Games in dental education: playing to learn or learning to play?

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Key points

Describes the potential of using serious games as a complementary teaching tool.

Speculates on reasons why games are under-used in dental education.

Provides simple pathways on how to start creating games in dental education.

Abstract

Learners are motivated when using games and they have been successfully introduced in many healthcare subjects such as medicine and nursing. The development of games in dentistry has not kept pace with their uptake both as a popular pastime and their implementation in other subjects. Games in the learning space have many advantages. Several scenarios can be gamified in pre-clinical and clinical practice creating an enjoyable learning experience for both undergraduate and postgraduate students. The aim of this article is to enthuse educators on the potential of games and offer practical suggestions on how to implement them in their teaching.

There is a worldwide phenomenon of people playing digital games. Wikipedia states that there are about 125 million people who started playing the game 'Fortnite' within the year it was launched. In 2017, a meeting on emerging technologies hosted by the Association for Dental Education in Europe (ADEE) stated that gaming would impact in dental teaching over the next ten years.¹ However, this prediction is not being realised and we should reflect on why this is so.^{2,3}

It may be argued that the majority of dental academics or postgraduate course providers are not game players and do not necessarily see games as having a place in dental education. They recognise dentistry as a professional subject and computer games are considered a distraction as they are predominantly a leisure activity. However, in both medical and nursing education there is good acceptance of games as a complementary tool for teaching basic sciences and clinical issues.^{4,5,6,7,8} Therefore, what are the barriers to the implementation of games in dental education?

The question is whether games are a superior learning tool compared to the traditional methods of teaching. If not superior, games may offer alternative approaches to dental education and provide a more flexible and varied classroom for the student. The teacher will be challenged by the introduction of gaming technology as it may be perceived as generating more work on an already overloaded curriculum. Fifteen years ago, Walmsley *et al.*⁹ reported that 45% of dental educators were hesitant to place their lectures on the internet, and now, most dental schools have online lectures. So, change does occur over time although bringing in new ideas should be carefully handled.

Both undergraduate and postgraduate students enjoy playing educational games since they are more attractive than conventional lectures.^{2,10,11} Traditional teaching uses the simple delivery of the content in the form of textbooks, lectures and tutorials while games allow students to interact with the learning process.¹² If the game is well made, then it will encourage the learners to become problem-solvers.

The formative aspect of the games can also help students to test themselves and get individual feedback.¹³ Even if they make mistakes, they are motivated to keep playing until they reach their goals. This repetition element helps the educational process and students learn in a playful way.^{12,14}

There are several game genres, but quizzes and training simulations are the most popular in medical education.^{11,12} The training simulation games mimic real situations and are the most stimulating learning tool for clinical based scenarios.¹⁵ They are not a substitute for live contact with the patient in the clinic; however, they are useful as an additional device in the learning process.^{3,12} Undergraduates can improve their practical skills and confidence before treating a real patient.^{13,16} Clinical scenarios can be introduced in a virtual world and the increase in haptic-based training simulations provides a base for the use of more sophisticated interaction. In postgraduate education, clinicians are able to interact with complex clinical cases as part of their continuing professional development (CPD). In the clinic of the future, person-centred care will be the manner in which we treat our patients.¹⁷ Simulation games can reproduce clinical cases which include the lifestyles and living environment of the patient. Games will be one of the ways that undergraduate and postgraduate education can assist clinicians to understand this new approach to our overall care.

Sipiyaruk *et al.*³ reported only two studies where serious games had been used in dentistry.^{2,10} In one, dental students were able to develop practical skills in alginate mixing and the other involved the sequencing of the steps in a resin bonding system.^{2,10} Preclinical games allow

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subjects to be taught in a different manner, as they let students practice several times. They are cost effective by saving money on consumables such as dental materials.³ It is also a good opportunity for a flipped classroom approach to learning, as students can play the games before their classes. Such training saves time and prepares them for their preclinical teaching.

There are many reported benefits with the gaming approach, students are motivated and have similar gains in knowledge compared to the traditional teaching.^{2,10} On the flipside, teachers need time to prepare, implement and test the games before providing them to students. For many years, educators have complained about the lack of time available for such university-related activities.⁹ Games are time-consuming and the educators may not wish to invest their time in developing such tools. Often there are limited academic incentives to introduce these new technologies into the learning space and then, teachers revert to the simple, time-served learning materials, ie lectures and tutorials.

Introducing games in dental education

When introducing games into the dental curriculum, a group of dental educators who wish to engage with this medium should be set up. The potential of game technology and its application in dentistry is huge. There are several suggestions that can illustrate the way forward, such as games in dental anaesthesia, diagnosis of oral lesions, activity in dental surgeries, complex or unusual cases, medical emergencies and patients with special needs.

As an educational tutor, you may not have the time to create such games by yourself, but there is usually university technical support available to build the game. As the mentor of the game learning tool, you will have to define the purpose of the game, indicate the

background of the players (undergrads or postgrads) and establish the skills you wish them to develop.

If a multidisciplinary team is not available or if you do not have the confidence to create a simulation game, you can always start with something simpler such as digital quizzes. Several institutions have virtual learning environments (VLE), such as Canvas or Blackboard, that provide a quiz maker. However, if you do not have access to these facilities, there are also free online websites, such as Googleforms, SurveyMonkey or Purposegames, where you can create multiple-choice questionnaires using picture and/or video media. Such websites also allow you to view and comment on respondents' performance in a formative evaluation. The use of such simple game technology is an approach that can transform your teaching and promote an interactive way of learning. It is a new and novel methodology in the learning spectrum. Recent literature suggests that it provides a whole new world of educational interaction with your students.

Conclusion

Gaming technology offers a new and different approach to undergraduate and postgraduate education. It provides potential new approaches to the learning space and the challenge is to implement it and inspire students to use it.

If you need any motivation in the area of games, then Freddie Mercury had the right message for this emerging technology.

'...Is this the real life? Is this just fantasy? Caught in a landslide. No escape from reality...'¹⁸

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