and the collected data were subjected to descriptive statistics. A Chi-square test was applied to check the association between the perception of dental students and academicians. **Results:** Among 635 dental students, 79.7% believed that online education was the safest way during the pandemic, and 80.8% believed that online education focused on developing theoretical knowledge rather than practical skills. Among 136 dental academicians, 91.8% believed that online education negatively impacted student participation and productivity. There is a significant difference in the perceptions between dental students and academicians toward online education. **Conclusion:** Online education is a boon in many fields during the pandemic, but this mode alone will not serve the purpose of dental education.

Keywords: Online education, Pandemic, Dental education, Dentistal students, Dental academicians

INTRODUCTION

The coronavirus disease 2019 (COVID-19) has caused a global public health crisis. India ranks second with more than 11 million cases and nearly 150 thousand deaths.^[1] To combat this situation, the Indian government declared a lockdown to limit daily outdoor activities, which hindered all sectors, including educational institutions, leading to the closure of dental faculties as a precautionary measure. The pandemic situation called for alternative strategies to preserve education worldwide, which led to the introduction of distance education. The United Nations Educational, Scientific, and Cultural Organization reported that at the height of the crisis in March and April 2020, more than 1.6 billion students in 190 countries were affected by the closure of educational institutions, with some remaining unaffected.^[2] The implementation of online education led to a temporary closure of educational institutions, thus introducing a worldwide interrupted full-time education. More than 100 million students worldwide take online courses, and in India, more than 91% of dental students have participated in online education.^[3] As the online education mode was not an easy way to adapt for a developing country like India.^[4] It has become a big challenge not only for the students but also for the academicians. Changes

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in the education system, including technical support, administrative planning, and maintaining online timetables and data are all very new to academicians.

With this sudden shift away from traditional methods in many parts of the world, some are questioning whether the introduction of online education will continue after the pandemic and how such a shift would affect the education system, given that the dental curriculum of theoretical education and practical training, the transition to online teaching that is generally applicable to theoretical content has greatly influenced dental faculties worldwide.^[5] Many teachers and students had to adapt to this system, called the “educational system of the future,” which they had not experienced before.^[6,7] Despite these new adaptations focused on educational matters, there was little evidence of the real impact of this sudden transition to online mode among dental students. Studies have shown successful experiences in other specializations; a study conducted by Tabassum *et al.*,^[8] among university science and engineering teachers showed that a maximum (79.8%) of teachers think that it is necessary to continue this online learning process, and very few (1.4%) of them think that this process does not help students to bridge the educational gap. However, when preclinical and clinical training is considered, the options available are scarce. Gungor^[9] suggested that comparing students' views with those of academicians will help fill gaps in the thorough evaluation of online education, as it seems likely to continue in the future. This study aimed to evaluate and compare the perception of dental academicians and students on online education.

MATERIALS AND METHODS

A cross-sectional study was conducted among 635 dental students and 136 dental academicians in the state of Telangana, India, from September 15 to October 15, 2021. Initially, a structured 46-item questionnaire was prepared based on the literature review, which included demographic data, questions regarding perspectives, challenges, and future recommendations for online education. Dental institution faculty members and students were invited to express their comments and opinions on the readability, feasibility, general formatting, and presentation of the 46-item questionnaire to assess validity by administering the questionnaire to five experts in the field (dental academicians). They were asked to verify the questions by rating the relevance of the items on a four-point rating scale (very relevant – 4, fairly relevant – 3, somewhat relevant – 2, and not relevant – 1) for each item in the questionnaire to calculate an item-level content validity index (I-CVI). The I-CVI is calculated as the number of experts rating the relevance of each item 3 or 4 divided by the total number of experts. According to Yaghmale,^[10] items with an

I-CVI score above 0.75 were recommended as an acceptable CVI value. Of the 46 items, the I-CVI value was lower than 0.75 for eight items. Items with an I-CVI score below 0.75 were discarded from the questionnaire. The final questionnaire consisted of 38 items. A scale-level CVI (S-CVI) was calculated for the total 38 items by summing the I-CVI scores of the total 38 items divided by the total number of items, and the S-CVI score was found to be 0.9. These CVI values indicated that the questionnaire had good content validity.

