

ASSESSING STUDENT ACHIEVEMENT OF LEARNING OUTCOMES USING A 3D COMMUNITY HEALTH VIRTUAL SIMULATION PROGRAM

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Continuing Nursing Education



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DISCLOSURES

Conflict of Interest

- Tona Leiker, PhD, APRN-CNS, CNE reports no conflict of interest
- Karen Whitham, EdD, MSN, MS, CNE reports no conflict of interest
- Julia Greenawalt (INACSL Conference Administrator & Nurse Planner) reports no conflict of interest
- Leann Horsley (INACSL Lead Nurse Planner) reports no conflict of interest

Successful Completion

- Attend 90% of session
- Complete online evaluation



OBJECTIVES

Upon completion of this presentation, participants will be able to:

- 1. Design and implementation of 3D virtual simulation for online RN to BSN students: Community Health.**
- 2. Support the development of student learning activities by demonstrating curricular mapping to articulate high priority design elements.**
- 3. Demonstrate student single sign-on capacity to log student time and activity in the virtual world, including movement within the virtual worlds.**
- 4. Discuss formative and summative assessments and data analysis that provided support for continued use and ongoing development of two virtual world learning experiences.**

GAP AND DESIRED STATE

Gap:

There is a knowledge gap on the outcomes of formative and summative assessments in 3D simulations in nursing education.

Desired State:

Current state is that virtual simulations are being developed and used in academic nursing programs to support clinical learning experiences.

Therefore:

Share knowledge gained in developing formative and summative assessments for online courses using 3D virtual simulations.



OBJECTIVE 1

- 1. Design and implementation of 3D virtual simulation for online RN to BSN students: Community Health.**

QUICK FACTS

- **American Sentinel University, Aurora, CO**
- **Collaboration between: Multiple Nurse Educators, Academic Administrators, Instructional Designers, 3D World Professionals, and University Assessment Personnel**

THE TECHNOLOGY

- **3D World Platform: Unity 3D 5 – Converted in 2016**
- **Interactive Communication: A flexible open source chatbot engine**
- **NPE (non-playing characters) - Miximo**
- **Learning Management System: Moodle**
- **Access: Single-sign-on Capabilities**

WORKGROUP MEETINGS

Weekly CITL Technical Review	Monthly CITL Pedagogy Review	Quarterly CITL Committee Meeting	Nursing CITL Workgroup Meetings
Occurred every Thursday	Occurred the first Thursday of each month	Occurred once per quarter	Occurred once a month on Tuesdays
Technical Team: Bugs, building, language, design	Curricular focus - learning outcomes driven	Includes executive team and administrative leadership – oversight group	Nursing workgroup – Curricular alignment with QSEN; project updates; volunteers; DNP projects, demos, etc.



NURSING PROGRAMS TECHNOLOGY ENHANCED LEARNING CURRICULUM MAPPING

Course	AACN Essentials*	Activity	QSEN**	Assigned Personnel	Requisite Technology	Progress
BSN432PE – Community Health Nursing	Integrate theories and concepts from liberal education into nursing practice. (EI-1.)	Write a letter to head of the health department to improve the water quality in the city. (C1.M2)	Appreciate importance of intra- and inter-professional collaboration. (TC-A)		Sentinel City - City Hall	Not started. Approved to develop. In development. Testing. Complete.

WORKGROUP DASHBOARD



Center for Innovation in Teaching and Learning (CITL)

