



DePaul University  
Via Sapieniae

---

Grace Peterson Nursing Research Colloquium

2019

---

Aug 17th, 10:00 AM - 11:30 AM

## Effective Learning Methods for Clinical Skills in Simulation Laboratories: High-Fidelity Mannequins and Standardized Patients

Sandra Cupic  
[cupicsandra88@gmail.com](mailto:cupicsandra88@gmail.com)

Follow this and additional works at: <https://via.library.depaul.edu/nursing-colloquium>

 Part of the [Nursing Commons](#)

---

Cupic, Sandra, "Effective Learning Methods for Clinical Skills in Simulation Laboratories: High-Fidelity Mannequins and Standardized Patients" (2018). *Grace Peterson Nursing Research Colloquium*. 7. <https://via.library.depaul.edu/nursing-colloquium/2018/summer/7>

This Event is brought to you for free and open access by the School of Nursing at Via Sapieniae. It has been accepted for inclusion in Grace Peterson Nursing Research Colloquium by an authorized administrator of Via Sapieniae. For more information, please contact [digitalservices@depaul.edu](mailto:digitalservices@depaul.edu).

Effective Learning Methods for Clinical Skills in Simulation Laboratories: High-Fidelity

Mannequins and Standardized Patients

Sandra Cupic

Research Advisors: Dr. Tamara Poole and Dr. Young-Me Lee

DePaul University

### Abstract

**Background:** Many nursing programs are utilizing simulation laboratories to teach clinical skills in a safe environment. Two modes of high-fidelity simulation—high-fidelity mannequins and standardized patients (SPs)—allow for an interactive experience that closely resembles the health care setting.

**Objectives:** The purpose of this integrative literature review was to compare the two high-fidelity simulation methods—high-fidelity mannequins and standardized patients (SPs)—and their benefits when it comes to the development of nursing skills. Furthermore, the paper explored how skills learning laboratories can be optimized.

**Method:** An integrative literature review of 19 research articles was conducted using databases of CINAHL, ERIC, and ProQuest. Search terms included nursing, skills, learning laboratories, undergraduate, baccalaureate, simulation, high-fidelity, mannequins, manikins, and standardized patients.

**Results:** Three benefits were identified in the utilization of high-fidelity mannequins including effective learning and knowledge acquisition, satisfaction with the simulated experience, and improved self-confidence. Four benefits of simulations with standardized patients consisted of improved communication skills, improved clinical judgement, increased confidence, and applicability. Furthermore, common themes of the optimal environments in skill learning laboratories included discussion and engagement, approachable and innovative instructors, and opportunity for practice.

**Conclusion:** Both high-fidelity mannequins and standardized patients give students a closely simulated health care experience. Further studies are needed to directly compare multiple attributes of high-fidelity mannequins and standardized patients. Finally, optimal learning environments were found to be supportive and engaging and led by approachable and innovative instructors.

## Introduction

### Background and Significance

Clinical skills acquisition is an essential part of nursing education. Oermann, De Gagne, and Phillips (2015) state that the students' ability to perform clinical skills is necessary for safe and quality patient care and that clinical competence is a precondition to developing professional competence. According to Theisen and Sandau (2013), competence includes "values, attitudes, general nursing knowledge, and clinical skills" (p. 407). A competent nurse, therefore, needs to be proficient in all four areas. Unfortunately, research has revealed that newly graduated nurses are not adequately prepared to join the workplace and that there is a gap between nursing education and clinical skill competence (Bennett, Grimsley, A., Grimsley, L., & Rodd, 2017; Theisen, & Sandau, 2013). Therefore, evaluation of nursing education programs and the way clinical skills are taught is of utmost importance for patient safety. Simulation laboratories are utilized more and more in nursing programs to prepare their students for clinical practice (Baptista, Paiva, Goncalves, Olivera, Pereira, & Martins, 2016). By simulating the clinical setting, learning laboratories offer a safe environment while providing a nonthreatening space for the development of knowledge, skills, and attitudes that are foundational to clinical practice (Oermann et al., 2015).

Furthermore, Strand, Naden, and Slettebo (2009) found that a secure environment contributed to learning by allowing errors without consequences. A safe and secure environment allows students to engage in learning without the fear of negative repercussions to self-image, social standing, or career trajectory (Oermann et al., 2015). Various learning methods are employed in simulation laboratories, including the use of mannequins and standardized patients (SPs) (Oermann et al., 2015).

Simulation allows for a bridge between classroom learning and real-life clinical experience (Society for Simulation in Healthcare (SSH), 2017). Moreover, simulation is defined as an imitation of one act or system by another with the purpose of education, assessment, research, and health system integration (SSH, 2017). Simulation consists of three stages: prebriefing, scenario, and debriefing (Page-Cutrara, 2014). In the prebriefing stage, the facilitator outlines the scenario objectives and communicates the “patient presentation, roles, tasks, time allotment, and orientation to equipment and general environment” (Page-Cutrara, 2014, p. 136-137). Next, in the scenario stage, the students have experiential and/or observational experiences with actual cases. Finally, in the debriefing stage, retrospective assessments and a discussion of students’ performance are conducted (AL Sabei & Lasater, 2016). Simulation is an active learning strategy that’s learner centered, and the educator acts as a facilitator of learning (Merriman, Stayt, & Ricketts, 2014). There are different types of simulations with different degrees of fidelity, or the ability to replicate the actual clinical environment: including mannequins and standardized patients (Oermann et al., 2015).

Mannequins act as human patient simulators and range in the degree of fidelity, from low to medium to high (Oermann et al., 2015). Low-fidelity mannequins are used as task trainers; they are static and usually represent one function of the human body (Oermann et al., 2015). Next, medium-fidelity mannequins are full-sized and can replicate physiologic changes only partially or at a slower pace (Oermann et al., 2017). Whereas, high-fidelity mannequins offer realistic patient care experiences and have programmable signs and symptoms (Weatherspoon, Phillips, & Wyatt, 2015); they are life-sized, with realistic anatomical features (Oermann et al., 2015). Benefits of using high-fidelity mannequins include authenticity of simulation and structured reflections (Sundler, Pettersson, & Berglund, 2015; Baptista, Paiva, Goncalves,

Oliveira, Pereira, & Martins, 2016). Limitation of mannequins includes a lack of providing non-verbal cues, body language, facial expression, and physical movements (GOH, Selvarajan, Chng, Tan, & Yobas, 2016).

The use of standardized patients (SPs) in learning is a concept developed by neurologist Howard Barrows in the 1960s (Andrea & Kotowski, 2017). The Association of Standardized Patient Educators defines SPs as people “trained to portray a patient with a specific condition in a realistic, standardized and repeatable way” (as cited in Sideras et al., 2013, p. 421). SPs have been used by medical and nursing programs to measure students’ clinical competency in skills, including communication and clinical and physical examination (Sideras et al., 2013). The benefits of learning clinical skills with the use of SPs include realism; knowledge integration; and improved satisfaction, confidence, communication proficiency, and clinical judgement (Andrea & Kotowski, 2017; GOH et al., 2016). On the other hand, the costs of recruiting, training, and managing individuals to be SPs, together with the availability of resources and faculty competency in simulation methodologies, lead to limitations in the use of this learning method (Andrea & Kotowski, 2017; GOH et al., 2016).

### **Problem Statement**

Transition of nursing skills from the classroom to the bedside requires innovative approaches that challenge the nursing students to master their skills, solve problems, and think critically (Sundler, Pettersson, & Berglund, 2015). The most controlled modes of learning in nursing simulation laboratories include the use of high-fidelity mannequins and standardized patients (SPs). Currently, there are various evidence-based research articles evaluating the benefits of each program separately. However, the literature shows a lack of recent comparisons

of the two high-fidelity simulations and their benefits related to improving the clinical competence of nursing students in a safe and secure environment.

### **Purpose Statement**

The purpose of this integrative literature review was to compare two learning methods commonly used in simulation laboratories and to evaluate the advantages of each in order to ultimately improve the clinical competencies of nursing students. The two methods include high-fidelity mannequins and standardized patients (SPs). Both modes of learning allow for the development of nursing skills in a controlled environment meant to prepare the students for eventual patient interaction. Furthermore, the review explored how skills learning laboratories can be improved in order to create an optimal learning environment.

### **Research Questions**

The following research questions were addressed in this literature review:

1. What are the benefits of high-fidelity mannequins and standardized patients (SPs) in simulation laboratories?
2. How can skills learning laboratories be improved in order to create an optimal learning environment?

