Improving Students’ Clinical Decision-Making Skills Through Virtual Simulations

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Disclosures

- Financial relationships with Allied Health Media, LLC
- Royalty agreements with Case Western Reserve University
- SimuCase patented technology in four countries

Why Incorporate Simulation-Based Education in CSD?

Simulation-based “experiences are critical in developing a clinician who can move from simply absorbing knowledge into one who can apply that knowledge effectively to assess and treat patients” (Tharpe & Rokuson, 2010).
Benefits of Simulation-Based Education

- Deliberate, repeated practice
- Minimal risk
- Practical application of knowledge
- Experiential and reflective learning
- Supports critical learning areas (interprofessional education and evidence-based practice)
- Comprehensive experience

(Jansen, 2014)

Everybody Wins

- Potter & Allen (2013) conducted a simulation of a bedside swallow exam on a manikin with a tracheostomy experiencing respiratory distress following aspiration.
- Six groups of students (10 students in speech-language pathology and 1 undergraduate nursing student)
- All students received the same training prior to the exam.
- SLP students performed the swallowing exam and the nurses performed deep-suctioning.
- Instructors provided guidance only when necessary to complete the exam.

Results

- All students indicated that they understood the importance of collaboration and communication with other professionals.
- Students were able to perform the procedure in a safe environment with minimal involvement from their instructors.
- Instructors realized that although they considered the students to be trained (textbook, lecture, practice in class), there were gaps in their knowledge base and consequently were able to provide remediation.

Potter & Allen, 2013

Interprofesional Education

- Communicating roles and responsibilities clearly to other professions
- Recognizing your limitations
- Engaging a professional who complements your expertise
- Working as a team to optimize patient care

(Interprofessional Education Collaborative, 2011)
### Types of Simulations

- Paper case studies
- Standardized patients
- Animated Virtual Patients
- Digitally Enhanced Manikins
- Computer-based simulations
- Virtual Caves
- The Future???

### 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.

### How do Computer Based Sims work?

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 (DecisionSim, Smart Sparrow, iHuman)
3. Educate students on the simulation learning process/program
4. Follow up discussions/feedback using decision data from students

### Computer Based Sims

- SimuCase (pre-defined case library)
- Smart Sparrow (authoring tool)
- DecisionSim (authoring tool)
- iHuman (authoring tool)
- WebSP (authoring tool)
- Virtual Case Creator (authoring tool)
SimuCase
A web-based virtual human simulation program designed to measure clinical decision-making skills for the SLP assessment process.

Solving a SimuCase
- Earn points for correct decisions and lose them for incorrect. Some decisions are neutral.
- Six Areas – Case History, Collaborators, Clinical Hypothesis, Assessments, Diagnosis, Recommendations
- Final Score yields a competency level – emerging, developing, mastering.

14 Virtual Patients, More Cases Coming Soon!

How to Implement Simulation-Based Education
1. Identify goals and learning objectives
2. Review the technology
3. Select your assessment method (formative or a summative)
4. Establish expectations that are clear and attainable (Prebrief)
5. Provide feedback and guidance during the simulation
6. Debrief
7. Evaluate outcomes
### Planning Worksheet: Simulation Based Education
#### Steps for Planning a Simulation
(The Society for Simulation in Healthcare)

1. Perform a needs assessment for your course
2. Define your learning goals
3. Create your learning objectives
4. Select your assessment method (formative vs. summative)
5. Select your evaluation methods (de-brief, feedback, etc.)
6. Select your evaluation tools (instruments, rubrics, checklists, etc.)
7. Design your simulation event (course, class, session, etc.)
8. Select your simulation modality (standardized patient, computer-based, etc.)
9. Identify additional resources needed (content experts, location, technology, etc.)
10. Organize your simulation team (SPs, technology, faculty, etc.)

### Pre-Brief Session
- Discuss purpose of the simulation
- Establish expectations and share goals of simulation and learning objectives
- Set ground rules and time-frame
- Provide background information
- Stress the need for deliberate practice
- Build motivation
- Tie-in clinical experiences

### First Session
- Discuss learning format and/or software interface
- Review critical components of the simulation
- Ensure relevancy to clinical experiences
- Prepare for frustration-resolution moments (highly emotional, immersive technology)

### Deliberate, Repeated Practice
- Encourage repeated practice to hone skills
- Applaud mistakes and push the envelope of learning
- Make students responsible for critically analyzing their own performance
- Provide ongoing access to simulations
- Consider contests for high scores
- Empower creation of new scenarios
Guided Instruction
Students will need supportive feedback and strong guidance from the instructor to succeed.
Kirschner et al (2006) concluded that educational approaches that provide extensive guidance to students are more effective and efficient than approaches that are minimally guided.

