Original research

Student preferences and perceptions of learning from vSIM for Nursing™

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ABSTRACT

This study explored BSN students' perceptions of learning with vSim for Nursing™. Using a mixed methods design with 99 students, key points of learning were medication administration and respiratory interventions. Qualitative data demonstrated learning of assessment, prioritization, and emergency management. The top student preferences of how to use virtual simulation were as a clinical makeup or to enhance lecture. The findings support the use of virtual simulation and provide data to guide nurse educators to more strategically integrate virtual simulation exercises.

1. Background

Facilitating quality clinical experiences for students is a recurring challenge in nursing education. According to the 2013–2014 National League for Nursing Biennial Survey of Schools of Nursing, 49% of Associate Degree in Nursing (ADN) programs and 41% of Bachelor of Science in Nursing (BSN) programs are disadvantaged by a lack of clinical placements serving as a leading obstacle in facilitating expansions in capacity (National League for Nursing, 2014). Nurses' lack of clinical preparedness resulting from traditional pedagogies coupled with limited clinical placement opportunities have called for transformation in nursing education (Benner et al., 2009; Jeffries, 2005; Bensfield et al., 2012). The integration of simulation into nursing curricula has assisted in this educational reform (Bensfield et al., 2012) and has been associated with improvements in student learning outcomes (Foronda et al., 2013).

In addition to mannequin-based simulation, virtual simulation has emerged as a solution to provide students with more experiential and application-based learning opportunities (Foronda and Bauman, 2014). Compared to mannequin-based simulation, virtual simulation holds several advantages. First, single-user virtual simulation systems are amenable to large cohorts of students. Further, the faculty workload of facilitating the simulations is greatly reduced. Third, there is a cost savings when comparing the expenses of purchasing sophisticated manikins and supporting the human resources of simulation facilitators. Additionally, virtual simulation requires minimal space allocation and

is efficient. Virtual simulation offers advantages of convenience and self-remediation that have not been previously available for students. As this new pedagogy is expanding, it is important that information is gathered about virtual simulation. More specifically, information is needed about how to best integrate virtual simulation, how and when students prefer to use virtual simulation to enhance their learning, and about the resulting student learning outcomes from this pedagogy.

1.1. Virtual simulation

According to the Healthcare Simulation Dictionary, virtual simulation is defined as "a simulation involving real people operating simulated systems. Virtual simulations may include surgical simulators that are used for on-screen procedural training and are usually integrated with haptic device(s) (McGovern, 1994; Robles-De La Torre, 2011)" (as cited in Lopreiato, 2016, p. 42). For this paper, we define virtual simulation as *clinical simulation offered on a computer, the internet, or in a digital learning environment including single or multiuser platforms*. As digital technologies are rapidly advancing, virtual simulation has capacity for broad utilization. Virtual simulation has been found to promote essential nursing skills such as critical thinking, decision making, communication (Guise et al., 2012) skill development, and clinical reasoning (Caylor et al., 2015). Pilot studies suggest that virtual simulation leads to improvements in communication ($p < .001$) (Foronda et al., 2014) and students feeling more prepared, confident, familiar and comfortable (Swiegart et al., 2014).

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Virtual simulation has been associated with a multitude of learning benefits. Studies demonstrate that the use of virtual simulation may decrease time to skill achievement (Farra et al., 2015) and increase learner's retention of material over time (Farra et al., 2013). Moreover, student nurses have expressed positive attitudes towards virtual simulation (Caylor et al., 2015; Farra et al., 2013; Kidd et al., 2012), describing it as "fun" and "better than reading" (Foronda et al., 2016a). When used in a mental health context, after performing virtual simulations, students demonstrated decreased anxiety levels during their interactions with patients and staff (Swiegart et al., 2014). However, as virtual environments present new, unfamiliar environments for students, it is common for technical issues to arise which may cause frustrations (Kidd et al., 2012; Foronda, Swoboda et al., 2016b; Hudson et al., 2014).

1.2. vSim for Nursing™

vSim for Nursing™, developed in collaboration with the NLN, Wolters Kluwer Health, and Laerdal Medical, is a product that adapts mannequin-based scenarios to a Web-based learning environment. Students are able to interact with patients and work at their own pace followed by an opportunity to repeat and remediate simulations. The current cost of vSim for Nursing varies, depending on the number of products purchased and whether bundling occurs. For a typical package of 10 simulations, the current cost is $99.95 per student, which is typically absorbed by the school of nursing or administered to the student as a study expense.

