Integration of Instructional Technology in new Health Sciences Education facilities

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Agenda

- Clinical Skills
- Simulation
- Software Management
- Anatomy
- Classrooms
- Engineering Applications
- Cost
List of Projects

• University of Central Florida, Medical Education Building
• Brown University Warren Alpert Medical School, Med Education Building
• Case Western Reserve University School of Medicine / Cleveland Clinic Lerner College of Medicine
• New York Medical College, Clinical Skills Training Center
• Eastern Virginia Medical School, Medical Education and Research Building
• Michigan State University College of Human Medicine, Secchia Center
• Central Michigan University, Simulation Suite
• Northeastern University, Bouvé Simulation Center
• Yale School of Nursing
• University of Tennessee, Interprofessional Center
Why it is Important!
Clinical Skills

Eastern Virginia Medical School
Medical Education and Research Building

Michigan State University College of Human Medicine
Secchia Center
Clinical Skills

New York Medical College
Clinical Skills Training Center
Clinical Skills

New York Medical College
Clinical Skills Training Center
Clinical Skills
Exam Room Technology

- Cameras (2 or more)
- Microphones
- Telephone
- Loudspeakers or intercom
- But not local start/stop controls
Clinical Skills
Control Room Technology

University of Central Florida
Medical Education Building
Clinical Skills
Control Room Technology

- Manages daily activities, controls recording
- Supervises the movement of people
- Scheduling and administrative tasks
- People-management activities
Clinical Skills
Faculty Viewing

Eastern Virginia Medical School
Medical Education and Research Building
Simulation
Introduction
Simulation

Michigan State University College of Human Medicine
Secchia Center
Simulation

Central Michigan University
Saginaw Facility
Simulation: Manikin Technology
High-fidelity/Low-fidelity

- Control systems
- Wireless vs. umbilicals
- Compressed air
- Other gases
- Maintenance
- Costs

Eastern Virginia Medical School
Medical Education and Research Building
Simulation
Virtual Simulation

Eastern Virginia Medical School
Medical Education and Research Building
Simulation
Virtual Simulation

- An extension of research facilities
- Immerse the participant in a virtual setting
- Custom built, many options
Simulation
Task Trainer room

Eastern Virginia Medical School
Medical Education and Research Building
Simulation
Large-scale

- Disaster
- EMTs
- Helicopter Simulation

Lorain County Community College
Laboratory Sciences Building
Simulation
Bed Lab

Lorain County Community College
Laboratory Sciences Building

Yale University
School of Nursing
Simulation
Various Infrastructure Needs

- Design for flexibility
- Extensive data communications
- Headwall infrastructure
- Monitors
- Manikin support
- Power loss
Simulation
Control Room Technology
Simulation
Control Room Technology

- Running the simulation
- Recording the simulation
- Creating an auditory environment
- Communications
- Control room may serve several simulation rooms
Simulation
De-brief rooms, Recording, Videoconferencing Capable

- Replay and discuss the simulation
- Record the debriefing activity, so cameras and microphones
- Participation by off-site specialists, video conferencing
Simulation
Video Studio

- More extensive recording than in skills or simulation rooms
- Produce training videos
- Substantial needs for space, lighting, electrical power
- Quiet acoustics

Eastern Virginia Medical School
Medical Education and Research Building
Software Management
Introduction
Software Management
Pedagogical Decision (Including Electronic Health Records)

- Capture the simulation activities for assessment and review
  - Actions of the learner
  - Actions of other participants (anesthesiologist, nurse)
  - Condition of the environment
  - State of simulation mannequins, vital signs
- Real-time bookmarking and assessment
- Management of SP’s, supplies, schedules, payroll
- Support for electronic medical records
- Integration with IT resources
Software Management
Software/Hardware

- Not all recording equipment (cameras) works with every software system
- Select software first, equipment last
- Recording is all digital, cameras may not be
<table>
<thead>
<tr>
<th>Software Management</th>
<th>Software/Hardware</th>
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<tbody>
<tr>
<td><strong>Video</strong></td>
<td>B-Line Medical</td>
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<tr>
<td>Video recording</td>
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<td>Sim data capture</td>
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<td>Intercom</td>
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<td><strong>Software</strong></td>
<td>EMS</td>
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<td>Components</td>
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<td>Database</td>
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<td>Authentication</td>
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<td>Other</td>
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<td>Supported clients</td>
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<td><strong>Implementation</strong></td>
<td>METI LearningSpace</td>
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<td>AV</td>
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<td>Server hardware</td>
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<td>Network infrastructure</td>
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<td>Backup</td>
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<td>Costs</td>
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<td><strong>Support</strong></td>
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<tr>
<td>Hardware</td>
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<td>Software</td>
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<tr>
<td><strong>Claimed strength</strong></td>
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</table>
Software Management
Equipment Room

