Review Article

Effective teaching methodologies for dentistry during covid-19 pandemic – A review

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A B S T R A C T

The challenging times of this pandemic had effect on teaching learning methods in various dental institutes. The paradigm shift during COVID-19 asked to break away from more traditional, less flexible physical methodologies and adapt to newer advanced online ones. This review has discussed challenges encountered by teachers and students and various online teaching learning tools which can be routinely practised for theoretical and clinical teaching. It is said that technology in education is only useful if it improves the experience in some way for educators or students. It is not meant to be a substitute for what can be accomplished in class, though all the subjects of Dentistry can be taught by using smart tools, leaving no gap in learning, deserved by our students.

1. Introduction

The common scenario at majority of dental schools few months back when the sudden phase of lockdown appeared was full of confusions, stress and challenging for teaching learning.

A plethora of robust and suitable mature digital technologies already existed. Though never tried, they could be used to support on-going teaching learning. This paradigm shift asked to break away from more traditional, less flexible and physical methodologies and adapt to newer advanced ones.

The expected challenges that had to be encountered were; Training faculty, sensitizing and engaging students, prioritizing and choosing digital technologies, funds from the authorities and the most significant was contribution to the learning process after incorporating newer media without changing the relevance to the course outcome.

Routinely in any university, curriculum defines the content of course outcome. All three learning domains viz, cognitive(knowledge), affective(attitude) and psychomotor(practical skills) are taken into consideration while planning curriculum. Dentistry deals with clinical presentations of various local and systemic disorders and treatments of the same. Accordingly, universities across India have also considered learning domains for the Dental curriculum to train undergraduates and postgraduates for diagnosis and management of oral diseases through didactic lectures and clinical teaching.

Traditional teaching has a wider range of teaching methods, advantage of social presence or communication skills and physical space for activities to engage students. In contrast, online teaching needs catchy presentations, use of various tools of students' interest and effective online activities or tasks to engage them.

Hence, to begin with effective teaching methods in Dentistry during this pandemic, it is necessary to follow few basics before planning online teaching. Those basics includes; knowing your learner (similar to traditional learning) and designing the online session content by using a standard instructional model (R2D2- read, reflect, display and do).

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To know your learner in class

Fleming and Mills in 1992 identified four types of learners and their learning styles [1] (VARK). Learning styles are; Visual (learn by diagrams or pictures), auditory (learn by listening), read/write (learn by reading or writing) and kinesthetic (learn by doing). Knowing the learner helps the instructor to design and deliver the content to its maximum acceptance.

How to use R2D2 in health profession? [2]

It is a model developed for designing and delivering distance education such as online learning. This type of model is important to address diverse preferences of online learners of varied generations.

(R) Read – acquire knowledge through online learning – addresses A and V learners

(R) Reflect - focuses on reflective activities such as blogs or reflective writing. – addresses R learners

(D) Display – visual presentations of the content is highlighted by using animations or concept maps – addresses V learners

(D) Do – This fourth component of the model emphasizes on what learner can do with the content learned through hands on activities or simulations or case studies - addresses K learners

This model helps to provide a framework for more engaging, dynamic, and responsive teaching and learning in online environment. Analysing students' learning style and following R2D2 model for online teaching aids to sharpen teachers' skills and engage more students in meaningful manner. Knowing the best tool to teach is however, equally important.

Following are few salient features of an appropriate online teaching learning tool to be considered for Dentistry: [2,3]

It should be:

1. User friendly to teachers and students
2. Useful for both teaching as well as assessment
3. Cost effective
4. Safe or encrypted
5. And Compatible with computers and mobiles

For online teaching in Dentistry, topographically, important sections are;

Theoretical teaching, case history taking, intraoral and extraoral clinical examinations, Diagnosis, investigations and management of diseases.

For the said topics, teaching methodologies can be categorized as synchronous and asynchronous ways of learning. [4,5] These are well accepted and observed as appropriate techniques for dental education. [6–8]

Synchronous learning is real time and can help students feel connected even if they aren't in the lecture hall. Students who participate in synchronous class can interact with the instructor and other students through e-Learning tools such as video conferencing and instant messaging.

In synchronous online learning, course content is shared via virtual classrooms, video conferences, live chats, webinars etc. Synchronous online learning helps to save time, cost and efforts, it has no geographical constraints for delivering sessions, even recorded sessions can be reused in future classes. Synchronous online learning helps to minimize the "Transactional Distance" thus reducing learner's feelings of isolation and disconnectedness. Few user friendly and commonly practiced tools are;

1. MicroSoft teamst
2. Google meet
3. Zoom
4. Peardeck
5. Nearpod
6. Poll everywhere

Example

In synchronous learning or live class, instructor can teach theory portion of processing techniques via routine ppt. Related questions on the taught topic can be asked at the same time in live class by using interactive applications like 'Peardeck' or 'Poll everywhere' which can also be used as formative assessment.

Any case scenario, for example, a case of TMJ pain with few significant clinical features can be shared with the class and students can be divided into breakout rooms to discuss best possible diagnosis and management. Students can be asked to share their screens later and can be allowed to interact with the peers. These methods can definitely increase interest in online class, can help to engage students and sharpen their critical thinking skills.

