**Presentation Overview**

- Introduction
- Standardized Patients, Simulations and Emerging Technologies
- Implementing Advanced Clinical Education Tools
- Measuring Competencies and Learning Outcomes
- SimuCase Technology (ODE-OMNIE funded)
- Colt - Voice Simulated Case Study
- Latreece - Language and Literacy Case Study

**Which Statement Best Describes You?**

1. I am a faculty member and I use or want to use simulations in my course or program.
2. I am an SLP and want to use simulations to further my learning.
3. I am a researcher and I want to investigate the use of simulations in the SLP and/or Audiology profession.
4. I am a student and I hope and pray my program will start to use simulations.
5. I don’t fit any of the above categories and this was the best session that piqued my interest.

**Where the Clinic Meets the Classroom**

**Alternate Clinical Education**
“There aren't any icons to click. It's a chalk board.”

ALVIN TOFFLER, Future Shock

“Technology feeds on itself. Technology makes more technology possible.”
Active Learning Environment

Immersive Learning

Just-In-Time Learning
Online Learning Trends
The Future of Learning is Now

Part 1

http://www.youtube.com/watch?v=dGCJ46vyR9o

Advanced Clinical Education Tools
A simulation is a generic term that refers to the artificial representation of a real world process to achieve educational goals via experiential learning (Flanagan, Nestel, & Joseph, 2004, p. 57).

**What is a Simulation?**

- Standardized Patients/Simulated Patients
- Virtual Patient Animation
- Digitally Enhanced Mannequins
- Serious Games / Computer Sims
- Total Immersion Virtual Reality

**Who’s Using Simulation?**

- Naval Air Systems
- Medicine (Surgical Procedures)
- Emergency Medical Training
- Military Training (Doctors Without Borders)
- Dentistry
- Nursing
- Police
- Armed Forces
Five key areas of focus for integrated clinical skills education include:

1. **Health Assessment and Interviewing Skills**
2. **Patient Education Strategies**
3. **Communication and Ethical Dilemma Skills**
4. **Team Collaboration Skills**
5. **Inter-Disciplinary Education**

In addition, skills in **Decision Making** and **Testing of clinical skills of students – Objective Structured Clinical Evaluations (OSCEs)** are also emphasized.

**Uses for Simulations?**

- Student Autonomy
- Repeated Practice
- Anxiety Reduction
- Standardization
- Patient Access
- Patient Safety
- Authenticity (fidelity level)
- Consistency and accuracy
- Focus on learner’s performance
- Encouragement of active learning

**Advantages of Simulations**

- Standardized/Simulated Patients – Individuals who are trained to act as a real patient in order to simulate a set of symptoms or problems.

**Simulated Patient**

- Standardized/Simulated Patients

---

**Student Autonomy**

- Repeated Practice
- Anxiety Reduction
- Standardization
- Patient Access
- Patient Safety
- Authenticity (fidelity level)
- Consistency and accuracy
- Focus on learner’s performance
- Encouragement of active learning

---

**Simulated Patient**

- Standardized/Simulated Patients – Individuals who are trained to act as a real patient in order to simulate a set of symptoms or problems.
1. Create a case study with scripts and learning objectives (faculty)
2. Hire actors/actresses (may need advertisements)
3. SPs study a case scenario and learn scripts (4-10 hours training)
4. Training may involve a video review
5. SPs are educated to complete informal and formal evaluations of each student
6. Follow up discussions/real-time feedback using video data for student

*How do Simulated Patients work?

*Challenges to Standardized Patients??

*Standardization
*Case specific
*Child labor laws (adults only)
*Limited practice opportunities
*Difficulty simulating specific symptoms
*Time & effort

*Challenges of SPs
Actor/Actress fees ($15-$35 an hour)
Advertisement and recruitment process
Simulation Center Instructional fee (parking)
Case creation time
Set up and training time for actors/actresses
HD video recordings and server space
Supplemental materials (tests, instruments, etc) as needed

* SP Program Costs

Voice disorders (Syder, 1996)
Apraxia and Alzheimer’s Disease (Zraick, 2004)
Educational outcomes (Edwards, McGuiness & Rose, 2000; Hill, Davidson and Theodoros 2010; Syder, 1996)
Preliminary data from a randomized controlled trial (RCT) conducted recently across eight Australian physiotherapy schools suggests that SP clinics can indeed achieve comparable learning outcomes to traditional clinical placement (Jull et al., 2010).

