Guest Editorial

Digital Dentistry and Dental Education

It seems everywhere I look something digital is being discussed, introduced or improved, such as digital phones, photos, toys, headphones, speakers and even a toothbrush. Dental is no exception to the digital era and it seems that the whole world is going from an analog world to the digital realm. Without a doubt, there are many advantages of the digital world. This precise data management has opened vast arenas of development. Over past several decades in dentistry both in private practice and now in academics there have been tremendous changes in dental technology, e.g. high-speed handpieces were quickly accepted by the professionals as composite resins and zirconia. However, digital dentistry has not been accepted with the same enthusiasm as other technologies. This is true both in private clinical practice and dental education and some authorities believe that from past 25 years dentistry is lagging behind other technologies.[1] There are many digital innovations in dentistry; computers, caries detection devices, guided implant surgery, radiography, photography, record management, anesthesia delivery devices, digital handpieces, digital printing, guided surgery, cone beam computed tomography (CBCT) and these are not all the applications. There are some technologies that are more easily adapted than others. The use of computers for patient records is almost universally accepted and followed. The implementation of these technologies presents advantages and challenges not only to the practitioners but also to dental educationalists. The question is that with all the available digital technology and modern instrumentation how it has affected the dental education? Common references suggested that only 10 to 15% of the primary care providers are using significant amount of digital dentistry. The role of dental education is not only to just train students how to do dentistry but also how to function once the student graduate, therefore, much of the traditional legacy dentistry is still to be taught. Some digital technology is not difficult to implement because of minimal costs while some technologies are every expensive and difficult to implement. A technology that can be readily adapted to computer use is digital radiography. By using photostimulable phosphor (PSP) plates, it is relatively an easy adaptation. The PSP plates are used more like conventional film and the cost is modest as compared to digital sensors. Considering the size of the student body at a dental school, providing sensors to all of them would be cost prohibitive. Because much of the digital technology is expensive, it cannot be lended to new dental graduates. There is still a need to teach traditional legacy dentistry, because a graduate may get associated with a practitioner who has not implemented digitally dentistry. Some real benefits of using digital technology in education as well as in large organizations are easy to access and easily storage and cross-referenced of records digitally once a case has been scanned. These records can take up virtually no room as opposed to a chart paper and casts. The most common thought about digital dentistry is the use of chairside economical restoration of esthetic ceramics (CEREC, Sirona Dental) which is computer-aided design and computer-aided manufacturing (CAD/CAM) which can assist in the design and fabrication of a dental appliance. Digital impressions are of great importance for the patient and convenient for both chairside fabrication or for sending the digital impression to a remote lab. Also the ability to print a cast from a digital file gives the ability to design and to execute a treatment plan with basically expendable materials. Perhaps one of the bigger deterrents for implementation of digital technology in dental education is the reluctant faculty. The younger students/dentists are much more comfortable with the digital world while the veteran faculty/dentist is much more wary. Perhaps it is technophobia or perhaps cost or both. But, it is important for the advocates of digital dentistry to make it clear about the benefits. At least one dental school in the US has gone completely digital.[2] Obviously, they had to be a significant buy-in by the faculty staff and administration and had to receive significant amount of support from industry. Many of older faculties are not enthusiastic about the learning curve for new technologies. Perhaps there is a sentiment that "if we had to learn it the old way so should we the new student" so it is kind of an initiation process. Also private practitioners are slow to adapt the technology. However, in 2014 a report on "dental agenesis" estimated that 16% dentists currently are using digital impressions and a 2 to 2.5% yearly growth was reported by Sirona (the maker of CEREC).[3] Many of the prosthetic laboratory managers are convinced that it will only after few years, the majority cases will be scanned and computer manufactured.[4] Still in its infancy are digital scanning and manufacturing of complete and partial dentures. So, the legacy technology of making impressions, border molding are still to be taught. However, with the use of 3D printing and CAM technology, there are rapid advances are being

made. Dentistry as it is taught at the chairside has not really changed in the digital world but the process has been enhanced. Patients are seen by the provider but the anesthesia may be delivered by a digitally controlled delivery device, preparations made with a handpiece with a digital controller, impressions are made but with a digital scanner, the data reviewed and modified as desired and sent to a local laboratory or to a local milling machine which can interpret the data and prepare a crown or a conventional impression can be made and then scanned. The data can be easily stored and recalled when needed.

In order for a dental school to move into the digital dentistry world, many things have to be considered. Of primary importance is buy-in by the faculty, staff and administration as well as support from industry or private resources for equipment acquisition. There is also the need for enhanced software and hardware technical support and technical training before implementation of any technology. If the digital training is phased-in by year groups, then faculty and staff resources will be necessary for both technical training for the digital technology and continuation of the traditional method. However, the true implementation of digital dentistry presents an awesome opportunity and long-term digital future looks bright for dental education. After initial equipment costs are resolved, the use of many materials will be greatly reduced. Also more expedient treatment for the patient can be achieved. For some of us, a golden age of technology is at hand but for some the technology may be "a bridge too far".[5]

Scientist strongly considers that through the scientific ideas and with the support of laboratory instruments, can broadens the vision that can discover patterns in all of human body.[6]

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