

# The perception of the level of realism of a dental training simulator (Simodont)

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## Introduction

Currently dental students spend a significant proportion of their preclinical dental education in training psychomotor skills in a simulation laboratory that is restricted to non realistic procedures in phantom heads and plastic teeth. Therefore this discipline could benefit the most from virtual reality (1)

A simulator, Simodont (Moog FCS, Nieuw Venne, the Netherlands and 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 these traditional lab conditions into a realistic factual virtual learning environment. (Figs 1 and 2).



Figure 1. The Simodont dental simulator

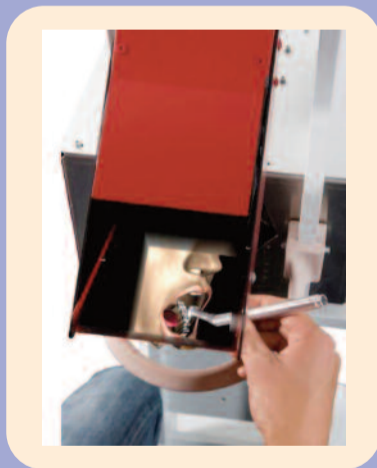


Figure 2. Showing the co-location within the Simodont

Simodont is a high quality, high fidelity dental simulator allowing future dentists to be trained in operative dental procedures in a realistic dedicated virtual environment while receiving accurate force feedback on the procedures carried out. Projection and mirror technology allow the full resolution, full stereo image to be seen "in" the physical workspace of the hand piece. A realistic model of the behavior of the drill speed, under the control of a foot pedal and the force exerted by the operator on the drill, drives a built in sound module which faithfully renders the sound of a dental drill.

Acceptance of such a simulator as a (preclinical) training tool is probably only possible if the level of realism of the system is close to the clinical reality (2,3) as we experienced in our school using other simulators. Therefore, a pilot study has been done on the perception of teachers and general practitioners about the level of realism of the simulator.

## Materials and methods

Ten teachers and 25 general practitioners familiar with the traditional preclinical training conditions as well as the real clinical conditions participated. They carried out a drilling exercise on the simulator. Thereafter they filled out a short questionnaire on their opinion about the realism of the various aspects (tactile reality, sound reality, visual reality, content validity of the training system) as well as the possible applications of the simulator.

## Results

The teachers were almost unanimously quite positive about the overall realism of the system (content validity), the dental practitioners were a little more critical. Both groups were highly satisfied with the imaging (80%) and with the sound simulation (80%). The dental practitioners were significantly less satisfied about the realism of the force feedback (tactile reality) than the teachers. The teachers as well as the practitioners agreed that the level of realism of the system was sufficient to replace part of the traditional preclinical as well as the clinical training and that the system is a valuable tool for applications in (continuous) education.

## Conclusions

The difference in perception of realism of the force feedback between the groups may be explained by the fact that the practitioners compared the experienced force feedback to the clinical reality where the teachers may have compared it to the preclinical reality. Though the clinicians were critical about the force feedback, all were convinced that the simulator was a valuable tool for continuous education because such applications were more dependent on realistic imaging than on realistic force feedback. It was concluded that the simulator has the potential to become a well accepted learning tool for preclinical training as well as continuous education.

## References

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