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Executive Summary: Staff Education Project Staff Education to Enhance Nursing Competency through Simulation Technology

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Executive Summary: Staff Education Project

Staff Education to Enhance Nursing Competency through Simulation Technology

by

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Summary

Simulation-based training is a key component of nursing education, providing immersive, hands-on experiences that enhance clinical skills in a controlled environment. In the local organization, leadership determined there was an underutilization of advanced simulation equipment stemming from a lack of standardized training among staff. Thus, the purpose of this Doctor of Nursing Practice (DNP) project was to determine whether an educational intervention focused on simulation improved competency among nurses at a local health care organization. To measure competency, 15 items from the Nurse Professional Competence Scale were used. Fifty-eight individuals were invited to participate in the educational intervention, and a total of 31 participants attended the educational intervention over the course of 7 days. Twenty-one of the participants did not complete both the pre- and posttest and were deleted from the sample for a final sample size of 10 participants. All 10 participants identified as female. Four of the participants were bachelor's prepared, five were master's prepared, and the remaining participant had a doctoral degree. Using a Wilcoxon Signed-Rank test to analyze the data, the results indicated there was no statistical differences between pre- and posttest scores across the 15 items ($p > 0.05$). Although the findings were not statistically significant, the project demonstrated clinical significance because the scores demonstrated that the educational intervention served as a review for the participants. It is recommended that annual education on simulation and the use of simulation be provided to promote positive patient, provider, and organizational outcomes and ultimately, positive social change.

Background

Simulation-based training has become a cornerstone of nursing education given its ability to replicate real-world scenarios in a safe and controlled environment. Ward-Smith (2008) posited that the first documented use of higher-level simulators occurred with pilots during World War II, and since then, simulation has made its way into health care. Chernikova et al. (2020) described simulation as a pivotal educational technique that can be applied across various fields, including health care, to replicate real-life scenarios in a controlled environment. Furthermore, the National League of Nurses (2003) supported the use of simulation to prepare students to critically think and perform within a complex clinical environment as a safe, controlled environment (Sanford, 2010). Since that time, simulation has grown exponentially, allowing not only students, but all health care providers to use advanced technology, such as high-fidelity mannequins and computerized models, to mimic patient care situations and practice clinical skills, decision making, and teamwork in a safe setting, enhancing competence and confidence before engaging in actual patient care (Aebersold & Gonzalez, 2023).

The literature strongly supports simulation to enhance nursing skills in patient care. For example, Niu et al. (2022) demonstrated that simulation-based training improved the clinical knowledge, skills, abilities, and thinking of military nurses, such as blood product administration or emergency management skills. Similarly, Hassanein et al. (2021) found that simulation-based learning not only enhanced essential nursing skills but also fostered effective teamwork and leadership capabilities. Hwang and Park (2020) emphasized that simulation-based learning effectively replicates real-life scenarios, providing a safe environment for skill development and knowledge application. Lastly,

Manz et al. (2022) emphasized that incorporating simulation-based tools in nursing staff training significantly enhances clinical skills, leading to better patient outcomes by providing consistent, practical experiences in a controlled environment.

Moreover, the literature strongly supports simulation to improve nursing competencies. Cieslowski et al. (2023) demonstrated that immersive simulation training improved the preparedness of prelicensure nursing students for real-life clinical scenarios, while De Cates et al. (2023) emphasized the effectiveness of emergency course simulations in enhancing critical response skills among nursing staff. Furthermore, Guerrero et al. (2024) highlighted that simulation-based interventions improved nurses' self-efficacy, confidence, and knowledge, particularly in handling complex clinical cases, such as chemotherapy administration. These findings emphasize the significant potential of simulation-based interventions to improve both technical and nontechnical skills in nursing practice.

