Perceptions of Dental Teachers about Blended Learning: A Qualitative Analysis

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Abstract

Objective: This qualitative study was conducted to explore the perceptions of dental teachers about utilizing blended learning (BL) in undergraduate teaching following the COVID-19 pandemic. The objectives were to study their willingness to move to BL and to identify the reasons for their willingness or lack thereof for this transition.

Materials and methods: This descriptive qualitative study is part of doctoral research that was conducted among health sciences teachers from the state of Maharashtra, India. The population for this study included all dental teachers from the 38 dental colleges in the state. To ensure proper representation of teachers, a proportionate stratified sampling method was used. The research tool used in this study was developed and validated, and data collection was conducted online using SurveyMonkey.

Results: The results showed that 137 (97.16%) teachers were inclined toward utilizing BL. Thematic analysis of the responses received was carried out using NVivo software. Around 10 main emergent themes were identified, which were grouped under four key areas. The majority of the dental teachers were appreciative of the benefits of BL in terms of accessibility, flexibility, and learner engagement, but some preferred traditional teaching methods.

Conclusion: For the dental teachers to continue with BL in instruction, there is a need to empower them *via* faculty development programs for successful adaptation to technology-enhanced instruction and to overcome the limitations and challenges associated with technology integration in education. The transformation from traditional face-to-face to technology-enhanced BL seems to be a worthwhile opportunity for future dental education.

Keywords: Blended learning, Dental education, Qualitative study, Teacher perception.

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Introduction

Blended learning (BL) or hybrid learning, also known as technology-mediated instruction, web-enhanced instruction, or mixed-mode instruction, is an approach to education in which both traditional classroom methods and online digital methods [using Information and Communications Technology (ICT) tools] are integrated.

It is an educational approach that combines traditional onsite teaching with the use of technology in order to ameliorate the strengths of both methods while minimizing their respective drawbacks. With the growth of technology-enhanced instruction, BL has gained widespread acceptance across various educational settings.[1] BL has been defined by Rowe et al. as the systematic integration of online and face-to-face engagement to support and enhance meaningful interaction between students, teachers, and resources.[2]

In India, the dental undergraduate program is of 5 years' duration and is conducted in multiple settings, including classrooms, simulation laboratories, and clinical environments. The goal of dental education is to produce clinically competent graduates capable of independent practice.

The COVID-19 pandemic brought about drastic changes in many areas of life, affecting society in general and the global health system in particular. Education was one of the most seriously affected components worldwide.[3]

Consequently, universities and colleges were obligated to promptly adopt various methods and tactics to deal with this extraordinary situation. Dental colleges too had to take various measures to continue imparting education while ensuring the safety of students, patients, and teachers. However, the COVID-19 pandemic seriously impacted dental education at both preclinical and clinical levels.

The field of dental education has witnessed many technology-related innovations in the past decade, and BL is one such outcome that was widely used during the COVID-19 pandemic.[4]

Globally, the use of technology in dental education was not new and had been employed to some extent even before the COVID-19 pandemic.[5] However, following the COVID-19 pandemic, BL has become the main method of dental education in a few countries worldwide.[6] Studies have reported the effective use of BL in the various specialties of dentistry such as endodontics,[7] orthodontics,[8] periodontics,[9] and oral surgery.[10] While Information and Communications Technology (ICT)-enabled instruction in dental education was a very rare practice earlier in India, limited

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to specific topics or specialties at particular colleges, the COVID-19 pandemic necessitated dental teachers to adopt and integrate ICT in their teaching activities. This led to the introduction of ICT tools in classrooms, laboratories, and clinical teaching at most health sciences universities and colleges in India. It paved the way for BL through the adoption and integration of ICT tools by dental teachers in various teaching-learning situations.

Advances in the field of dentistry, along with rapid growth in technological innovations, have brought about a transformation in instructional methods. Considering these technological advancements and the use of technology during and following the COVID-19 pandemic, there is a need to examine whether dental teachers feel that they are willing to transition to BL.

