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Featured Article

The Student Experience Using Virtual Reality Simulation to Teach Decontamination

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virtual reality simulation;
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handle Kinects;
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Abstract

Background: There is a need to prepare new nurses in disaster procedures. Virtual reality simulation (VRS) offers a method for disaster training; yet, little is known about the student experience using this type of simulation.

Methods: Senior baccalaureate students at two universities who experienced a VRS decontamination exercise were asked to participate in focus groups to describe their experience. Responses were analyzed using constant comparative analysis.

Results: Student feedback was positive, and three themes emerged from the data: The Experience of VRS, The Learning Process, and The Implementation of the Learning Activity.

Conclusions: VRS provides an engaging learning opportunity to learn the skill of decontamination. Educators and developers must work together to ensure optimal learning opportunities for students in virtual environments.

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Nursing educators are being called to reform nursing education and offer opportunities for students to practice and integrate knowledge and skills to ensure preparation for the complexities of today's health care environment. The examination of new teaching strategies and the development of evidenced-based teaching practices are critical to this transformation of nursing education (Benner, Sutphen, Leornard, & Day, 2010; Institute of Medicine, 2011). One of the most complex practice scenarios that nurses must be prepared for is the delivery of care in a disaster situation. Opportunities for students to provide care during disasters are rare; yet, it is a critical component of preparedness.

One technology-based strategy that has been identified as a method for preparing nurses for disasters is virtual reality simulation (VRS) (Farra, Miller & Hodgson, 2013a; Farra, Miller, Timm, & Schafer, 2013b). VRS is an active learning strategy that is grounded in the theory of situated cognition as it allows students to apply and practice learned content in realistic environments. The purpose of this article was to explore the experience of students participating in a VRS for the disaster competency of decontamination.

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Review of the Literature

Virtual reality is defined as a multisensory computer-generated environment that provides the user with a sense of presence or of "being there" within an alternate world as the participant interacts via computer (Burdea & Coiffet, 2003; Lalor et al., 2005). Visual displays, directional sound systems, and other devices provide the outputs used to generate the virtual environment. The user participant interacts within the virtual world by using a broad range of input devices that can include a mouse and a keyboard, game pads, data gloves, or motion tracking systems. As the participant gives inputs to the simulated virtual world, they are provided with real-time feedback about their effect on the environment. Depending on the combinations of technologies being used, a VRS can resemble a traditional video game ("desktop virtual reality") or a high-tech flight simulator with surround screens and a motion platform ("fully immersive virtual reality"), with many variations along the way. The current work falls between these extremes by immersing students in a virtual emergency setting to conduct the skill of decontamination.

Key Points

- Nursing students report that an immersive virtual reality simulation (VRS) provides a safe realistic method for learning the disaster skill of decontamination.
- The use of an immersive VRS promotes learning through implementation of the theory of situated cognition including concepts of embeddedness, extension, and embodiment.
- Nurse educators must partner with students and technology experts to develop quality VRS learning experiences that lead to positive student outcomes.

Two published literature reviews support the use of VRS for disaster training. Findings of these reviews demonstrate support of positive student outcomes using VRS. For example, in study of students who participated in VRS training for triage skills, participants demonstrated equal or superior triage skills to those who received traditional training. In addition, qualitative measures of student engagement indicate that participants find virtual environments realistic and a positive enhancement to learning (Farra et al., 2013a; Hsu et al., 2013).

Interactivity is a key to learning (Brown, Collins, & Duguid, 1989). According to Robbins and Aydede (2009), situated cognition is grounded in the three concepts that can be met by interacting in a virtual environment (Figure 1). These three concepts include

1. Embeddedness: cognition is fixed in context-specific representations
2. Extension: cognitive systems exist in physical and social environments
3. Embodiment: cognition is linked to the sensorimotor brain and body

Situated cognition is supported by work in the field of neuroscience related to the development of memory. Kandel (2006) describes the neurophysiology of the brain and the development of procedural memory. Procedural memory is a type of long-term memory of how to do things, like perform a psychomotor skill. An example would be giving an intramuscular injection. Mirror neurons in the psychomotor cortex fire when an individual performs an activity resulting in new pathways within the brain. More pathways are formed during participative learning activities than through lecture alone. Within the virtual environment, participants are given the opportunity to perform activities, which facilitate procedural memory formation and retention of the content.

The VRS developed for this study provided first-person experiences for participants to practice decontamination. The VRS was viewed using a traditional computer monitor, but participants were able to physically interact with the

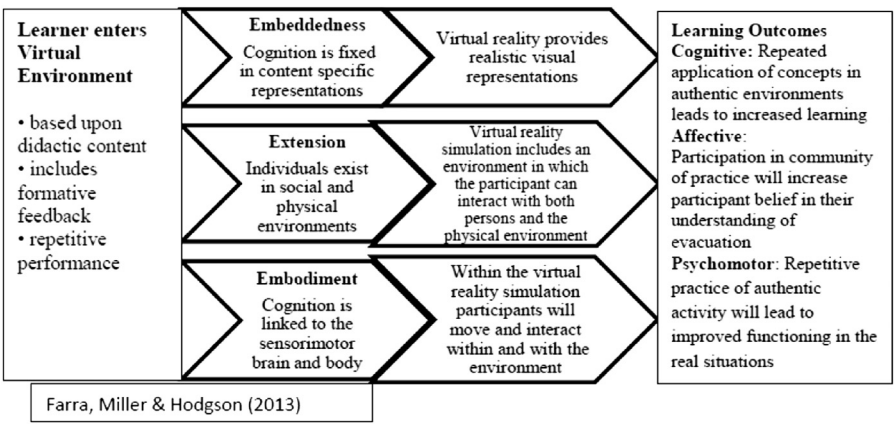

Figure 1 Situated cognition and virtual reality simulation.