The local organization recently established an innovation hub equipped with advanced simulation tools, such as Laerdal 3G SimMan mannequins and the SimCapture interface; however, leadership identified that there was a notable shortage of nurses proficient in utilizing the advanced simulation equipment effectively. This gap in practice hindered the organization's ability to fully harness the simulation lab's potential for enhancing nursing competencies. To address this gap, the organization identified the need for an educational intervention that would increase the nurses' confidence in becoming "super users" of the simulation so that they may develop their expertise in simulation and share their knowledge with other nurses on their clinical units. Thus, the purpose of this DNP project was to determine if an educational intervention focused on simulation and

the use of simulation increases competency among nurses working in a local organization. The project question guiding this work was: Did an educational intervention focused on simulation and the use of simulation increase competency among nurses working in a local health care organization?

Staff Education Project Development

To develop this DNP project, I began by analyzing the local health care organization's resources by conducting a strengths, weaknesses, opportunities, and threats analysis. The analysis revealed several key strengths that provided a solid base for the project, such as the organization's commitment to innovation, strong interdisciplinary collaboration, and a learning environment where teamwork and knowledge sharing could thrive. However, the analysis also uncovered some internal weaknesses that needed addressing. One key issue was a shortage of experienced simulation instructors, which made it difficult to develop comprehensive training programs. There were also resource limitations and some resistance to change among staff. Additionally, there were opportunities for growth, such as the strong evidence supporting the use of simulation as a teaching mechanism, as well as the threats of external competing priorities and external regulation surrounding the use of simulation.

With this understanding in place, I used an Organizational Readiness for Implementing Change tool to evaluate the organization's capacity for adopting the proposed intervention. The evaluation indicated strong readiness, with a motivated staff and leadership showing a clear commitment to enhancing clinical competencies through simulation-based training. I also completed a stakeholder analysis to better understand the roles and influences of key individuals and groups in the project. The insights gained

from both assessments revealed several opportunities to leverage the organization's resources while addressing identified weaknesses and building a sustainable model for staff education.

Following the approval of the project and guided by the current evidence, I conducted a review of the literature on simulation and the use of simulation to increase competency among nurses. Using the analysis, design, development, implementation, and evaluation model to guide the project's development, I created the education intervention (Appendix A) for the project. To create the pre- and posttests, I used the Nurse Professional Competence (NPC) Scale, a reliable and validated tool that measures self-reported professional competence among practicing nurses (see Nilsson et al., 2014). The tool consists of 88 items over eight individual factors, with all factors achieving a Cronbach's alpha greater than 0.80 (Nilsson et al., 2014). In aligning the NPC with the goals of this project, I used the 15 items from the factor of nursing care to measure competency among the participants (see Appendices B and C).

After the materials were developed, I organized a panel of experts to evaluate the education intervention to determine the content validity. The Item-Content Validity Index and Scale Content Validity Index for the education intervention was 1.0 and 1.0, which exceeded the acceptable level of 0.80 (see Polit & Beck, 2006). Given that the pre- and posttests were developed from a reliable and valid tool, the Item-Content Validity Index and Scale Content Validity Index were not used to evaluate them.

Procedures

Following the development of the materials, I invited a convenient sample of nurses working in the local organization to participate in the educational intervention.

Participation was voluntary and no compensation was offered for attendance. First, the participants were asked to generate a unique identifier to link their pretest to its posttest. Following the creation of the unique identifier, I asked the participants to complete the pretest, which consisted of two demographic questions to describe the sample and 15 items from the NPC to measure competency. After participants completed the pretest, I delivered the education intervention. After its conclusion, participants were asked to complete the posttest, which contained the same 15 items from the NPC. Upon finishing the posttest, participants were free to depart.

After the intervention, I matched each pretest with its posttest using the unique identifier. The demographic data, pretest scores, and posttest scores were entered into a Microsoft Excel spreadsheet and uploaded into the Statistical Package for the Social Sciences for analysis. I used descriptive statistics to describe the sample and inferential statistics to determine whether there was a statistically significant difference between pre- and posttest scores.

Results

Demographic Results

I invited 58 individuals to participate in the educational intervention. With the support of the organizational leadership, 31 individuals were able to attend the educational intervention over the course of 7 days. Twenty-one of the participants did not complete both the pre- and posttests and were removed from the sample for a final sample size of 10 participants. All participants 10 identified as female. Four of the participants were bachelor's prepared (40%), five were master's prepared (50%), and the remaining participant had a doctoral degree (10%).