In asynchronous learning, students can learn the same course content at different times and locations. Learners complete the course at their own pace after accessing the course material provided by their instructor. While asynchronous learning classes are flexible since they are not time-bound (as they are not live), they also promote collaboration and foster a sense of community in learners.

We may be worried that since the instructor is not present online, the students may take things lightly, but there are few interesting ways to improve power points of the subject prepared which can help to make asynchronous online teaching interactive and engage the students smartly. [9,10]

These include;

Making a concise, logically organized, visual presentation by creating videos (Movenote, Moovly), podcasts (Audacity, Podbean), narrative PowerPoint presentations or other multimedia. Example : A recorded video of lymph node examination and narrative ppt on lymphatic system recorded with teacher's voice itself can be shared in google group or google class. [11–13]

Demonstrations - Record the demonstration as a video clip or develop a document with step-by-step illustrations. Example : Video on Intraoral Radiographic techniques.

Group activities - Online group activities help students to interact with each other and find solutions for a given problem. Tools used can be google docs, dropbox, google hangout, padlet and mindmeister. Example: Few short answer questions or a problem scenario can be shared and students can be asked to solve the issue in preformed groups.

Student presentations - Students can prepare and upload the video in the offline class(google classroom) and then respond to questions or critiques by peers. Media such as VoiceThread, Flipgrid, Screencast-o-matic can record their presentation which can then be shared with the class. Example : Student can be given the task of counselling a patient of oral carcinoma &can be assessed for their communication skills.

Quizzes – This can be a fun way of formative assessment for the students which help them to know how much they have learnt. Tools like hot potatoes or quizlet or google forms can be used for this interactivity.

Asynchronous learning offers the opportunity to students to learn from anywhere and at any time. By using the tools discussed here, a teacher can continue making meaningful connections with the students.

There are a few more concepts introduced in online teaching learning which can work magically for Dentistry, like, Online Flipped Class, Script Concordance Test and E-moderation.

Online flipped class[3]**-** In this model, educational resources are delivered via an online education platform (google groups) to students before class starts, for example, few articles on differential diagnosis of chronic vesiculobullous lesions. Students are expected to access and understand the materials prior to class. During class time, students then discuss and apply the new material in problem-solving activities or a problem scenario given by teacher. Unlike in a didactic teaching model, in a flipped classroom new information is disseminated outside of class time to maximize the time in the classroom spent on critical-thinking activities (Hughes & Lyons, 2017).

Advantages of flipped class are Flexibility, Personalization (chance to spend their time on things that they don't understand) and active learning. But, it has few disadvantages as, it requires greater levels of self-discipline and students who are used to a more passive learning style may initially resist it.

Script Concordance Test (SCT)[14] can be practised exclusively for postgraduates. It Measures clinical reasoning competence. It allows students to focus on data interpretation by asking for probabilities in a specific context in a given case scenario (signs and symptoms). SCT therefore tests knowledge of illness scripts. For example five to seven case scenarios with their history of illness

and few details are shared with PG's and they are asked to derive best possible diagnosis in a given time.

E-moderating[15] is one more concept of engaging learners discussed by Gilly Salmon (2000). A five step model is introduced to effectively foster online student engagement and learning in the realms of communication and collaboration. It works by initially facilitating the discussion and then taking a step back to allow students to drive the ongoing discussion and construct new knowledge. An important element of e-moderating is the role of the online facilitator who is known as an e-moderator.

Dental education can be made more interesting in these Covid times by using few more teaching methodologies; like,

1. Case based studies/problem based learning ((asynchronous)
2. Debates (asynchronous)
3. Concept map (asynchronous)
4. Syndicate learning (synchronous)
5. Study projects (synchronous and asynchronous)

Also, online clinics can also be conducted by sharing treated cases and investigations carried out and management methods practised. These methods can be integrated with Learning Management Systems like Sakai, Moodle.

2. Conclusion

The UNESCO International Commission on Education for the 21st century has identified four pillars of learning:

1. Learning to know (acquisition of relevant knowledge)
2. Learning to do (prepare to contribute to economic development.
3. Learning to be (development of individual for self-reliance).
4. Learning to live together (to minimise social frictions)[15]

The teacher in today's world has to sow all these, and more, for future generations to reap excellence in tomorrow's world.

Teachers learned the technical stuff and grappled with the logistics needed to deliver virtual learning. These online classrooms also opened a world of opportunities to re-imagine what learning could look like in the years to come. Education has changed dramatically, with the distinctive rise of e-learning via digital platforms. Research suggests that online learning has been shown to increases retention of information while taking less time. Perhaps the changes coronavirus have caused might be here to stay.

Technology in education is only useful if it is improves the experience in some way for educators or students. It is not meant to be a substitute for what can be accomplished in class. Therefore all the subjects of Dentistry can be taught

by using smart tools discussed so far, leaving no gap in learning deserved by our students.

3. Conflicts of Interest

None.

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