Creating Engaging Virtual World Simulations for Collaborative Healthcare Education
EAHCS - Doha, Qatar
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Breakout Session 1
Learning about virtual world applications

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• No conflicts of interest to disclose
Learning Objectives

• Understand the potential applications of virtual simulation in a variety of health care settings
• Know the potential applications of virtual environments for collaboration and information sharing
Outline

• Review examples of Virtual World applications to teaching in the health professions
• Small group discussion on the ways that these examples could apply to local needs
Case Studies

• Practice & Simulation
• Collaboration/Distance learning
• Role-Play/Dramatization
• Visualization
• Gaming
PRACTICE & SIMULATION
• Faculty training in simulation management (Weiner, 2010)

• Ease transition to manikin-based simulation or clinical practice (Brydges, 2010)

• Technical training for surgical residents (Alwadani, 2012; Akdemir, 2014, Al-Noury 2012)

• Basic Laboratory Skills (SWIFT Lab)
Communication Training and Practice

- Empathy (Lim, et al 2011; Andrade et al 2010)
- Delivering bad news (Jarmon, et al 2009)
- Motivational Interviewing (Mitchell, et al 2011)
- Cross-cultural communication (Fors, et al 2009)
Interviewing mother with a sick baby in local hospital setting
Practice patient interview using web-based Unity3D platform

Ohio State University Virtual Patient

Student Instructions

Please interview Mr. Jack Wilson, who is here for back pain.

Please sign in with your first and last name, and obtain a complete medical history from Mr. Wilson, including Past Medical History, Family History, Social History, and Review of Systems as relevant. The interview should take no more than 15-20 minutes.
COLLABORATION/DISTANCE LEARNING
Interact with educators and students from other countries

Global Unique Active Users (m) Q4 2012

Logged in at least once to a VW/MMO in the quarter
Collaborate on international educational and research projects

Frequency of papers on virtual health care related projects from different countries

Ghanbarzadeh et al., 2014
ROLE-PLAY/DRAMATIZATION
Teamwork Training through role-play in virtual hospital setting

Team STEPPS® 2.0

Team Strategies and Tools to Enhance Performance and Patient Safety
Objectives

To create a virtual 3D site for health professional education
To determine usability of the site
To determine effect on learners’ attitudes to teamwork

• Hypothesis: Students’ will show an increase in post-test scores on the Teamwork Attitudes Questionnaire compared with pre-test scores

• Study Design: Pre-/Post-test
Methods

- Conducted at Indiana University and Ball State University (Indiana) within Unity3D environment
- 145 health professional students (Medicine/Nursing/Social Work/Health & Rehabilitation Science)
- Reviewed TeamSTEPPS concepts
• Students completed three scenarios designed to enable individual practice of teamwork principles
• Scenarios required them to apply their knowledge of the *TeamSTEPPS* tools
<table>
<thead>
<tr>
<th>School</th>
<th>18-24 years</th>
<th>25-30 years</th>
<th>31-35 years</th>
<th>36-40 years</th>
<th>40+ years</th>
<th>Total</th>
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</thead>
<tbody>
<tr>
<td>Ball State School of Nursing</td>
<td>40 88.9%</td>
<td>2 4.4%</td>
<td>1 2.2%</td>
<td>2 4.4%</td>
<td>0 0.0%</td>
<td>45 31.0%</td>
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<tr>
<td>IU School of Medicine</td>
<td>10 76.9%</td>
<td>3 23.1%</td>
<td>0 0.0%</td>
<td>0 0.0%</td>
<td>0 0.0%</td>
<td>13 9.0%</td>
</tr>
<tr>
<td>IUPUI School of Social Work</td>
<td>2 28.6%</td>
<td>2 28.6%</td>
<td>1 14.3%</td>
<td>0 0.0%</td>
<td>2 28.6%</td>
<td>7 4.8%</td>
</tr>
<tr>
<td>IU School of Health &amp; Rehab Sciences</td>
<td>45 56.2%</td>
<td>27 33.8%</td>
<td>6 7.5%</td>
<td>2 2.5%</td>
<td>0 0.0%</td>
<td>80 55.2%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>97 66.9%</td>
<td>34 23.4%</td>
<td>8 5.5%</td>
<td>4 2.8%</td>
<td>2 1.4%</td>
<td>145</td>
</tr>
</tbody>
</table>

The sample was predominantly female (79.2%) and Caucasian (89.7%). While the Ball State students were college seniors, the students at the other schools were in graduate programs.
## Results: Positive change in attitudes to teamwork