Hence, this study was conducted with the aim of exploring the perceptions of dental teachers about the use of BL in instruction. While some may be discouraged by challenges presented by BL, such as technological limitations, increased workload, and reduced face-to-face interaction with students, others may find satisfaction in its flexibility and ability to cater to different learning styles. As many dental teachers were compelled to adopt BL during the COVID-19 pandemic, this study aimed to determine whether they feel this method could be integrated into their routine teaching for dental undergraduate students following the pandemic.

OBJECTIVES

- To study if dental teachers were willing to move to BL.
- To identify the reason(s) behind their willingness or lack of it, for this transition.

MATERIALS AND METHODS

The study was part of doctoral research based on the perceptions of health sciences teachers from the state of Maharashtra, India, regarding the use of ICT tools in instruction. To ensure proper representation of teachers, a proportionate stratified sampling method was used, and the sample size for each specialty was calculated. The strata considered were (1) specialty/faculty of health sciences, (2) administrative regions of Maharashtra, and (3) college type, category of ownership, and university affiliation.

The aim of this study was to explore the perceptions of dental teachers about the use of BL in instruction, focusing on dental teachers from the state of Maharashtra, India. There are 38 dental colleges in the state, and for this arm of the study, the strata considered were (1) administrative regions of Maharashtra and (2) college type, category of ownership, and university affiliation.

There are six administrative regions of the state, with the maximum number of dental colleges located in the Pune region and the minimum in the Amravati region. The distribution of dental colleges region-wise is depicted in Table 1. Maharashtra has one University of Health Sciences for the entire state, Maharashtra University of Health Sciences (MUHS), which is established and funded by the state government, along with a few Deemed to be University (DTU). An Institution of Higher Education, other than universities, that operates at a very high standard in a specific area of study can be declared by the Central Government, upon the advice of the University Grants Commission (UGC), as an Institution "DTU." Institutions that are "DTU" enjoy academic status and privileges similar to those of a university.[11] There are a few dental colleges owned by the government, and many privately owned ones in the state, and their distribution, with their affiliation, is depicted in Table 2.

Table 1: Distribution of dental colleges across regions in the state of Maharashtra, India

Region-wise distribution of dental colleges		
Region	Name of region	Number of colleges
1	Amravati	2
2	Aurangabad	7
3	Mumbai	8
4	Nagpur	4
5	Nashik	6
6	Pune	11
Total number		38

Table 2: Distribution of Government and privately owned dental colleges and their affiliations

Ownership and affiliation-wise distribution of dental colleges		
SN	Ownership and affiliation	Number of colleges
1	Government College, affiliated to MUHS	5
2	Private College, affiliated with MUHS	25
3	Private college, affiliated to DTU	8
Total number		38

Based on the proportionate stratified sampling method of the population, the expected number of responses according to the calculated sample size of dental teachers was 104. However, 189 responses were received, out of which 48 were incomplete and thus discarded. The 141 completed responses were included for studying dental teachers' perceptions about BL. Table 3 depicts the demographic data of teachers who participated in the study.

To study teacher perceptions, a research tool was developed and validated. It was administered to dental teachers online using SurveyMonkey. This tool included two questions about the use of BL in instruction. The response to the first question about their willingness to transition to BL was mandatory (yes/no), while the second question, asking for reasons, was optional.

Ethical Considerations

This study was part of doctoral research approved by the Institutional Research Committee, with ethical clearance granted. Written informed consent was obtained from participants, and participation was entirely voluntary. Participants were assured that their responses would be anonymous, and the data collected would not be linked to any specific participant or college in any way and would be used solely for research purposes.

RESULTS

The results showed that 137 (97.16%) teachers were willing to move to BL. Qualitative thematic analysis of their responses, citing reasons for their willingness or lack thereof to transition to BL, was carried out using NVivo software.