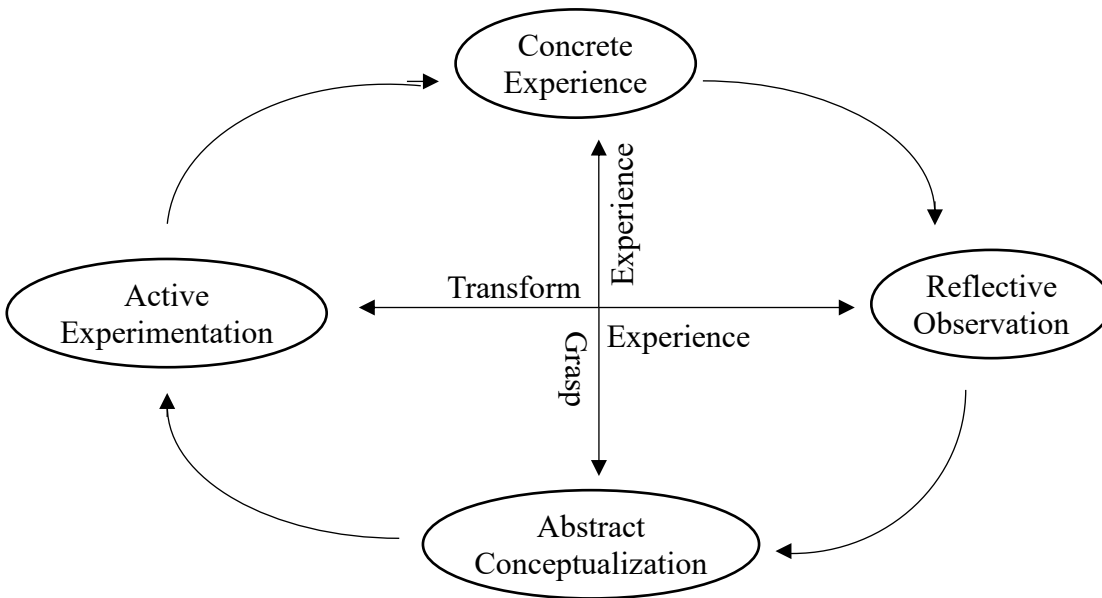
### **Conceptual Framework**

Learning through experience is central for nursing skill acquisition in laboratory settings; thus, Kolb's Experiential Learning Theory will be utilized. Kolb's theory is founded on the learning theories of Lewin, Dewey, and Piaget; these three theorists postulated that learning is a process formed through experience (Kolb, 2015). Experiential learning is a holistic approach that combines experience, perception, cognition, and behavior leading to learning through reflection on previous experiences (Kolb, 2015).

Kolb (2015) defined six characteristics of experiential learning. First, learning is a process, rather than an outcome, and learning occurs whether the outcome is successful or not. Second, learning is a continuous process grounded in experience, meaning that all learning is relearning; one doesn't simply start from a blank slate, rather each individual has some notion shaped by previous experiences (Kolb, 2015). Third, Kolb (2015) goes on to say that the process of learning requires the resolution of conflicts among opposing learning modes: concrete experience versus abstract concepts and observation versus action. Fourth, Kolb (2015) states that learning is a holistic process that involves adaptation to the social and physical environments. Fifth, learning involves transaction between the person and the environment (Kolb, 2015). Learning is not just a personal, internal process that requires only books, teachers, and the classroom. Instead, learning occurs as the person acts on and reacts to his/her environment. Sixth, learning is the process of creating knowledge (Kolb, 2015). Knowledge occurs as an exchange between social and personal knowledge; where social knowledge is the objective accumulation of previous human cultural experiences, and personal knowledge is accumulated through one's subjective life experiences.

Kolb's Experiential Learning Theory is based on the Learning Cycle (Fig. 1) (Kolb, 2015). The Learning Cycle aims to resolve the above mentioned conflicts of experience vs. abstraction and action vs. reflection (Kolb, 2015). It includes concepts of *concrete experience* (one's own experience), *reflective observation* (observation of and reflection on the experience from many perspectives), *abstract conceptualization* (creating concepts to integrate observations into theories), and *active experimentation* (use of theories to make decisions and solve problems) (Kolb, 2015). Kolb (2015) states that knowledge results from *grasping*, taking in the information, and *transforming*, interpreting and acting on the experience.





**Figure 1. The Experiential Learning Cycle (Kolb, 2015)**

## Methods

### Design

An integrative literature review design was used to examine the literature regarding learning methods in nursing skills laboratories. According to Grove, Burns, and Gray (2013), the literature review summarizes and presents relevant findings of published material on a particular topic; in this case the relevant topic is learning methods in nursing skills laboratories. This design will enable the identification of different learning methods and their benefits.

Furthermore, the literature review will lead to new recommendations that integrate the benefits of each learning method in order to give the best learning experience.

### Literature Search Strategies

In this review, internet databases searched included CINAHL, ProQuest, and ERIC. An overall search of nursing skills laboratories was conducted, as well as individualized searches based on the specific learning method explored. Multiple keywords were used in different combinations when searching for articles, including: *nursing, skills, learning, laboratories,*

*laboratory, lab, undergraduate, and baccalaureate.* Additional keyword combinations for simulation learning with mannequins included: *simulation, patient simulation, anatomic models, simulators, high fidelity, medium fidelity, low fidelity, mannequins, and manikins.* Additional keyword for simulation learning with SPs included: *standardized patients, SP, and human patients.*

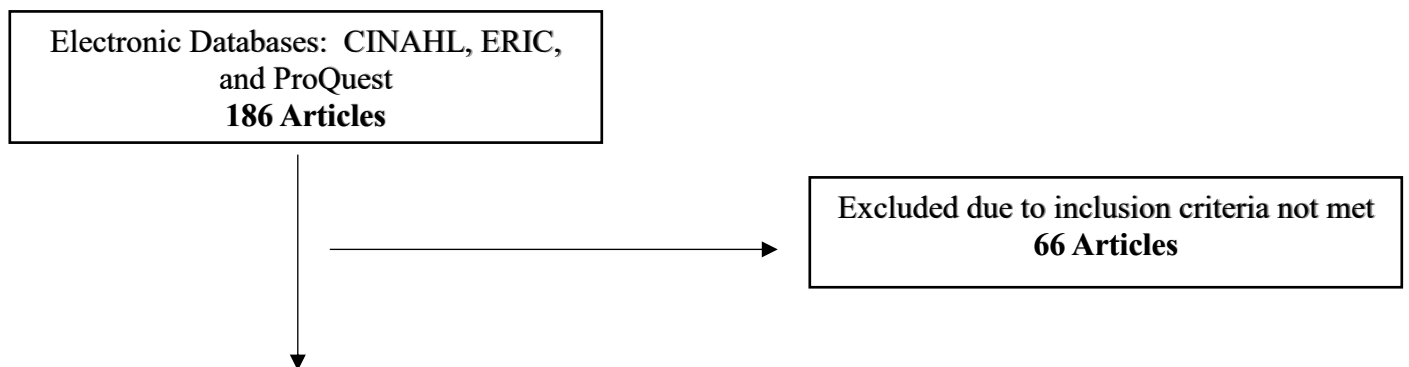
### **Literature Search Limitation**

All articles, searched with the above keywords, identified learning methods used in nursing skills laboratories (Figs. 2, 3 and 4). The inclusion criteria during the search were:

- Peer reviewed
- English language
- Published within the past 10 years (2009 to 2018)
- Population of undergraduate or baccalaureate nursing students

Exclusion criteria included:

- Graduate-entry nursing students; due to a difference in age/maturity and learning styles
- Clinical sites; due to the lack of a controlled learning environment