-2014 Project Roadmap

Project Synopsis	Q1 1/1-3/31/2014	Q2 4/1-6/30/2014	Q3 7/1-9/30/2014	Q4 10/1-12/31/2014	Dashboard 1/1-12/31/2014
<p>Virtual Hospital- Health Assessment</p> <ul style="list-style-type: none"> 2014 Budget-\$75,000 Project Lead- Trevor Staff Involved <ul style="list-style-type: none"> John Tona, Karen Margaret, Bruce Contractors <ul style="list-style-type: none"> Shadow Health Reaction Grid Courses <ul style="list-style-type: none"> BSN432 & BSN437 N522 More possible Final Completion <ul style="list-style-type: none"> 8/1/2014 Sign-off- <ul style="list-style-type: none"> Judy 	<p>Due to CITL activities in 2013, we are now in the beginning stages of developing a Virtual Hospital that will house many future activities within the nursing curriculum. The first of these activities revolves around a product developed by Shadow Health: Tina Jones Sim. This simulation takes students through two versions (undergraduate/graduate) of a head-to-toe health assessment. In 2013, the nursing team decided to implement this sim into two new courses (Health Assessment and Advanced Health Assessment).</p> <p>-Shadow Health's Tina Jones Sim- to be implemented and tested in Q1 & Q2 of 2014.</p> <p>-Other Activities in the Virtual Hospital- Informatics, ethics ect. To be tackled in Q3 & Q4 of 2014.</p> <div style="display: flex; flex-direction: column;"> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">Determine accessibility and Single Sign-on options (RT, Karen, Tona, Trevor, Shadow Health)</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">Determine the graduate & undergraduate faculty needing training, and execute any training necessary. (Karen, Tona, Shadow Health)</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">Develop orientation materials to introduce students to accessing and paying for the sim. (Trevor)</div> </div> <div style="display: flex; flex-direction: column;"> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">Evaluate and integrate Shadow Health simulation into health assessment courses (BSN432, BSN437, BSN522) at both the graduate and undergraduate levels (Bruce, Karen, Tona)</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">Ongoing testing during trial period for each project (Margaret).</div> </div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">Build interiors of Virtual Hospital (John, Trevor, Reaction Grid)</div> <div style="border: 1px solid black; padding: 5px;">Add other rooms, examples, instrumentation, informatics etc. (Margaret, John, Trevor)</div>				<div style="border: 1px solid black; padding: 5px;"> <p>■ Complete</p> <p>■ Partially Complete</p> <p>■ Incomplete</p>  </div>
2014 Deliverable Goals:	3/1	3/31 4/21	6/30	9/30	12/31



OBJECTIVES 2 AND 3

Support the development of student learning activities by demonstrating curricular mapping to articulate high priority design elements.

Demonstrate student single sign-on capacity to log student time and activity in the virtual world, including movement within the virtual worlds.

RESOURCES FOR FACULTY AND STUDENTS

Sentinel City™ 2.2
Faculty Guide
v1

Sentinel City™ 2.2
Student Guide
V1

Sentinel City™ 2.2
Quick Start Guide

EXAMPLE OF A QUICK START GUIDE



Sentinel City™ 2.1 Instructions

Step 1

Download the newest version of [Firefox®](#), and use it to run the simulation.

- This simulation will only work in Firefox® 43 or higher. Download the newest version for free here: <https://www.mozilla.org/en-US/firefox/new/>
- Simply follow the on-screen instructions provided by Firefox® before proceeding to the next step.

Step 2

Click here to open the [Sentinel City™ 2.1](#) simulation and select an avatar.

- Open the link above in Firefox®.
- Select an avatar by clicking "Select" next to either the male or female characters on the first screen.
- This will be the avatar used throughout the activity.

Step 3

Listen to the voice-over instructions and expand the view to full-screen mode.

- For the best viewing experience, toggle to full-screen mode by clicking: 
- Select a bus speed and then press "Start"

Icon Legend



City Demographics



Neighborhood Demographics

Quick Tips!

- ✓ Make sure your speakers are on
- ✓ Use the arrow keys on your keyboard to walk around when getting off the bus
- ✓ Click and drag your mouse to look around
- ✓ To get back on the bus, simply click "Get on Bus".
- ✓ Close the browser window to exit
- ✓ The simulation will not work on mobile devices
- ✓ Only access on a PC or Mac, using Firefox® 43 or higher
- ✓ If you are unable to see all icons, toggle to full-screen mode in Step 3 above
- ✓ Assure there is a strong and reliable internet connection

EASE OF USE – SINGLE SIGN ON THROUGH COURSE



EASE OF USE – TAKING THE BUS



CITY QUADRANT DEMOGRAPHICS

The screenshot shows a virtual city street scene. In the top left, there is a blue button labeled "DRIVE BUS" and a red icon of a bus. In the top right, there is a blue button labeled "GET OFF BUS" and a purple camera icon. A semi-transparent grey overlay box on the left side of the screen displays demographic data for the "INDUSTRIAL HEIGHTS" area. The data includes population, veterans, ethnicity, age groups, income, and insurance statistics. The background shows a wide street with yellow double lines, multi-story brick buildings, and a clear blue sky with some clouds.

