INTRODUCTION

In 2014, the Advancing Careers and Training for Healthcare (ACT for Healthcare) was formed as part of a three year Trade Adjustment Assistance Community College and Career Training (TAACCCT) Grant from the Department of Labor. The ACT for Healthcare group is a collaboration of 16 Wisconsin technical colleges, industry partners, workforce development systems, and previous TAACCCT grant recipients focused on enhancing healthcare training programs. One portion of the grant is the development of Augmented Reality Integrated Simulation Education (ARISE) utilizing the ARIS application. The ARISE project merges the concepts of simulation with augmented reality and game-based situated learning theory within 150 scenarios for healthcare students. The finished scenarios will be open source through the Multimedia Educational Resource for Learning and Online Teaching (MERLOT) database in fall 2017.

TECHNOLOGY PLATFORM

This project utilizes the Augmented Reality and Interactive Storytelling (ARIS) platform developed by David Gagnon from the University of Wisconsin – Madison. ARIS is an iOS App that can be used on iPads and iPhones. It is an open source platform for creating and playing mobile games and interactive stories.

OVERALL DESIGN

The ARIS platform is used to create designed experiences for learning in clinical education. The designed experiences begin with a patient storyline describing an individual or family experience with a health challenge. Multiple scenarios are created in each storyline leveled to match the learner educational level. Scenarios are augmented with rich media (video, images, and sounds) to enhance learner engagement. Scenarios are designed in three formats: games, designed for the novice learner with limited experience; clinical case studies, designed to be more challenging and used in groups or flipped classroom activities; and simulations, designed with the flexibility to be used in high resource simulation labs or low resources lab settings.

AUGMENTED REALITY

Augmented Reality is an enhanced version of reality created with the use of technology. For the purposes of this project a media image, video, or sound is overlaid into the learning environment to provide a more authentic and immersive learning experience for participants. All components are focused on patient-centered care using scenarios across storylines, and lead to the transfer of knowledge/skills/attitudes to real world experience.

ARISE Clinical Learning Model
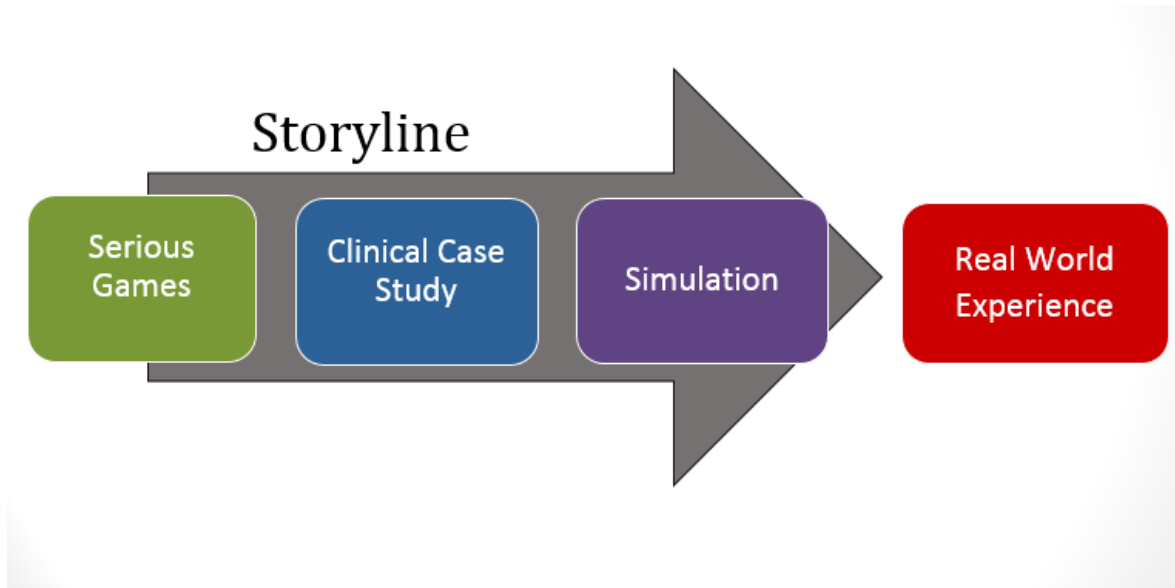
STORYLINES

Storylines are individual patient stories as they experience health events. Storylines cross disciplines and follow patient stories throughout healthcare settings. Each storyline may have multiple scenarios that are designed to match the learners' educational levels.

SCENARIOS

Clinical scenarios provide context for clinical decision making. Scenarios are designed to provide as realistic as possible representations of clinical environments, events, and consequences. These scenarios allow participants to practice high-stakes clinical decision making skills in a low-stress learning environment, preparing them for real world experiences.

