Multi-Player Virtual Reality Used to Introduce High School Seniors to Medical Technology

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Dorothy Rider Pool Trust Grant

- Started by Leonard Parker Pool in 1975
- Mission:
  - Enable the Lehigh Valley Health Network to be a superior regional hospital and improve the health of the citizens of the region it serves.
The Dorothy Rider Pool Health Care Trust Youth Programs Grant

Objectives:

- Provide experiential opportunities for youth within the context of a Health Care Career Discovery curriculum
- Recruit and longitudinally track students into health care careers at LVHN
Health Care Career Discovery

- This program exposes students to a wide variety of health care careers and positive adult role models in authentic, real-world settings.
- It is currently in the pilot stage with ~200 students from Building 21 in the Allentown School District.
- Goal: To create an evidence-based model that can be implemented in other school districts.

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Research Scholars

- The Research Scholar Program at LVHN is a paid internship program for undergrads that may be interested in a variety of positions within the healthcare field.
- Students work on research or quality improvement projects with mentors in both the network’s clinical and non-clinical departments.
Emerging Health Professionals (EHP)

- EHP is a program of Lehigh Career & Technical Institute (LCTI), in partnership with Lehigh Carbon Community College (LCCC), Penn State Lehigh Valley (PSU-LV), and Lehigh Valley Health Network (LVHN)
- EHP recruits high achieving seniors from 9 sending school districts
- EHP has three core features in its curriculum:
  - Dual Enrollment
  - Career Technical Education (CTE)
  - Health Care Career Shadowing/Observations
EHP was introduced into the Lehigh Valley as a new concept to expose students to health care, a dominant industry in the region.

- EHP began with 13 students in 2005.
- As of 2016, a total of 600 students have graduated from the program.
- Many of the students have gone onto to become nurses, PAs, physicians, PTs etc.
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Simulation

- “Simulation is the imitation of the operation of a real-world process…”
- “Imitation or enactment”
- “The process of pretending”
- Started in 1930s with Link Trainer, a flight simulator
- Medical simulation started with anesthesia to practice intubation, ventilation, and emergency airway punctures
- Examples of other areas using simulation:
  - Sports, Economics, Military, Biomechanics, Weather…
Healthcare Simulation at LVHN

- **Inpatient**
  - Medical Surgical Ward
  - Intensive Care Unit
  - Burn Unit
  - Multipurpose Room
  - Debriefing Room
  - Control Room
  - Changing Room

- **Outpatient**
  - 12 Exam Rooms
  - Control Room
  - Standardized Patient Prep Room
  - 3 Multipurpose Rooms
  - Debriefing Room
  - “Cold Room”
  - “Med Room”
  - “Wet Room”
Manikins

- Low Fidelity Vs. High Fidelity
  - Birthing Prompt vs Birthing Manikin ($10k – $1.5M)
- Different functional capabilities and benefits
Standardized Patients

- Active and engaging learning
- Improve performance after receiving feedback
- Actors who portray a role within a simulation
  - Patient
  - Family Member
  - Nurse or physician
  - Voice of manikin
Prebriefing / Debriefing

- **Prebriefing**
  - Summary of the scenario
  - Learning objectives

- **Debriefing**
  - Reflection of the scenario
  - Learning objectives revisited
  - **Feedback**
    - Information, not advice
    - Descriptive, not evaluative
Pros/Cons of (Live) Simulation

Pro
▪ Safe learning environment
▪ Tactile interactions, muscle memory
▪ Immersive

Con
▪ Cost of equipment
▪ Travel
What are Virtual Simulations?

- **Virtual Reality Defined**
  - "An artificial environment which is experienced through sensory stimuli (as sights and sounds) provided by a computer and in which one's actions partially determine what happens in the environment; also; the technology used to create or access a virtual reality."
  - Computer-based training simulations that take place within 3D virtual environments
  - Users control 3D characters called "Avatars"
What are Virtual Simulations?