Ethical approval was obtained from the Institutional Review Board (IRB) (Ref. No. 1/SSCDS/SS/IRB/2021), and permissions were obtained from eight dental colleges in Telangana. A pilot study was conducted on 20 dental students and dental academicians at a dental institute. This was done to verify the feasibility of conducting the study and identify any difficulties encountered during data collection. Responses were reported on a five-point Likert scale (strongly agree, agree, neutral, disagree, and strongly disagree). Internal consistency was determined based on a pilot study and was found to be good (Cronbach's alpha = 0.81). Based on a pilot study considering a response rate of 50%, a 95% confidence level ($Z = 1.96$), and a precision error of 5% using the formula Z^2pq/d^2 , the final sample obtained was 755. Pre-designed questionnaires were distributed to dental students and dental academicians in their respective preclinical and clinical departments, and were asked to complete the questionnaire to collect relevant information on a 5-point Likert scale. To preserve anonymity, no personal identifiers were used in the questionnaire. Participation was completely voluntary. After allowing sufficient time for completion, the questionnaires were collected back on the same day. Statistical analysis was performed using IBM SPSS 28.0. Descriptive statistics were generated, and a Chi-square test was performed to check for association.

RESULTS

A total of 635 dental students and 136 dental academicians participated in the study. Of the 635 dental students, 27.4% were men, and 72.6% were women, with an average age of 22.2 ± 7.1 years. Among the 136 dental academicians, there were 58 (42.6%) male and 78 (57.4%) female respondents with an average age of 33.7 ± 8.3 years. Table 1 shows the positive perception of online education by dental academicians and students; 55.8% of dental academicians and 43.3% of dental students showed a positive perception of online education. There was a significant difference in positive perception of online education between dental academicians and dental students ($P < 0.05$). Table 2 shows the negative perceptions of dental academicians and students toward online education; there was no significant difference in perception regarding the difficulty of providing dental education online and the effect on student participation

and overall productivity between dental academicians and dental students. 60.1% and 69.9% of dental students and academicians considered face-to-face education as the preferred mode of education, respectively, and more than 50% of dental academicians and students felt that it was not necessary to continue their education online. 64.6% and 74.8% of dental students and 74.8% of academicians, respectively, believed that the clinical training of dentists was most influenced by experience.

Figure 1 shows the challenges encountered during online education where 57.6% of dental students and 46.3% of dental academicians experienced poor network connectivity or lack of technical resources, followed by (55.1% of dental students, 40.4% of dental academicians) feeling unable to concentrate on screens for long periods was a major problem. Figure 2 shows the measures preferred to make online sessions interactive and interesting, where the majority 56.2% of dental students and 66.2% of dental academicians reported that individual attention followed (46.3% of dental students and 57.4% of dental academicians) personalized feedback as the preferred measure to make the online session interactive and interesting.

DISCUSSION

Dental education in universities around the world has been greatly affected by the COVID-19 pandemic, and dental colleges have to face a new challenge in implementing the "online education mode" to continue educating dentists. Their responsibility is not only to provide an adequate education but also to ensure that our students are competent to face new work challenges. In this study, the majority of dental students and academicians were female, which is similar to the study conducted by Cheng *et al.*^[11] Every year, women account for an average of 70% of admissions to Bachelor of Dental Surgery. The majority of dental academicians and students agreed that online education is the safest mode during the pandemic and allows flexibility that was comparable to the study done by Costa *et al.*^[12]. Although online education is seen as a safety benefit, the perceptions of dental academicians and students differ. There was a significant difference in the positive perception of online education between dental academicians and students, which was in line with the study conducted by Schlenz *et al.*^[13] as technology anxiety and lack of experience to handle complicated technology-based online education platforms in the age

Table 1: Comparison of dental academicians and dental students based on positive perception questions towards online education.

