Beyond Mannequins: A Potpourri of Enabling Technology for Healthcare Education

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Beyond Mannequins: 
A Potpourri of Enabling Technology for Healthcare Education

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Associate Chief of Staff/Medical Education
Dayton VAMC, Dayton, Ohio
The Potpourri

• AAMC’s Curriculum Inventory Project
• Disaster Management Training
• Designing a Virtual Patient to Teach Communication
• Breaking Down Silos
The Curriculum Inventory Portal: International Health Professions Curriculum Database

- Benchmark assessment, content, and objectives
- Compare data (e.g. educational methods and location taught in curriculum)
- Map a common set of competencies at the UME, GME and CME learning levels
- Map competencies across specialties

Flexible Reporting System – Summary and Graphical Reports

Shareable framework across institutions
- Institutional Systems
- Vendor Systems
- CIP

Exportable data
- XML
- CSV
- Access
- Excel

Web Service in development with
Disaster Management Training
A Look at High Tech Approaches
San Diego VA Experience

• San Diego has activated the Command Post several times a year
• Bomb Threats, Wild Fires, Pandemic flu
• Needs of both experienced & new staff
  – Improve training methods
  – Increase training
  – Cross train staff with various roles
  – Practice, practice, practice
# Collaborators

**VA HSR&D & UCSD SOM**
- Zia Agha, MD MS
- Alan Calvitti, PhD
- Laura Greci, MD MPH
- Erin Higginbotham
- Samantha Hurst, PhD

**UCSD SOM**
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- Helene Hoffman, PhD
- Todd Porteous
- Tana Troke, MBA

**UCSD Calit2**
- Ricky Huang

**UCSD CRCA**
- Micha Cardenas, MA MFA
- Kristen Kho, MS

**UCSD SDSC**
- Michael Gates
Curriculum

Pandemic Influenza Response

1. Second Life Orientation - Discovery
2. Triage and/or HICS - Knowledge Review
   Reflective Debrief/Hotwash
3. First Drill - Learning
4. Second Drill - Practice
   Reflective Debrief/Hotwash
5. Machinima Review & Stress Management
Learners in a Virtual World

BASIC VR SKILLS

• Interacting with objects
• Changing uniforms
• Private chats
• Private phone calls
• Flying
• Searching virtual world
• Changing avatar appearances

VR EXPERIENCE

• Reinforces new VR skills
• Places skills into context
• Team building exercise—good ice breaker
• 🔄 team communication
• Encourages exploration of new virtual environment
Personal Protective Equipment

Severity Index
## Implementation Assessment

<table>
<thead>
<tr>
<th>Assessment Factor</th>
<th>N</th>
<th>1 (+)</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5 (+)</th>
<th>mean</th>
<th>median</th>
<th>mode</th>
<th>Frequency Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>The exercise was well structured and organized</td>
<td>23</td>
<td>0</td>
<td>2</td>
<td>6</td>
<td>9</td>
<td>6</td>
<td>3.8</td>
<td>4</td>
<td>4</td>
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<tr>
<td>The exercise scenario was plausible and realistic</td>
<td>23</td>
<td>0</td>
<td>3</td>
<td>2</td>
<td>11</td>
<td>7</td>
<td>4.0</td>
<td>4</td>
<td>4</td>
<td><img src="image" alt="Bar Chart" /></td>
</tr>
<tr>
<td>The Second Life orientation helped the participants understand and become engaged in the VA scenario</td>
<td>23</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>12</td>
<td>7</td>
<td>4.0</td>
<td>4</td>
<td>4</td>
<td><img src="image" alt="Bar Chart" /></td>
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</tbody>
</table>
# Implementation Assessment

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<th>5 (+)</th>
<th>mean</th>
<th>median</th>
<th>mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>The participants included the right people in terms of level and mix of disciplines</td>
<td>23</td>
<td>0</td>
<td>1</td>
<td>4</td>
<td>8</td>
<td>10</td>
<td>4.2</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>The exercise provided a good test of knowledge/skills obtained in past training courses (check here if have had no previous training ___) N=6</td>
<td>17</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>7</td>
<td>7</td>
<td>4.1</td>
<td>4.5</td>
<td>4</td>
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<tr>
<td>This exercise was beneficial for me professionally</td>
<td>23</td>
<td>0</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>11</td>
<td>4.0</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>This exercise will benefit the VASDHS</td>
<td>23</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>7</td>
<td>13</td>
<td>4.4</td>
<td>5</td>
<td>5</td>
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</tbody>
</table>

