

Next generation of dental practitioners: virtual learners in the 21st century flipped classrooms and clinics

Dental education and learning behaviors of younger generations are going through rapid change, and certainly the COVID-19 pandemic has accelerated the way the new millennials learn medicine and dentistry.¹ The reason for the big change is that many of those who entered dental school this year have completed at least three or four semesters of college education at home during the pandemic, mostly watching online content and taking their exams online. Although many had looked forward to having in-person instruction when they entered dental schools, this was prevented by the continued resurgence of COVID-19 positivity, lockdowns, and public health measures that restricted large group gatherings, including those within classrooms. Instead, virtual education continued via Zoom, BlueJeans, Google Meet, Microsoft Teams, or something similar. The lab component had to be modified to trim down the hands-on portion, while didactic learning happened ahead of time remotely via course curricular software like Canvas or Blackboard. Information was available to the students, so physical laboratory tasks became more focused and could be accomplished quickly. Learning became accelerated with less wastage of time in a lecture hall. Flipped classrooms became an integral part of dental school education. Laboratory training became shorter, and the shift in the learning paradigm was essential. However, there were side effects from such a curriculum, especially during the pandemic when person to person interaction became minimal, with high levels of emotional stress among the new generation of learners.² This must be kept in mind to better protect those who are unable to withstand the “virtual digital storm.”

Clinical skill development returned with preclinical virtual digital labs. Cavity preps were practiced with real-time experiences of prepping enamel and dentin, but virtually for a restoration or a crown. Students were trained to navigate a myriad of electronic health records, taking radiographs digitally and storing them to remote picture archiving and communication systems (PACS). The average dental student needed to master the digital world of records, imaging, storage, and retrieval; the in-

structors approved completion of procedures with a stroke of their IDs that had electronic chips to create a digital signature within the electronic health record. Paper was already a thing of the past. Patient interaction upon entering clinics was a big change for the students, who had the least interaction compared to any previous classes. As this was still officially peri-pandemic, added to the complexity were souped up personal protective equipment (PPE), additional Centers for Disease Control and Prevention (CDC) regulations, and modified headgear for loops, etc. To someone trained within the older pedagogic curriculum, these changes were almost unthinkable. Fortunately, those were mostly professors who had taught the old-school curriculum for over a decade or two, and were in a minority.

Many medical and dental schools following the Flexner report of 1910³ had continued until recently with two separate blocks of education, namely biomedical education (preclinical) and clinical education. Even before the COVID-19 pandemic, many dental schools adopted a new curricular model that combined basic medical sciences and clinical sciences. In the post-pandemic period, there was an urgency to connect students to patients earlier than before, and the learning process was flipped. Students interacted with patients and became inquisitive as to why patients presented their symptoms. This naturally led to intellectual curiosity, and they went back to learn more on their own. The actual learning now began for the student. Flipped classroom and then flipped clinics: curricular changes in dental schools and medical schools helped transform the students' education in both preclinical and clinical years. The lines between so-called preclinical and clinical have become blurred as patient experiences became part of freshman and sophomore dental education, via “Doctoring sessions.” In addition, dental students were also taught dental auxiliary utilization. Two-handed dentistry did not exist even a decade or two ago, and it certainly does not exist now. Proper utilization of expanded function dental assistants (EFDA), involving dental hygienists in dental school curricula as teachers, utilization of medical nurse practitioners for patient screening and medical



clearances before dental work begins – all are examples of how dentistry has transitioned to a newer learning model.

Clinical training for dental students is different from that of medical students, as dental students in training must perform all the procedures (that they would likely practice in real life) during their junior and senior years under supervision. Thanks to digital innovation, patient data including facial photographs, dental radiographs, CBCT scans, and intraoral scans of teeth and soft tissues are taken in one visit, and a virtual 3D patient called the “digital clone”⁴ is created. Patient’s visits are cut down as there are no physical impressions, casts being poured, or creation of special trays. Crowns are prepped and everything else is virtual, including wax-ups and milling the porcelain crowns. CAD/CAM entered dentistry in a big way, and printing restorations and crowns has become the order of the day using porcelain milling machines that are networked to computers. Digital occlusal bite registration saves a lot of time compared to manual wax bite registrations. The need for articulators has reduced. The new learning technology has crept into every dental specialty and the world of general dentistry. Dentistry has undergone tremendous changes, and the only thing we, as educators and clinicians, must be mindful of, is that it will continue to change. Brace yourself and adapt. The future of these young dental practitioners is in our hands.

*“When the change of wind blows hard,
some build walls while others build windmills.”*

[Chinese proverb]



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