

E- LEARNING DURING COVID-19: AN IRIDESCENT STEP INTO THE FUTURE OF DENTAL EDUCATION?

ABSTRACT

COVID-19 has brought a great range of changes to the world, dental education proved no different. There has been a boom in e-learning over the past one year or so as measures to ensure social distancing and prevention of the spread of the virus have been put into place. In this narrative review, the authors aimed at reviewing various e-learning modalities employed in dental education and how knowledge of the same can help us improve dental learning as practised today. A search of the PubMed database was conducted in November 2020, with no date limits, using the search terms "COVID-19", "SARS", "medical education" and "dental education", "Flipped class rooms", "Learning management systems", "Augmented reality" and "Problem based learning" and the results were screened for relevance to the review topic. Additional searches were done in Google Scholar for categories that yielded few results in PubMed. There are an array of tools at our disposal, one amongst the many and certainly the most popular being video conferencing. Home environments might not be the most conducive for education for various reasons. Assessments are to be done at regular intervals. We as educators must actively revise and review our teaching strategy and maintain a continuum in ways that are feasible and appropriate for our institutions respectively as well as effective for students.

Key words: Dental Education, E-Learning, COVID-19, Remote learning, Medical education, Dentistry, Online learning.

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INTRODUCTION

COVID-19 emerged in Wuhan of Hubei Province of China in December of 2019 and has spread throughout the world, causing great concern.¹ To control COVID-19 transmission, various governments world over have implemented strict domestic quarantine and social isolation policies. Dentistry despite being a very practise centred profession, has firm roots in theory classes. This, enables the temporary shifting of the dental curriculum to one that is remote. Thus, keeping students in touch with the subject matter, ensuring their safety as well as engaging them thus alleviating fear, discomfort and uncertainty caused by the pandemic.

Dental colleges in India have been working to transform pedagogy by reducing lectures using technology, implementing active self-directed individualized learning and inter-professional education for more than a decade.^{2,3} The advent of COVID-19 has led dental education into a new phase in India. Measures to ensure social distancing have included closure or partial functioning of medical and dental schools and working from home for both educators as well as students. Though the situation might seem as if learning may take a back seat, institutions and organizations have gone to great lengths to keep the learning going thus, providing an impetus to e-learning. This transition has been easy for some who had already incorporated e-learning in their system and a bit difficult for others who are completely new to this system. In a situation where remote learning is the need of the hour and the lack of a review summarizing the same, this article is aimed at reviewing the various modalities employed in facilitating remote learning in Dental Colleges during such unprecedented times.

Search Methods :

As this is a narrative review, we did not conduct a systematic literature search. However, a search of the PubMed database was conducted in November 2020, with no date limits, using the search terms "COVID-19", "SARS", "medical education" and "dental education", "Flipped class rooms", "Learning management systems", "Augmented reality" and "Problem based learning" and the results were screened for relevance to the review topic. Additional searches were done in Google Scholar for categories that yielded few results in PubMed.

Online learning:

According to Moore, Dickson-Deane, & Galyen online learning is learning that uses internet networks with accessibility, connectivity, flexibility, and the ability to bring up various types of learning interactions.⁴

A learning style can be described as a set of cognitive, emotional and physiological features that can be used as indicators of how a person can learn.⁵

There are certain types of learning one can employ in online education.

- **Asynchronous learning** - Literature states that this method works best in the digital format. Teachers need not deliver material at a fixed time, it can be posted online for access. While it gives respite for students and teachers, such learning tools are to be moderated by experienced faculty in order to be effective.

- **Synchronous learning** - Synchronous learning refers to that circumstance where a group of students are learning at the same time. Thus, it is preferred tool of choice where peer interactions are deemed necessary and appropriate.

- **Blended learning** - It can be used for integrated content and clinical scenarios where both synchronous and asynchronous elements may be effective.⁶

The success of e-learning depends on the attitudes and interactive teaching styles of the faculty, as well as on the experience and attitudes of students with regard to technology.

Students' characteristics refers to their general attitudes and behaviours towards achieving certain learning goals.⁷ Student characteristics that define the success or failure of online learning are many and varied. Computer anxiety due to sense of inadequacy, lack of technological experience, computer self-efficacy (self-assessment of one's ability to apply and use the computer to accomplish a task), self-discipline, social interactions, motivation, extent of active learning are key factors.

Studies state that students in more advanced years of learning tend to perform better than those in the initial years of the course most commonly due to better exposure and thus resultant familiarity with the tools.⁸

Educator Factors/ Instructor factors include, instructor attitude, teaching style, instructor

practise and online responsiveness.

These times are, in a great number of ways unprecedented for many of us. There are an array of tools at our disposal.

Tools of Online Education

Technology has advanced a great deal over the years. The tools of online learning available at our disposal are many and varied. We attempted to discuss a few through the course of this article.

Video conferencing - A common cost-effective tool for accomplishing synchronous learning.

Video conferencing is an accommodative tool for disparate learning styles, helps diversify the reach of education and compares positively with traditional teaching methods.

These days many conferences and workshops are also conducted on such platforms, eliminating need to travel and making it more accessible to many.⁹ The most familiar tools used include Zoom, Skype, Google meet, Jio meet.

