Virtual Reality in Nursing Education

By

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Introduction

- With the breakout of Covid-19 in March 2020 in the United States, many nursing students were unable to finish their practical training at various medical facilities.
- As a result, a question came to mind as to how nursing students can obtain clinical application training, cost effectively in a safe environment avoiding harm to themselves and to patients.
- Virtual Reality simulation seemed to offer the opportunity for nursing students to obtain additional experience in a real-time feedback with the ability to track their progress and learning outcomes.

Background

" The use of simulation in nursing education emerged in 1874 and is now recognized as a valuable teaching method."

- (Jeong, S., Lee, K., 2019)

Virtual Reality

- Virtual Reality is the use of computer technology to create an interactive world, which gives users a sense of spatial presence throughout their interactions within a simulation.

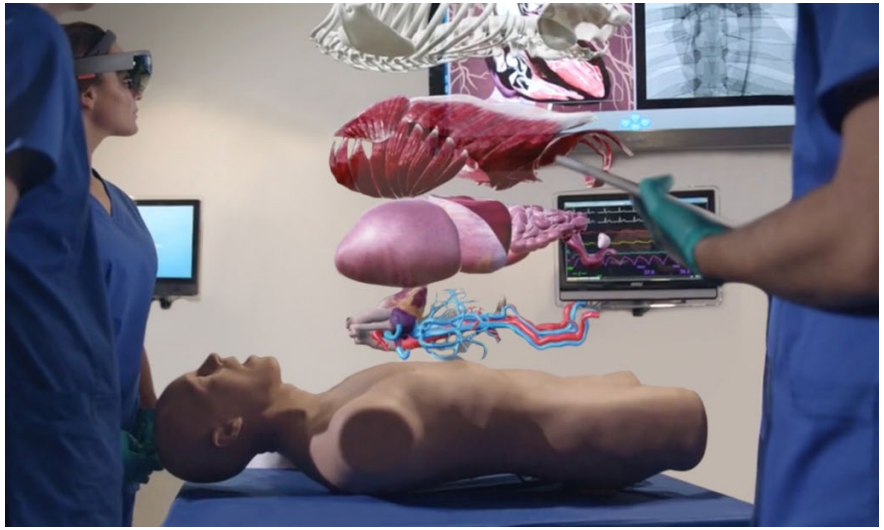
- Simulation is the way in which nurses experience hands on knowledge

- Clinical case studies and hypothetical situations in a safe environment allows nurses to focus on refining skills with no harm to patient

Virtual Reality in Nursing

- Virtual Reality comes in many different forms such as Virtual Simulation, Virtual Simulation Games, Virtual Gaming Simulation or Augmented Reality (AR)
  - Augmented reality is a type of Virtual Reality where synthetic stimuli are superimposed on the real world to make information that our senses would normally not be able to perceive be perceptible. It is the technology overlay of digital computer-generated information on objects or places in real world to enhance user perception and experience. (Kardong-Edgren, S. et al. 2019, p 31)

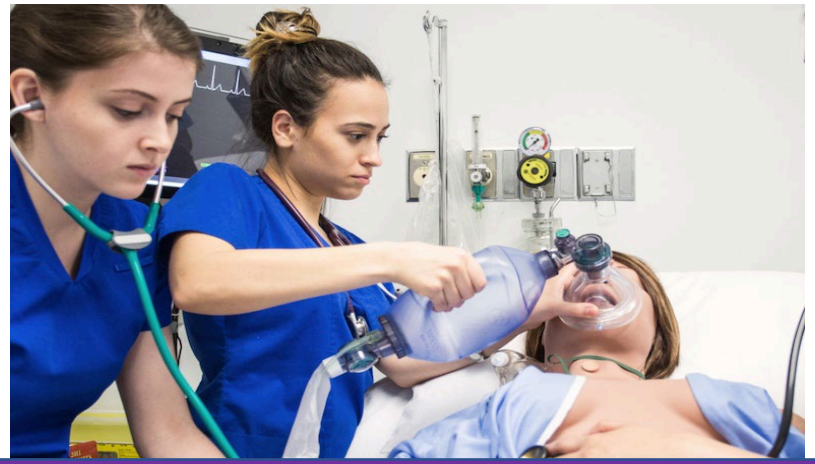
- Virtual Reality vary by levels of:
  - Interactivity
  - Technology
  - Immersion



Virtual Reality in Nursing

Virtual Reality has gained momentum over the past 5 years.