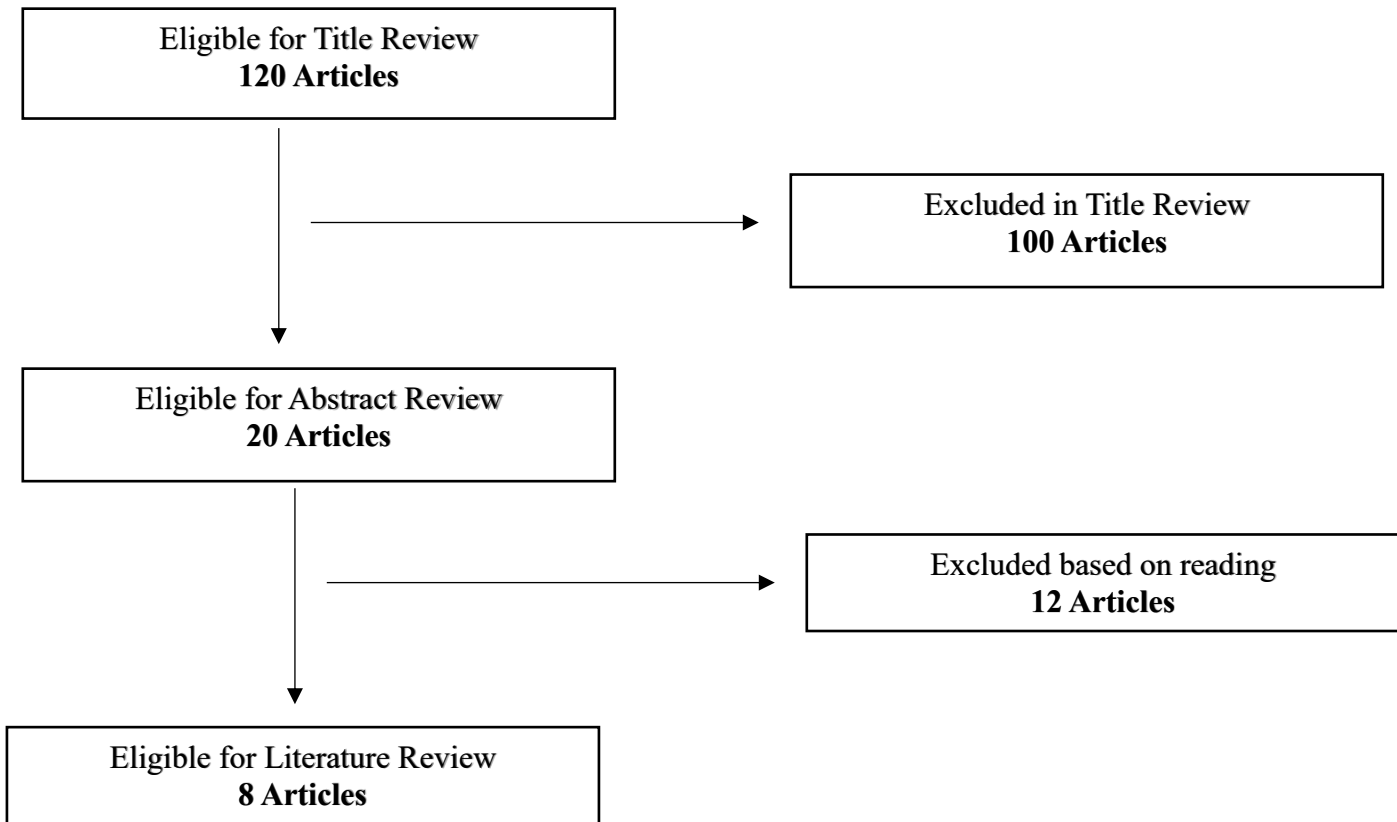
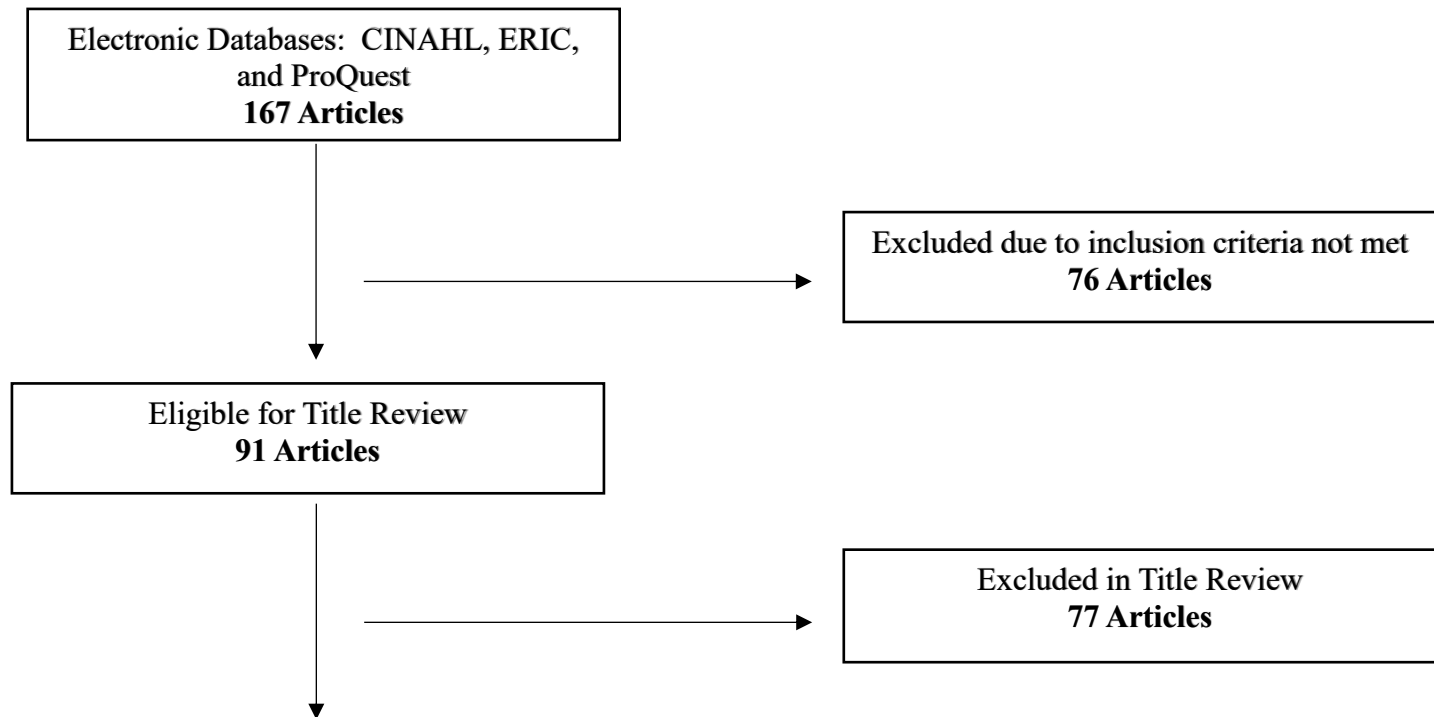
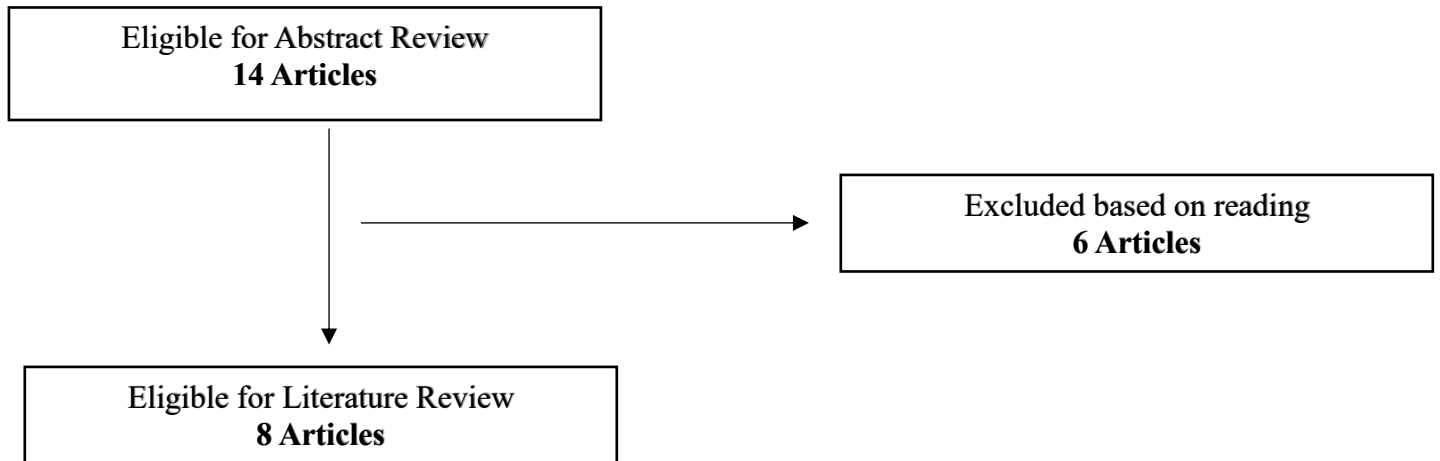
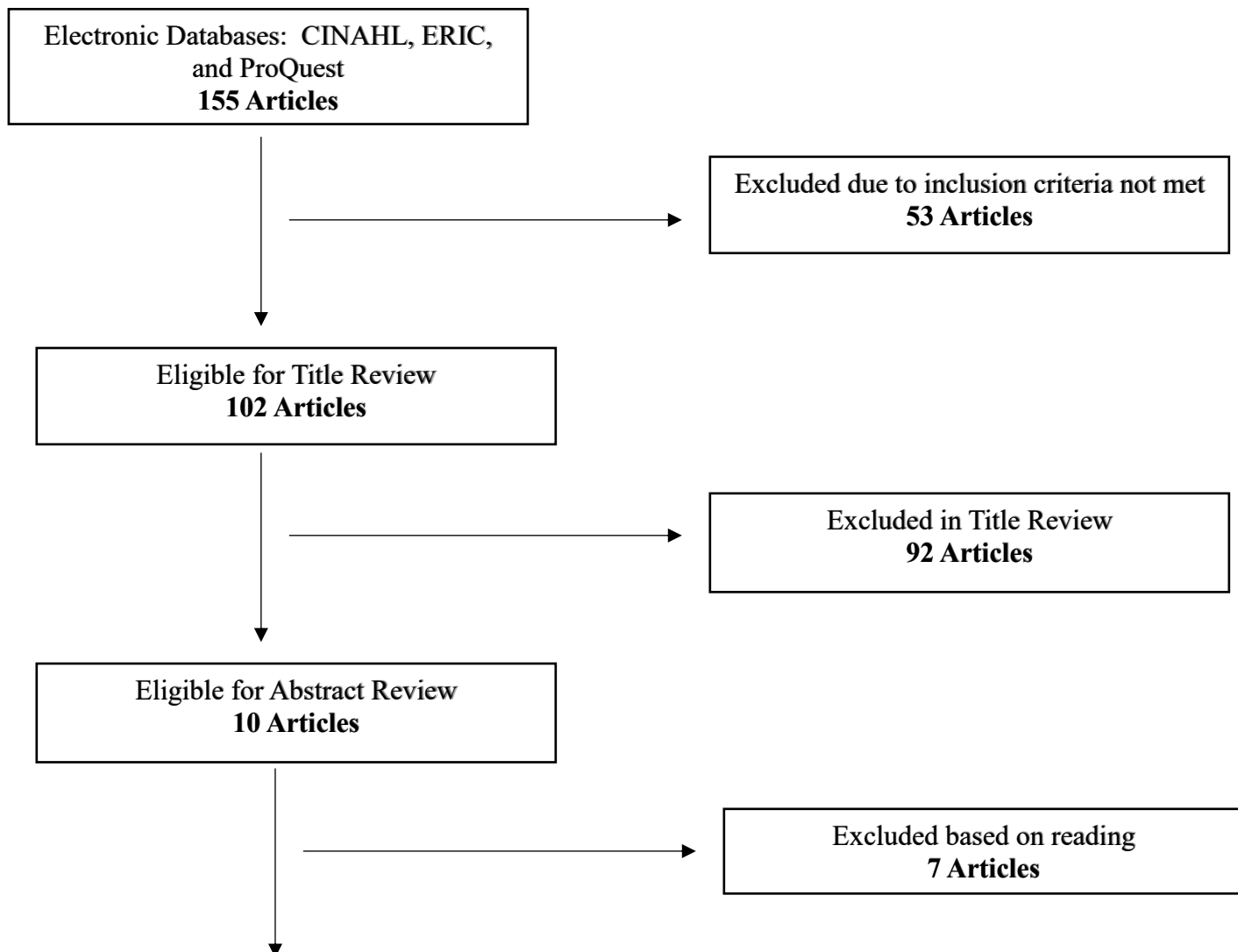


