Can Undergraduate Dental Education be Online and Virtual
During the COVID-19 Era? Clinical Training as a Crucial Element of Practical Competencies [version 1]

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Abstract
This article was migrated. The article was marked as recommended.

The COVID-19 pandemic has brought ample challenges to clinical dental education all over the world. Dental schools had to adopt diverse strategies as a result of the exceptional circumstances, to provide a safe environment for their students, faculties, and patients. Despite the broad implementation of innovative educational tools in the form of blended learning, virtual reality simulators (VRS), and virtual learning environment, dental students expressed their willingness to restore on-site practical lessons, developing their clinical skills with patients' presence.

It is believed that undergraduate dental education (UDE) during post COVID-19 pandemic lock-down might require substantial organisational changes, adequate adjustments of dental curricula and novel educational approaches in order to maintain a high level of UDE. This should be delivered by utilising the blended teaching methods, with core involvement of traditional clinical sessions and safety preventative measures arranged by dental faculties, allowing a safe return to dental schools for at least essential clinical sessions.

This personal view aims to emphasise the need for re-establishment and continuity of crucial clinical and practical dental training during 'new normal' dental education era, as an integrated and unique element of UDE, which can be only partially substituted by online learning programs.
Keywords
e-learning, blended learning, virtual reality simulation, dental education, COVID-19

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Introduction

Covid-19 has brought ample challenges to education, hampering the global health system and economy, as well as society at large. Inevitably, both medical and dental schools instantly adopted various, diverse strategies for coping with the exceptional situation to provide a safe environment for their students, staff, and patients aligned to various sectors of high education and economies. As a result, governments introduced regulations concerning social distancing, movement restrictions, and nation lockdown. This led to the complete suspension of universities and faculties on-site educational activities, including dental schools, except for some dental school hospitals which provided urgent and emergency dental care (Quinn et al., 2020).

Undergraduate dental students, clinical teachers, and dental educators were forced to stay at home, while their practical clinical sessions were substituted with other forms of dental education. Dental educators had to come up with new, innovative ways of ensuring the partial continuation of knowledge dissemination based mainly on using online platforms and other informative technology methods, including primarily live streaming and video conferencing lectures, with virtual problem-based tutorials among others adopted to deliver curricula programs and motivate students to continue learning (Liu et al., 2020).

Traditional clinical training as a crucial element of undergraduate dental education

Following the excessive use of online tools over the last few months and in discussion with our dental students (certainly using online communication), it has been concluded that there is no substitute for actual clinical cases involving patients in clinics. Most students clearly expressed their willingness to safely return to dental school for practical sessions as soon as possible. Moreover, clinical teachers and students accept that clinical-based education is highly specific and cannot be replaced with any, even the most advanced, technologies at present. Eventually, clinical teachers and students must carry on with their duties and live in the ‘new normal’.

Equally, robust and fully structured dental training in variable teaching/learning environments has been a core, fundamental element of UDE globally, regardless of local preferences. The face-to-face, trainer-student teaching pathway is still considered as the best educational practice and now, some dentists may regret the fact there was not enough practical training with direct patient involvement. Unfortunately, this lack of a ‘real scenario’ might have an immense impact on the future career choices of dental practitioners.

The outbreak of COVID-19 has raised the following questions: Is there any need for a substantial change in the UDE curricula as a result of COVID-19? Should the UDE curricula be dramatically altered or reduced? Is there genuine evidence-based data suggesting that online training can replace the traditional teaching methods in dental clinical subjects? Shall we be optimistic about the future of mainly online/virtual UDE?

The role of blended learning and e-learning methods during COVID-19

As we endeavour to provide competent instruction in our curriculum during the current pandemic, it is crucial to reconsider the effective adoption and implementation of various e-learning and blended methods. Undoubtedly, due to the sudden high demand for the digitalised environment during COVID-19, e-learning has become mainstream mainly due to safety and epidemiological measures. Hence, it is important to highlight that e-learning is not only broadcast of synchronous and asynchronous educational information in an electronic format. The curriculum content should be revised to discuss the prospect of dental modules and courses that might be run entirely online or as a mixture of traditional class learning with online learning (blended learning). This method merges the advantages of e-learning, whereby teaching is without time and space restraints, with additional input from face-to-face teaching. Dental students’ satisfaction with the e-learning resources delivered in a blended approach was relatively good and they performed better academically (Jeganathan and Fleming, 2020; Yashwant et al., 2020).

