Augmented Reality: Using the Microsoft HoloLens® to Promote Student Success

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Abstract

Background: Simulation is a widely accepted educational strategy used to create realistic patient care opportunities for nursing students in a safe learning environment (National League for Nursing, 2015). Further, the National Council of State Boards of Nursing (NCSBN) landmark study exploring the role and outcomes of simulation in pre-licensure nursing education across the United States, concluded that simulation can be used as a substitute for up to fifty percent of traditional clinical experiences when delivered in a way that is evidence based (Hayden, Smiley, Alexander, Kardong-Edgren & Jeffries, 2014). Currently, multiple modes of simulation are being used in various educational contexts to allow nursing students to apply theory into practice including the use of computers, low-to-high fidelity manikins, task trainers, standardized simulated patients, and standardized human patients. Unfortunately, many of the modalities used within simulation are expensive and not quantifiable in terms of return on investment. Newer technologies such as augmented reality (i.e., Microsoft Hololens®) may be an answer to this dilemma. Augmented reality devices provide a computer-generated reality through the use of specialized ear and eyewear, which allow a student or group of students to experience a variety of visual and auditory stimulation. Overall, augmented reality devices are less expensive than traditional high-fidelity simulators, can be used anywhere and are technologically advanced (INACSL Standards Committee, 2016). However, its use has not been fully explored for reliability and validity within baccalaureate nursing education.

Purpose: The focus of this study will be to determine whether the use of a Virtual Standardized Patient delivered with the Microsoft Hololens® can improve the knowledge, skill, and confidence of nursing students with regards to nursing assessment and intervention in a low-frequency, high-stakes scenario.

Methods: This quasi-experimental study will utilize the virtual standardized patient scenario for anaphylaxis, which is a low-frequency, high-stakes scenario developed by Microsoft Hololens® as its augmented reality education treatment. The study sample will include over 150 pre-licensure medical-surgical students at the sophomore, junior, and senior-level at a large school of nursing on the West Coast. In addition, approximately 20 Registered Nurse-Bachelor of Science students at the university’s satellite campus will also participate in the study. After the theory for caring for a patient who is experiencing anaphylaxis has been reviewed in the classroom during the Fall 2017 semester, students will be randomly assigned to one of the following groups: 1) Full Dose-students who individually experience the anaphylaxis scenario utilizing the Microsoft Hololens® technology, 2) Partial Dose-students watch a video of taped Microsoft Hololens anaphylaxis experience from the student’s perspective, or 3) Control-students work through a written anaphylaxis case study. Following the experience, each student will have their knowledge regarding anaphylaxis, their nursing skill related to caring for a patient experiencing anaphylaxis, and their self efficacy (confidence caring for a patient with anaphylaxis) assessed using validated instruments. Analyses of variance will be conducted to examine differences among and between study groups. In addition, focus groups will be conducted to allow students to provide feedback on their experience with the Microsoft Hololens®.

Implications for practice: According to the National League for Nursing (2015), nursing faculty should become experts in simulation. The NLN further denotes that nurse educators should strategically
integrate simulation into curriculum with concrete connections to student learning outcomes. The debate exists regarding what technology is best, how the technology can be fully integrated to produce measurable student learning outcomes, and what is the right combination of simulation versus real-life clinical experience. This study helps bridge the gaps identified by the NLN. Newer technologies such as augmented reality (i.e., Microsoft Hololens®) have the potential to transform nursing education. The technologies are less expensive than previous modalities, are mobile, and can provide a safe environment for students to improve knowledge, skill, and confidence with nursing assessment and proactive intervention in a low-frequency, high-stakes scenario. This study will provide quantitative and qualitative data not currently found in the literature regarding the reliability and validity of using an augmented reality virtual standardized patient simulation experience in nursing education. This data can be used by policy makers, educators, students, and clinical partners to better provide evidence-based teaching methodologies that prepare student nurses and licensed nurses to have the knowledge, skill and confidence in caring for low-frequency, high-stakes scenarios that can’t otherwise be practiced in real life.

Title:
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Keywords:
Augmented reality, Microsoft Hololens® and Simulation

References:


Abstract Summary:
Augmented reality, the integration of digital information with the user's environment in real time, is a new lower cost simulation technology that shows promise for nursing education. It utilizes specialized ear and eyewear which allows students to participate in a variety of life-like computer generated audio and visual clinical experiences.

