

Advantages of Simodont, a dental training simulator combined with courseware

Koopman P, Umanski D, Kulk R, Vervoorn JM and Wesselink PR

Institute of Education

Academic Centre of Dentistry Amsterdam (ACTA), the Netherlands



ACTA

Introduction

Simodont is an innovative dental training simulator being developed to improve the methodology of dental education. The simulator utilizes a virtual reality setting to allow students to practice drilling skills, providing realistic visual and haptic feedback.

The operation of Simodont is conducted with a specially developed courseware application, which provides the educational context of the training, including qualitative and quantitative feedback on performance.

The training framework of the Simodont offers several significant advantages for learning dental procedures:

Context

The integration of theory and practice is achieved by setting the exercises within a clinical context. Each exercise can be coupled with a virtual patient, representing specific history, needs, circumstances, and approach. Such contextual setting allows students to practice clinical reasoning, decision making, and critical thinking.

Bookmarks

While practicing complex preparations, key moments in the drilling process can be "book-marked". This allows users to return to the bookmark and start practicing from that point. Thus allowing users to learn to identify significant events in their working process and repeat the training efficiently.

Feedback

By providing intelligent feedback on the quality of performance, the simulator allows students to become more self-critical and less dependent on teachers for assessment and evaluation. Rewards on progression are built in the courseware to create a challenging and enhanced learning environment.

Assessment

When using Simodont, teachers are not only able to assess the final product but also the process of the preparation. Such evaluation can promote a more detailed understanding of difficulties and solutions. The system thus provides more dimensions within one learning experience.



Aims

The simulator and the courseware are currently under development. In order to assess the work in progress, a number of studies are planned to investigate the usability and effectiveness of the developed

system. A first milestone is to assess the quality of the integration between the simulator and the courseware. In the course of working with the system, commands are sent back and forth between the

simulator and the courseware components. This communication protocol must support the functionality of the system while assuring a consistent and smooth user experience.

Materials and methods

A pilot study on the technical requirements has been carried out in which the speed and robustness of the communication between the courseware and the simulator were tested. Two students and four teachers participated in this study. Interviews were used to gather user experiences with the Simodont. The questions addressed the user's experience of the smoothness of the interactions of the two components and to what extent the work flow was perceived as integrated. Next to that a stress test was conducted in which the robustness of the integration of the components was tested. During the stress test five Simodonts were used for six hours by fourteen users.



Simulator



Courseware

Results

Initial results reveal that the simulator and the courseware communicate smoothly and create a consistent work flow. Commands from the courseware arrived instantly and reliably at the simulator. The courseware and the simulator cooperated fluently during use. During the stress test only minor interaction problems were discovered which were solved easily.

Conclusion

The first positive results concerning the system integration provide a good base from which to extend the communication protocol between the courseware and the simulator. Further research to assess the integration quality of the system components is in progress while extending the communication protocol with additional commands and signals thus increasing the elaborate functionality of the system.