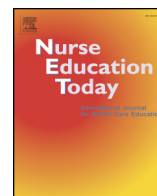




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Effectiveness of online simulation training: Measuring faculty knowledge, perceptions, and intention to adopt

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ABSTRACT

Background: Best practice standards of simulation recommend standardized simulation training for nursing faculty. Online training may offer an effective and more widely available alternative to in-person training.

Objectives: Using the Theory of Planned Behavior, this study evaluated the effectiveness of an online simulation training program, examining faculty's foundational knowledge of simulation as well as perceptions and intention to adopt.

Design: One-group pretest-posttest design.

Setting: A large school of nursing with a main campus and five regional campuses in the Midwestern United States.

Participants: Convenience sample of 52 faculty participants.

Methods: Knowledge of foundational simulation principles was measured by pre/post-training module quizzes. Perceptions and the intention to adopt simulation were measured using the Faculty Attitudes and Intent to Use Related to the Human Patient Simulator questionnaire.

Results: There was a significant improvement in faculty knowledge after training and observable improvements in attitudes. Attitudes significantly influenced the intention to adopt simulation ($B = 2.54, p < 0.001$).

Conclusions: Online simulation training provides an effective alternative for training large numbers of nursing faculty who seek to implement best practice of standards within their institutions.

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Over the last 15–20 years there has been a significant increase (1000%) in the number of nursing programs in the United States (U.S.) that have incorporated simulation into the curriculum. From 2002 to 2010, the number of nursing programs using simulation grew from 66 programs to 917 programs and it is anticipated that this number will continue to grow across all levels of nursing education (Hayden et al., 2014). The benefits of simulation, including safe deliberate practice, enhanced clinical reasoning, communication skills, and transfer to practice, warrant comprehensive integration of simulation into nursing education (Goodstone et al., 2013; Ricketts, 2011; Sanford, 2010; Shin et al., 2015).

The National League for Nursing (NLN) recommends that simulation be facilitated by adequate numbers of faculty who have received training and developed expertise in the pedagogy of simulation, as data support the relationship between effective faculty simulation training and better learning outcomes for students (Jeffries, 2005; Nguyen et al., 2011; Rizzolo et al., 2015). However, nursing faculty have identified

barriers to adopting this new technology, including a lack of training, lack of time, and limited resources (Akhtar-Danesh et al., 2009; Blazeck, 2011; Davis et al., 2014; Jansen et al., 2009; Nguyen et al., 2011). Online simulation training provides a mechanism to train large numbers of nursing faculty who potentially might not otherwise have access to training. However, limited information is available about the effectiveness of online simulation training for faculty.

We sought to evaluate the effectiveness of an online simulation training program for nursing faculty by measuring changes in knowledge, perceptions, and intention to adopt simulation before and after training. The Theory of Planned Behavior (TPB) was used as a guiding framework for the study (Ajzen, 1991). In accordance with the TPB, faculty members' perceptions, including attitudes, subjective norms, and perceived behavioral control, were evaluated as factors potentially influencing the intention to adopt simulation. The specific aims of this study were to:

- Aim 1. Examine the effectiveness of online simulation training on faculty's foundational knowledge of simulation
- Aim 2. Examine the effectiveness of online simulation training on faculty's perceptions of simulation, including attitudes, subjective norms, perceived behavioral control, and intention to adopt

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1. Background

Simulation facilitates learning based on principles of repetitive practice, feedback, standardization of experiences, and minimization of patient safety risks (Durham and Alden, 2008). A study of the National Council of State Boards of Nursing (NCSBN) found that up to a 50% substitution of traditional clinical time with high-fidelity simulation yielded no significant differences in outcomes (Hayden et al., 2014). Important outcomes, including licensure pass rates, nursing knowledge, and perceived readiness to practice were similar in nursing students who spent 50%, 25%, or no hours in high-fidelity simulation, as replacement for traditional clinical training. The NCSBN study and several systematic reviews of simulation recommend that simulation outcomes are dependent on using best practice guidelines, including faculty simulation training (Cant and Cooper, 2010; Doolen et al., 2016).

The literature supports a lack of adequate faculty training and competence with simulation. For example, in a systematic review of faculty development for the use of high-fidelity simulation, a lack of faculty training was identified as a key barrier to using high-fidelity simulation in nursing (Nehring et al., 2013). In one study with 193 nursing faculty from all levels of nursing education, 70% of faculty identified themselves as novices or advanced beginners in the use of simulation and 69% reported the need for more comprehensive education (Nguyen et al., 2011). Similarly, 90% of faculty members ($n = 20$) at a nursing program in the United Kingdom were using simulation yet only 40% felt confident using simulation. Other studies have found that as few as 25% of faculty feel prepared to use simulation (Dowie and Phillips, 2011). Faculty who are new to simulation report feeling less motivated, unqualified, uncertain, less innovative, and not ready to use it in practice as compared to faculty who have received training and consider themselves experts (Duvall, 2012; Harder et al., 2013).