Content Outline:
Augmented Reality: Using the Microsoft Hololens® to Promote Student Success

I. Introduction

A. Example: Simulation is a widely accepted educational strategy used to create realistic patient care opportunities for nursing students in a safe learning environment.

B. Example: Newer technologies such as augmented reality provide a computer-generated reality through the use of specialized ear and eyewear, which allow a student or group of students to experience a variety of visual and auditory simulation.

II. Body

A. Main Point #1: Simulation as an educational strategy

1. Supporting point #1: NLN Framework

2. Supporting point #2: NCSBN Landmark Study
B. Main Point #2: Simulation Technologies
1. Supporting point #1: Traditional Modes
2. Supporting point #2: Applicability to Nursing Education

C. Main Point #3: Emerging Technologies
1. Supporting point #1: Augmented Reality
2. Supporting point #2: Virtual Standardized Patient Applicability to Nursing Education

III. Conclusion
A. Example: Augmented reality devices are less expensive than traditional high-fidelity simulators, can be used anywhere and are technologically advanced.

B. Example: A Virtual Standardized Patient delivered with the Microsoft Hololens® has the potential to improve the knowledge, skill, and confidence of nursing students with regards to nursing assessment and intervention in a low-frequency, high-stakes scenario.

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Professional Experience: Helina Hoyt is the RN-BS Program Coordinator for San Diego State University-Imperial Valley. She received a bachelor’s degree from Azusa Pacific University in 1995. She then completed the Parkland Memorial Hospital Critical Care/Trauma Nurse Internship in 1997. After working in both urban and rural critical care units, she returned to San Diego State University and completed a master’s degree in community health with a specialization in school nursing in 2001. After serving as a school nurse in Imperial County, she welcomed the opportunity to transform nursing in Imperial County as the inaugural RN-BS Program Coordinator. Her work focuses on transforming health in the rural, border region through nursing leadership and evidence based practice. She is currently in the San Diego State University-Claremont Graduate University Joint PhD Education Program. Her research focus is use of a Virtual Standardized Patient to increase nursing knowledge and skill in a low-frequency, high-stakes scenario.

Author Summary: Helina Hoyt is the RN-BS Program Coordinator for San Diego State University-Imperial Valley. Since 2007, she has been committed to improving health in the rural, border region of Imperial County, California through nursing leadership and evidence based practice. She is currently in the San Diego State University-Claremont Graduate University Joint PhD in Education Program. Her research focuses on using a Virtual Standardized Patient to increase nursing knowledge and skill in a low-frequency, high-stakes scenario.

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**Professional Experience:** Michael Gates, Ph.D, RN is an associate professor and the associate director for the School of Nursing at San Diego State University. He received is bachelor’s degree in nursing from the University of Tennessee-Memphis in 1994 and his PhD in Nursing from the University of North Carolina-Chapel Hill in 2005. Dr. Gates is also a Robert Wood Johnson Foundation Nurse Faculty Scholar alumnus. His research interests include the nursing workforce, workplace diversity, and the utilization of technology in nursing education. He has current work underway that examines nurse leader stress, how staff nurses and nurse leaders view their work, and simulation use in the education setting. Dr. Gates has also been on the board of the Gamma Gamma chapter of Sigma Theta Tau International for the past 9 years and has been a member of the National League for Nursing Research Review Panel since 2014.

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**Professional Experience:** Sean Hauze is an instructional designer/developer at the San Diego State University (SDSU) Instructional Technology Services department, where he develops online education and instructional media for faculty and students, with a focus on augmented, virtual, and mixed reality. Sean also helps manage SDSU’s course capture systems, learning management system, and the Instructional Technology Services web presence. Previously, Sean was Technology Director at The Grauer School in Encinitas, California, and 3D Data Specialist at Google. Sean is currently a doctoral student in the Claremont Graduate University/San Diego State University Joint PhD in Education Program. Previously Sean completed a M.Ed. in Educational Technology at SDSU, and a B.S. in Architecture at University of Colorado, Boulder. Sean also works as a web design consultant, developing websites for educational and nonprofit organizations. Sean currently serves as co-PI for the STEM Guitar Project (NSF Award #1700531).

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