Questions	Participants	Strong Agree		Agree		Neutral		Disagree		Strongly Disagree		P-value
		n	%	n	%	n	%	n	%	n	%	
Online education is the safest mode during the pandemic	Dental Academician	47	34.5	76	55.8	12	9	1	0.7	0	0	0.000*
	Dental Student	247	38.8	275	43.3	93	14.6	12	1.8	8	1.2	
Online education has kept the learning process intact even at this time of crisis	Dental Academician	31	22.7	71	52.2	25	18.3	7	5.4	2	1.4	0.000*
	Dental Student	125	19.6	290	45.6	169	26.6	34	5.2	17	2.6	
Online education is helping students to overcome the educational gap during pandemics	Dental Academician	26	19.1	75	55.1	18	13.2	15	11.0	2	1.4	0.000*
	Dental Student	240	37.7	238	37.8	105	16.5	36	5.6	16	2.5	
Online education reduces geographic location constraint	Dental Academician	39	28.6	81	59.5	11	8.0	5	3.6	0	0	0.000*
	Dental Student	96	15.1	250	39.3	218	34.3	48	7.5	23	3.6	
Online education is cost-effective	Dental Academician	25	18.3	76	55.8	20	14.7	14	10.5	1	0.7	0.000*
	Dental Student	128	20.1	224	35.2	208	32.7	58	5.9	17	2.6	
Online education gives access to greater resources	Dental Academician	21	15.4	60	44.1	29	21.3	26	19.1	0	0	0.000*
	Dental Student	98	15.4	24	39.2	210	33.0	64	10	24	3.7	
Online education increased my technological literacy	Dental Academician	28	20.5	53	39.9	38	27	17	12.5	0	0	0.012*
	Dental Student	138	21.1	280	44	145	22.8	58	9.1	14	2.2	
Online education is played role in combating covid-19 pandemic	Dental Academician	59	43.3	64	47	10	7.5	2	1.5	1	0.7	0.035*
	Dental Student	224	35.2	257	40.3	130	20.4	16	2.5	8	1.2	
Online education mode increased my collaboration with my colleagues	Dental Academician	59	43.3	64	47	10	7.5	2	1.5	1	0.7	0.000*
	Dental Student	205	32.2	252	39.6	108	17	50	7.8	20	3.1	
Online education allows flexibility	Dental Academician	24	17.6	79	58.2	24	17.6	9	6.6	0	0	0.000*
	Dental Student	98	15.4	246	38.7	164	25.8	90	14.3	37	5.8	

* $p < 0.05$ = statistically significant.

group >22 years of age. As the younger generation of students (< 22 years old) are more tech-savvy and have been more accessible on the Internet, they experienced less difficulty in working with different online platforms to better access the Internet. They reported that younger students tend to easily adapt^[14] in developing countries such as India, the necessary infrastructure and resources are not always available to support this full transition.

There was no significant difference in negative perception questions such as “there was less student-teacher interaction in online education compared to face-to-face education,” that dentistry is difficult to deliver online, online education has a negative effect on student participation, and overall productivity as the teacher is usually the focal point of the classroom – lecturing, asking questions, leading, and responding to students. However, the online mode may lack

this immediate connection, as students typically interact with various online resources rather than live interaction. Without meaningful interaction, students may feel disconnected and demotivated during the COVID-19 pandemic. A significant problem faced by many university centers was clinical internships in hospitals and dental clinics were deeply affected; students were not allowed to enter hospitals because the university management did not want to risk exposing students to the disease. Therefore, in many medical specialties, including dentistry, the activity took place hybridly or completely online. This was consistent with a study conducted by Sarwar *et al.*^[15]

Most dental academicians and dental students felt that poor network connectivity/lack of technical support, followed by the inability to concentrate on screens for long periods, were the main problems they encountered during online education. These results were consistent with those of

Table 2: Comparison of dental academicians and dental students based on negative perception questions towards online education.