Figure 2. Process of inclusion and exclusion of studies on high-fidelity mannequins





**Figure 3. Process of inclusion and exclusion of studies on standardized patients (SPs)**



<p>Eligible for Literature Review <b>3 Articles</b></p>
---

**Figure 4. Process of inclusion and exclusion of studies used to answer Research Question 2**

**Data Synthesis and Data Analysis**

For the first research question, identifying the benefits of each type of learning in clinical skills laboratories, articles were reviewed to find the benefits related to high-fidelity mannequins and SPs. The inclusion and exclusion criteria listed in the *Literature Search Limitation* section were used.

In the initial search process, there were a total of 353 articles (CINAHL 126, ERIC 23, and ProQuest 125) (Figs. 2 and 3). Of those, 16 met all the inclusion criteria and were selected to address the first research question related to the benefits of using high-fidelity mannequins and standardized patients. Major findings related to the benefits of each learning method were tabulated and summarized in Table 4. Relevant data was categorized by the learning method and ordered alphabetically by the authors' last names.

Next, the second research question regarding the optimal learning environment in skills learning laboratories was addressed. Articles reviewed related to the learning and teaching process in the skills learning laboratories. The inclusion and exclusion criteria listed in the *Literature Search Limitation* section were used.

In the initial search process, there were a total of 155 articles (CINAHL 127, ERIC 5, and ProQuest 23) (Fig. 4). Of those, 3 met all the inclusion criteria and were selected to address the second research question related to the optimal learning environment in skills learning

laboratories. Major findings related to the optimal learning environments were tabulated and summarized in Table 5.

### Results

Benefit	Explanation
Knowledge acquisition	Improved examination performances
Satisfaction	Practical, cognitive, and realism modes contribute to student learning
Self-confidence	Opportunity to control feelings of fear and panic

**Table 1. Benefits of High-Fidelity Mannequins**

Benefit	Explanation
Communication skills	Verbal, nonverbal, and environmental cues utilized to improve reasoning and make correct clinical judgement
Clinical judgement	Linking multiple data points in order to determine the best course of action
Confidence	Belief that one can be successful at a task or skill
Applicability	Ability to translate theory into practice

**Table 2. Benefits of Standardized Patients**

Characteristic	Explanation
Discussion and engagement	Active learning and participation enable students to express their abilities and allow teachers to recognize each student's learning style
Approachable and innovative instructors	Acceptance and support of students' way of learning and performance fosters a positive learning environment
Opportunity for practice	Hands-on experience fosters learning and familiarity with patients and equipment

**Table 3. Characteristics of Optimal Learning Environments**

### Benefits of High-Fidelity Mannequins in Skills Learning Laboratories

Three benefits of high-fidelity mannequins, seen in Table 1, were identified: effective learning and knowledge acquisition, satisfaction with the simulated experience, and improved self-confidence.

**Knowledge acquisition.** The ability of high-fidelity mannequin simulations to produce effective clinical competence contributes to the benefits of their utilization (Merriman, Stayt, & Ricketts, 2014). When comparing high-fidelity simulators with low-fidelity simulators or

traditional classroom learning, researchers have found improved examination performances for students learning via high-fidelity modes (Gates, Parr, & Hughen, 2012; Merriman et al., 2014; Simonelli & Paskausky, 2012; Sundler, Pettersson, & Berglund, 2015). Learning through the use of high-fidelity mannequin simulations was found to be more effective. However, two studies comparing medium- and high-fidelity simulators did not find a significant difference in knowledge acquisition between the two modes of fidelity (Baptista et al., 2016; Levett-Jones, Lapkin, Hoffman, Arthur, & Roche, 2011).

**Satisfaction.** Satisfaction with a simulated experience including the practical, cognitive, and realism modes contributed to student learning (Baptista et al., 2016). Specifically, the increased realism of a high-fidelity simulation increased satisfaction and improved learning (Baptista et al., 2016; Basak et al., 2016; Merriman et al., 2014; Parker & al., 2011). Furthermore, Sundler et al. (2015) found that high-fidelity simulations engaged students in “pleasurable learning,” which allowed them to view the simulation as a meaningful experience and a learning opportunity (p.1259).

**Self-confidence.** Improved self-confidence in learning through the use of high-fidelity mannequins comes about from an opportunity to “control the feelings of fear and panic,” leading to positive effects (Basak et al., 2016). Improved self-confidence was also found in the studies conducted by Parker et al. (2011) and Sundler et al. (2015). As the students developed their knowledge, they expressed improvements in confidence and preparedness for the “real world of nursing” (Sundler et al., 2015, p. 1260).

### **Benefits of Standardized Patients (SPs) in Skills Learning Laboratories**

Four themes were identified when it comes to the benefits of utilizing SPs, seen in Table 2. They include: improved communication skills, improved clinical judgement, increased confidence, and applicability.

**Communication skills.** Communication skills are invaluable in nursing, especially when it comes to “meeting the quality and safety standards in patient-centered care” (Andrea & Kotowski, 2017, p. 310). One has to be able to utilize verbal, nonverbal, and environmental cues in order to improve their reasoning and make correct clinical judgements (Herron et al., 2017). Moreover, the ability of a nurse to express empathy and have an appropriate bedside manner rely on both verbal and nonverbal communication (Andrea & Kotowski, 2017). Whether it is interviewing, recognizing and assessing the signs and symptoms, communicating and describing the medical procedures, educating, providing therapeutic communication, or collaborating with a multidisciplinary healthcare team, standardized patients (SPs) have been found to improve the students’ communication skills (Andrea & Kotowski, 2017; Doolen, Giddings, Johnson, de Nathan, & Badia, 2014; de Goes et al., 2017; Herron et al., 2017; Williams & Ruhs, 2017).

**Clinical judgement.** Clinical reasoning involves linking multiple data points in order to determine the best course of action in a situation (Herron et al., 2017). Clinical judgement is necessary when attempting to make sense of data, planning, focusing the assessment, and prioritizing tasks (Andrea & Kotowski, 2017). Simulations with SPs allowed nursing students to assess new situations and think critically in order to make the appropriate interventions when it comes to patient care (Andrea & Kotowski, 2017; Herron et al., 2017)

**Confidence.** According to Andrea and Kotowski (2017), “the belief that one can be successful at a task or skill is an internal motivator for learning” (p. 312). Furthermore, anxiety and low self-confidence can impair clinical decision-making skills (Andrea & Kotowski, 2017).



