Virtual Patient And Medical Device Simulation In Second Life: The Use Of Immersive Virtual Worlds For Learning And Patient Safety

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Summary

- Background – Department and Synopsis of Project
- Introduction to Second Life for Healthcare
- Virtual World Simulation Projects
- Virtual Patient/Medical Device Simulation Project Details
- Future work
Imperial College London – Department of Biosurgery and Surgical Technologies (BSST)

**Clinical Diagnostics**

**Future technologies**

**Care Closer to Home**

**Virtual Healthcare**

**Sensing & Imaging**

**Skills assessment, Simulation & Training**

**Education**
Virtual Worlds Applications in Healthcare ....

- Public Engagement
- Patient Safety & Information
- Knowledge Sharing

- Professional Education
- Design Innovation
- Future Service Delivery

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The 3D Web

Island Department of Biosurgery and Surgical Technology

Website (with related links)

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Website (with related links)

Isolated

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Community
Imperial College is in the SciLands
- an open-ended International *Interdisciplinary* Education/Research Community

SciLands – founded Dec 06

**BERR (Future Focus)**  
Nanotechnology (NPL)  
**NASA, NOAA, CSIRO**  
**National Institutes of Health**  
Imperial College London  
JPL, National Space Society  
Mars Institute, Space Studies Institute  
Caltech, EPA, DOE  
**SF Exploratorium**  
**Tech Museum of Innovation**  
IYA2009  
**University of Denver**  
Elon University  
**Texas Wesleyan University**  
**Memorial Sloane-Kettering Cancer Center**  
Princeton Institute of Advanced Research  
Science Friday  
Naked Scientists  
**University of Texas at San Antonio**  
Westchester University  
ACM Supercomputing  
Classroom of the Future  
**Navy Research Laboratories**  
**North Michigan University**
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Medical School Island
Second Health – Public Engagement

• Future of health care provision in London
• Need for visualisation of strategy

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http://secondhealth.wordpress.com/movies/
Second Health – London access to care in the age of Polyclinics

http://www.secondhealth.org
Why virtual worlds simulations?

- We have a focus on specialized simulation technologies for key skills training and surgical accreditation: from procedural to cognitive and team interaction.
- In modern, time-pressured curricula there is reduced clinical contact and limited ward-based teaching.
- Dedicated simulator experience-based training is effective, but widespread uptake has been slow due to high cost and need to adequately portray complex clinical environments (staff, actors & equipment).
- BSST are therefore exploring simulated clinical scenarios in virtual worlds.
Second Life for Training - Methods

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Virtual Worlds Technology Enhances Medical Student Training In The Operating Room


*n=33.*

Virtual worlds group less stressed about visiting real world OR (P=<0.004)
Virtual Hospital - Simulated Patients

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Virtual Patient And Medical Device Simulation Project

Objectives

- Develop and evaluate a contextual simulation based on realistic clinical scenarios and protocols as a research tool
- Demonstrate an environment enabling participants to learn and practice in a complex but safe environment where they could make mistakes, without risk to any real patients
Simulation involves Virtual Patients, Medical Devices and Immersive 3D Clinical Environments

Developed in consultation with nursing staff and an interdisciplinary team

Adopted the virtual world of Second Life where we are actively engaged with several collaborators and have amassed experience since 2005

Experimented with the Medbiquitous standard for virtual patients for specific content items
Why Medical Device Training?

- Medical devices are an important source of clinical error
- Widespread medical device training can be difficult to provide
- Where provided it often lacks an appropriate clinical context
Prospective feasibility study with nurses recruited from several departments at St Mary’s Hospital, Imperial College Healthcare NHS Trust

Results

Feasibility study funded by NHS Training for Innovation (formerly THOTH)

- All participants felt this form of training was useful for in-service practice
- Almost all felt that this form of training should be made available for nursing students

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Provides evidence that …

- 3D Virtual World Clinical Scenarios can be used as an affordable, engaging teaching aid
- Can provide objective feedback and analysis for the student
- Facilitates real time remote learning
- High fidelity clinical simulations provide compelling and safe environments for medical device training
We propose that these could become a standard online method for medical device training.

However, it is still early days for virtual worlds and this type of development requires several specialist skills.

We are continuing this research with a larger cohort.

In the rest of this talk I will illustrate the scenarios and examine the role that Medbiquitous could play in de-skilling development.
Virtual patient and device simulation

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Objectives of Project

- Create a facility in SL to host medical device training
- Provide environment for medical device training
- Develop simulation methods to enable users to interact with the medical device and patient
- Develop a clinically relevant and engaging scenario
- Develop a tailored initiation program for the new SL user
- Validate the use of the training scenario by experienced health care professionals
Virtual Training Facility
Enrolled in instructional sessions including:
- NHS Trust Based Courses
- Industry representative led sessions
- E-learning modules

Consulted experts including:
- A consultant anaesthetist
- A reader in surgical education,
- 2 Senior nursing representatives
- An infusion pump training specialist
- A senior research associate
- A 3D designer
- A senior bioengineer with experience in medical device training
Feasibility Study Participants – 11 nurses

- 10 classified themselves as ‘Beginners’ (ie. experience with WP, email and internet browsing)
- 1 participant classified as ‘Intermediate’ (specialist packages, eg statistics or editing)
- Majority had used a computer game but not regularly
- 1 had used Second Life before

- 50% had been on formal infusion device training
- 50% had formal structured ward based training
- 2 had experiences training on adverse scenarios related to infusion devices
Illustrating the Scenario

http://secondhealth.wordpress.com/clinical-scenarios/
Feasibility Study Results

- Mean time for orientation = 10 mins (5-18 mins)
- Mean time taken for scenario = 22 mins (16-27 mins)

- N=9 agreed SL induction was sufficient for scenario
- N=7 were able to navigate easily within the simulator
- N=8 found the simulation a good representation of a real clinical environment

- All participants felt scenario was useful for medical device clinical scenario training
- N=9 recommended this form of training should be used for nursing students

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The scenario was a realistic clinical situation.

The tasks performed in the scenario were similar to those in real life.

The virtual patient responded appropriately to interventions.

The medical device responded appropriately to interventions.

I would perform the same assessments and interventions in real life.

The scenario was a realistic clinical situation.

Participant agreement with statement (%)

- I would perform the same assessments and interventions in real life: 90%
- The medical device responded appropriately to interventions: 95%
- The virtual patient responded appropriately to interventions: 100%
- The tasks performed in the scenario were similar to those in real life: 98%
- The scenario was a realistic clinical situation: 100%
Medbiquitous and Pivote

- Virtual Patient is significant part of the scenario
- Medical device simulation can be incorporated in the VP
- Have re-created significant portions of scenario using Pivote
- Can incorporate media for different player types in the medbiqititous package
- Can originate 2D web player media from 3D virtual world
Ongoing work

- Larger more in depth evaluation
- Further scenarios involving patient cases compatible with Medbiquitous standards
- Investigate 3D environment simulations that permit greater freedom to explore and interact with (eg. Physiology)
Virtual Worlds Applications in Healthcare....

Public Engagement

Patient Safety & Information

Knowledge Sharing

Professional Education

Design Innovation

Future Service Delivery

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THANK YOU

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