*Frequency Distribution*
Reported Performance Shifts

• Knowledge:
  – “I am now aware of my expected role and responsibilities within the pandemic influenza action plan.” (Judgment in relational terms)

• Skills:
  – “I can provide reliable information and accurate communication using HICS principles.” (Integration of related skills)

• Attitude:
  – “I am confident that I can use the chain of command to perform emergency response tasks effectively.” (Internalized value)

ED nurses observed to “huddle” and plan.
“Let’s do this like we did in the VR drill.”
National Center for Medical Readiness
Calamityville Tactical Laboratory

• 55 acre state-of-the-art, innovative, all-hazards and actual conditions training and research facility

• Bridge the identified recurrent gaps between medical providers and traditional disaster response, e.g. Logistics, Communications, Situational Awareness

• The first site in the US to fully integrate civilian and military relationships, focused on the medical and human support responses occurring during and after a disaster
Development Phases

Phase I (2008-11) - Establish Initial Environment ($9M)
- Obtain site, EPA clean-up, Building renovation, Remediation, Early prop development, New hires
- Begin offering classes in February 2011

Phase II (2011-12) - Maturing the Site ($6M)
- Maximize potential for site (additional props, water feature, logistics warehouse)
- Medical Simulation Center

Phase III (2013-14) - A Sophisticated Setting ($6M+)
- Reassess programs/products, Build on strengths
Designing a Virtual Patient for Communication Training

April Barnes, M.S., Ph.D. Candidate
Jennifer Cloud-Buckner., Ph.D. Candidate
Jennie Gallimore, Ph.D.
Rosalyn Scott, M.D., M.S.H.A.
Attributes of Conventional Virtual Patient

- Information presented to user through video or text
- Best for training clinical reasoning/decision-making skills

**Abdominal Exam**

**History**
- Chief Complaint
- History
- Past Medical History
- Menstrual Cycle
- Disturbance with Movement
- Shoulder Pain
- Frequency and Urgency

**Physical Examination**

**Summary**

**Picture/video of patient**

Navigation Menu
Research Goals

- Develop high-fidelity, interactive VP
  - Realistic appearance (3D, animated, full body, non-verbal behavior)
  - Speech recognition
    - Natural, conversational capability
  - Animated facial expressions, gestures
  - Adaptive responses and emotion detection
- Develop training related to communication skill performance
Virtual Patient Framework

INPUT

- Speech Recognition
- Signal Processing (tone, inflection)
- Key word Processing (learning algorithm)

Evaluation/Coding of Context in Communication Model

Selection of Responses (emotion, non-verbal, verbal)

Communication Analysis for Learner Feedback

VP Output

Learning Objective, Scenario Development
Continuing Work

• Conduct study: Comparison of training with SP alone to training with VP and SP.

• Move from prototype to build a VP in a gaming environment with more realistic non-verbal movements.
  
  • Army project to develop learning for cross-cultural competencies focusing on non-verbal behaviors.
System Under Development for Army Cultural Competence Training

- Unreal Tournament SDK game engine
- Stereoscopic 3D display
- Maya 3D, object editing software for body and object creation.
- FaceFX for visual expressions and matching speech phonemes with mouth movements.
- Custom creation of facial action movements
- Natural Speaking Professional
- Scripting language in Unreal Tournament.
- Ipisoft and PlayStation video cameras (6) for creating natural body movements into characters.
Simulation in Silos

- Simulation has become an essential part of healthcare education
- There is little or no integration between training tools and systems
- Simulation modalities are siloed and disconnected which in turn limits their utility and ROI
- Limited resources restrict implementation in many environments that would benefit from their use.
- Unmet challenge: how to integrate simulation devices and other resources
The Northern Ontario Simulation for Healthcare Network Experience

CHALLENGES

• Few centers using resources maximally
• Great variation in extent and form of use
• Lack of personnel was biggest challenge
• Limited space, equipment and expertise

APPROACHES

• Policies for sharing equipment/scenarios/skills
• Joint activities to explore collaborations
• Shared online environment: wiki, database, file server and object repository
HSVO
Health Services Virtual Organization

- OpenLabyrinth – virtual patients
- SimMan 3G – mannequin
- Camera array
- Hypovolemic Shock Model
- Bassett Collection
- Visible Human
- CMA, PubMed etc
- Camera array engine
- Remote Stereo Viewer (RSV)
- VOLSEG
Going Forward

- Many ways to implement simulation continua
- Classic opportunity for standards activity
- Key role in bridging safely and confidently into practice