Following the thematic qualitative analysis, 10 main themes emerged and were identified and grouped under four key areas—(1) advantages of transitioning to BL, (2) continued preference for the traditional method of instruction, (3) constraints and restrictions with BL, and (4) the need for faculty development. There were a total of 128 statements supporting the 10 main themes. These provided a comprehensive overview of the perceptions of dental

Table 3: Demographic data of teachers who participated in the study

	Description of participant demographics		
SN	*Characteristic*	*Number*	*Percentage*
1	Gender		
	Male	79	56.02%
	Female	62	43.97%
2	Age (in years)		
	Below 30	1	0.70%
	31–40	50	35.46%
	41–50	61	43.26%
	51–60	27	19.15%
	Above 60	2	1.42%
3	Educational qualification		
	BDS	3	2.13%
	MDS	128	90.78%
	PhD	10	7.09%
4	Teaching experience (in completed years)		
	6–10	43	30.50%
	11–14	39	27.66%
	15–20	23	16.31%
	>20 years	36	25.53%
5	College type and affiliation		
	Government (MUHS)	4	2.84%
	Private (MUHS)	63	44.68%
	Private (DTU)	74	52.48%

teachers regarding the use of BL as an instructional method in the dental curriculum.

Sentiment Analysis

Overall, the sentiment of the responses appeared very positive toward integrating technology (ICT tools) in teaching. The benefits that technology could bring in terms of accessibility, flexibility, and engagement were appreciated. However, concerns regarding the limitations and challenges of relying solely on technology for teaching were also expressed. Some teachers emphasized the importance of traditional teaching methods, highlighting the value of human interaction, face-to-face teaching, and classroom engagement. BL, which combines both traditional and online teaching methods, was widely seen as beneficial for catering to different learning styles and preferences. Overall, there was optimism about the potential of BL to enhance learner engagement and understanding.

Details of the thematic analysis, with the emergent themes, key areas identified, a summary of understanding of themes, and a few quotes cited as examples are presented in Table 4.

DISCUSSION

This study aimed to explore the perceptions of dental teachers about transitioning to BL in the aftermath of the COVID-19 pandemic. In the present study, 97.16% of teachers indicated willingness to transition to BL. The COVID-19 pandemic compelled dental teachers to adopt and integrate ICT in their teaching activities across classrooms, laboratories, and clinical teaching at most dental colleges in India.[12] As observed by Ali

Table 4: Details of thematic analysis with key areas identified, emergent themes and some quotes as examples

Themes	*Summary of understanding*	*Quotes*
Key area (1) advantages of transitioning to BL		
Flexibility and accessibility	Respondents express the view that technology, when used appropriately, can enhance accessibility and flexibility in learning. Online resources, mobile learning, and virtual classrooms are seen as tools that can broaden educational opportunities and reach a wider audience	"As students choose time to learn, it should be available for them anytime." "Material can be shared to students which they use for learning anytime anywhere." "This will definitely help us as teachers to teach and reach the current generation students in an easy way."
Optimization of teaching methods	There's a consensus on the importance of optimizing teaching methods by integrating technology intelligently. Contributors suggest using technology as a supplementary tool to enhance traditional teaching rather than replacing it entirely	"We should not depend only one method, as a teacher I will be able to teach with all the available methods." "Technology should be used and used intelligently when available." "It is easy for the students to understand."
Enhanced learning experience	BL is perceived as providing a more interactive and personalized learning experience. It allows for simultaneous theoretical and practical learning, facilitates deeper understanding, and encourages active participation from students	"More information can be carried to the learner." "BL combines face-to-face learning with online learning. This offers more interactive learning, improves communication between students and teachers." "Helps students understand better."
Student-centered learning	The focus is on catering to the needs and preferences of modern learners, who are increasingly tech-savvy and accustomed to digital resources. BL is seen as aligning with the preferences of the new generation of learners	"Blended is more effective in teaching and understanding rather than ICT alone." "Student will have more imagination and visualization." "It's very easy to approach the learner, wherever and whenever required."
Benefits of BL	There is a prevalent theme emphasizing the advantages of BL, which combines traditional face-to-face instruction with online resources. Respondents believe that BL offers flexibility, accessibility, and engagement for students, catering to diverse learning preferences	"BL offers the advantage of combining in-person interactions with online resources…" "BL is more useful for the learners." "BL not only helps in deeper understanding but also allows assessment for learning simultaneously."

