Comprehensive Virtual Human Initiative for Complex Interaction Skills Training

ESHELMAN SCHOOL OF PHARMACY

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RESEARCH QUESTION

How to most effectively represent a virtual patient, taking into account student characteristics, task demands, and the nature of the pharmacy domain.

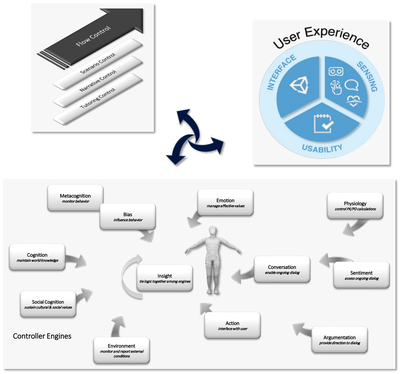
BACKGROUND

Using standardized patients (SPs) for OSCEs or other practice/assessment sessions pertaining to patient counseling and education skills is widely accepted and established as part of the Pharm.D. curriculum. There are some logistical issues and limitations, though, that come with use of SPs.

We developed a virtual standardized patient platform to portray complex encounters by which to train students.

Our platform allows for conditions and parameters (e.g., disease state, environmental influences, lifestyle choices) to underlie each virtual patient. We employ off-the-shelf tools such as Kitware's Pulse physiology engine and Unity's game engine. Patients present over time based on aging, disease progression, course of therapy, and adherence to treatment. The platform facilitates analytics and reporting on student performance to identify gaps in knowledge changes in application of skills.

virtual patient screenshot



architecture schematic

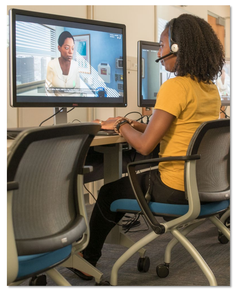
APPROACHES

LOW FIDELITY. One approach is just to engage the students in narrative, for them to demonstrate dialog capability. Though simplistic, this approach is advantageous in being scalable, distributable, and usable.

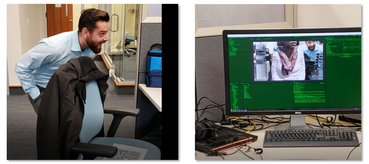
EMBODYING THE VIRTUAL PATIENT. A more complex approach (for developers and students) is to use a screen-based game environment. This approach is helpful for being able to present visual and auditory cues to students, and enable them to react and reply. We have studied engagement with this approach for many years.[1-4]

Ink dialog script

EMBODIED INTERACTION. Newer technologies involving augmented (AR) or mixed (MR) realities allow for having the students be immersed in the encounter. This approach, when appropriate, is advantageous in being able to account for physical engagement within a space.



student engaging with virtual patient



MR projection

Magic Leap AR headset; also testing the Looking Glass Holographic Display

QUESTIONS WE ASK

- What are the students' responsibilities?
- What are their actions?
- Are the skills procedural, interactive, strategic?
- Are the skills meant to be familiarized, practiced, mastered?
- What level of interactivity is needed?
- How easy or hard is it to model behaviors of entities and objects?
- How sensorially demanding is the task?
- What are advantages over current approaches and what technological affordances are useful?

OBSERVATIONS

TRAINING USING IMMERSION

MAKES MORE SENSE

- There are pressing issues such as interaction or cultural skills
- There is a need to simulate and depict variable patient characteristics (age, ethnicity, etc.)
- There is a demand for high ecologic validity
- There are unsafe, unethical, unreliable, or costly features of to-be-trained content

MAKES LESS SENSE

- The tasks do not involve interactivity
- The tasks overwhelmingly involve physical movement
- There already exists cost-effective training and assessment
- There is a demand for high graphic fidelity
- There would be adverse influence on daily activities

CONCLUSIONS

We study the intelligent use of advanced technologies. Lessons learned from this research are informing design and development decisions for current and future applications.

In additional projects, we are investigating inspection of a complex environment for anomalies (using 360° video and MR), helping adolescents to understand health professions (using a video game), and telestrating[5] consequential medical procedures (using AR).

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