Scenario levels:

- Level 1: basic assessment & basic intervention

- Level 2: advanced assessment & complex intervention

- Level 3: complication identification & treatment

- Level 4: crisis & intervention

SCENARIO DESIGNS

Each level is developed into one or all three scenario designs: serious games, clinical case studies and simulation. Training binders will be provided to each WTCS college containing storylines that are color coded to identify the scenario design.

SERIOUS GAMES

- Designed to be completed independently by the learner

- Media creates interactive, goal-directed learning with immediate feedback

- Can be used to prepare for class or simulation

- Perfect for the pre-novice or novice learner according to Benner's levels of nursing experience (Benner, 1984)

- Assists learners to progress from knowledge, to comprehension, to application to patient care according to Bloom's taxonomy (Bloom, 1956)

- Color coded in green

CLINICAL CASE STUDIES

- Designed to be completed in a class or lab situation, with a faculty-led discussion or a flipped classroom approach

- Media brings case studies to life

- Interactive questions and guides encourage participants to explore compelling cases and promote the development of clinical reasoning

- Case studies promote higher order thinking: application, analysis, and synthesis according to Bloom's taxonomy (Bloom, 1956)

- Can be used for debriefing across the curriculum as called for by the NLN (NLN Board of Governors, 2015)

- Color coded in blue

SIMULATIONS

- Designed for use in low and high resource simulation settings with maximum flexibility for student centered learning

- Media augments reality in simulation with videos, pictures, and sounds

- Debriefing guides provide interactive questions to guide clinical reasoning and promote reflective learning using International Nursing Association for Clinical Simulation and Learning (INASCL) Standards of Best Practice (2013) and NLN-recommended Theory Based Debriefing by Driefurest (2012).

- Color coded in purple

LEARNING THEORY SUPPORTING AUGMENTED REALITY

Simulation, gaming, and augmented reality combine to create an innovative and effective method for designing and delivering active and engaging learning experiences that will result in improved clinical reasoning in healthcare graduates.

KOLB

Experiential learning theory (Kolb, 1984) provides a framework for understanding why students learn effectively from augmented reality incorporated into classroom activities and simulation. Kolb's theory proposes effective learning occurs when a person progresses through four stages: concrete experience (i.e. serious gaming or interactive case study) followed by reflective observation on that experience, leading to abstract conceptualization and active experimentation (i.e., simulations where students "try out" what they have learned, followed by debriefing.)

BENNER

Benner's theory of clinical competence proposes that understanding of patient care progresses through multiple stages over time from "novice" to "expert" as experience is gained (Benner, 1982). The leveling of Augmented Reality experiences in each storyline promote student progression through Benner's stages of nursing competence. Levels are also aligned with WTCS Nursing Curriculum.

BLOOM

Blooms taxonomy (Bloom, 1956), is well known in education for his classification of educational objectives. Bloom classified objectives into three domains: Affective, Psychomotor, and Cognitive. Each domain was leveled and hierarchical – meaning learners must master the lower levels before proceeding to the next higher order thinking. Bloom's cognitive domain included six levels of thinking with the lowest levels being: knowledge, comprehension, and application; and three highest levels as; analysis, synthesis, and evaluation. Bloom's model was revised to a multidimensional model and slightly updated terminology (Forehand, 2005). Bloom's updated model includes 4 knowledge dimensions: factual knowledge, conceptual knowledge, procedural knowledge, and meta-cognitive knowledge; and within each dimension six levels of thinking and learning (remembering, understanding, applying, analyzing, evaluating, and creating) (Anderson and Krathwohl, 2001). The ARISE curriculum model provides leveling of thinking and learning from concrete mastery of content in serious games to more advanced levels of analyzing , evaluating, and creating in clinical case studies and simulations. In addition, each scenario is leveled following curriculum from basic assessment and interventions in level one to the most advanced thinking and advanced interventions in level 4. The curriculum guides the learner to master advanced problem solving in as step by step fashion using debriefing across the curriculum to advance critical thinking and problem solving.

NLN DEBRIEFING ACROSS THE CURRICULUM

Debriefing has been shown to be an essential role in the development of clinical reasoning along a continuum from "knowing what" to "knowing how" and "knowing why"(NLN Board of Governors, 2015). Integrating debriefing across the curriculum – not just in simulation – has the potential to transform nursing education (NLN Board of Governors, 2015).

QSEN AND PATIENT CENTERED CARE

Augmented reality uses patient videos and associated interactive curriculum to emotionally engage the student and focus the learning environment on patient centered care, a core competency established by the QSEN project "(QSEN, 2014).   Patient centered care is defined as "Recognizing the patient or designee as the source of control and full partner in providing compassionate and coordinated care based on respect for patient's preferences, values, and needs"(QSEN, 2014). Using augmented reality to contextualize practice focuses student attention on the patient's preferences, values and needs.

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