1.3. Research on vSim for Nursing™

Currently, research on how vSim for Nursing may improve student learning outcomes is slim but is expanding. Gu, Zou and Chen (2017) used vSim for Nursing to enhance fundamentals of nursing. In a randomized controlled post-test design study with a sample of 28 undergraduates examining the effectiveness of vSim for Nursing on performance in nursing fundamentals, students' knowledge scores in the experimental group (M = 73.31, SD = 9.27) were significantly higher than those of students in the control group (M = 65.36, SD = 8.93), $t = 2.27$, $p = .032$ (Gu et al., 2017).

In a study examining use of vSim for Nursing in the context of maternal health, Cobbett and Snelgrove-Clarke (2016) sought to examine the effects of virtual simulation on learners. Using a randomized pretest-posttest design, they found that learning outcomes with vSim for Nursing were comparable to those of face-to-face simulation as there were no statistically significant differences in student knowledge and self-confidence (t (48) = 1.75; $p = .09$; Cobbett and Snelgrove-Clarke, 2016). However, virtual clinical simulation was noted to have a statistically significant effect on students' anxiety levels ($t = -3.2$; $p = .002$), which were significantly higher for students in the virtual clinical simulation (M = 73.26) than for those in the face-to-face simulation (M = 57.75).

While there is evidence to support the use of virtual simulation, we have only scratched the surface in terms of knowledge about this new pedagogy. Faculty should not use technology just because it is new. It is important that educators understand student outcomes when using such technology to guide decision-making and implementation. Researchers have found that objective learning outcomes are significantly better when students' perceptions of their instructional activities are congruent with their preferred learning environment ($p = .01$; Yeh et al., 2016). What remains unclear, are the preferences and perceptions of students who use vSim for Nursing. As vSim for Nursing has the potential to be infused throughout the nursing curriculum, such information is critical in decision making as it relates to the use of varying types of simulation and resource allocation.

1.4. Theoretical framework

This study was guided by the Jeffries' (2005) Simulation Framework which provides a context for understanding the design, implementation, and evaluation of simulations used in nursing education (Jeffries, 2005). The components of this framework include best practices in education, student and teacher factors, simulation design characteristics, and outcomes which for the purpose of providing context are all linked to a variety of likely variables (Jeffries, 2005). In particular, this study hones in on the variables of knowledge and learner satisfaction within the outcomes component.

1.5. Specific aim

The aim of this study was to explore the preferences and perceived learning outcomes of pre-licensure nursing students who engaged in a virtual simulation experience using vSim for Nursing.

2. Methods

2.1. Design and sample

This study employed a mixed-methods design using a descriptive, quantitative and descriptive qualitative approach. Ninety-nine pre-licensure accelerated BSN students participated in the study during their advanced medical-surgical clinical course. The school of nursing was located in the Mid-Atlantic United States and comprised of an ethnically diverse cohort of mostly female and several male students. Demographic data were not formally gathered as the data reviewed were regularly collected as part of program evaluation. vSim for Nursing was provided at no cost to the School or students. This study was approved by the Johns Hopkins University Institutional Review Board.

2.2. Virtual simulation

The virtual simulation exercise was offered in Spring of 2016 at a school that followed the International Nursing for Clinical Simulation and Learning (INACSL) Standards of Best Practice: Simulation[SM] (INACSL, 2018). In lieu of one of the four planned mannequin-based simulation sessions offered for that day, a virtual simulation session was offered. For the virtual simulation session, students worked in pairs in the School's computer lab under the guidance of a facilitator. The simulation scenarios were part of the vSim for Nursing Medical-Surgical package. One scenario included a patient suffering pneumonia who develops anaphylaxis upon receipt of an antibiotic (Kenneth Bronson) and a patient who deteriorates into sudden cardiac arrest (Carl Shapiro). After completion of the virtual simulation, students were directed to repeat each simulation to allow opportunity to improve and enhance learning similar to methods used in prior research (Foronda et al., 2016b). Therefore, the students performed a total of four simulations (two simulations repeated). The students were informed that they would not be graded; rather, completion of the simulation counted toward their hours in simulation. After the two virtual simulations, a trained facilitator used Dreifuerst's (2012) Debriefing for Meaningful Learning to lead the debriefing session. The entire simulation lasted about 1 h and 45 min. As students had the opportunity to receive performance feedback with vSim for Nursing, they worked in pairs allowing for discourse with each other, and repeated each of the two simulations, only 15 min was used to debrief the students.

2.3. Survey

Students were provided surveys by the simulation facilitator immediately after the simulations (Fig. 1). Students were asked to report on their experience with the virtual simulation exercise (involving both