Fortunately, the literature review has found that simulations with SPs improved students' confidence and comfort when it comes to patient care (Andrea & Kotowski, 2017; Doolen et al., 2014; GOH et al., 2016; Williams & Ruhs, 2017). GOH et al. (2016) also emphasize that the ability to learn in a safe environment reduces stress and anxiety, leading to improved confidence. Students have indicated that the acquisition of confidence through simulated practice will allow them to lessen their anxiety when entering the clinical setting (GOH et al., 2016; Herron et al., 2017).

**Applicability.** The ability of standardized patients (SPs) to translate theory into practice with a realistic scenario allows students to gain further knowledge and understanding (GOH et al., 2016; Ross & Burrell, 2018). Utilizing realistic environmental props further increases the applicability of the simulation (Herron et al., 2017). Researchers have found that engaging with the SP increased the fidelity of the simulation, allowing students to experience realistic interactions when assessing and providing patient education (Herron et al., 2017).

### **Optimal Learning Environment in Skills Laboratories**

Common themes found in literature concerning optimal learning environments, seen in Table 3, include the following: discussion and engagement, approachable and innovative instructors, and opportunities for practice.

**Discussion and engagement.** Ewertsson et al. (2015) found that a learning environment that fostered ongoing discussions regarding learning methods led to better knowledge acquisition. Active learning and participation enabled each student to express his/her unique abilities and characteristics, allowing the teacher to consider each student's learning styles when planning lessons (Sheahan et al., 2015). Furthermore, Sheahan et al. (2015) emphasized the value of reflecting on one's work in order to enhance self-awareness and set new learning goals.

Finally, Strand et al. (2009) highlighted the use of dialogue as a way to invigorate learning and foster understanding.

**Approachable and innovative instructors.** Instructors who are approachable and accept and support their students' way of learning and practice fostered a positive learning environment (Ewertsson et al., 2015; Sheahan et al., 2015). Strand et al. (2009) found that students preferred a “modern-minded’ master teacher” who provided guidance, led by example, and mastered the curriculum. They wanted a professor who followed up with constructive feedback and encouraged understanding (Strand et al., 2009).

**Opportunity for practice.** The ability to practice skills multiple times fosters learning and familiarity (Ewertsson et al., 2015). Students who utilized different laboratory equipment correctly felt more prepared when they came across it in a clinical setting (Ewertsson et al., 2015). Sheahan et al. (2015) found that students reported negatively when there was a lack of practice time. Finally, Strand et al. (2009) reported that hands-on experience and team training allowed students to have a good foundation when it comes to performing their clinical skills.

### **Discussion**

The integrative literature review identified three themes when it comes to the use of high-fidelity mannequins: effective learning and knowledge acquisition, satisfaction with the simulated experience, and improved self-confidence. Simulations with high-fidelity mannequins allowed for a safe environment which led to improved self-confidence. Furthermore, the students found learning in a simulated environment highly satisfactory, allowing them to improve their clinical skills and confidence, while utilizing critical thinking, communication, and decision making (Basak et al., 2016). High-fidelity mannequins also improved students' learning and knowledge acquisition; however, both Baptista et al. (2016) and Levett-Jones et al. (2011)

found that there was not a significant difference in knowledge acquisition when comparing medium- and high-fidelity simulators. Thus, bringing into question the cost-benefit analysis of using high-fidelity simulations. While there are limited studies directly comparing the use of high-fidelity mannequins and SPs, the known limitations of mannequins include their inability to provide non-verbal cues, body language, facial expressions, and physical movement, which may limit their use in settings such as mental health nursing (Doolen et al., 2014).

Four benefits of standardized patients (SPs) were also identified: improved communication skills, improved clinical judgement, increased confidence, and applicability. A simulated patient allowed students to assess the body language, physical findings, and emotional and personality characteristics; thus, improving applicability, communications skills, and clinical judgement (Doolen et al., 2014). Furthermore, just like mannequins, SPs provided a safe learning environment which contributed to reduced anxiety and led to improved confidence (GOH et al., 2016).

In order to create an optimal learning environment in clinical skills laboratories, the following elements were found to be beneficial: discussion and engagement, approachable and innovative instructors, and opportunities for practice. An environment that fosters discussion leads to the development of methods that improve learning (Ewertsson et al., 2015). Clinical skills laboratories provide a bridge between theory and practice, as well as between the skills learned at school and those observed in the clinical setting (Ewertsson et al., 2015). Allowing the students to reflect on any differences in practice leads to increased discussion, understanding, and clinical skill development (Sheahan et al., 2015). Such a bridge allows for the correction of any misconceptions or incorrect behaviors (Strand et al., 2009). Furthermore, an instructor who is able to demonstrate the practical skills accurately and back them up with theoretical

explanations avoids confusion and discrepancies (Ewertsson et al., 2015). An emphasis was also placed on fostering an atmosphere for learning that is constructive and goal directed (Sheahan et al., 2015). An instructor that provided tangible feedback to students' questions and contributed to their understanding, allowed students to reach their learning goals (Strand et al., 2009). Finally, these studies emphasized the importance of having an appropriate amount of time allotted for practice of clinical skills so that the students could improve their knowledge and performance. Moreover, the practice of skills with realistic materials and in realistic settings enhanced the ability to translate the skills learned into the clinical setting (Ewertsson et al., 2015). A theme that evolved among these studies was that of a supportive and engaging learning environment.

### **Limitations**

The limitations in the studies reviewed include discrepancies in training of standardized patients (SPs), differences in student preparation, a lack of standardized scenarios, and varying times allowed for each part of the simulation—prebriefing, scenario, and debriefing. Additionally, the instructors leading the simulations and engaging the students were all different professors from their respective programs. Thus, a major element of the simulation experience was variable and could have contributed either positively or negatively to skills learning. Furthermore, while there is a lot of data on the use of simulations in nursing school, there is less data to quantify their benefits when it comes to translation of confidence and competence into the clinical settings. Lastly, there is a lack of research to determine whether the acquired knowledge remained stable over time.

### **Suggestions for future research**

Future research should focus on direct comparisons of mannequins and standardized patients in simulation laboratories. Thereby, exploring which mode of learning is the most appropriate when it comes to different nursing courses and simulation scenarios, for example mental health versus critical care. Furthermore, future research should explore the ways through which nursing skills can be more effectively translated from the school setting into the real world. Finally, research should focus on the ways through which simulations can be optimized and standardized so that they become optimal learning environments for nursing students.

### **Implications for nursing**

Nursing education prepares the future generations of nurses to care for the health of our population. Their clinical readiness and commitment to continuous learning and improvement should start in school. Allowing students to experience multiple environments where they can think critically and collaborate prepares them for future situations; they'll be better equipped to react appropriately and prioritize correctly. Moreover, a secure and stimulating environment can inspire the students' inquisitive minds and lead them to pursue further education and advancement in their careers.

### **Conclusion**

The integrative literature review has shown that the use high-fidelity mannequins in a simulation laboratory brought about effective learning and knowledge acquisition, satisfaction with the simulated experience, and improved self-confidence. While the use of standardized patients (SPs) was found to have multiple benefits, including improved communication skills, improved clinical judgement, and increased confidence and applicability. Both types of simulation modes were found to improve students' knowledge and confidence levels. Limited studies were found comparing the two modes directly and have shown comparable results when

it comes to performance and satisfaction. In order to improve upon the simulated experience, the literature review also explored common themes of optimal learning environments in clinical skills laboratories and found that discussion and engagement, approachable and innovative instructors, and opportunities for practice allowed students to have a beneficial learning experience. Thus, this literature review was able to bring further insight to the benefits of simulation laboratories and the ways in which clinical skill learning can be optimized.

## References

- AL Sabei, S. D., & Lasater, K. (2016). Simulation debriefing for clinical judgment development: A concept analysis. *Nurse Education Today*, 45, 42-47. Retrieved from [http://www.sciencedirect.com.ezproxy.depaul.edu/science/article/pii/S0260691716301034?\\_rdoc=1&\\_fmt=high&\\_origin=gateway&\\_docanchor=&md5=b8429449ccfc9c30159a5f9aeaa92ffb&ccp=y](http://www.sciencedirect.com.ezproxy.depaul.edu/science/article/pii/S0260691716301034?_rdoc=1&_fmt=high&_origin=gateway&_docanchor=&md5=b8429449ccfc9c30159a5f9aeaa92ffb&ccp=y)
- Andrea, J., & Kotowski, P. (2017). Using standardized patients in an undergraduate nursing health assessment class. *Clinical Simulation in Nursing*, 3 (7), 309-313. Retrieved from <https://www-sciencedirect-com.ezproxy.depaul.edu/science/article/pii/S1876139917300580>
- Baptista, R. C. N., Paiva, L. A. R., Oliveira, L. M. N., Pereira, M. de F. C. R., & Martins, J. C. A. (2016). Satisfaction and gains perceived by nursing students with medium and high-fidelity simulation: A randomized controlled trial. *Nurse Education Today*, 46 (1), 127-132. Retrieved from [http://www.sciencedirect.com/science/article/pii/S0260691716301745?\\_rdoc=1&\\_fmt=high&\\_origin=gateway&\\_docanchor=&md5=b8429449ccfc9c30159a5f9aeaa92ffb](http://www.sciencedirect.com/science/article/pii/S0260691716301745?_rdoc=1&_fmt=high&_origin=gateway&_docanchor=&md5=b8429449ccfc9c30159a5f9aeaa92ffb)
- Bennett, L. L., Grimsley, A., Grimsley, L., & Rodd, J. (2017). The gap between nursing education and clinical skills. *Association of Black Nursing Faculty Journal*, 28 (4), 96-102. Retrieved from <http://web.a.ebscohost.com.ezproxy.depaul.edu/ehost/pdfviewer/pdfviewer?vid=2&sid=f860879f-71bc-436f-9471-7e9ad3dec274%40sessionmgr4010>
- Bornais, J. A. K., Raiger, J. E., Krahn, R. E., & El-Masri, M. M. (2012). Evaluating undergraduate nursing students' learning using standardized patients. *Journal of Professional Nursing*, 28 (5), 291-296.

de Goes, F. S. N., Aredes, N. A, Hara, C. Y. N., Fonseca, L. M. M., & Campbell, S. H. (2017).