The Role of Faculty in Simulated-Based Education
Methodology:
- Compared two SLP graduate level courses at two universities targeting child language disorders using a virtual human simulation experience (SimuCase) within their curriculum.
- Graduate level course A (n=10) had limited faculty support during simulation experiences – encouraging students to work independently
- Graduate level course B (n=10) had strong faculty support during simulation experiences – using facilitation techniques
- Both SLP graduate level courses consisted of first year students with similar educational backgrounds and experiences

Results
First year graduate students performed significantly higher on a virtual human simulation experience when provided faculty feedback compared to their counterparts.
Program A (M=72.98, SD=5.88) and program B (M=82.49, SD=6.38) for virtual human simulation performance scores [t (18)=2.878, p<.01]

Seven Elements of Debrief Session
1. Debriefer
2. Participants to Debrief
3. An Experience (the simulation)
4. The Impact of the Experience (the simulation)
5. Recollection
6. Report
7. Time

Lederman (1992)
The Debrief Session

- After each simulation always have an after-action review
- Skilled debriefers or "facilitators tend to position themselves not as authorities or experts, but rather as co-learners" (Fanning & Gaba, 2007, p.118).
- Provide formal thought time for students to recollect, reflect and report
  - How did it go?
  - What did you do well?
  - What could you do better?
  - What will you do differently next time?
  - How does this apply to what you have already experienced or will experience?

Simulation research shows that learners who do NOT participate in a de-brief process fail to improve their skills and transfer skills.

(Savoldelli, G.L., et al 2006)

Summary: Effective Educational Simulations

4 Pillars of Simulation-Based Education

- Learning to Know
- Learning to Do
- Learning to Be
- Learning to Work Together

Student Perspectives on the Efficacy of Simulations Methodology:

- A total of 500 online surveys were distributed via email to SLP graduate students who completed one or more SimuCase™ modules. 129 students (26% response rate) responded to the online survey.
- A Likert scale rating 1-5 was used for all survey questions.
- All survey participants were anonymous and data was coded/analyzed by independent researchers.

Survey Results

**SLP Student Levels of Immersion**

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<tr>
<th>Not Involved</th>
<th>Somewhat Involved</th>
<th>Neutral</th>
<th>Involved</th>
<th>Very Involved</th>
<th>Rating Average</th>
<th>Rating Count</th>
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<td>25.6% (33)</td>
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<td>45.6%</td>
<td>6.2%</td>
<td>3.24</td>
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</table>

**SLP Student Levels of Engagement**

<table>
<thead>
<tr>
<th>Not Well</th>
<th>Somewhat Well</th>
<th>Neutral</th>
<th>Well</th>
<th>Very Well</th>
<th>Rating Average</th>
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<td>24.8%</td>
<td>15.9%</td>
<td>36.4%</td>
<td>7.8%</td>
<td>2.98</td>
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Survey Results Continued

**Student Perceptions for Virtual Human Simulations**

<table>
<thead>
<tr>
<th>Disagree</th>
<th>Somewhat Disagree</th>
<th>Neutral</th>
<th>Somewhat Agree</th>
<th>Agree</th>
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<td>10.1%</td>
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<td>35.7%</td>
<td>37.2%</td>
<td>3.08</td>
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**Overall, these virtual experiences were relevant to my educational program.**

<table>
<thead>
<tr>
<th>Disagree</th>
<th>Somewhat Disagree</th>
<th>Neutral</th>
<th>Somewhat Agree</th>
<th>Agree</th>
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<td>6.2%</td>
<td>7.8%</td>
<td>38.5%</td>
<td>43.4%</td>
<td>4.14</td>
<td>129</td>
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</table>

**SimuCase will help develop and enhance my clinical skills as a student.**

<table>
<thead>
<tr>
<th>Disagree</th>
<th>Somewhat Disagree</th>
<th>Neutral</th>
<th>Somewhat Agree</th>
<th>Agree</th>
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<td>12.0%</td>
<td>11.2%</td>
<td>37.8%</td>
<td>34.4%</td>
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**Overall, I was satisfied with SimuCase.**

<table>
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<th>Disagree</th>
<th>Somewhat Disagree</th>
<th>Neutral</th>
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<td>38.2%</td>
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Conclusion

Evidence indicates that SLP students are **motivated** and **engaged** in simulated learning environments:

- Reflects real-life scenarios and decision-making
- Offers dynamic and challenging learning environments
- Promotes multiple practice opportunities which lead to greater generalization of clinical skills and confidence levels

(Jansen, 2014)
Preparing Students for the Future

- Identify strengths and weaknesses before entering clinical placements
- Case study approach reflects the case study questions that have been added to the new Praxis
- Interprofessional education – ability to collaborate has been identified as an area where students have limited experience.
- Knowledge of assessment instruments

Future Research

- James Madison University and Flinders University Australia. Begin 2015. Foundational Study. Replacing Clinical Hours with Simulation in SLP Graduate Education Programs.
- Saint Xavier University studying SLP graduate student cohorts Praxis test performance comparing SimuCase students scores to control counterparts. Data to be presented at CAPSCD 2015.
- James Madison University and Kent State University presenting case study data using SimuCase with individual classes to demonstrate student competency. To be presented at CAPSCD 2015

A Future Vision for Simulation-Based Education

Google Glass
Holographic Projection

Android Technology

A Future Vision for Simulation-Based Education


A Future Vision for Simulation-Based Education
QUESTIONS????

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References


Williams, S., & Schriner, J. (2010, April). SimuCase: Interactive case studies for student assessment. Presentation at the annual conference of the Council of Academic Programs in Communication Sciences and Disorders, Austin, TX.