Competency

I analyzed the mean pre- and posttest scores for competencyusing an Wilcoxon

Signed-Rank test to estimate the data. The results showed there was no difference

between pre- and posttest scores across all 15 items ($p > 0.05$; see Table 1).

Table 1

Competency (N = 10)

Item	Pretest		Posttest	
Do you think you have the ability to…	*M* (*SD*)	Range	*M* (*SD*)	Range
Enhance patient health?	3.80 (0.42)	3 to 4	3.80 (0.42)	3 to 4
Independently apply the nursing process (assessment)?	3.20 (1.23)	0 to 4	3.20 (1.23)	0 to 4
Independently apply the nursing process (nursing diagnosis)?	3.20 (1.23)	0 to 4	3.20 (1.23)	0 to 4
Independently apply the nursing process (nursing intervention)?	3.40 (1.26)	0 to 4	3.20 (1.23)	0 to 4
Independently apply the nursing process (plan, implement, evaluate)?	3.30 (1.25)	0 to 4	3.20 (1.23)	0 to 4
Meet patient's basic physical needs?	3.80 (0.42)	3 to 4	3.80 (0.42)	3 to 4
Meet patient's specific physical needs?	3.60 (0.52)	3 to 4	3.60 (0.52)	3 to 4
Meet the psychological and social needs?	3.60 (0.51)	3 to 4	3.30 (1.25)	0 to 4
Meet the patient's cultural and spiritual needs?	3.30 (0.67)	2 to 4	3.00 (1.25)	0 to 4
Manage changes in a patient's physical status?	3.70 (0.48)	3 to 4	3.70 (0.48)	3 to 4
Document the patient's physical status?	3.40 (1.25)	0 to 4	3.80 (0.42)	3 to 4
Manage changes in the patient's psychological status?	3.50 (0.70)	2 to 4	3.50 (0.52)	3 to 4
Document the patient's psychological status?	3.20 (1.23)	0 to 4	3.40 (1.26)	0 to 4
Recognize the patient's experiences and suffering?	3.60 (0.52)	3 to 4	3.70 (0.48)	3 to 4
Alleviate patient's experiences and suffering?	3.60 (0.52)	3 to 4	3.70 (0.48)	3 to 4

Implications

As evidenced by the results, the educational intervention did not increase the confidence level of the participants ($p > 0.05$). Despite not demonstrating statistical significance between pre- and posttest scores, the project demonstrated clinical significance for the organization. Statistical significance refers to the likelihood that a result is due to a difference in the sample, while clinical significance refers to the practical influence of an intervention on patient care and outcomes (Tenny & Abdelgawad, 2023). First, the participants may have had a solid confidence level in using simulation; therefore, the intervention may have provided a review for the participants and may have reinforced existing confidence. This is clinically significant for the organization in terms of providing continuing education for nurses. Price and Reichert (2017) emphasized the importance of continuing education and professional development among nurses to maintain and sustain quality care delivery. Additionally, this project emphasized the importance of using evidence to inform the development of educational interventions targeted at specific topics. By focusing on areas, such as simulation equipment use and clinical decision making, the project aligned training content with both the identified needs of the participants and evidence-based practices. The results also emphasize the necessity of assessing participants' baseline knowledge to tailor interventions effectively. A preassessment approach may allow for a more strategic use of resources and helps prioritize learning objectives. This approach aligns with the organization's focus on efficient resource utilization and targeted professional development.

Implications Outside the Organization

This project holds implications for organizations beyond the project site organization. As the health care industry increasingly adopts technology-enhanced learning, it becomes essential to create tailored programs that build on existing competencies while identifying opportunities for growth. This structured approach to educational interventions can be applied to all health care organizations to enhance continuing education initiatives (Cieslowski et al., 2023; Guerrero et al., 2024). By using baseline assessments to guide focused training, organizations can effectively reinforce competency among their staff with the hope of ultimately improving patient, provider, and organizational outcomes.