Simulation with standardized patients: Nursing student's communication skills in health.

*Rev Rene*, 18 (3), 383-389.

Doolen, J., Giddings, M., Johnson, M., de Nathan, G. G., & Badia, L. O. (2014). An evaluation

of mental health simulation with standardized patients. *International Journal of Nursing*

*Education Scholarship*, 11 (1), 55-62.

Ewertsson, M., Allvin, R., Holmstrom, I. K., & Blomberg, K. (2015). Walking the bridge:

Nursing students' learning in clinical skill laboratories. *Nurse Education in Practice*, 15

(4), 277-283. Retrieved from [http://www.sciencedirect.com/science/article/pii/S14715](http://www.sciencedirect.com/science/article/pii/S1471595315000529?_rdoc=1&_fmt=high&_origin=gateway&_docanchor=&md5=b8429449ccfc9c30159a5f9aeaa92ffb)

[95315000529?\\_rdoc=1&\\_fmt=high&\\_origin=gateway&\\_docanchor=&md5=b8429449cc](http://www.sciencedirect.com/science/article/pii/S1471595315000529?_rdoc=1&_fmt=high&_origin=gateway&_docanchor=&md5=b8429449ccfc9c30159a5f9aeaa92ffb)

[fc9c30159a5f9aeaa92ffb](http://www.sciencedirect.com/science/article/pii/S1471595315000529?_rdoc=1&_fmt=high&_origin=gateway&_docanchor=&md5=b8429449ccfc9c30159a5f9aeaa92ffb)

Gates, M. G., Parr, M. B., & Huguen, J. E. (2012). Enhancing nursing knowledge using high-

fidelity simulation. *Journal of Nursing Education*, 51 (1), 9-15.

GOH, Y-S., Selvarajan, S., Chng, M-L., Tan, C-S., & Yobas, P. (2016). Using standardized

patients in enhancing undergraduate students' learning experience in mental health

nursing. *Nurse Education Today*, 45, 167-172. Retrieved from [http://www.](http://www.sciencedirect.com/science/article/pii/S0260691716301526?_rdoc=1&_fmt=high&_origin=gateway&_docanchor=&md5=b8429449ccfc9c30159a5f9aeaa92ffb)

[sciencedirect.com/science/article/pii/S0260691716301526?\\_rdoc=1&\\_fmt=high&\\_origin](http://www.sciencedirect.com/science/article/pii/S0260691716301526?_rdoc=1&_fmt=high&_origin=gateway&_docanchor=&md5=b8429449ccfc9c30159a5f9aeaa92ffb)

[=gateway&\\_docanchor=&md5=b8429449ccfc9c30159a5f9aeaa92ffb](http://www.sciencedirect.com/science/article/pii/S0260691716301526?_rdoc=1&_fmt=high&_origin=gateway&_docanchor=&md5=b8429449ccfc9c30159a5f9aeaa92ffb)

Grove, S. K., Burns, N., & Gray, J. R. (2013). *The practice of nursing research: Appraisal,*

*synthesis, and generation of evidence* (7th ed.). St. Louis, MO: Elsevier Inc.

Herron, E. K., Nemeth, J., Powers, K. A. (2017). Community health simulation with a

standardized patient: Exploring the experience. *Clinical Simulation in Nursing*, 13 (7),

331-337.



- Holland, A., Smith, F., McCrossan, G., Adamson, E., Watt, S., & Penny, K. (2013). Online video in clinical skills education of oral medication administration for undergraduate student nurses: A mixed methods, prospective cohort study. *Nurse Education Today*, 33(6), 663-670. Retrieved from <http://www.sciencedirect.com.ezproxy.depaul.edu/science/article/pii/S0260691712000159?via%3Dihub>
- Johnson, G., & Flagler, S. (2013). Web-based unfolding cases: A strategy to enhance and evaluate clinical reasoning skills. *Journal of Nursing Education*, 52 (10), 589-592. Retrieved from <https://www.healio-com.ezproxy.depaul.edu/nursing/journals/jne/2013-10-52-10/%7Be7467a09-26a7-43ca-874d-37a47e9fbb04%7D/web-based-unfolding-cases-a-strategy-to-enhance-and-evaluate-clinical-reasoning-skills>
- Kelly, M., Lyng, C., McGrath, M., & Cannon, G. (2009). A multi-method study to determine the effectiveness of, and student attitudes to, online instructional videos for teaching clinical nursing skills. *Nurse Education Today*, 29 (3), 292-300. Retrieved from <http://www.sciencedirect.com.ezproxy.depaul.edu/science/article/pii/S0260691708001779?via%3Dihub>
- Kolb, D. A. (2015). *Experiential learning: Experience as the source of learning and development* (2nd ed.). Upper Saddle River, NJ: Pearson Education Inc.
- Levett-Jones, T., Lapkin, S., Hoffman, K., Arthur, C., & Roche, J. (2011). Examining the impact of high and medium fidelity simulation experiences on nursing students' knowledge acquisition. *Nurse Education in Practice*, 11, 380-383.
- McKenny, K. (2011). Using an online video to teach nursing skills. *Teaching and Learning in Nursing*, 6 (4), 172-175. Retrieved from [http://www.sciencedirect.com/science/article/pii/S1557308711000394?\\_rdoc=1&\\_fmt=high&\\_origin=gateway&\\_docanchor=&md5=b](http://www.sciencedirect.com/science/article/pii/S1557308711000394?_rdoc=1&_fmt=high&_origin=gateway&_docanchor=&md5=b)

8429449ccfc9c30159a5f9aeaa92ffb

- McNett, S. (2012). Teaching nursing psychomotor skills in a fundamentals laboratory: A literature review. *Nursing Education Perspectives*, 33 (5), 328-333. Retrieved from <http://web.b.ebscohost.com.ezproxy.depaul.edu/ehost/pdfviewer/pdfviewer?vid=3&sid=0cd4bdfc-c28f-4327-8175-8269d4b24c6e%40sessionmgr103>
- Merriman, C. D., Stayt, L. C., & Ricketts, B. (2014). Comparing the effectiveness of clinical simulation versus didactic methods to teach undergraduate adult nursing students to recognize and assess the deteriorating patient. *Clinical Simulation in Nursing*, 10 (3), 119-127. Retrieved from <http://www.sciencedirect.com.ezproxy.depaul.edu/science/article/pii/S1876139913002417?via%3Dihub>
- Oermann, M. H., De Gagne, J. C., & Phillips, B. C. (Eds.). (2015). *Teaching in nursing and role of the educator: The complete guide to best practice in teaching, evaluation, and curriculum development* (2nd ed.). New York, NY: Springer Publishing Company
- Page-Cutrara, K. (2014). Use of prebriefing in nursing simulation: A literature review. *Journal of Nursing Education*, 53 (3), 136-141. Retrieved from <https://search-proquest-com.ezproxy.depaul.edu/docview/1634766143?OpenUrlRefId=info:xri/sid:wediscovery&accountid=10477>
- Parker, R. A., McNeill, J. A., Pelayo, L. W., Goei, K. A., Howard, J., & Gunter, M. D. (2011). Pediatric clinical simulation: A pilot project. *Journal of Nursing Education*, 50 (2), 105-111.
- Ross, J. G., & Burrell, S. A. (2018). Standardized patient simulation to facilitate learning in evidence-based oncology symptom management. *Journal of Nursing Education*, 57 (4), 250-253.