A majority of faculty continue to learn about simulation through trial and error, training from mannequin suppliers, reading the literature, and more positively, increasingly through formal workshops either in-person or online (Anderson et al., 2012). Several simulation programs in the U.S. provide simulation training for nursing faculty, but the high cost, access, and time intensive nature of in-person training are barriers for schools of nursing that seek to train more than a few faculty. For example, the Center for Medical Simulation at Harvard offers a 5 day in-person comprehensive instructor workshop at a cost of over 5000 U.S. dollars per person. For faculty seeking in-person training without travel, the Center does offer host site training around the world, but the cost is significant. As an alternative to in-person training, the NLN offers 17 e-learning courses that can be paid for by an individual or institution at a reasonable price, but no evaluation data about program outcomes was found in the literature.

Despite an increasing number of simulation training options, little is known about their effectiveness. In one study, nursing faculty ($n = 11$) who completed a simulation training program reported feeling more comfortable after simulation training, but faculty attitudes were not found to change after training, nor did their intent to use simulation after training (Jones et al., 2013). In contrast, faculty attitudes ($n = 15$) towards the use and value of simulation were found to increase following an educational intervention, and this was highly predictive of their reported intent to use simulation with future students (King et al., 2008). Understanding faculty perceptions of simulation and how these in turn influences their intention to use or not use simulation have importance in understanding how to engage, train and support faculty.

In summary, although there is consistency with the need for faculty simulation training, barriers such as the high cost and time intensive nature of the programs limit the ability of many faculty and schools of nursing to participate (Nehring et al., 2013). Training faculty using online methods is convenient and time-flexible and may overcome the access issue, at a minimum (Cook and Steinert, 2013). A clear lack of simulation training program evaluation, beyond just examining faculty

satisfaction further adds to the challenge (Berkowitz et al., 2011). The purpose of this study is to evaluate the effectiveness of an online simulation program, examining faculty's foundational knowledge of simulation as well as their perceptions and intention to use simulation, before and after training.

1.1. Theoretical Framework

Based on theories of learning outcomes (Kraiger et al., 1993), the effectiveness of faculty training can be evaluated by measuring changes in cognitive, behavioral, and affective aspects. In particular, cognition can be assessed by measuring changes in knowledge and strategies, behavior can be assessed by examining whether there is a gain in a new skill or improvement, and affect can be assessed by evaluating improved motivation and self-efficacy (Salas et al., 2012).

In this study, the TPB was used as a guiding framework to measure faculty outcomes related to an online simulation training program. The TPB hypothesizes that intention is influenced by one's attitude, subjective norms, and perceived behavioral control (Ajzen, 1991). Using simulation as an example, the intention to adopt simulation into teaching can be influenced by attitudes, such as faculty's comfort level with, competence with, and valuation of simulation. In addition, the framework suggests that faculty norms, such as the perception that simulation is supported by peers or administrators, can influence the intention to adopt simulation. A third concept of the TPB, perceived behavioral control, suggests that faculty perceptions of the ease of using simulation, training, and time associated with use may lead to the intention or lack of intention to adopt.

The Faculty Attitudes and Intent to Use Related to the Human Patient Simulator instrument was developed in 2008 using the TPB framework (King et al., 2008). The instrument evaluates faculty attitudes, subjective norms, perceived behavioral controls, and behavioral intention to use simulation. Although two studies, where the instrument was applied, had mixed results, the authors recommended continuing to examine faculty perceptions and intention within the context of educational simulation preparation for faculty.

2. Methods

2.1. Design and Sample

A one-group pretest-posttest design was used to measure the effects of an online simulation training program on faculty's knowledge, perceptions, and intention to adopt simulation and differences in the influence of perceptions on faculty's intention to use simulation. All clinical faculty members of a Midwest college of nursing in the U.S. (which includes a main campus and five regional campuses) were invited to participate. The sample was a convenience sample of the nursing faculty. The school of nursing was actively increasing use of simulation across both the undergraduate and graduate programs so any clinical faculty who were actively teaching those students were invited to participate. Research active faculty were not asked to participate in this study, although they were given access to the training if they chose to participate.

Of the 60 clinical faculty members invited to participate, 52 completed the pre-assessment survey measuring perceptions and intention. However, only 27 completed the post-assessment survey and were included in the final post-group analysis.

2.2. Instruments

We used pre/post module quizzes and a 24-item survey to measure faculty's knowledge, perception, and intention to adopt simulation. Module quizzes (ranging from 4 to 8 items per module) were used to measure faculty members' foundational simulation knowledge before and after each of four online training modules. Quizzes were multiple choice items developed by the principal investigator in collaboration

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