Flipped classrooms: The flipped classroom is a teaching model that changes most of the teacher-centered learning to more student-centered learning activities. It was originally introduced due to the ineffectiveness of traditional lectures in retaining students' attention and encourages active learning. This method seems to offer promising ways to engage students in a more effective, supportive and a motivating manner especially for low achievers and students that may struggle with traditional lectures. It is a mode of education which has mixed reviews based on the circumstance in which it is implemented. The evidence tips slightly towards the positive benefits especially if the student preparation is assessed.¹⁰

Learning management systems (LMS)/ Content Management Systems (CMS) / Virtual Learning Environment (VLE): which provides educators tools to create a course web site. They maybe cloud based or open source. Open Source LMS has an open source code that you can access for free, and customize it according to your specific requirements. Cloud LMS is a web-based LMS hosted on the servers of the service provider (vendor). A few examples of the same include Google

classrooms, Moodle, Medwiz, Canavas, Edume, Edumodo. The use of such systems require the user to educate themselves in the process of using the same.¹¹

Augmented reality/ Virtual reality

Augmented reality forms a useful tool especially for training and workshops in situations which need to be made genuinely authentic . It helps in developing participatory environments and activities, teaching tasks involving manual dexterity or physical movement. It can be used where it is essential to make learning more interesting and fun. It can assist in understanding clinical scenarios where mistakes made by the learner or trainee using the real thing could be devastating and/or demoralizing to the learner, harmful to the environment, capable of causing unintended property or equipment damage or is costly.¹² It also saves students from not being able to see demonstrations due to hampered visibility.

Paper cases/ clinical case scenarios- It helps students to understand the art of diagnosis better .

Gamification of learning-Gamification refers to the application of game design elements to non-game activities, such as education. Points, levels, badges, leader boards, prizes and rewards, progress bars, storyline and feedback are key determinants in the level of engagement provided and thus the success of the game.^{13,14}

Problem based learning (PBL) - It is often suggested in psychological research that learning content as well as improvement in thinking strategies occurs through problem based learning. Groups of students engage in self-directed learning and the teacher is a mere facilitator of this process. It encourages students to apply new knowledge to problems, solve problems with multiple answers, reflect on what they have learned and essentially asses the effectiveness of the strategies employed. It ingrains in them intrinsic motivation, effective collaborative skills and flexible understanding and life-long learning skills¹⁵.

Open online resources- Giving students links, webpages, videos to learn from and assessing them based on the same helps them build upon already existing knowledge.

Social media- Social media can be used as an adjunct with other mediums to pass on information. Such as the use of blogs where study material is often discussed and reviewed. Blogging has been used commonly in various health care sectors, as a time intensive teaching tools. The use of other social media platforms such as facebook through closed groups which permit the students to interact the experts, eliminate doubts as well as discuss cases where deemed appropriate.

Integrating virtual education into the curriculum would largely eliminate issues that students may have regarding class timings, inability to see demonstrations in large classrooms as well as hear the speaker/teacher during lectures. It has mediums for all types of learners whether visual, tactile or audio based and ensures a greater level of learner satisfaction. It also helps those with low attention span or those who are slow learners because they have the option to repeat the material provided to them multiple times unlike real time lectures where some students may not be able to absorb the complete essence of the topic under discussion.

Causes of concern

There is a great deal of fear with regard to making e-learning as effective and engaging as offline learning. This may be overcome using good visually esthetic and creative presentations along with voice modulation to keep the students interested as well as engaged. A common issue faced when teaching online is the inability to know whether students are learning. Interaction is key to the success of the virtual classroom.

Assessing the level of a class is important so that the level of difficulty is set at an optimum. One cannot be sure if students comprehend the content that is provided to them till assessments are done to ensure the same in the form of quizzes/ polls, games, reflection, interactive and thought provoking assignments. ‘Polleverywhere,’ ‘Kahoot’, ‘Socrative’, ‘Answer garden’ are a few assessment tools.

Over the last year many universities adopted a range of measures to ensure the safety of the students, as well as the patients involved. Most universities conducted some form of virtual practical exams, making use of paper cases, and virtual vivas. Dentistry per se is a practical

oriented subject and despite the availability of such tools, they only act as a supplement to what clinical experience one may gain from a patient. A very important fact we would like to emphasize here is the educational experience of the student must not be disrupted for a longer duration of time. These tools help one ensure that.

Students' mental health is often greatly affected when faced with a public health emergency. The dental students today are facing a unique situation, where social distancing is the norm and thus their mental state and quality of life is at risk. The environment one is in, as well as social interactions one has play a key role in ensuring good mental health thus setting the ideal tone for a good academic life. Home environment should be conducive for academic achievement. The size of the study site, the amount of light and even the color of the environment often influence the quality of learning.¹⁶

Educational institutions and government must help those students are unsupportive and whose home environments are not conducive to study to financial as well as other reasons. Studying at home is not easy for many, especially for children with low motivation.^{17,18} Other disadvantages include network issues (lack of good band width), technical issues and lack of access to e-learning in remote areas. Constructive feedback helps both teachers and students function better on multiple fronts.

CONCLUSION

Students learn better when they connect newly learned knowledge and skills to previous knowledge. Schools and colleges are creating opportunities for engagement through collaborative, team-based, and inter-professional projects that support learners, with tailored resources within and outside of the classroom.¹⁹ Encouraging a learn from anywhere approach and bridging divides will be critical in overall results.²⁰

Due to the constraints experienced by the world economies, dental colleges are also under great amount of strain to provide an effective education that is feasible, here e-learning comes to the rescue. Yet the effectiveness of the same for the practical aspects of dentistry as a specialty is yet to be evaluated. The extraordinary circumstances we are in demand

a balance between protecting students from the exposure of COVID-19 and saving resources to achieving an effective learning experience.

The present situation we are in has taught us a great deal, the stage for change has been set, we must continue to keep the ball rolling in a positive direction for dental instruction through the implementation of efficient changes that apply current and emerging information in novel ways that are found appropriate for our system.

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