Recommendations

I can offer several recommendations based on the outcomes of this DNP project. To improve the organization's educational programs, it is crucial to conduct regular baseline assessments before developing new educational opportunities. This allows for educational interventions to target specific knowledge gaps and build on existing competencies. Expanding professional development through ongoing education programs and regular refresher courses will help staff maintain their skills and confidence with simulation technology.

I also recommend that organizations develop a structured system of educational interventions and guidelines that can adapt to the changing needs of different departments (see Cieslowski et al. 2023). This approach will ensure that educational opportunities remain relevant and align with the organization's long-term goals for delivering high-quality patient care. An example of this includes developing customizable training

modules tailored to specific departmental needs, conducting baseline assessments to identify knowledge and skill gaps, and implementing ongoing evaluations to refine training approaches. This structured strategy should also integrate standardized, yet adaptable protocols and a comprehensive train-the-trainer model to ensure consistency and scalability across the organization, fostering long-term sustainability in competency development (see Manz et al., 2022).

My last recommendation is that the organization partner with external experts, such as academic institutions, that can support and enhance best practices and continuous improvement of the educational interventions (see Guerrero et al. 2024).

Strengths and Limitations

This project was successful due to strong support from the organization, its leadership, and engaged participants. However, the project had some limitations. The findings did not demonstrate a statistically significant increase in confidence among the participants. Another limitation was that the findings may lack generalizability to other settings because the participants were selected from a convenience sample within a single organization. Additionally, the sample size captured only a fraction of the provider population within the organization, suggesting replication with a larger cohort could be done to validate the results.

Conclusion

As simulation becomes increasingly essential in nursing education, this project demonstrated the critical value of structured interventions in enhancing competencies. The findings emphasize the importance of engaging stakeholders, assessing organizational readiness, and leveraging internal strengths to build sustainable

educational programs. By addressing both technical needs and the human elements of education, this project provides a scalable and adaptable framework that can be replicated across diverse health care settings to elevate nursing competencies and improve patient, provider, and organizational outcomes.

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Appendix A: Educational Intervention Outline

Course Outline: Simulation Equipment and SimCapture Interface Training
Title: Enhancing Nursing Competency through Simulation Technology
Duration: 45 minutes (25-minute instructional session + 20-minute return demonstration)

- **Welcome and Introduction**

  o Creation of unique identifier and pretest

  o Introduction of the facilitator and participants.

  o Brief overview of the session objectives and agenda.

  o Participants will complete pretest.

Part 1: Instructional Session (25 minutes)

- **Overview of Simulation Technology (5 minutes)**

  o Introduction to the simulation equipment.

  o Importance of simulation in nursing education and competency.

- **Operating Simulation Equipment (10 minutes)**

  o Step-by-step guide on operating the simulation equipment.

  o Demonstration of key features and functions.

  o Safety and maintenance procedures.

- **Using the SimCapture Interface (10 minutes)**

  o Introduction to the SimCapture interface.

  o Navigating the interface and selecting scenarios.

  o Detailed instructions on choosing and setting up the STEMI client scenario.

  o Tips for troubleshooting common issues.

Part 2: Hands-On Practice and Return Demonstration (20 minutes)

- **Hands-On Practice (10 minutes)**

  o Participants practice using the simulation equipment and SimCapture interface.

- o   Facilitator provides guidance and support as needed.

- **Return Demonstration (10 minutes)**

  - o   Participants perform a return demonstration by choosing the STEMI client scenario and running the simulation.

  - o   Facilitator observes and evaluates using an observational checklist.

Conclusion (5 minutes)

- **Q&A Session**

  - o   Participants can ask questions and seek clarifications.

  - o   Facilitator addresses any remaining doubts.

- **Summary and Feedback**

  - o   Summary of key points covered during the session.
  - o   Participants will complete posttest.
  - o   Participants complete feedback forms to provide their perceptions of the training session.

  - o   Thank participants for their attendance and participation.

Appendix B: Pretest

Dear Participant,

Thank you for agreeing to participate in this educational intervention. Please create a unique ID that is only known to you. You will not be asked to share this ID with anyone, nor should you share your ID with anyone. The ID will only be used to match your pretest with your post-test. Please do not provide any additional information outside of the questions being asked. All information collected is anonymous and will be reported in the aggregate. Thank you again for agreeing to participate in this educational intervention.