Virtual Patient Animation - The manipulation and performance of digitally animated 2D or 3D figures in a virtual environment that are rendered in real time by computers.
1. Create a case study with scripts and learning objectives (faculty)
2. Faculty can puppet animated characters with voice changing software
3. Creation of computer avatars for puppeting
4. Computer logistics and set up (SecondLife, NeuroTV, ToonMX)
5. Follow up discussions/real-time feedback using video data for students
When measuring the use of virtual patients to teach medical students history taking and communication skills, students feedback was 7.22 + 1.76 for VP and 7.47 +1.16 for SP (no significant difference) (Stevens et al., 2006).
Digitally Enhanced Mannequins - High-fidelity simulators, can be programmed to exhibit a wide range of clinical signs and symptoms, along with other real life functions.

Human Patient Simulators (HPS) - life sized technologically advanced simulators

Part Task Trainers (PTT) - pinpoint training of basic skills

Typical high fidelity functions being:
- Pupils that automatically dilate and constrict in response to light
- Thumb twitch in response to a peripheral nerve stimulator
- Automatic recognition and response to administered drugs and drug dosages
- Variable lung compliance and airways resistance
- Automatic response to needle decompression of a tension pneumothorax, chest tube drainage and pericardiocentesis
- Automatic control of urine output
- Speech production

1. Create a case study with scripts and learning objectives (faculty)
2. Mannequin set up and programming
3. Clinical environment set up (simulation center)
4. Faculty can control the outcome from a computer located within the lab setting
5. Follow up discussions/real-time feedback using video data for students

How do Mannequins work?
Mannequins ($30,000 - $200,000+)
*Technical Maintenance
*Simulation Center Facility Fee
*Case creation time
*Set up and training time
*Supplemental materials (tests, instruments, etc) as needed

Human patient simulators (HPS) are used extensively within medical and nursing education (Issenberg, McGaghie, Petrusa, Gordon & Scalese, 2005). Applications to allied health professionals for example preparing students for the care of seriously ill patients and in cardiorespiratory training for physiotherapists (Blackstock & Jull, 2007).

HPS benefits for speech pathology education:
*Tracheostomy and laryngectomy management
*Dysphagia
*Management of clients with cleft palate
*NICU settings
Computer Based Simulations: Computer based representations of patients designed to determine or test clinical decision making.

Serious games are simulations of real-world events or processes designed for the purpose of solving a problem.

1. Create a case study with scripts and learning objectives (branched narrative decision tree)
2. Use an existing software solution (SimuCase) or an authoring platform (DecisionSimulation)
3. Educate students on the simulation learning process/program
4. Follow up discussions/feedback using decision data from students
Computer Based Sims

Challenges to Computer Based Sims??

Challenges of Computer Based Sims

*SimuCase
*DecisionSimulation (authoring tool)
*WebSP (authoring tool)
*Virtual Case Creator (authoring tool)
*Virtual Humans (authoring tool)

*Cost
*Resource Intensive
*Challenging to integrate into curricula
*Difficult to edit and author cases
*Weak evaluating empathy, negotiations, conveying bad news
*Cost ($99 - $200+ per user)
*Simulation training courses
*Case creation time
*Set up and training time
*Game play time (edit and revise cases)
*Supplemental materials (tests, instruments, etc) as needed

*Computer Based Sims
Program Costs

*Cave automatic virtual environment - a CAVE is an immersive virtual reality environment where projectors are directed to three, four, five or six of the walls of a room-sized cube. An instructor or computer controls the actions of the objects or visual images on the screen.
“Virtual reality simulations create authentic experiences and encourage discovery learning.”

*Challenges to CAVe VR Patients??*

*Cost
Space
Difficult to edit and author cases
Technical Maintenance

*Challenges of CAVe Sims*
- Cost ($125,000)
- Simulation training scenarios ($25,000 each)
- Room set up and maintenance
- Case creation time
- Set up and training time
- Supplemental materials (tests, instruments, etc) as needed
- Instructor time

**CAVE Sim Program Costs**

- 52% of 0-8 year olds have access to mobile digital media devices
- 11% use digital devices daily for an average of 43 minutes a day
- 90% of 5-8 year olds have used a computer
- Children spend 13 hours a week playing video games

**Remember This...**

www.commonsense.org/research

**The ditto is dead!**
The Future of Learning

The Future of Learning

The Future of Learning
Learning to DO
NOT
just Learning to KNOW

But Clinical Education is...

Because you can’t learn to ride a bicycle from a book
Or interact and treat patients ..... 