- Asynchronous learning (self-guided)
- Immersive learning
- Gamification



Learning Without Consequence

Virtual Reality offers:

- Safe environment for scalable educational framework
- Repetitive practice
- Increased readiness for the workforce

Methods

Salem State University library EBSCO database

- CINAHL, education research complete, and Medline
- The key words, “Virtual Reality” and “ Nursing Education”
- Peer reviewed articles
- 2017-2020
- 234 articles found
- Removal of duplicate articles left 170 articles
- Reviewed by title to screen for pre-licensure nursing students, left 59 articles
- Further screened for articles regarding virtual reality utilization and information for nursing education and studies.
- 12 articles were selected

EBSCO

CINAHL

MEDLINE

Methods

- The 12 articles were further separated into:
  - VR = 8 articles help define **virtual reality** and the various forms of virtual reality as used in studies and as a background
  - IN = 9 articles reference **implications to nursing education** as a summary or integrated study
  - EC = 7 articles about **effectiveness of** virtual reality in **clinical** nursing education

- The studies performed throughout the articles are a mix of integrative reviews, meta-analyses, questionnaires, surveys, and mixed studies.

Article #	Author	Article Title	VR	IN	EC
29	Chen, F. et al., 2020	Effectiveness of Virtual Reality in Nursing Education: Meta-Analysis		X	X
19	Esposito, C. et al., 2020	Maintaining Clinical Continuity Through Virtual Simulation During the COVID-19 Pandemic.		X	X
54	Farra, S. L. et al., 2018	The Student Experience With Varying Immersion Levels of Virtual Reality Simulation.	X	X	
37	Jeong, S. et al., 2019	The Emergence of Virtual Reality Simulation and Its Implications for Nursing Profession.	X	X	
58	Kardong-Edgren, S. et al., 2019	A Call to Unify Definitions of Virtual Reality.	X		
4	Keys, E. et al., 2019	Developing a Virtual Simulation Game for Nursing Resuscitation Education.	X		X
46	McCarthy, C. et al., 2019	Advances in Virtual and Augmented Reality-Exploring the Role in Health-care Education.	X	X	
5	Mendez, K. J. et al., 2020	Virtual and augmented reality: Implications for the future of nursing education.	X	X	
6	Shin, H. et al., 2019	Educational Characteristics of Virtual Simulation in Nursing: An Integrative Review.		X	X
8	Smith, S. J. et al., 2018	Effectiveness of Two Varying Levels of Virtual Reality Simulation.	X		X
48	Thompson, D. et al., 2020	Nursing students' engagement and experiences with virtual reality in an undergraduate bioscience course.		X	X
7	Verkuyl, M. et al., 2019	Virtual Gaming Simulation in Nursing Education: A Mixed-Methods Study.	X	X	X

Integrative Review

Some of the studies performed in my integrative review include

Maintaining Clinical Continuity Through Virtual Simulation During the COVID-19 Pandemic

- By Christa Esposito and Kelly Sullivan
- 17 third year undergraduate nursing students
- Clinical continuity through SIMs development
- Pre-Assignment, video debriefing through Zoom and Assessment through reflection paper.
- SIMs described as valuable in exposing student scenarios.
- Sense of community and collaboration enhanced learning
- 5 students still desire in house experience
- Clinical proficiency is delivered but student engagement and learning needs to be a focus