- Sheahan, L., While, A., & Bloomfield, J. (2015). An exploratory trial exploring the use of a multiple intelligences teaching approach (MITA) for teaching clinical skills to first year undergraduate nursing students. *Nurse Education Today*, 35 (12), 1148-1154. Retrieved from <http://www.sciencedirect.com.ezproxy.depaul.edu/science/article/pii/S0260691715001884?via%3Dihub>
- Shellenbarger, T., & Robb, M. (2015). Technology-based strategies for promoting clinical reasoning skills in nursing education. *Nurse Educator*, 40 (2), 79-82. Retrieved from <http://ovidsp.tx.ovid.com.ezproxy.depaul.edu/sp-3.27.0b/ovidweb.cgi>
- Sideras, S., McKenzie, G., Noone, J., Markle, D., Frazier, M., & Sullivan, M. (2013). Making simulation come alive: Standardized patients in undergraduate nursing education. *Nursing Education Perspectives*, 34 (6), 421-425. Retrieved from <https://search-proquest-com.ezproxy.depaul.edu/nahs/docview/1465296372/fulltextPDF/BBDA9DDE1A374378PQ/1?accountid=10477>
- Simonelli, M. C., & Paskausky, A. L. (2012). Simulation stimulates learning in childbearing clinical course. *Journal of Nursing Education*, 51 (3), 172-175.
- Smith, M. J., Carpenter, R. D., & Fitzpatrick, J. J. (Eds.). (2015). *Encyclopedia of nursing education*. New York, NY: Springer Publishing Company.
- Society for Simulation in Healthcare (SSH). (2017). *About simulation*. Retrieved from <http://www.ssih.org/About-SSH/About-Simulation>
- Staykova, M. P., Von Stewart, D., & Staykov, D. I. (2017). Back to the basics and beyond: Comparing traditional and innovative strategies for teaching in nursing skills laboratories. *Teaching and Learning in Nursing*, 12 (2), 152-157. Retrieved from <http://www.sciencedirect.com.ezproxy.depaul.edu/science/article/pii/S1557308716301172?via%3Dihub>

- Strand, I., Naden, D., & Slettebo, A. (2009). Students learning in a skills laboratory. *Nordic Journal of Nursing Research and Clinical Studies*, 29 (3), 18-22. Retrieved from <http://web.a.ebscohost.com.ezproxy.depaul.edu/ehost/pdfviewer/pdfviewer?vid=8&sid=16f78e51-c655-483a-92d3-96df55102919%40sessionmgr4006>
- Sundler, A. J., Pettersson, A., & Berglund, M. (2015). Undergraduate nursing students' experiences when examining nursing skills in clinical simulation laboratories with high-fidelity patient simulators: A phenomenological research study. *Nurse Education Today*, 35 (12), 1257-1261. Retrieved from <http://www.sciencedirect.com.ezproxy.depaul.edu/science/article/pii/S0260691715001628?via%3Dihub>
- Weatherspoon, D. L., Phillips, K., & Wyatt, T. H. (2015). Effect of electronic interactive simulation on senior bachelor of science in nursing students' critical thinking and clinical judgments skills. *Clinical Simulation in Nursing*, 11(2), 126-133. Retrieved from [http://www.sciencedirect.com/science/article/pii/S1876139914002199?\\_rdoc=1&\\_fmt=high&\\_origin=gateway&\\_docanchor=&md5=b8429449ccfc9c30159a5f9aeaa92ffb](http://www.sciencedirect.com/science/article/pii/S1876139914002199?_rdoc=1&_fmt=high&_origin=gateway&_docanchor=&md5=b8429449ccfc9c30159a5f9aeaa92ffb)
- Williams, M. G., & Ruhs, J. (2017). Using a standardized patient to improve collaboration and problem solving skills with CPAP usage in the home. *Home Health Care Now*, 35 (6), 314-320.

## Appendix A.

Table 4. Data Summary: Benefits of High-Fidelity Mannequins and Standardized Patients

Authors (Year)	Purpose	Design/Sample/Setting	Theoretical Framework	Description of Program	Benefits
<b>HIGH-FIDELITY MANNEQUINS</b>					
Baptista, Paiva, Goncalves, Oliveira, Pereira, & Martins (2016)	To analyze and comparatively assess gains and satisfaction perceived by nursing students, depending on their participation in medium- and high-fidelity simulation (HFS) practices	<ul style="list-style-type: none"> <li>• Randomized control trial w/a post-test only design control group</li> <li>• Baccalaureate</li> <li>• N = 85</li> <li>• Groups: n/a Portugal</li> </ul>	No information	Simulations w/medium and high-fidelity mannequins. Data collection carried out at end of two training days (7 <sup>th</sup> and 14 <sup>th</sup> December, 2013). Researchers assessed performance w/2 questionnaires: Satisfaction Scale and a Scale of Gains Perceived	Satisfaction with both simulated experiences in three categories (practical, realism, cognitive), w/HFS significantly higher in realism and the overall satisfaction score (SCESS). Gains perceived with both simulated experiences in categories (recognition/decision, cognitive, intervention, attitudinal, technical/practical), w/HFS significantly higher in recognition/decision
Basak, Unver, Moss, Watts, & Gaioso (2016)	To examine the differences between low- and high-fidelity mannequins when it comes to skill acquisition	<ul style="list-style-type: none"> <li>• Quasi experimental design</li> <li>• Baccalaureate</li> <li>• N = 34</li> <li>• Groups: 3 Alabama</li> </ul>	Principles of active learning	Each group of students performed 2 simulations; one w/a low-fidelity & one w/a high-fidelity mannequin. Both sims were related to patients w/respiratory distress. Afterwards, the students completed a satisfaction and self-confidence scale and a simulation design scale	High-fidelity sim had higher scores in satisfaction, sim design, and self-confidence in learning
Gates, Parr, & Hughen (2012)	To examine the effects of high-fidelity simulation on knowledge acquisition as evidenced by performance on content-specific examinations	<ul style="list-style-type: none"> <li>• No info on study design</li> <li>• Baccalaureate</li> <li>• N = 104</li> <li>• Groups: 3-5 California</li> </ul>	No information	Students randomly assigned into two simulations (PE & GI bleed). Following their simulation experience, students completed a 10-item exam during	Scored significantly higher on examinations when it comes to knowledge acquisition

				the next class meeting	
Levett-Jones, Lapkin, Hoffman, Arthur, & Roche (2011)	To measure and compare knowledge acquisition in nursing students exposed to medium or high fidelity mannequins	<ul style="list-style-type: none"> <li>• Quasi-experimental design</li> <li>• Undergraduate</li> <li>• N = 84</li> <li>• Groups: n/a</li> </ul> Australia	No information	Researchers compared knowledge acquisition of nursing students when using medium vs. high fidelity mannequins. Data collected prior to sim, immediately following, & 2 weeks later	Differences in scores for knowledge acquisition not statistically significant
Merriman, Stayt, & Ricketts (2014)	To evaluate effectiveness of clinical simulation compared w/classroom teaching when it comes to assessment a deteriorating pt	<ul style="list-style-type: none"> <li>• Phase II, single, randomized, controlled trial w/single-blinded assessments</li> <li>• Undergraduate</li> <li>• N = 150</li> <li>• Groups: 5-6</li> </ul> UK	Experiential Learning theory (Kolb, 1984)	Students received either classroom based teaching or clinical simulation teaching. Participants underwent pre- and post-intervention OSCE and completed a self-reported competence and self-efficacy questionnaire.	Self-efficiency and competency irrespective of teaching method. OSCE scores better for simulation taught students. Simulation students were more satisfied w/their teaching experience
Parker, McNeill, Pelayo, Goei, Howard, & Gunter (2011)	To examine learning outcomes (knowledge) and student perceptions of simulation experience	<ul style="list-style-type: none"> <li>• Quasi-experimental posttest design</li> <li>• Baccalaureate</li> <li>• N = 41</li> <li>• Groups: 5</li> </ul> Texas	No information	Comparing learning outcomes between students in a traditional clinical vs. a clinical hybrid (4 simulations + clinical). Students evaluated through course grades & Student Satisfaction & Self-Confidence in Learning Scale	No significant difference in learning outcomes (knowledge); but students expressed satisfaction w/simulation and increased confidence in skills
Simonelli & Paskausky (2012)	To examine effectiveness of adding high-fidelity simulation to a childbearing clinical course when it comes to knowledge acquisition and clinical competency	<ul style="list-style-type: none"> <li>• Pre-test &amp; post-test design</li> <li>• Undergraduate</li> <li>• N = 272</li> <li>• Groups: Northwest US</li> </ul>	No information	Researcher compared sim vs. non-sim experience participants. Experimental group had 2 sims that replaced 2 clinical days in the hospital. Same NCLEX-style test was administered pre- & post-sim. Students also	Higher knowledge acquisition & skill acquisition scores

