USC | IMSC

A NATIONAL SCIENCE FOUNDATION
ENGINEERING RESEARCH CENTER

2020Classroom: Immersive Educational Visualization

application research projects

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Research Goal

•Enable a rich learning experience through a dynamic environment.

•Help students learn complex materials by interacting in an immersive virtual environment.

•Help teachers assess students by providing in-depth analysis based on student's behavioral data.

Role in IMSC

•Vision: Enable immersive technology closely coupled with innovative curriculum design and meaningful assessment tools to increase efficiency and improve the quality of the learning experience.

"Our mission is to pioneer a new learning paradigm with high presence, and high fidelity technologies."

•BioSIGHT is strategically positioned to develop and test a new paradigm for the application of immersive technologies to science learning and education.

Research & Development Approach

•Research Approach:

- •The approach addresses how learning can be conveyed through games without diminishing learning content.

•Accomplished through education oriented Immersive game:

- •Define learning objectives
- •Develop back story and game-play (task based)
- •Validate concepts and solutions with usability testing

•Game development:

- •Use state of the art software development techniques: version control tool, defect database, code review...

Accomplishments

•Contributed to the "Metalloman" game scenario.

•Set-up a 3D authoring pipeline using 3D Studio Max, Quark, Photoshop and Torque world creator.

•Implemented 3 levels of game-play using a commercial engine (Torque Game Engine from Garage Games).

•Defined innovative game concepts to support student's assessment and improve the learning experience: prototyping using usability tests.

•Integrated data mining technology to provide users with feedback and added support for 5.1 sound.

Results show a 10% improvement for students answering content related questions after game-play.

Uniqueness & Related Work

•Related Work:

- •Edutainment: Games for history.
- •Games to Teach: MIT students, game developers for math and engineering.
- •Mission to Arabic: ISI, USC. Uses A.I. and computer game techniques to make learning languages easier.

•2020Classroom effort Uniqueness:

- •Targets undergraduate biomedical engineering students.
- •Addresses the challenge at each level of content development, technology integration, learning and usability issues, as well as assessment.

5-Year Plan

•Complete development of the Metalloman mission.

•Design and implement game elements where physiological equations drive content interactions.

•Add support for 10.2 spatial sound.

•Use lessons learned to provide new directions for the development of advanced educational systems.

•Implement and asses novel interaction devices.

•Investigate analysis tools to improve learning and assess students.