Contd…

Table 4: *Contd…*

Themes	Summary of understanding	Quotes
Balanced approach	The emphasis is on leveraging the strengths of both approaches to create a holistic and effective learning environment	"Classical teaching has its own benefit that's why I prefer both." "Both have merits of their own." "Most appropriate combination...face to face interaction (traditional) and Online teaching will ensure maximum participation of students."
Key area (2) continued preference for traditional method of instruction		
Value of traditional teaching methods	Despite the recognition of technology's benefits, there's a consistent acknowledgment of the value of traditional teaching methods. Face-to-face interaction, classroom dynamics, and personal engagement with students are highlighted as essential aspects of effective teaching	"Classroom method makes understanding of students better than online." "Walk chalk talk are the best methods of teaching and learning." "Eye contact with learners would prefer different designs of the classrooms."
Importance of the human element	Many contributors emphasize the irreplaceable role of human interaction in the learning process. They suggest that while technology can enhance learning, it cannot fully substitute for the nuanced understanding and responsiveness that human teachers provide	"When I have eye contact with the students, I can judge their responses, interests, and I feel being connected with them." "Exploring various innovative methods such as digital animation can make the students understand and reproduce the content much better." "Though ICT tools make the task convenient, I still prefer some traditional classes as I believe when I have eye contact with the students..."
Key area (3) constraints and restrictions with BL		
Challenges and limitations of technology	Alongside its benefits, there's an awareness of the limitations and challenges associated with technology in education. Concerns include internet connectivity issues, dependency on devices, and the inability of technology to fully assess learning or provide nuanced feedback	"ICT teaching is technique sensitive; depends on factors like internet connectivity, availability of laptop." "PPT for example is abused...ICT needs human touch." "As a clinician, you can not teach clinical subjects using ICT technology."
Key area (4) adaptation to technological advancements		
Adaptation to technological advancements	Respondents recognize the need for educators to adapt to technological advancements and changing learning styles. They advocate for continuous professional development and training to effectively integrate technology into teaching practices	"Today we need to change by time and need to be digital." "It helps in ease of understanding for the students to grasp the knowledge and implement it well." "Because it offers better content development (recording of webinars) and flexibility."

et al.[13] in their global pilot study regarding the future of BL in undergraduate dental education, over 70% of the faculty regarded BL as a suitable method of teaching and predicted a greater use of BL in future.

Advantages of Transitioning to BL

Blended learning combines traditional classroom teaching with ICT tools for teaching and has gained importance as an innovative approach in higher education[14] since it offers many advantages over traditional onsite and online learning methods.[1]

Participants of this study stated that BL as a method of instruction offered flexibility, interactivity, self-paced learning, and catered to different learning styles. They also opined that ICT tools made teaching more organized, enjoyable, visual, and easier for learners to understand concepts.

A major advantage of employing BL in instruction is that it is more flexible and allows for better learner engagement.[15] Clinical teaching, which is an integral component of the dental curriculum, cannot be entirely conducted by technology-enhanced methods alone to ensure clinically competent graduates.[15] During the COVID-19 pandemic, BL was the preferred method of instruction, where lectures and seminars were conducted online, while clinical training resumed on-site through a well-planned staggered posting of students in dental clinics.

Study participants stated that online resources, mobile learning, and virtual classrooms were tools that could broaden educational opportunities and reach a wider audience. BL was perceived as providing a more interactive and personalized learning experience. It allowed for simultaneous theoretical and practical learning, facilitated deeper understanding, and encouraged active participation from students.

Appreciating the role of ICT in current times, especially following the COVID-19 pandemic, educational institutions have now restructured their curricula to some extent and modified infrastructure to accommodate technology in their teaching, acknowledging the importance and impact of ICT in teaching methodology.[16]

Due to the use of ICT tools, BL is an effective method of teaching, and teachers can utilize various tools such as multimedia, and digital communication platforms like Google Meet, WeChat, Zoom, and WhatsApp.[17]

Thus, teachers have creative liberties to use various tools for explaining any idea or concept in BL.[4] This facilitates greater

involvement of the students with the content and promotes communication, collaboration, and professionalism among them.[4]

The focus is on catering to the needs and preferences of modern learners, who are increasingly tech-savvy and accustomed to digital resources. BL is seen as aligning with the preferences of the new generation of learners.