- **Virtual Environment Platform Examples:**
  - Second Life / Open Simulator, AvayaLive Engage, Unity 3D

- **Common Features**
  - Multi-user environments
  - Voice and Text communication
  - Point and Click interactivity with environment
  - Presentation Capabilities
    - “In-world” collaborative web-browsing
Virtual Environments

- General Educational Uses of Virtual Environments
  - Virtual Classrooms
  - Virtual Field Trips
  - Virtual Simulations

- Subjects covered in Virtual Worlds
  - Science / Engineering
  - Literature – Literary Worlds Project
  - History – Exploring historical sites/events
  - Archeology
  - Language Learning
  - Etc.
Virtual Simulation in Healthcare

- Healthcare Training in Virtual Sim
  - Communication
  - Routine patient encounters
  - Equipment training
  - Disease management
  - Mass Casualty – Triage

- Who is virtual simulation for?
  - Doctors
  - Nurses
  - Medical Assistants
  - Medical Students
  - Office Staff
  - Etc.
Why We Use Virtual Simulation?

**Benefits**

- **Distance Learning**
  - Geographically dispersed learner population
- **Cost / Savings**
- **Scalability**
- **Repeatability**
- **Less faculty required**

**Drawbacks**

- **No physical feedback**
- **Information Technology Issues**
- **Learning curve**
History of Virtual Sim at LVHN

- **Second Life**
  - **Primary Usage:**
    - Online Social Platform, Education
  - **Benefits:**
    - Low Cost (Free client / Rented Server Space)
    - In-world building/scripting tools
  - **LVHN Projects:**
    - Simulation Orientation Course
    - MI Alert Emergency
History of Virtual Sim at LVHN

- **AvayaLive Engage**
  - **Primary Usage:**
    - Online meetings, conferences, and training
  - **Benefits:**
    - Browser-based client
    - Supported large groups
    - 3D Audio for VOIP
  - **DOE Projects:**
    - Office-based medical emergencies
      - Cardiac, Respiratory, Behavioral Health
      - Emergency Cart
History of Virtual Sim at LVHN

- **CliniSpace**

  - **Custom** Environment - LVHN Virtual Sim Center
  - Developed from the ground up to be used for virtual clinical simulation
  - Rich interactive environments and clinical settings
  - Dynapatients
    - Head-to-toe patient assessment
    - 10 patient avatars
    - Dynamic physiology
  - **Case Authoring Tool**
    - Clinical scenario details
    - Event Authoring
History of Virtual Sim at LVHN

- CliniSpace / LVHN VSC
  - Platform Rollout
    - Bronchiolitis Sim for Pediatrics Nurses
    - Hypoglycemia Sim for Outpatient Clinicians
EHP Student Experience

- Introduced students to the concept of virtual simulation and the associated vocabulary
- Reviewed possible careers in virtual and live simulation:
  - Simulation Specialist
  - Instructional Technologist
  - Senior eLearning Designer
  - Standardized Patient
EHP Student Experience

• Students came with a higher level of medical knowledge as compared to average seniors in high school
• We leveraged that knowledge to have them go through a Hypoglycemia case in the VSC
EHP Student Experience

- A worksheet was handed out to the students to provide them with scaffolding, but also allow them to explore on their own:
  - Example Questions:
    - Identify the following Vital Signs on the patient:
      - BP
      - SpO2
      - Temperature (oral)
      - Blood Sugar
    - Based upon what you’ve identified above, what is your diagnosis?
  - We also used open-ended questions to gather information:
    - Did you feel as if you were treating a real patient?
    - If you could come up with a topic/case of your own, what would you choose?
EHP Student Experience

- All students went through the online orientation built into the VSC to get comfortable moving their avatars and moving around in the environment.
- We then gave them the worksheet and allowed them time to work alone on the first half.
- The group came back together to finish the case on the projector screen in front of the room.
Feedback from Students

- How has this speaker/presenter assisted you in learning about this health care career path?
  - “Teamwork and individual practice possibilities limitless.”
  - “It assisted in my understanding of different hospital situations and their protocol.”
  - “I never knew computer science could be in health care.”
  - “I learned how to assess a patient”
  - “Jason showed me that there are jobs in the medical field for computer science majors. People with an interest in technology are also needed in this field.”
  - “The speaker assisted me in learning about how this simulation is treated as a real-life scenario.”
VSC Demonstration
Conclusion and Future Plans

- Watching the learning occur as the students worked through the case was rewarding
- Hearing through their feedback that they both enjoyed and learned from us is key to our future development
- We learned as much from the students as they learned from us
- We plan to use their feedback and continue working with other student groups including:
  - Building 21 Allentown
  - Lehigh County Medical Society Middle and High School Students from the Allentown School District
Questions?

Contact Information:

Name
Title
Email address