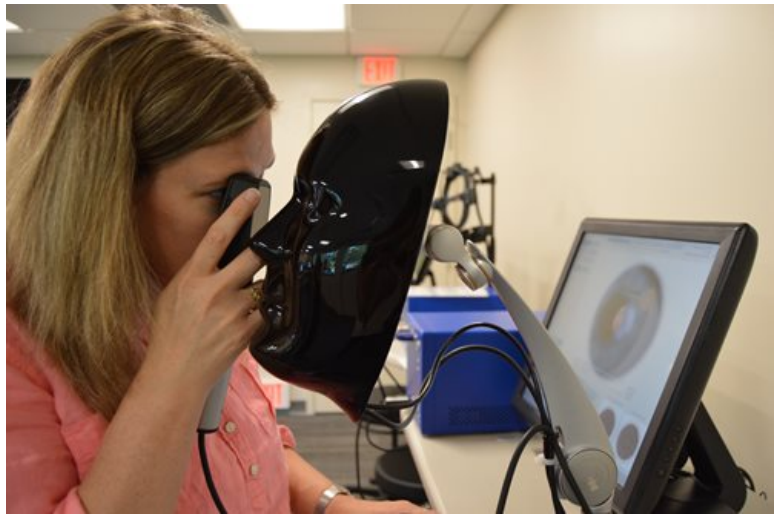
The Emergence of Virtual Reality Simulation and Its Implications for Nursing Profession

- By Sarah Jeong and Kwang-Ok Lee
- VR Simulation is increasingly applied and evaluated in nursing education and research. (Jeong S., et al. 2019)
- Bachelor of Midwifery study they used virtual neonatal resuscitation with a safe and repeatable environment to practice techniques.
- 43 nursing students reported positive learning experience and enhanced knowledge, engagement and self confidence boost.
- The study showed the benefits of VR simulation provide nurse with opportunities to improve patient care, nursing practice and nursing education. (Jeong S., et al. 2019)

Integrative Review

Effectiveness of Virtual Reality in Nursing Education: Meta-Analysis

- By Feng-Qiin Chen, Yu-Fei Leng, Jian-Feng Ge, Dan-Wen Wang, Cheng Li, Bin Chen, and Zhi-Ling Sun
- 821 participants tool part in 12 studies.
- VR was more effective than control conditions in improving knowledge (Chen. F., et al. 2020)
- No difference in control conditions and VR in skills retention, satisfaction and performance time.
- Overall VR can effectively improved knowledge in nursing education, but it was not more effective in other areas
- Further studies with larger sample size is warranted



Benefits of Virtual Reality

- Visual and auditory immersion (Oculus)
- AI/Computer simulations
- Learning gamification / learning objectives modification
- Critical thinking and clinical experience in learning
- Repeatability and replicability
- Clinical knowledge to a greater audience (scalable)
- Support increased nursing intervention and education
- Increased data capture and analytics
- Transcend across languages

Disadvantages of Virtual Reality

- Scalability due to lack of trained people, moderators and educators a like.
- Lack of maturity and testing for VR curriculum and evaluation of learning outcomes.
- Side effects to immersive technology such as motion sickness and cybersickness (sensory mismatch)
- Start up costs for institutions is high with inconsistent measure of learning outcomes and business return/gain.
- Unknown maintenance, update and troubleshooting (support) costs associated with owning VR systems for education

Results

- Enhanced learning for learners
  - Increased knowledge retention
  - Experiential learning and student engagement
  - Improved competency
  - Safe scalable learning application during a pandemic

- Constant change in technology with ever reducing cost on tech
  - Wearable tech
  - Augmented reality
  - Enhanced simulators and tech

Conclusion

- VR in Nursing Education still needs…
  - Standardization
  - Definitions
  - Consistency in goals and objectives in VR Education
  - More trained faculty and clinical educators
  - Reduction of cost (in-depth expense analysis is needed.)
- Bigger scale research is needed on Virtual Simulation to track proficiency, knowledge, and satisfaction of nursing students.

"Technologies offer a major opportunity to revolutionize nursing education and to promote student-centered learning"

(Mendez, K. J., Piasecki, R. J., Hudson, K., Renda, S., Mollenkopf, N., Nettles, B. S., & Han, H., 2020)


Thank
you

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