INDUSTRIAL HEIGHTS

Population	- 38855
Veterans	- 607
Primary Ethnicity	- Hispanic or Latino 46.8%
Secondary Ethnicity	- Black or African American 13.1%
Persons Under 5 Years	- 10.9%
Persons Under 18 Years	- 20.8%
Persons 65 Years and Over	- 0.9%
Median Household Income	- \$24,672
Disabilities Under Age 65	- 12.9%
Persons without health insurance, under age 65	- 37.5%

CITY CHILDREN



A VIEW FROM THE BUS



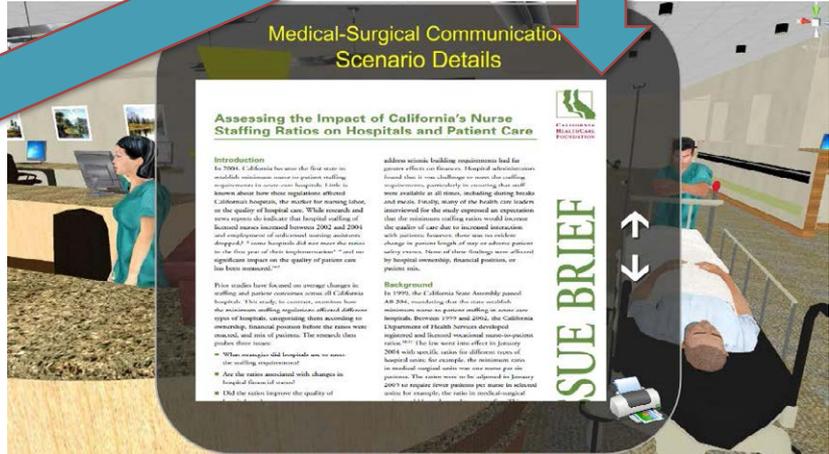
A VIEW OUTSIDE THE BUS



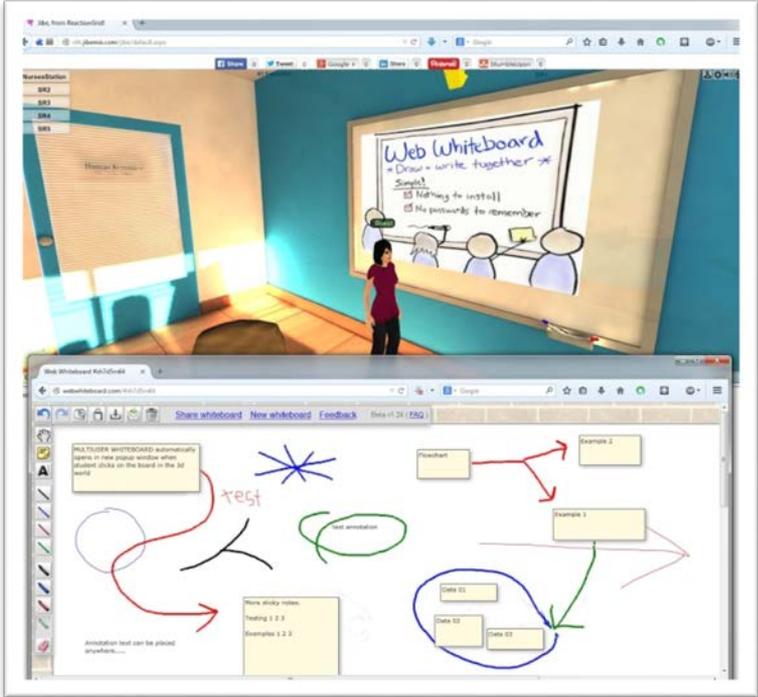
BUSY CITY STREET CORNER



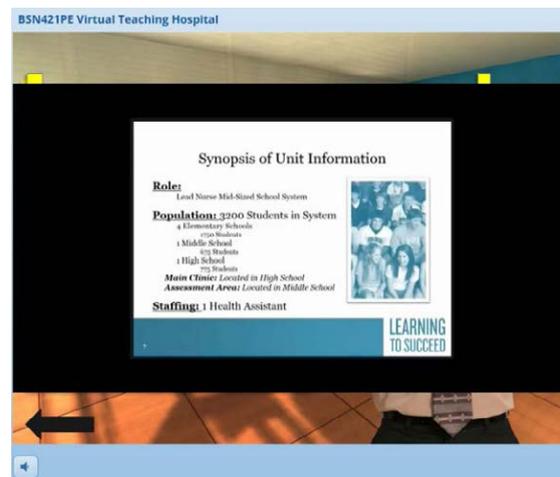
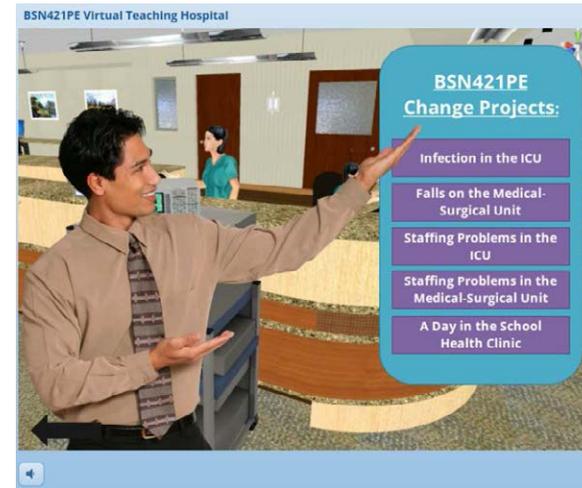
SELECTING A CHANGE PROJECT... VIRTUAL TEACHING HOSPITAL – IN 3D



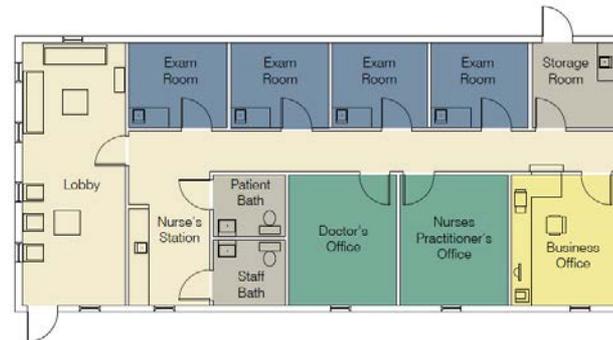
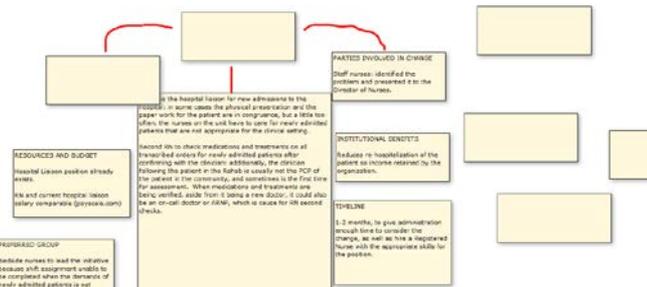
EXPLORE THE SITUATION ROOM