Questions	Participants	Strong agree		Agree		Neutral		Disagree		Strongly disagree		P-value
		n	%	n	%	n	%	n	%	n	%	
		Online education doesn't allow efficient performance monitoring	Dental Academician	44	32.3	68	50	15	11.5	9	6.7	
	Dental Student	247	38.8	275	43.3	93	14.6	12	1.8	8	1.2	
Online education requires strong self-motivation and time management skills	Dental Academician	48	32.3	68	50	15	11.5	9	6.6	0	0	0.000*
	Dental Student	125	19.6	290	45.6	169	26.6	34	5.2	17	2.6	
Online education is focused more on developing theoretical knowledge rather than practical skills	Dental Academician	54	39.7	59	43.3	19	14	4	3	0	0	0.000*
	Dental Student	240	37.7	238	37.8	105	16.5	36	5.6	16	2.5	
Online education fails to develop the communication skills of the learners	Dental Academician	51	37.5	53	38.9	18	13.2	14	10.4	0	0	0.000*
	Dental Student	96	15.1	250	39.3	218	34.3	48	7.5	23	3.6	
Online education is not suitable for a variety of teaching styles	Dental Academician	41	30.1	69	50.7	17	12.5	9	6.7	0	0	0.000*
	Dental Student	128	20.1	224	35.2	208	32.7	58	5.9	17	2.6	
There is more academic dishonesty in online education mode	Dental Academician	48	35.2	54	39.7	24	17.6	10	17.5	0	0	0.000*
	Dental Student	98	15.4	24	39.2	210	33.0	64	10	24	3.7	
There is less student – teacher interaction in online learning environments	Dental Academician	59	43.3	64	47	10	7.5	2	1.5	1	0.7	0.000*
	Dental Student	138	21.1	280	44	145	22.8	58	9.1	14	2.2	
Student discussions in online education will seem impersonal and lack feeling compared to face-to-face classes	Dental Academician	55	40.4	60	44.1	15	11	6	4.5	0	0	0.000*
	Dental Student	224	35.2	257	40.3	130	20.4	16	2.5	8	1.2	
Online education mode provides a limited feedback mechanism	Dental Academician	38	27.9	63	46.3	20	14.7	12	8.8	3	2.3	0.000*
	Dental Student	205	32.2	252	39.6	108	17	50	7.8	20	3.1	
Good teaching principles will be carried from face-to-face to online education mode	Dental Academician	49	36	48	35.2	18	13.2	19	13.9	2	1.7	0.000*
	Dental Student	98	15.4	246	38.7	164	25.8	90	14.3	37	5.8	
Dentistry is difficult to be delivered online	Dental Academician	71	52.2	48	35.5	11	8	5	3.6	1	0.7	0.260
	Dental Student	366	57.6	200	31.4	58	9.1	11	1.7	0	0	
Online education has a negative effect on student's participation and their productivity as a whole	Dental Academician	68	50	45	33	17	12.5	6	4.5	0	0	0.570
	Dental Student	155	24.4	112	17.6	64	10	13	2	12	1.8	

* $p < 0.05$ = statistically significant

Shrivastava *et al.*,^[16] and Hattar *et al.*^[17] The most common problem faced by dental students across India was internet connectivity and unfamiliarity with new learning platforms, and staring at computer screens for long periods can cause headaches, eye strain, blurred vision, and dry eyes due to harmful rays. Aggravation pre-existing health problems caused by extended online lessons “continuous lessons lead to worsening of migraines and back pain” should be avoided to increase the productivity of students’ long lessons and sufficient breaks should be provided between two consecutive lessons.^[18] It avoids not only cognitive load but also takes care of physical load caused by long-term use of electronic devices. It was supported by Thompson’s *et al.*,^[19] formula of working for 52 min and a break for 17. Other challenges felt by academicians and students as clinical training and complex case presentations most negatively affected the experience due to the online mode, using methods stimulating critical thinking, such as discussions of clinical and scientific articles or videos of clinical procedures, these are not able to meet the requirements of training—interpersonal skills and confidence in patient care. Medicine, regardless of specialization, can only be learned through direct contact with patients.