My Unique ID: _____

Demographic Information

Gender:

_____Male

_____Female

_____Non-binary

Highest Level of Education

_____Associates Degree

_____Bachelor (BS/BSN)

_____Masters (MS/MSN)

_____Doctoral (DNP or PhD)

Please read each question carefully and select the response that best reflects your current level of competence in the described activity using the following Likert scale of 1 to 4 where:

1 = To a very low degree; you feel that you have very little to no competence in this area.

2 = To a relatively low degree; you feel that you have some competence, but it is relatively low.

3 = To a relatively high degree; you feel that you have a good level of competence in this area.

4 = To a very high degree; you feel that you have a very high level of competence and are very confident in this area.

Cannot take a standpoint = if you are unable to take a stance on a question or feel it does not apply to your experience.

1. Do you think you have the ability to enhance patient health?

    1 (To a very low degree)

    2 (To a relatively low degree)

    3 (To a relatively high degree)

    4 (To a very high degree)

    Cannot take a standpoint

2. Do you think you have the ability to independently apply the nursing process (assessment)?

    1 (To a very low degree)

    2 (To a relatively low degree)

    3 (To a relatively high degree)

    4 (To a very high degree)

    Cannot take a standpoint

3. Do you think you have the ability to independently apply the nursing process (nursing diagnosis)?

    1 (To a very low degree)

    2 (To a relatively low degree)

    3 (To a relatively high degree)

    4 (To a very high degree)

    Cannot take a standpoint

4. Do you think you have the ability to independently apply the nursing process (nursing intervention)?

    1 (To a very low degree)

    2 (To a relatively low degree)

    3 (To a relatively high degree)

    4 (To a very high degree)

    Cannot take a standpoint

5. Do you think you have the ability to independently apply the nursing process (planning, implementation, and evaluation)?

    1 (To a very low degree)

    2 (To a relatively low degree)

    3 (To a relatively high degree)

    4 (To a very high degree)

    Cannot take a standpoint

6. Do you think you have the ability to meet patient's basic physical needs?

    1 (To a very low degree)

    2 (To a relatively low degree)

    3 (To a relatively high degree)

    4 (To a very high degree)

    Cannot take a standpoint

7. Do you think you have the ability to meet patient's specific physical needs?

   1 (To a very low degree)

   2 (To a relatively low degree)

   3 (To a relatively high degree)

   4 (To a very high degree)

   Cannot take a standpoint

8. Do you think you have the ability to meet patient's psychological and social needs?

   1 (To a very low degree)

   2 (To a relatively low degree)

   3 (To a relatively high degree)

   4 (To a very high degree)

   Cannot take a standpoint

9. Do you think you have the ability to meet patient's cultural and spiritual needs?

   1 (To a very low degree)

   2 (To a relatively low degree)

   3 (To a relatively high degree)

   4 (To a very high degree)

   Cannot take a standpoint

10. Do you think you have the ability to manage changes in patient's physical status?

   1 (To a very low degree)

   2 (To a relatively low degree)

   3 (To a relatively high degree)

   4 (To a very high degree)

   Cannot take a standpoint

11. Do you think you have the ability to document patient's physical status?

    1 (To a very low degree)

    2 (To a relatively low degree)

    3 (To a relatively high degree)

    4 (To a very high degree)

    Cannot take a standpoint

12. Do you think you have the ability to manage changes in patient's psychological status?

    1 (To a very low degree)

    2 (To a relatively low degree)

    3 (To a relatively high degree)

    4 (To a very high degree)

    Cannot take a standpoint

13. Do you think you have the ability to document patient's psychological status?

    1 (To a very low degree)

    2 (To a relatively low degree)

    3 (To a relatively high degree)

    4 (To a very high degree)

    Cannot take a standpoint

14. Do you think you have the ability to recognize patient's experiences and suffering?

    1 (To a very low degree)

    2 (To a relatively low degree)

    3 (To a relatively high degree)

    4 (To a very high degree)