2D VERSION OF VIRTUAL TEACHING HOSPITAL



2D VERSION OF VIRTUAL TEACHING HOSPITAL CONTINUED



Webliography for Change Projects

- [Academy Health](#)
- [Agency for Healthcare Quality and Research](#)
- [American Nurses Credentialing Center](#)
- [American Nurses Foundation](#)
- [American Public Health Association](#)
- [American Society for Healthcare Executives](#)
- [Center for Disease Control and Prevention](#)
- [Center for Studying Health System Change](#)
- [Centers for Medicare & Medicaid Services](#)
- [Changes in Health Care Financing & Organization](#)
- [Council on Health Care Economics and Policy](#)
- [Eastern Nursing Research Society](#)
- [Economics Departments, Institutes & Research Centers](#)
- [Health Affairs: The Journal of the Health Sphere](#)
- [Health Finance Management Association](#)
- [Health Information Management Systems Society](#)
- [Health Services Research Journal](#)
- [Healthcare Finance News](#)
- [HealthEconomics.Com](#)
- [Institute for Healthcare Improvement](#)
- [Joint Commission for Accreditation of Healthcare Organizations](#)
- [Managed Healthcare Organization](#)
- [Midwestern Nursing Research Society](#)

- Legend
- Public Area
 - Exam Rooms
 - Business Office
 - Support Rooms
 - Back of House



OBJECTIVE 4

Discuss formative and summative assessments and data analysis that provided support for continued use and ongoing development of two virtual world learning experiences.

QUALITATIVE AND QUANTITATIVE ASSESSMENTS

Formative Assessments

BSN432PE

Summative Assessments

Virtual Simulation Course Surveys

BSN432PE Community Health

BSN421PE Leadership and Management

Academic Assignment Assessments

End of Course Surveys

Student

Faculty

EXAMPLE OF STUDENT REPORT

SENTINEL CITY™

REPORT

EXAMPLE OF STUDENT USE OF CAMERA WITHIN THE WORLD



ASSIGNMENTS

BSN421PE Leadership and Management

Four Assignments

Final Project

Eight Weekly Discussion Forums

BSN432PE Community Health Nursing

Four Assignments

Final Project

Eight Weekly Discussion Forums

****All curricular mapping benchmarks met for multiple terms in both courses.**

FEEDBACK FROM STUDENTS

☐ *“Enjoyed the Sentinel City experience. I felt the program was very easy to use and fun. More detailed than I had expected. More realistic than I had anticipated. I strongly recommend this program to other students.”*

☐ *“Sentinel City was fun and exciting to use. Positive learning experience that brought with it a new way to visualize and interpret the surrounding community.”*

☐ *“Allowed me to use a windshield approach . . . from the comfort of my home, at my convenience and on my own time. It is technology at its best.”*

FEEDBACK FROM FACULTY

- “This was an optimal way to teach about a windshield survey... Students could go back in and view it as many times as they needed to, and the common experience supported discussion between peers.”*
- “In traditional educational settings, there are many experiences that pass for a windshield survey, but using Sentinel City provided more directed observations after which several students related that they were now paying attention to these concepts in their home community. This transference is valuable to students’ learning.”*
- “This is a tremendous tool for our students and a wonderful vehicle for us to teach about community nursing... [the program lets] the students explore as many times as they would like, and each foray into Sentinel City allowed them to observe something new. The online format also is very convenient, allowing them to interact when they are able, a documented benefit of virtual simulation... immersion in Sentinel City can only enhance students’ learning. They will have more control to examine and explore.”*
- “As an instructor, the simulation allowed me to know exactly what the students were viewing so that I could draw connections between their reading and what they were seeing.”*

PRE AND POST SIMULATION SURVEYS

Overall have a greater than 80% student response rate to pre and post surveys in virtual simulation courses across the university.

BSN432PE Simulation Surveys:

In BSN432PE 6.67% of respondents strongly agreed with knowing what a windshield survey is whereas, 100% strongly agreed at end of course. And, 66.66% felt confident in doing a windshield survey at the beginning of the course as opposed to 100% at end of course.

BSN421PE Post Simulation Surveys:

In BSN421PE 83% (3D) and 86.66% (2D) of respondents agreed/strongly agreed with: There were enough opportunities in the simulation to find out if I clearly understand the material and 77% (3D) and 93.33% (2D) of respondents agreed/strongly agreed that the simulation resembled real life.

All things considered, were you satisfied with your studies with us?

END OF COURSE SURVEYS

Students

In both courses, 100% of students responded yes to:

Did you achieve, or will you achieve upon completing your studies, the goals you had when you started the course or program?

Would you recommend these studies to a friend?

All things considered, were you satisfied with your studies with us?