Although few studies report the challenges students face during online education, limited information is available on the specific strategies that they use to overcome them; the present study also highlighted the strategies to overcome

these challenges. Children often suffer from several problems that remain unresolved due to lack of attention. Online courses need to engage participants with frequent and meaningful activities that help them stay focused. Smith and Winking-Diaz also explained the importance of the frequency of interaction in the creation of online classes.^[20] It was also found that the lack of immediacy in getting answers to their questions was a problem in the online mode of education, which was also reported by Vonderwell S, Noor R and Iurcov *et al.*^[21-23] Therefore, the teacher should take care to answer the students’ questions immediately and add more images/videos/GIFs/comics, etc., that would be more suitable for the course content to make it more interesting, moving and also, good for listeners thereby, magnetizing listeners concentration, this was also supported by previous literature.^[24-26]

Other important findings from this study are that the majority of dental academicians and students felt that face-to-face education was the preferred mode of education and that it was not necessary to continue their education online, as most dental students reported that they were only able to understand 50% of what was taught online. They also mentioned repeating some of the lectures that took place online once the school reopens. The strengths of the present study are that it is the first of its kind to compare the perceptions of dental academicians and students; it also discusses the challenges that they face and provides measures to overcome these challenges; findings from this study can help design curriculum for a new normal because this study provided evidence-based information to help decision-makers and educators reform and create a new face for dental education.

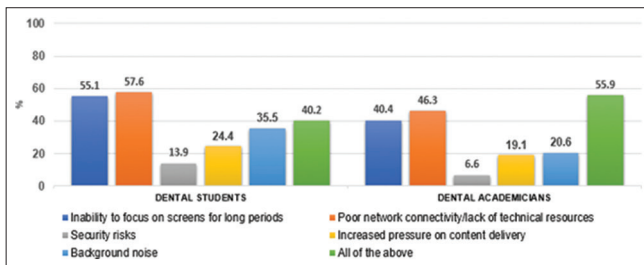


Figure 1: Challenges faced by dental students and academicians due to online education.

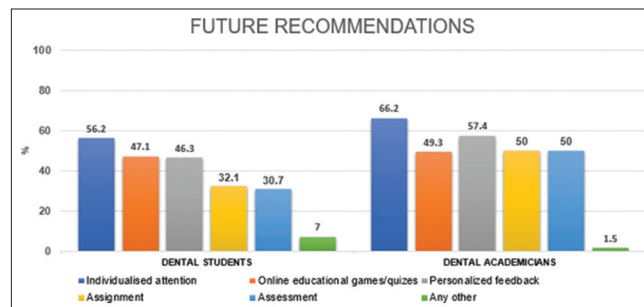


Figure 2: Measures preferred to implement by dental students and dental academicians to make online sessions interactive and interesting.

CONCLUSION

Online education is definitely beneficial during the pandemic. Because there are two sides to the coin, online education also has its pros and cons; dental education, where practical training plays an important role in dental education, alone will not serve the purpose. It can complement traditional education, but it cannot replace it. To use technological advancements to our advantage, implementation of new technologies such as virtual reality/augmented reality mannequins and stimulation devices along with haptic technology would become very helpful in raising the bar of online dental education.

Ethical approval

The research/study complied with the Helsinki Declaration of 1964.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Conflicts of interest

There are no conflicts of interest.

Use of artificial intelligence (AI)-assisted technology for manuscript preparation

The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

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