				evaluated based on their clinical performance grades and an NCLEX-style final exam	
Sundler, Pettersson, & Berglund (2015)	To explore experiences of undergraduate nursing students when examining knowledge, skills, and competencies in clinical simulation laboratories w/high-fidelity patient simulators and to analyze their learning experiences during the examination	<ul style="list-style-type: none"> <li>• Qualitative interviews</li> <li>• Undergraduate</li> <li>• N = 23</li> <li>• Groups: n/a</li> </ul> Sweden	Phenomenological approach (Dahlberg et al., 2008) and Husserl's theory of human intentionality and the lifeworld	Students participated in an examination involving a high-fidelity patient simulator where they were assessed by their teachers. Afterwards, qualitative interviews were conducted based on the reflective lifeworld research (RLR) approach	Getting involved in scenario and environment, confronting and challenging one's knowledge and skills, contemplating and reflecting on the course of events, engaging in pleasurable learning, and improving self-confidence
<b>STANDARDIZED PATIENTS (SPs)</b>					
Andrea & Kotowski (2017)	To determine if SPs would be useful in increasing students' confidence, communication skills, and clinical judgement when working w/patients in a clinical setting	<ul style="list-style-type: none"> <li>• Quantitative design</li> <li>• Baccalaureate</li> <li>• N = 80</li> <li>• Groups: n/a</li> <li>• Health Assessment in the Midwest</li> </ul>	Experiential Learning	Lasater Clinical Judgment Rubric (LCJR), a self-assessment tool, completed at three different points in time (1. At baseline, 2. After 12 hours of clinical experience, 3. After 1 week of working w/SPs)	Increased scores in following areas: being skillful, making sense of data, feeling calm and confident, clear communication, being well planned and flexible, focused observation, and prioritizing data. Led researchers to conclusion that SPs increased confidence, communication skills, & clinical judgement
Bornais, Raiger, Krahn, & El-Masri (2012)	To examine effectiveness of using SPs in improving health assessment skills among 1 <sup>st</sup> -year nursing students	<ul style="list-style-type: none"> <li>• Comparative design</li> <li>• Undergraduate</li> <li>• N = 180</li> <li>• Groups: n/a</li> <li>• Ontario</li> </ul>	No information	Faculty written multiple choice test and a randomized OSCE were used to compare assessment skills of students who practiced w/peers vs. students who practiced on SPs	Higher objective structured clinical examination (OSCE) mean scores (i.e., improved clinical competencies in health history, infection control measures, and physical assessment)
Doolen, Giddings, Johnson, Nathan, & Badia (2014)	To examine effectiveness of using SPs in mental health simulations	<ul style="list-style-type: none"> <li>• Post-intervention survey</li> <li>• Baccalaureate</li> <li>• N = 94</li> <li>• Groups: 2</li> </ul>	Kolb's experiential learning	3 case studies w/SPs conducted w/an 11-item questionnaire of the experience at the end of clinical simulation day	Improved interview & communication skills, increased confidence, and decreased anxiety

de Goes et al. (2017)	To identify and measure nursing students' communication skills in health using simulation w/SPs	<ul style="list-style-type: none"> <li>• Descriptive, cross-sectional study</li> <li>• Undergraduate</li> <li>• N = 16</li> <li>• Groups: 2</li> <li>• 8 sessions</li> <li>• Brazil</li> </ul>	No information	Health Communication Assessment Tool using Likert scale statements to evaluate students' ability to communicate a request for authorization for a venipuncture from pt & family	Communication was satisfactory, emphasizing the need for reinforcing communication learning in a nursing curriculum
GOH et al. (2016)	To explore undergraduate nursing students' learning experiences w/the use of SP for mental health nursing	<ul style="list-style-type: none"> <li>• Pre- and post-test, single group quasi experimental design</li> <li>• Undergraduate</li> <li>• N = 95</li> <li>• Groups: n/a</li> </ul>	John Dewey's Experiential Learning Philosophy and Kolb's Experiential Learning Theory	Self-report questionnaire filled out pre- and post-experimental tutorial using SP	Increased satisfaction & confidence after use of SPs. Qualitative comments on use of SPs: bring about realism, improve confidence, narrow the theory practice gap, & valuable experience
Herron, Nemeth, & Powers (2017)	To explore students' experiences w/engaging an SP in a community health simulation	<ul style="list-style-type: none"> <li>• Focus group interviews</li> <li>• Baccalaureate</li> <li>• N = 39</li> <li>• Groups: 3-4</li> <li>• Southeast US</li> </ul>	Experiential Learning	30 min focus group interviews recorded and transcribed; analyzed using Giorgi's and Saldana's methods to form themes	Safe place to learn (increase in confidence & comfort), preparation (leads to less anxiety), realistic environment, communicating (pt centered care, improved confidence, clinical reasoning)
Ross & Burrell (2018)	To enhance students' ability to apply evidence based principles from classroom to oncology symptom mgmt. practice	<ul style="list-style-type: none"> <li>• Anecdotal feedback</li> <li>• Baccalaureate</li> <li>• N = 9</li> <li>• Groups: 4-5</li> </ul>	Transfer of knowledge from theory to practice	Anecdotal reporting on two SP sims	Realism and innovation
Williams & Ruhs (2017)	To address the gap in knowledge and practice competency when it comes to home health care of patients w/CPAP units	<ul style="list-style-type: none"> <li>• Pilot study using preexperimental pretest-posttest design</li> <li>• Associate degree nursing students</li> <li>• N = 21</li> <li>• Groups: n/a</li> <li>• Midwest</li> </ul>	No information	Mayo High Performance Teamwork Scale, Simulation Experience Survey, Interprofessional Collaborative Sim Experience Survey conducted pre- and post-simulation	Interdisciplinary communication was improved, esp. ability to recognize leader, error awareness, and team communication; improved comfort level w/pt; and improved understanding of different roles of HCPs
<b>SPs AND MANNEQUINS</b>					
Luctkar-Flude, Wilson-Keates, & Larocque (2012)	To examine learners' satisfaction, self-efficacy, and performance	<ul style="list-style-type: none"> <li>• No info on study design</li> <li>• Undergraduate</li> <li>• N = 44</li> <li>• Groups: n/a</li> <li>• Canada</li> </ul>	Self-efficacy theory (Bandura, 1977)	Students performed focused respiratory assessments on high-fidelity	Performance better w/high-fidelity simulators, but learners were less satisfied w/this modality; no



	behaviors among high-fidelity mannequins, SPs, and community volunteers			mannequins, SPs, or community volunteers. Afterwards, students completed a Health Assessment Education Modality Evaluation survey & a performance checklist was utilized	significant difference in self-efficacy
Tuzer, Dinc, & Elcin (2016)	To compare effects of the use of a high-fidelity simulator and SPs on the knowledge and skills of students conducting thorax-lungs and cardiac examinations and to explore students' views and learning experiences	<ul style="list-style-type: none"> <li>Mixed method explanatory sequential design</li> <li>Undergraduate</li> <li>N = 52</li> <li>Groups: n/a</li> </ul>	None mentioned	Students randomly assigned into groups 1 and 2. Students in group 1 were assigned training w/a high-fidelity simulator while students in group 2 were using SPs	Students working w/SP achieved higher knowledge scores than those working w/high-fidelity simulator. No significant difference in skills scores.

**Table 5. Data Summary: Optimal Learning Environment in Skills Learning Laboratories**

Authors (Year)	Purpose	Design/Sample/Setting	Theoretical Framework	Description of Program	Benefits
Ewertsson, Allvin, Homstrom, & Blomberg (2015)	To describe nursing students' experiences of learning in clinical skills laboratory (CSL) in preparation for their clinical practice	<ul style="list-style-type: none"> <li>Qualitative descriptive design w/an inductive approach/</li> <li>Undergraduate</li> <li>N = 16/a Sweden</li> </ul>	Theory of experiential learning (Kolb 1984; Dewey, 1938)	Semi-structured interviews conducted 1 to 2 weeks after students completed clinical practice in CSL	Learning environment that: fosters ongoing discussions, engagement, clear instruction w/theoretical explanation, opportunities for practice, prepared and realistic material available.
Sheahan, While, & Bloomfield (2015)	To test the effectiveness of teaching clinical skills using a multiple intelligences teaching approach (MITA)	<ul style="list-style-type: none"> <li>Randomized controlled trial</li> <li>Baccalaureate</li> <li>N = 90 Ireland</li> </ul>	Multiple Intelligences theory (Webber, 2005)	Students randomly assigned to experimental or control group. Control group taught by a traditional approach, while experimental	Enablement of clinical skills learning, MITA as a diverse learning method, environmental factors, and an approachable instructor. Negative features

				group taught by MITA approach. 12 week period; Afterwards, participants assessed w/an OSCE in 3 practical skills	included a lack of practice time and amount of information provided
Strand, Naden, & Slettebo (2009)	To gain knowledge about how students become competent	<ul style="list-style-type: none"> <li>• Descriptive design w/a semi-structured questionnaire</li> <li>• Baccalaureate</li> <li>• N = 256 Norway</li> </ul>	Jigsaw puzzle model of learning	Two questionnaires w/5 open-ended questions employed first in the autumn and then in the spring	A feeling of security is a prerequisite for the learning process. Learning occurs through interactive teamwork and is influenced by a shared, practical environment. Learning occurs through the training of practical skills. Learning occurs via a sensing/ kinesthetic involvement. Learning occurs best w/a “modern-minded” master teacher by one’s side