Since BL promotes student-centric learning, students tend to become more involved and enthusiastic about the learning process.[18] Previous studies have shown that BL has a significant impact on students' learning, as it allows catering to differences in the learning styles of the students.[19–21] World over, there is an increased demand for the utilization and integration of ICT tools in education to equip today's learners with the requisite knowledge and appropriate skills.[22] BL has the potential to bring about revolutionary strides in contemporary dental education.[14,23]

Continued Preference for Traditional Method of Instruction

There was consensus among the participants of this study about the importance of optimizing teaching methods by integrating technology intelligently. Teachers in this study suggested using technology as a supplementary tool to enhance traditional teaching rather than replacing it entirely.

Some of the participating teachers in this study felt that despite the known benefits of using technology and ICT tools, they still preferred traditional teaching methods. Face-to-face interaction, classroom dynamics, and personal engagement with students were highlighted as essential aspects of effective teaching by these teachers.

Blended learning was considered an effective method for didactic teaching and for conducting seminars and journal clubs for students. However, it was not found to be as useful for practical or clinical training in simulation laboratories or clinical settings, as these require in-person, hands-on training.[13] Clinical training in dentistry involves communicating and interacting with the patient, and so requires an onsite presence.[4]

The traditional system of teaching is typically preferred for mandatory in-person interactions, especially in a specialty like dentistry, as this method helps achieve educational objectives related to the affective and psychomotor domains.[4]

Many teachers emphasized the irreplaceable role of human interaction in the learning process. They suggested that while technology can enhance learning, it cannot fully substitute for the nuanced understanding and responsiveness, such as judging responses and clearing doubts, that human teachers provide.

Conventional methods will continue to be the backbone of dental teaching.[4] BL should be employed for areas and domains where it can enhance the learning experience. However, transitioning to BL is not easy, as it requires extensive resources, training, and support. Therefore, this transition should be gradual.[4]

Constraints and Restrictions with BL

The sudden transition to online instruction during the COVID-19 pandemic was a major cause for concern in dental education in India, as most institutions were not fully equipped to handle this emergency. Moreover, teachers' workload seemed to have increased manyfold, along with uncertainty about effective instruction.

Since dentistry specialties are clinical in nature, teaching involves laboratory, clinical, and didactic components. While clinical teaching temporarily shifted to modified simulation-based methods during the pandemic, other newer teaching and assessment methods were also used. However, didactic methods required improvisation and innovation to adapt effectively.

Some universities employed learning management systems (LMSs), but often there wasn't enough training provided to teachers for techno-pedagogical skills. It seemed to require a significant amount of time, and overall, there was a lack of satisfaction.[1]

Implementation of BL was not without substantial challenges,[1] navigating the digital landscape of BL being a major concern. Krishnan and Nagaratnam[14,24] and Khatib have highlighted the struggles that teachers experienced in managing the pedagogical and technological complexities of this approach, emphasizing the exhaustive efforts needed to effectively integrate digital technology into BL.

Information and Communications Technology tools made teaching very effective in BL, but since not many teachers had the requisite training, aptitude, and willingness for it, integrating ICT-enabled instruction or BL was not an easy task.[12]

Teachers should also receive training in the adoption of ICT tools and platforms, enabling them to overcome slight technical issues if they arise.[1] Teachers who were tech-savvy and able to integrate technology effectively seemed to prefer BL over the conventional face-to-face method of instruction.

For BL to be effective, it is important to ensure that teachers have easy access to necessary resources such as the requisite devices and software, along with reliable internet connectivity.

A prerequisite for successful BL is ensuring that teachers have access to the requisite technology and infrastructure, including devices, software, and support.