<table>
<thead>
<tr>
<th>Teamwork Principles</th>
<th>Mean Pre</th>
<th>Std. Dev Pre</th>
<th>Mean Difference</th>
<th>n</th>
<th>P-value</th>
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<tbody>
<tr>
<td>Team Structure</td>
<td>4.33</td>
<td>.361</td>
<td>.055</td>
<td>144</td>
<td>.026</td>
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<tr>
<td>Post</td>
<td>4.38</td>
<td>.409</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Leadership</td>
<td>4.47</td>
<td>.406</td>
<td>.109</td>
<td>144</td>
<td>&lt;.001</td>
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<tr>
<td>Post</td>
<td>4.58</td>
<td>.411</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Situation Monitoring</td>
<td>4.31</td>
<td>.420</td>
<td>.121</td>
<td>144</td>
<td>&lt;.001</td>
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<tr>
<td>Post</td>
<td>4.43</td>
<td>.444</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Mutual support</td>
<td>4.11</td>
<td>.517</td>
<td>.208</td>
<td>144</td>
<td>&lt;.001</td>
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<tr>
<td>Post</td>
<td>4.33</td>
<td>.567</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communication</td>
<td>4.22</td>
<td>.396</td>
<td>.156</td>
<td>143</td>
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<tr>
<td>Post</td>
<td>4.37</td>
<td>.447</td>
<td></td>
<td></td>
<td></td>
</tr>
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</table>

Umoren, et al. Unpublished data
This simulation provided good information about different ways of handling situations that could happen in reality.

The case study was a better way to learn about the TeamSTEPPS. Sitting through the hour + of the man speaking [TeamSTEPPS lecture] was not a productive way to spend my time.

This is a very cool and interesting learning tool!

I enjoyed the life-like interaction.
VISUALIZATION
OpenSim simulates human movement with robotics

By: Alexis Garduno   November 7, 2011   0 Comments

Stanford researchers have developed an open-source, human-inspired robotics technology that simulates human movement and can be scaled to match individual body sizes, ages and genders.

Astym 3D Visualization

An animation created using Unity3D to visualize specific effects and treatments of tendonosis

http://idialab.org/astym-3d-visualization/
Physiology

BIOME Region
Giant Cell

Courtesy: Carolyn Lowe/VIBE
BioZone Region
Focus on Mycobacterium tuberculosis
Displays include a giant cell, giant genome, large molecules and metabolism model

http://opensim-edu.org/blog/2012/01/biozone/
Biochemistry/Genetics (Genome Island)

ONPG reaction: In which tube was beta-galactosidase present?
ONPG reaction: Click on the tube that you think has the enzyme
Virtual Hallucinations (UC-Davis)
Allows students to experience the life of a schizophrenic patients through visual and auditory hallucinations
http://www.youtube.com/watch?v=s33Y5nI5Wbc
EDUCATIONAL GAMES
Time-to-Adoption Horizon: One Year or Less
- Massively Open Online Courses
- Tablet Computing

Time-to-Adoption Horizon: Two to Three Years
- Games and Gamification
- Learning Analytics

Time-to-Adoption Horizon: Four to Five Years
- 3D Printing
- Wearable Technology
Gamification

Hughes, A. Using Virtual Worlds and Gamification to Enhance Learning. VWBPE 2014
Categories of Educational Games

Hughes, A. Using Virtual Worlds and Gamification to Enhance Learning. VWBPE 2014
East Africa Travelers’ Safety Activity

This is a virtual 3D simulation which uses Open Sim technology. The simulation gives new and experienced travelers an opportunity to test their knowledge of tropical diseases they may encounter and to practice their cross-cultural communication skills.

https://sites.google.com/site/globalhealth3dgrid/
• **LEARNING OBJECTIVES:**
  – Know the etiology, prevention and treatment of common tropical diseases endemic to the East African Region
  – Become familiar with and avoid common risk factors for acquiring tropical diseases
  – Prepare to interact with the local community in a culturally sensitive way, for the purposes of health care, health education and research.

• **YOUR MISSION:**
  – Follow instructions on the signs
  – Pick up your supplies
  – Answer questions on the radio
  – Stay on the path
  – When directed, communicate with members of the local community who are non-player characters (NPCs) by typing in the local chat

• **HEALTH RISKS:**
  – You will encounter biological and environmental health risks.
  – Your supplies include a green exposure tracker to monitor your health and exposures, a backpack with emergency medications and a manual for reference.

• **QUESTIONS?** Contact Rachel Umoreen at rumorenen@iu.edu
Meeting the Maasai herdsman
(Exposure to brucellosis)
Local water sources (Exposure to Salmonella at the community well)
Diagnosing a patient at the local hospital
Physical examination findings are provided

Jaali

Physical Exam
- **General**: pale, diaphoretic, febrile T 38.5C
- **HEENT**: PERL, EOMI, pale conjunctiva, anicteric, no lymphadenopathy
- **Chest**: Diminished breath sounds bilaterally with bibasilar crackles 2/3rd way down the lung. Lung bases dull to percussion left > right
- **Cardiac**: Regular Rate and rhythm, HR 90bpm, BP 100/80mmHg, grade III/VI systolic murmur, S3 gallop present. No S4
- **Abdominal**: distended, uterine fundus 6cm above umbilicus, fetal heart rate 150bpm, hepatosplenomegaly, bowel sounds present
- **Extremities**: thin, pale, with 2+pulses distally in radial, dorsalis pedis, and posterior tibialis, pitting pedal edema bilaterally
- **Neurologic**: CNII-XII intact, normal sensation throughout, 5/5 strength throughout, no neck rigidity

NEXT => Labs/Xray
Small group discussion

• Keeping in mind the broad categories below write down one or two ways that you would like to use virtual simulation in your field
  – Practice & Simulation
  – Collaboration/Distance learning
  – Role-Play/Dramatization
  – Visualization
  – Gaming
References


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