However, from our experience when learning technologies are presented, consideration is usually paid to the implementation of technology, while there is insufficient time, effort or funds allocated to the creation of appropriate e-learning resources content to produce a prosperous blended program. Relying solely on online education seems to be justified and rational, as long as it provides theoretical information, case presentations, essential explanations, and the rationale for the next clinical stages, mainly for non-clinical teaching of the first three years of BDS/DDS programs. However, for clinical years, it would be challenging to adopt such a simplified and online-based long-term approach to replace on-site training, as well as purely clinical practice.

For dental educators and clinical teachers, the difficulties with adopting e-learning are associated with their basic needs for the required technical skills together with a lack of confidence, which can frustrate their enthusiasm to engage with the development and offering of online learning. This seems to be associated with a lack of incentives and motivation to
engage with online or e-learning before the pandemic. Also, the lack of dental school infrastructure as an ongoing challenge in dental education cannot be excluded (Figure 1, A).

In addition, we would support the effective use of the Virtual Learning Environment (VLE) within dental schools, which provides alternative assistance for teaching and learning by supporting e-learning resources electronically and facilitating engagement in interactive characteristics, such as assessments, assignments, and discussions. Integrating such a learning environment for managing educational material, monitoring students and educators, and customising learning and teaching processes is required. Among the most popular dedicated VLE adopted in dental schools are Moodle and Blackboard that assist in advancing learning activities in a well-organised and prospective manner. Although some dental schools have implemented such platforms or created their VLE that is suitably built with their contexts of use, there is often an issue regarding the technical skills and accessible technology for dental educators and students. Hence, training and workshops to reduce the technical challenges and improve skills should be considered.

Virtual Reality Simulation (VRS)
Although virtual reality simulation (VRS) for dental education training and the use of the most advanced technology showed promising results, it is no established educational standards for VRS or their associated exercises, as well as requiring substantial financial investment. For instance, ‘tactile sensation’ is a unique, individual human feature and even using VRS training simulators branded as mixing virtual reality with reality for virtual cavity and crown preparation, supported by state-of-the-art online learning technology platforms and associated technologies, it will be challenging to deliver a genuinely clinical scenario, although, the virtual clinical sessions can be designed, monitored, and repeated to expedite learning.

Without a doubt, dental simulation facilities have become an efficient way to teach undergraduate students’ safely while considerably improving their pre-clinical skills and reduce the required clinical teacher supervision time as well as promote a more learner-centred approach to the complex technical and clinical skills required to conduct clinical oral healthcare during a pandemic (Murbay et al., 2020; Liu et al., 2020). However, there is no real patient interaction, an immensely important aspect of dental care and most importantly, very few dental schools have such VRS equipments, nor the in-house expertise for haptic technology to be implemented effectively and promptly (Figure 1, B).

Provision of a safe clinical teaching and learning environment in the COVID-19 Era
Rather than utilising a complete suspension approach or drastically reduced on-site and face-to-face training for dental students, especially for those in final years, dental schools administrators would consider resuming practical sessions of UDE following a scheduled time slot and a well-structured rotation system for clinical training sessions with substantial limitation of students’ number and contact would be one of the provisional plans. However, keeping enough time slots between student’s groups to allow generous ventilation and air replacement still a challenge.

Online training and workshop about infection control practices should be delivered. Strict cross-infection control measures in university teaching clinics, e.g. additional air purifiers, ozone generators, UV technology, HEPA filter.

Figure 1. A & B: summarises some limitations of using e-learning and VRS in UDE.
extractors, would be considered on a broader scale to help re-establish the pre-COVID UDE, following risk assessment and compliance with national and government guidance and core standard operating procedures for the de-escalation phase (Iyer et al., 2020). Also, it would be suggested that the rapid molecular test COVID-19 screening of staff and students, and subsequent pre-appointment rapid testing for patients attending university teaching clinics will secure optimal and comprehensive UDE programs.

Conclusion
The COVID-19 pandemic has brought critical hardships for clinical dentistry and educational institutions. As both teachers and clinicians, we must act sensibly and responsibly not to deter the young generation of dentists, offering a new technology that can substitute traditional dentistry teaching. While the traditional on-site training with patient involvement is still considered as a core element and works well, the UDE should be optimised and adjusted by combining traditional methods with new approaches. The creation of blended learning, replacing lectures with online tutorials seems to be in the right direction.

