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Denture teeth arrangement using a web-based digital software program: Taking preclinical dental education to another level



KEYWORDS

CAD/CAM;
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Software

Swiftly evolving digital technologies are entering the field of dentistry at a fast rate and are ousting traditionally analog practices.^{1,2} Several traditional methods such as impressions, denture teeth arrangements, and wax-ups are being abandoned by practitioners who are now conducting these processes digitally.^{3,4} One of the most recent digital advancements is the incorporation of digital technology in academia to enrich students' learning experiences. This virtual approach has become of increasing importance in the past two years since preclinical hands-on experiences in dental schools has been limited due to COVID-19. Removable prosthodontics courses have taken advantage of these platforms to allow students to learn and practice denture fabrication. These platforms give students the ability to learn the art of fabricating dentures and place teeth digitally without the need of in-person instruction.

New York University College of Dentistry, the flagship dental institution in the United States of America, like a few other institutions has seen a decrease in student laboratory time caused by COVID-19 related occupancy restraints. To combat these limitations while also delivering clinically relevant skills to their virtual student body, New York University College of Dentistry incorporated a web-based digital platform (DENTCA Academy, DENTCA Inc., Torrance, CA, USA) for

denture teeth arrangement into their removable prosthodontics curriculum. This integration of digital methods into traditional curriculums, or 'hybrid learning' approach, has allowed for unhindered progress in students' laboratory coursework with the added benefits of personalized, self-paced, and accommodating exercises.

Traditionally, removable prosthodontics courses rely heavily on in-person courses. However, with this virtual technology, students can master several prosthodontics concepts such as occlusion, midline, positions/inclinations/rotations of artificial teeth by using a web-based and download-free program that is intuitive and easy to navigate (Fig. 1A–D). These types of programs allow for students to apply knowledge learned in didactic courses to correctly arrange digital teeth for denture fabrication. A student's work is automatically graded by comparing to the previously established ideal arrangement immediately after the student has completed the exercise, which is considered to be another benefit of this digital platform. This automated and objective grading is of utmost importance, especially in large dental schools during remote instruction.

Preclinical laboratory teaching for denture teeth arrangements is a labor-intensive, time-consuming, and expensive operation for teaching institutions. Digital software for

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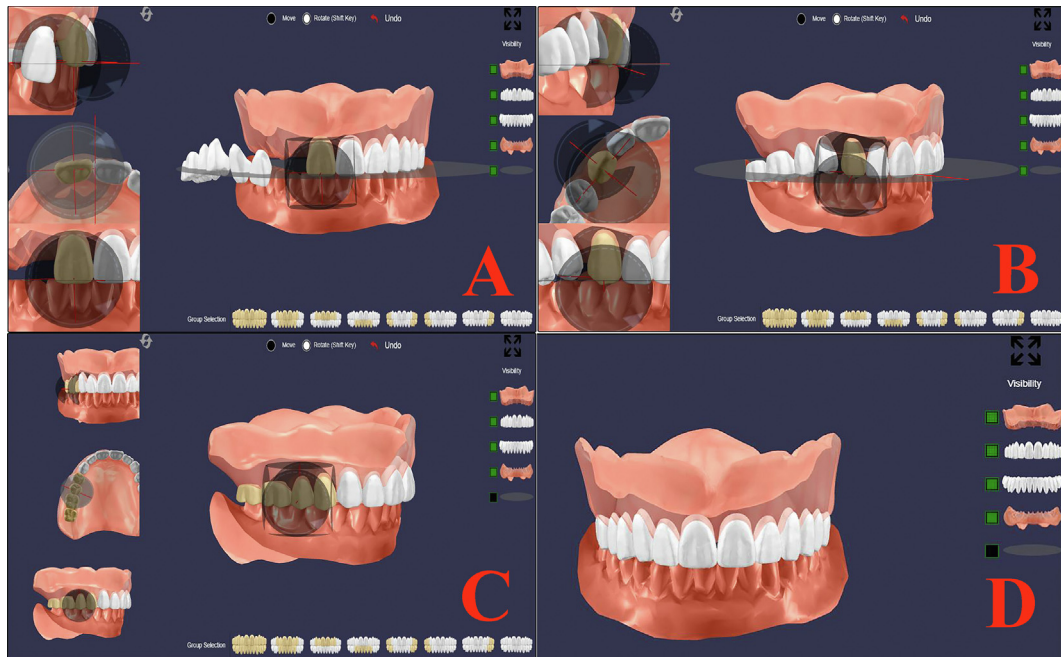


Figure 1 Digital workflow for denture teeth arrangement. (A, B) Anterior and (C) posterior teeth arrangement (position/inclination/rotation) by using the digital software program. (D) Completed teeth arrangement for the maxillary right quadrant.

denture teeth arrangement allows students to use a computer/mouse, instead of their hands, to learn the same concepts without the need for costly physical materials such as wax, acrylic resin, and artificial teeth. Digital learning platforms' ability to remotely teach students at any place or time where internet connection can be found is another substantial benefit to its implementation. This accessibility was particularly important for the international student body of New York University College of Dentistry since the pandemic had forced many students to attend class remotely, with many students located in different time zones.

Similar to the shift dentistry has been experiencing by adopting digital technologies, we can expect that the dental school experience will soon be following the same course. These digital methods of teaching allow for students to work at their own pace, receive instruction regardless of location, and be objectively graded. It is encouraged that both undergraduate and postgraduate education programs implement digital platforms into their removable and fixed preclinical and clinical curriculums to make their programs more enticing for prospective student/resident candidates.

Declaration of competing interest

The authors have no conflicts of interest relevant to this article.

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References

1. Unsal GS, Turkyilmaz I. Improved reconstruction of an implant-retained auricular prosthesis using CAD/CAM technology. *J Dent Sci* 2019;14:328–9.
2. Zhivago P, Turkyilmaz I. A comprehensive digital approach to enhance smiles using an intraoral optical scanner and advanced 3-D sculpting software. *J Dent Sci* 2021;16:784–5.
3. Alghazzawi TF. Advancements in CAD/CAM technology: options for practical implementation. *J Prosthodont Res* 2016;60:72–84.
4. Steinmassl PA, Klauzner F, Steinmassl O, Dumfahrt H, Grunert I. Evaluation of currently available CAD/CAM denture systems. *Int J Prosthodont* 2017;30:116–22.

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