- Digital video recorders and storage
- Video conferencing systems
- Secondary systems (hallway cameras, intercommunications)
- Consider this a server room
Anatomy

University of Central Florida
Medical Education Building
Anatomy
Technology at Each Table

- Video monitor, with interface
- Camera at selected tables
- Lighting
- Ventilation
- Power
- Gesture-recognition

Central Michigan University
Medical Education Building
Anatomy
Divided Rooms – Communications

- Sound amplification for instructor
- Videoconferencing, allows procedure to be viewed by large group

University of Central Florida
Medical Education Building
Anatomy
Virtual Anatomy

- Anatomage flat table simulates dissection
- Biodigital human (2D on desktop, 3D on special displays)
Anatomage offers a unique, life-size virtual dissection table for the medical community. Anatomage Table offers an unprecedented realistic visualization of 3D anatomy and interaction. Delivering accurate anatomical details, it is complimentary to cadaver-based dissection courses. For anatomy courses without cadavers, Anatomage Table offers the most realistic virtual cadaver. This cutting edge technology will help raise the standards of medical education to the next level.

Full Body Life Size
Anatomage Table offers stunning visualization of full body anatomy in Life Size. The perception is the next best thing to real patients or full body cadavers.
Other Learning Spaces

- Studio classrooms
- Large format spaces
- Small format spaces
Separation of Simulation vs. Other Learning Spaces

Central Michigan University
Medical Education Building
Other Learning Spaces
Studio Classrooms
Other Learning Spaces
Studio Classrooms - Distributed Learning CMU, UVA

- Students learn from each other
- TEAL classrooms at MIT, other models
- Technologies
  - local student images
  - wireless networks
  - voice interactivity
  - whiteboards
  - BYOD (Bring Your Own Device) – phones, iPads
- How prominent is the instructor?
  - Is this also a lecture room?
Other Learning Spaces
Large Format Teaching

- Dual image (requiring a wide teaching wall)
- Document camera (requiring a large teaching station)
- Videoconferencing (needs far-end image), microphones
- Tele-presence
- 3-D displays (in smaller rooms)
- Wireless data to students, wired to instructor
- Testing may require data, reduce seat count
Classrooms
Small Format Problem-Based Learning

- Whiteboards – emphasize interaction and teamwork
- Single display
- Smart-boards
- Other emerging technologies
Other Learning Spaces
Small Format Teaching
Emerging Applications
Tele-presence
Other Learning Spaces
A/V asset management

- Remote operation if instructor requests
- Reporting of failures
- User help desk
- Scheduled operation (turn off at midnight)
- Usage tracking
Emerging Applications
New Technologies in Large-scale Displays

- Touch interaction is everywhere
- Different geometries possible, not necessarily rectangular
- Assume that any size display can be created, though cost may be substantial
- Large displays will be ubiquitous
- They will also be touch-enabled
- They will have a big impact on interaction - imagine tele-presence and tele-medicine training
- The technology will be equipped with IR sensors such that one can gesture at the screens to turn pages, zoom in etc.—imagine such media in an Anatomy lab
- Online courses coupled with real time large displays (skeleton, models etc), and interactive assessment/competency in the subject matter will be in a virtual feedback loop that will allow crediting of courses and eventual accredited degrees (Georgia Tech already doing)
Emerging Applications
New Technologies in Large-scale Displays
Emerging Applications
New Technologies in Large-scale Displays

Cleveland Museum
Gallery 1
Emerging Applications
Touch interaction is everywhere
Emerging Applications
Large-scale Displays
Emerging Applications
Displays are Becoming Life Size
## Cost
Can be 5% of Construction Cost, up to 10%

<table>
<thead>
<tr>
<th>Institution</th>
<th>Audiovisual Budget</th>
<th>Software Budget</th>
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<tbody>
<tr>
<td>A</td>
<td>$2.6 M</td>
<td>They already owned WebSP</td>
</tr>
<tr>
<td>B</td>
<td>$2.5 M</td>
<td>They already owned WebSP</td>
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<tr>
<td>C</td>
<td>$1.3 M</td>
<td>WebSP $235K for 16 skills rooms</td>
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<tr>
<td>D</td>
<td>$1.6 M</td>
<td>EMS $467K for 12 skills rooms and 2 sim rooms</td>
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<tr>
<td>E</td>
<td>A/V &amp; B-Line together estimate $2.0M, A/V only, $1.4M</td>
<td>B-Line only, $600K</td>
</tr>
<tr>
<td>F</td>
<td>rough estimate $300K</td>
<td>CAE/METI quote $387K for 20 skills rooms and 2 simulation rooms</td>
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Take-Aways

• Complex integration process – many players
• Significant costs of A/V and manikins
• Significant costs of operation/maintenance