We would welcome decision-makers and stakeholders to take into consideration the long-term effect of deferred practical clinical sessions on the young generation of dental students. Overall, we as educators are responsible for the future high quality of dental care and comprehensive care provision for, especially vulnerable patients. The current COVID-19 pandemic should be regarded as an excellent opportunity for dental educators and the health care faculties at large to review their clinical practices and implement measures that will keep the future of the next generation of dentists alive.

Take Home Messages
- Adopting online education seems to be justified and rational during COVID 19 era. However, for clinical education, it would be challenging to adopt such a simplified and online-based as a long-term approach to replace on-site training.

- Resuming clinical training sessions with substantial limitation of students’ number and additional measures to reduce the risks would be one of the provisional plans.

- Research is necessarily required to build evidence on the efficient use of technologies for clinical training for the long term.

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Figure 1A and 1B. Source: the authors.
Bibliography/References

Iyer, P., Aziz, K. and Ojcius, D. (2020) Impact of COVID-19 on dental education in the United States. Journal of Dental Education. 84(6), pp. 718–722.

Reference Source

Jeganathan, S. and Fleming, P. S. (2020) Blended learning as an adjunct to tutor-led seminars in undergraduate orthodontics: a randomised controlled trial. British Dental Journal. 228(5), pp. 371–375.

Reference Source

Liu, X., Zhou, J., Chen, L., Yang, Y., et al. (2020) Impact of COVID-19 epidemic on live online dental continuing education. European Journal of Dental Education. In Press.

Reference Source

Liu, L., Zhou, R., Yuan, S., Sun, Z., et al. (2020) Simulation training for ceramic crown preparation in the dental setting using a virtual educational system. European Journal of Dental Education. 24(2), pp. 199–206.

Reference Source

Murbay, S., Chang, J., Yeung, S. and Neelakantan, P. (2020) Evaluation of the introduction of a dental virtual simulator on the performance of undergraduate dental students in the pre-clinical operative dentistry course. European Journal of Dental Education. 24(1), pp. 5–16.

Reference Source

Quinn, B., Field, J., Gorter, R., Akota, I., et al. (2020) COVID-19: The Immediate Response of European Academic Dental Institutions and Future Implications for Dental Education. European Journal of Dental Education. 21(1), pp. 2–10.

Reference Source

Yashwant, A., Arayambath, B., Murugaboopathy, V., Kommi, P., et al. (2020) Comparative Evaluation of the Effectiveness of Blended Learning Versus Traditional Learning in Cephalometrics for Undergraduates. Journal of Indian Orthodontics Society. 54(1), pp. 24–30.

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Mushriq Abid

This review has been migrated. The reviewer awarded 5 stars out of 5

Interesting and very well organized paper that summarizes the challenges that teachers, students and clinicians face during the pandemic. Different fields including the educational sectors have been affected by Covid-19. For the time being online training is a good substitute but not the perfect one. I believe that virtual training cannot and will not substitute clinical or traditional training.

Competing Interests: No conflicts of interest were disclosed.

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Naif Ganadely

This review has been migrated. The reviewer awarded 5 stars out of 5

Virtual classes and virtual training can't be a substitute for the traditional method. Students can be easily distracted at home. There are different solutions can be done to adopt with the new normal. For example: open the dental school 7 days a week and hire more faculty. I believe that VR can only be an additional method of learning. By the way, it is really interesting paper. Thank you.
**Competing Interests:** No conflicts of interest were disclosed.

**Mohsen Aljabri**

This review has been migrated. The reviewer awarded 5 stars out of 5

This is really an interesting paper. In fact, UG and even PG students will have several challenges due to the current pandemnic situation. I am not sure what 'habtics in dentistry' can add and help us during the clinical training? What are the benefits in general and specifically the cost benefits?

**Competing Interests:** No conflicts of interest were disclosed.

**Mohamed Al-Eraky**

University of Dammam

This review has been migrated. The reviewer awarded 4 stars out of 5

This is an interesting article, yet the question in the title cannot be answered by a simple Yes or No. It all depends on the competencies we need in future graduates of dental schools and the expected roles in the society. Will they offer consultations online, or they have to practice certain skills on patients? Then it's crucial to decide 'when', 'why' and 'for how long' we need our current dental students to come to practice in the medical schools and when to trust them to learn other things on their own or at a distance. We have a great responsibility to keep our standards high and safeguard the quality of our graduates, particularly in this era of uncertainty, which was perfectly advocated by the authors. Good luck!

**Competing Interests:** No conflicts of interest were disclosed.