TRANSFER OF MANUAL DEXTERITY SKILLS ACQUIRED ON THE SIMODONT, A DENTAL HAPTIC TRAINER WITH A VIRTUAL ENVIRONMENT, TO REALITY. A PILOT STUDY

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Abstract: Introduction: Dental students invest many hours in manual dexterity training to prepare themselves for the clinics. Exercising on plastic has the advantage of learning within a standardized environment; continuing exercises on prefab teeth are unrealistic as plastic does not generate a training facility for clinical problem solving. Introducing a virtual learning environment with haptics and 3D models with realistic pathology (the Simodont) enables students to become competent before they enter clinics, assuming that the competences are easily transferred from virtual reality to reality. Therefore a study has been carried out to investigate if skills developed in virtual reality are transferred to reality. Methodology: Twenty-eight students participated in the study; 10 trained in the traditional phantom lab, 10 trained in the Simodont lab and 8 acted as a control group. Performance was tested before, during and after training. Result: It turned out that all students performed better after little or more training, independent of the training environment. Conclusion: Skills developed in virtual reality on the Simodont were transferred to reality.

Key words: dental education, preclinical training, haptics, virtual reality

Introduction

The goal of dental education is to guide students’ development through different stages from novice to competent, eventually resulting in an expert clinician. Students traditionally devote several years to the acquisition of sufficiently fine manual skills to prepare them for entry-level dental practice. In the current simulation laboratory, training is restricted to non realistic procedures using phantom heads, often on plastic teeth. Dental education, of all the health professional schools, is the discipline that could benefit the most from virtual reality since a significant proportion of preclinical dental education is dedicated to teaching psychomotor skills (1, 2, 3).

A simulator, Simodont, (Moog, Nieuw Vennep, the Netherlands and ACTA, Academic Centre of Dentistry Amsterdam, Amsterdam, The Netherlands) consisting of a force feedback robot arm connected to software in such a way that every movement of the arm is visualized on a screen, has been developed to replace the traditional lab conditions by a realistic virtual learning environment (Figs. 1 and 2).

The haptics are based on the Moog patented admittance control paradigm for the HapticMaster (4, 5). The simulator

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