And, self-reported:

In BSN432PE, 95.83% and in BSN421PE 100% of the respondents reported that the learning materials, including the text, contributed to my learning.

Faculty

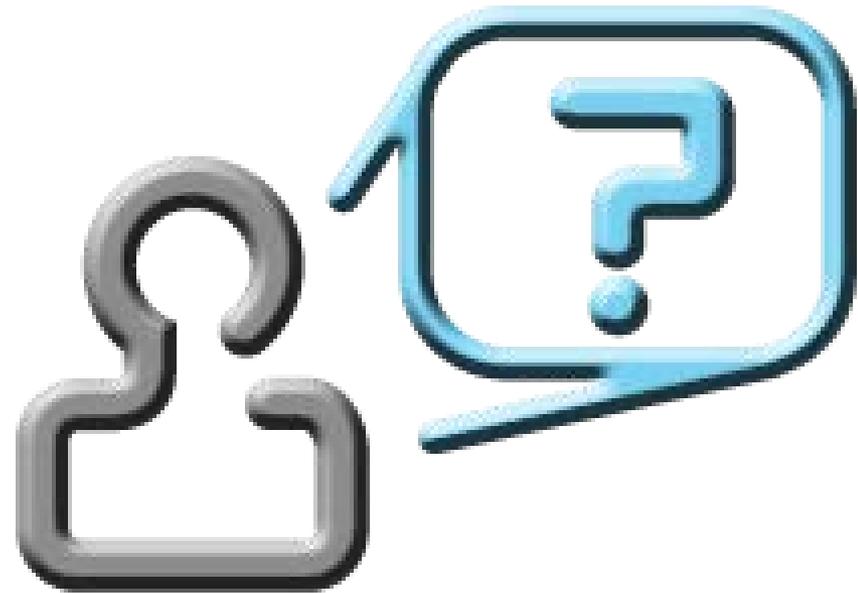
In both courses, 100% of faculty responded to faculty survey that these courses do not need revision.

REFERENCES

- Annetta, L. A. (2008). *Serious educational games: From theory to practice*. Rotterdam, The Netherlands: Sense Publishers.
- Annetta, L., & Bronack, S. (Eds.). (2011). *Serious educational game assessment: Practical methods and models for educational games, simulations and virtual worlds*. Rotterdam, The Netherlands: Sense Publishers.
- Chodos, D., Stroulia, E., King, S., & Carbonaro, M. (2014). A framework for monitoring instructional environments in a virtual world. *British Journal Of Educational Technology*, 45(1), 24-35.
- Dalgarno, B., & Lee, M. J. W. (2010). What are the learning affordances of 3-D virtual environments? *British Journal of Educational Technology*, 41(1), 10-32.
- Foronda, C., Godsall, L., & Trybulski, J. Virtual clinical simulation: The state of the science. (2015). *Clinical Simulation in Nursing*. doi:10.1016/j.ecns.2012.05.005
- Foster, A. (2008). Professor avatar. *Education Digest*, Vol. 73 Issue 5, p12.
- Hansen, M. M. (2008). Versatile, immersive, creative and dynamic virtual 3-D healthcare learning environments: A review of the literature. *Journal of Medical Internet Research*. 10:3.
- Jeffries, P. R. (2007). *Simulation in nursing education: From conceptualization to evaluation*. New York, NY: National League for Nursing.
- Kleinheksel, A. J. (2015). Transformative learning through virtual patient simulations: Predicting critical student reflections. *Clinical Simulation in Nursing*. doi:10.1016/j.ecns.2014.02.001
- Miller, M., & Jensen, R. (2014). Avatars in nursing: An integrative review. *Nurse Educator*, 39(1), 38-41.
- Mon, L. M. (2012). Professional avatars: Librarians and educators in virtual worlds. *Journal Of Documentation*, 68(3), 318-329.
- Noteborn, G., Dailey-Hebert, A., Carbonell, K., & Gijsselaers, W. (2014). Essential knowledge for academic performance: Educating in the virtual world to promote active learning. *Teaching & Teacher Education*, 37217-234.



Questions?



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