*The 4 Pillars of Education*
*Learning to Know*
*Learning to Do*
*Learning to Be*
*Learning to Live Together*

[http://www.unesco.org/delors/fourpil.htm](http://www.unesco.org/delors/fourpil.htm)

“Simulations can teach some things well, but not everything at once - choose your battles”
Stuart Moulder - former GM for Microsoft Games
**4 Best Uses for Simulation Technology**

* Develop an understanding of big ideas and concepts
* Assist with dealing with time and scale
* Practice with decision making in a safe, controlled environment
* Take learners to a time and place unlikely to experience

**Simulations: Situational Awareness**

The ability to filter out certain details and highlight and extrapolate others, to better understand and control the outcome.

Aldrich, C 2009

**Simulations: Situational Awareness**

Most formal learning programs to date, using classrooms and traditional media do not develop situational awareness in their students.

Aldrich, C 2009
The goal of clinical simulations is to stimulate the creation of mental models within the learner by having them discover rules and principles through experimentation. Instructors should constantly be asking themselves, ‘How do I help the learner discover this principle and then verify that they know it?’

James Hadley, IT designer at JHT Incorporated
Simulation learning if structured rather than left as a pure simulation, can enable learners to understand and transfer concepts more effectively than a traditional curriculum (Mandl, Gruber, & Renkl, 1994)

**Simulation Conclusions**

First/Second Year Graduate Students in a Communication Sciences Program in Ohio, Illinois, Florida, Kansas, California, New Jersey

**SimuCase Beta Testing**

**Differences in CSR Class Level:**

- t-tests for independent means indicated no significant differences between:
  - Class level groups for first year (M=43.63, SD=22.78) and second year (M=42.09, SD=13.75) graduate students for case study performance scores
    - [t (119)=.36, p=.05]
  - Total simulation time between first year (M=113.31, SD=120.32) and second year (M=81.03, SD=84.68) graduate students for case study completion
    - [t (119)=1.40, p=.05]
t-tests for independent means indicated a significant difference between:

- Number of completed simulations within a case study for first year ($M=2.76$, $SD=3.41$) and second year ($M=1.39$, $SD=.60$) graduate students

  $[t(119)=3.32, p=.05]\$

First year graduate students completed significantly more simulations compared to second year graduate students.

How do we determine the successful use of simulations?

*Using an Educational Simulation*

It’s Not What You Think…..

“An inexperienced learner is thrown by frustration, but a good learner uses it”

Carol O’Conner
A moment of learning that is marked first by being frustrated at not being able to do something and then resolving that frustration.

The Frustration-Resolution Pair

The point at which an individual will abandon a given educational program

*The student is evaluating the material
*The program has little support
*Expectations for the simulation have been poorly set

Threshold to Quit

I quit!
A live instructor is provider for feedback
* The material is necessary for the students and they understand that
* The program has credibility
* The students have a contract
* The students are being evaluated in some capacity

*Minimize Threshold to Quit*

*Students will work on their own
* Time commitments
* Grading rules
* Process rules
* Cooperative effort rules
* Waivers (no blacklists)
* Participation expectations

*Student Contracts & Performance Expectations*

*Transfer of Learning* - the application of skills, knowledge, and/or attitudes that were learned in one situation to another learning situation (Perkins, 1992)

*Near Transfer* - skills and knowledge are applied the same way every time the skills and knowledge are used.

*Far Transfer* - tasks involve skills and knowledge being applied in situations that change.

*Competency Based Assessments*
Think Alouds - described as “eavesdropping on someone’s thinking.” Their verbalizations include describing things they’re doing as they work through their simulation experience.

Clinical Decision-Making Model - Likert Scale Based
* Reflective - Higher order thinking skills
* Acceptable - General knowledge base
* Rejected - Flawed/Inconsistent

Competency Based Assessments

Design a simulation program for CSD:
* Applicable to all levels of students
* Standardized scoring algorithm on decision-making
* Non-linear sequence with multiple outcomes
* High degree of interactivity & immersion
* Fun & challenging
SimuCase™ is a new computer-based simulation technology utilizing the latest animation software to assess virtual case studies with speech and language disorders.

SimuCase content has been provided by families and clinicians from a variety of hospitals, schools, and clinics.

Each simulated case is created from an actual case submitted by a practicing SLP.

Once a case is created, at least 2 reviewers with expertise in the disorder area review the case content for best practices and scoring.
Kara Lynn is a three year-six month old, who was referred for an assessment by her preschool teacher because of her unintelligible speech.