    Cannot take a standpoint

15. Do you think you have the ability to alleviate patient's experiences and suffering?

      1 (To a very low degree)

      2 (To a relatively low degree)

      3 (To a relatively high degree)

      4 (To a very high degree)

      Cannot take a standpoint

Appendix C: Posttest

Dear Participant,

Thank you for agreeing to participate in this educational intervention. Please identify your posttest using the unique ID that you created. The unique ID will only be used to match your pretest with your posttest. Please do not provide any additional information outside of the questions being asked. All information collected is anonymous and will be reported in the aggregate. Thank you again for agreeing to participate in this educational intervention.

My Unique ID: _____

1. Do you think you have the ability to enhance patient health?

    1 (To a very low degree)

    2 (To a relatively low degree)

    3 (To a relatively high degree)

    4 (To a very high degree)

    Cannot take a standpoint

2. Do you think you have the ability to independently apply the nursing process (assessment)?

    1 (To a very low degree)

    2 (To a relatively low degree)

    3 (To a relatively high degree)

    4 (To a very high degree)

    Cannot take a standpoint

3. Do you think you have the ability to independently apply the nursing process (nursing diagnosis)?

    1 (To a very low degree)

    2 (To a relatively low degree)

    3 (To a relatively high degree)

    4 (To a very high degree)

    Cannot take a standpoint

4. Do you think you have the ability to independently apply the nursing process (nursing intervention)?

    1 (To a very low degree)

    2 (To a relatively low degree)

    3 (To a relatively high degree)

    4 (To a very high degree)

    Cannot take a standpoint

5. Do you think you have the ability to independently apply the nursing process (planning, implementation, and evaluation)?

    1 (To a very low degree)

    2 (To a relatively low degree)

    3 (To a relatively high degree)

    4 (To a very high degree)

    Cannot take a standpoint

6. Do you think you have the ability to meet patient's basic physical needs?

    1 (To a very low degree)

    2 (To a relatively low degree)

    3 (To a relatively high degree)

    4 (To a very high degree)

    Cannot take a standpoint

7. Do you think you have the ability to meet patient's specific physical needs?

    1 (To a very low degree)

    2 (To a relatively low degree)

    3 (To a relatively high degree)

    4 (To a very high degree)

    Cannot take a standpoint

8. Do you think you have the ability to meet patient's psychological and social needs?

    1 (To a very low degree)

    2 (To a relatively low degree)

    3 (To a relatively high degree)

    4 (To a very high degree)

    Cannot take a standpoint

9. Do you think you have the ability to meet patient's cultural and spiritual needs?

    1 (To a very low degree)

    2 (To a relatively low degree)

    3 (To a relatively high degree)

    4 (To a very high degree)

    Cannot take a standpoint

10. Do you think you have the ability to manage changes in patient's physical status?

    1 (To a very low degree)

    2 (To a relatively low degree)

    3 (To a relatively high degree)

    4 (To a very high degree)

    Cannot take a standpoint

11. Do you think you have the ability to document patient's physical status?

    1 (To a very low degree)

    2 (To a relatively low degree)

    3 (To a relatively high degree)

    4 (To a very high degree)

    Cannot take a standpoint

12. Do you think you have the ability to manage changes in patient's psychological status?

    1 (To a very low degree)

    2 (To a relatively low degree)

    3 (To a relatively high degree)

    4 (To a very high degree)

    Cannot take a standpoint

13. Do you think you have the ability to document patient's psychological status?

    1 (To a very low degree)

    2 (To a relatively low degree)

    3 (To a relatively high degree)

    4 (To a very high degree)

    Cannot take a standpoint

14. Do you think you have the ability to recognize patient's experiences and suffering?

    1 (To a very low degree)

    2 (To a relatively low degree)

    3 (To a relatively high degree)

    4 (To a very high degree)

    Cannot take a standpoint

15. Do you think you have the ability to alleviate patient's experiences and suffering?

    1 (To a very low degree)

    2 (To a relatively low degree)

    3 (To a relatively high degree)

    4 (To a very high degree)

    Cannot take a standpoint