For teachers from developing countries such as India, one of the main challenges has been the availability of uninterrupted, high-speed internet connection, and power supply. Technical glitches and issues pertaining to the hardware and software of internet devices used during BL were also reported to be significant concerns.[13]

Besides the lack of administrative support, the lack of encouragement and incentives for promoting the use of BL were also perceived as demotivating by teachers.[25] Teachers felt that environmental factors or those related to their workplace were a greater cause for their perceived difficulty in moving to BL, rather than their lack of knowledge.[26]

To summarize, teachers have perceived major constraints with BL to be a shortage of resources, lack of access to computers and ICT tools, their knowledge and confidence about the use of computers and technology, lack of training, difficulty in integration of tools in curriculum, inefficient time management, and lack of administrative support.[27–30]

Adaptation to Technological Advancements

Teachers in this study opined that BL is the future of education. Today's students are tech-savvy, and teachers should use ICT tools intelligently when available.

Information communication technology plays a pivotal role in an effective BL method. Therefore, teachers should be able to successfully adopt and integrate ICT tools in their teaching. ICT competencies, such as web technology, software, hardware, and tools, are integral components of technology-enhanced instruction like BL.[17]

Of the various factors influencing the integration of ICT in teaching, the efficacy of using computers by the teachers and their ability to use technology have a great impact.[31,32] But the most

significant factor is teacher competence and skill in adopting and integrating technology for the benefit of the learners.[33–35] Lack of knowledge about ICT on the part of teachers, their unwillingness to accept change, concerns with time management, and difficulties with ICT integration are the major hurdles to ICT-enabled teaching.[36]

For utilizing and adopting ICT tools in their instructional methods, teachers need to have an open mind, flexible attitude, and willingness to learn.[33,37] Wang and Dostá[38] have stated that for integration of ICT into regular teaching, the attitude of teachers toward ICT is a crucial factor. Studies[15,27] have suggested that computer attributes, cultural perceptions, and competence in the use of computers were predictors of positive attitudes of teachers toward the use of ICT in education. Teeroovengadum et al.[34] have pointed out that perceived usefulness and perceived ease of use of ICT are the major predictors of teachers' attitudes toward the adoption of ICT within the teaching and learning context.

Studies have revealed that there was a paucity of training opportunities provided for teachers[28,39,40] which had adversely affected their attitudes toward using ICT in teaching. However, as observed by Zamir and Thomas,[41] sometimes even with increased accessibility and support for technology-integrated instructional methods, teachers did not easily accept technology for teaching.[42]

To be able to adopt ICT tools for BL, teachers should be provided training,[32,43] and they should be supported not just by their peers but also by higher authorities, leadership, and top management.[32,34]

Limitations of the Study

This study is based on perceptions of dental teachers from a state in the western region of India. The findings could potentially be extended to other geographical locations. It is a qualitative study aimed at identifying the willingness or lack thereof among dental teachers to adopt BL during the COVID-19 pandemic, and the reasons for their stance. Therefore, the study does not measure the effect of various factors systematically.

Implications and Future Directions

Considering the technological advancements and the rapid adoption of technology during and following the COVID-19 pandemic, there is a need to examine if dental teachers feel they have the requisite skills, knowledge, and training to successfully integrate technology into education. Thus, there is a need to gather more information and explore how these teachers feel about transitioning to BL.

A similar study could be conducted across different locations and states of India, as well as in various other geographical locations. Based on existing literature, the lack of willingness among teachers to use ICT is identified as one of the biggest challenges in implementing BL at the ground level.[44] The relationship between faculty development programs and their influence on faculty perceptions about using BL could be explored further.

Conclusion

With advances in the field of Health Sciences and rapid growth in technological innovations, methods of teaching are undergoing transformation at a rapid pace. A teacher is one of the major stakeholders in ICT implementation, and thus, a teacher's role must shift from being a mere user of technology to that of a facilitator in technology-enhanced instruction. For this shift to occur, the teacher should be willing to integrate ICT tools in teaching and transition to BL.

Clinical training is an integral component of the dental curriculum and cannot be replaced by technology-enhanced instruction alone. However, dental teachers need to be aware of their digitally savvy learners' preferences, such as virtual education and virtual reality simulated experiences, alongside traditional methods of clinical teaching. The transformation from traditional face-to-face instruction to technology-enhanced BL appears to be a promising opportunity for the future of dental education.

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