



## PhD in Biomedical Sciences

### Research Area: Dental Teaching Simulation

**Title:** DENTIFY - Virtual Reality and Haptic in Restorative Dentistry and Oral Implantology Teaching - a multimodal approach

Teaching in Dentistry involves 2 phases: first, the theoretical schematic representation of the clinical situation and its supervised execution in models and, secondly, its supervised execution in a real clinical environment. Phantom heads have had a pivotal role in simulation in dentistry teaching, ever since they were introduced in 1894. However, these present some limitations, namely the lack of abundant pathological models, the absence of real clinical situations and absence of universal evaluation criteria. In this context, these can be considered subjective and inherent to the evaluator. Furthermore, the amount of time required for the constant supervision of a student can threaten the tutor/student ratio. Simulation in animals and human cadavers for teaching in Dentistry has also been used, even though animals and humans differ in anatomy. Furthermore, the utilization of human cadavers can raise both ethical and legal questions. The most widely used application of VR and Haptic technologies for teaching is aviation. In these simulators, universal and mandatory evaluation criteria are used to evaluate young pilots as well as for continuous evaluation of experienced ones. In Dentistry, several simulators have been tested with positive outcomes in teaching, namely the improvement of higher precision and speed of execution observed in undergraduate students who were exposed to these simulators before being placed in real clinical environment. Also, students who used VR and Haptic simulators demonstrated steeper learning curves and had more hours of training when compared to those who only used the traditional methods. VR and haptic simulators in Dentistry have been developed in Endodontics, Periodontology, Oral Surgery, Fixed Prosthetics, Restorative Dentistry. However, current models still present a significant gap to clinical reality. The global migration of students must induce global alterations in teaching (Dentistry included), both in undergraduate and postgraduate programs. Dental faculties must undergo profound changes in their curricula so that these programs stay adequate universally, with scientific and universally accepted evaluation criteria, independently from their geographical location. Independently from their background, migrating students must be offered objective and universal teaching and evaluation criteria. Virtual Reality and Haptic simulators can be helpful in providing this opportunity for change. Our objective is to create a simulator closer to the real clinical environment both in the fields of Restorative Dentistry and Oral Implantology.

**Keywords:** Simulator, Haptic, Virtual Reality, Teaching

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