

ASCILITE 2024

Navigating the Terrain:

Emerging Frontiers in Learning Spaces, Pedagogies, and Technologies

Time Efficient & Cost Effective Online teaching tool with iConcepts in Orthodontics for DDS students @ UoM

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Background

Traditional teaching methods in Orthodontics include plaster models and photos which have been used for decades, however due to the nature of being static still images its difficult for 3-Dimensional (3D) changes in Orthodontics teaching, which has posed immense challenges as the learner is unable to clear concepts on the different planes that affect the final tooth positions not to mention the protracted treatment time ranges from 12 months (simple cases) to 36 months (complex cases). In 2024 with variety of platforms such as videos, 3D animations, interactive changes in face and teeth can be added to teaching tools for Orthodontics.

Furthermore, orthodontic movements can pose difficulty in understanding the changes particularly in growing children adding to the 4th dimension. At UQ (Naser-ud-Din, 2015) and internationally (Bridges, 2015) provided experience with creating online teaching modules highlighting its strengths of flexibility, ease of access on demand and global presence. UQ developed SBLi -Scenario Based Learning interactive for Postgraduate Orthodontic students who found it highly engaging, with self-reflective and self-assessment elements useful. (Khoo et al., 2023; Naser-ud-Din, 2016). Generally simulations can be expensive to create (Kröger et al., 2017) and it's essential to explore cost effective simulation teaching tools with industry partners for authentic learning experience.

Aims

There is a gap in the dental education sector, particularly with emerging CAD/CAM (Computer Assisted Design and Computer Assisted Manufacture), which can be used to enhance the learning of core concepts in biomechanics with the aid of 3D simulated online learning. This is reflected particularly for the university students in undergraduate courses who need to feel confident and clinically ready on graduation as Dentists. Thus, greater expectations to be aligned with current technological processes in dentistry. Over the past 5 years, in particular, there has been exponential improvements by the industry providing 3D simulations for treatment planning and patient communication, commonly referred to as the GPS for smile transformations. The aim of this presentation is to highlight the time efficiency and cost effectiveness of the learning tool in sync with contemporary demands in Orthodontics to provide authentic learning platform that prepares the clinician for real patients.

Material & Methods

Currently the CAD/CAM technology provide 3D simulations as open access to general public and doctors portal which can be utilized for teaching core concepts related to biomechanics foundations for student learning, engagement and self-assessment. This project envisages to create a novel forum encompassing education revolution as massive changes in delivery will occur with speed and efficiency internationally with online learning demands. Hence, robust online presence with an interactive textbook such as iConcepts in Orthodontics under the banner of UoM to assist students in Doctor of Dental Surgery at MDS shall pave the way to learning needs for the future.

Results

The purpose of iConcepts a digital interactive online textbook is to create lifelong learning opportunities in safe space for visual, auditory and kinesthetic with quizzes for interactive learning of concepts without pressure in class learning and feeling judged by peers. Interactive 3D Orthodontic learning directly translates into clinical applications for various orthodontic cases. In the past decade CAD/CAM has become clinically relevant particularly with Clear Aligner Therapy adding to higher precision and patient satisfaction. Moreover, it is imperative to have Long Term Retention (LTR) (Irvine, 2020) of learning new tasks. It is essential that students in dentistry are aware of the digital workflows and have clinical preparedness on graduation as it's the future and certainly here to stay.

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Both qualitative and quantitative data on student experience shall be collected and analysed to seek out the best practices and processes for instruction of delivery in Orthodontics for DDS cohort in particular and lifelong learning for all ages in general encompassing time efficiency and cost effectiveness.

Conclusion

The current iConcepts is developed by the author with Apple Education and prototype is being assessed with MSc Data Science cohort at UoM. Furthermore, it is refined by Master of Science Software Engineering students at UoM.

Future Recommendations

Novel teaching tools shall be marketed to developing universities internationally assisting the dissemination of information a flagship for UoM and revenue generation for department of Education at UoM. In future there will be more and more demand towards interactive concepts clarification (Poblete et al., 2020) and self-assessments hence iConcepts provides that ideal platform. Such technologies will become more prevalent in the future particularly with AI and translated into different languages/ sectors of education. Various faculties that showcase start to finish particularly lengthy/complex outcomes can benefit with timelapse videos and 3D CAD/CAM for clarity and comprehension for the entire process such as patient journey throughout treatment in Orthodontics.

Keywords: Interactive, Biomechanics, Dentistry, CAD CAM, Simulations, Orthodontics

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