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Use of High-Fidelity Simulation in Clinical Teaching: Nurse Educators' Perspective

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ABSTRACT

Background: Despite the benefits of high-fidelity simulation (HFS) in developing clinical skills, Nursing schools in lower-middle-income countries like the Philippines are less successful in the implementation of HFS as a pedagogy. The utilization of HFS was recommended to offset the effects of COVID-19 on clinical placements which received various reactions from nurse educators. **Objective:** This study aimed to explore the views of nursing educators who did not use HFS as an instructional strategy in nursing education. **Methods:** A qualitative descriptive research design was utilized and data were gathered through a focus group discussion involving seven nurse educators who fit the criteria. Using thematic analysis, the following themes were uncovered: (1) technological complexities and difficulties, (2) lack of training and application, (3) need for expert support, (4) inadequate resources, (5) fear and apprehensions, and (6) not a requirement but an option. **Results:** Multiple factors affect the use of HFS among nursing educators in a lower middle-income country that requires users to be knowledgeable, skillful, and technologically adept. The lack thereof coupled with fear has consequently reduced HFS to an option rather than an indispensable tool for nursing education. **Conclusion:** Hence, to facilitate the utilization of HFS, a structured HFS training program that considers the context, and faculty needs might be instrumental. Additionally, the likelihood of integrating HFS in the curriculum as an equivalent to clinical placements can be explored to future-proof nursing education from the effects of a pandemic.

Keywords: High Fidelity Simulation; Technology Adoption; Nursing Education; Philippines

INTRODUCTION

The clinical experience of nursing students is being challenged by the COVID-19 pandemic. The considerable threat of the virus to health has caused an abrupt cessation of actual student nurse-patient interactions worldwide (Dewart *et al.*, 2020). With this, nursing students and educators alike are compelled to implement alternative ways to address the need for the application of theories and concepts into nursing practice. One of the key strategies identified is high-fidelity simulation (HFS).

In the Philippines, the use of HFS in nursing education is still in its early stages. Few nursing colleges house laboratories where students can practice nursing skills and competencies with high-fidelity mannequins following case scenarios. By practice, simulation in the laboratory is usually done before actual nurse-patient encounters to enhance the readiness of students to care for actual patients in various clinical or community settings (Gamble, 2017; Woods *et al*., 2015). However, this process was hampered as clinical exposures for student nurses were held in abeyance giving priority to their health and safety. The Commission on Higher Education (CHEd), a governing and regulating body for higher education in the Philippines, issued guidelines on the implementation of flexible learning, which initially shifted face-to-face clinical duties to online modalities (CHEd, 2020). However, with COVID-19 cases slowly declining, schools were then granted limited face-to-face sessions provided that they complied with the set requirements before re-opening (CHEd & Department of Health, 2021). With this opportunity, nursing schools in the country considered simulation-based education as one of the proxy strategies for clinical experience.

HFS as an instructional approach offers quite a few benefits in nursing education but is not without challenges in

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implementation. Primarily, it provides a safe, non-threatening, but close-to-real-life learning environment where students can develop and improve skills such as critical thinking, clinical reasoning (Alshehri *et al.*, 2023), clinical decision-making (Eyikara & Baykara, 2017; Jacobs, 2020) and collaborative skills in complex care situations (Krueger *et al.*, 2017). It is also an effective strategy to facilitate affective and psychomotor outcomes while motivating nursing students (Fawaz & Hamdan-Mansour, 2016; La Cerra *et al.*, 2019). However, despite the many studies supporting its advantage in applying skills before actual clinical placement, there are still nursing schools that are unsuccessful in encouraging their educators to adopt or use HFS specifically in lower-middle-income countries. There is poor adoption of this type of pedagogy, which means that simulation is used once or not at all within an academic year.

One crucial element in the adoption of relatively new technology is the perception of the stakeholders (Davis,1989). Nurse educators are users of HFS whose perception of the technology affects its utilization. In a study among simulation educators in twelve Asian countries, including the Philippines, perceived difficulties were uncovered as they worked with colleagues to further encourage the adoption and application of simulation (Sungkai *et al.*, 2016). It was revealed that adoption took time, whereby most institutions started with a core faculty who were in charge of specific skills training and simulation scenario building (Sungkai *et al.*, 2016). Other pieces of literature shared that faculty training and a lack of resources such as time and equipment have affected the use of HFS (Janse van Vuuren et al., 2018; Luo *et al.*, 2021; Munangatire & Naidoo, 2017). Overall, it is understood that the goal is to realize faculty participation and buy-in when considering simulation as a teaching-learning activity (Taplay *et al*., 2015).

In summary, studies that contributed to the understanding of HFS utilization are common among developed countries. However, there is still a dearth of information that highlights HFS and nurse educators' perspectives in a lower middle-income context. The socioeconomic background of users, such as education and income, affects the acceptance and utilization of technology and therefore should be taken into account (Paccoud *et al.*, 2021). With the increasing demand for a safer learning environment but low uptake of HFS, the issue of poor adoption of HFS in developing countries needs to be investigated for a deeper understanding of the phenomenon. Hence, this study explored the views of nursing educators in a lower middle-income country who have poor adoption of HFS as an instructional strategy in nursing education. An inquiry on this may provide insights on how to improve strategies towards a wider acceptance and subsequent use of high-fidelity simulations.

METHODOLOGY

Research Design, Locale, and Sampling Technique

The study utilized a qualitative descriptive design to inquire about the views and perceptions of nurse educators who have low adoption of HFS. This approach is appropriate for research questions focused on discovering the who, what, and where of events and for gaining insights from informants regarding a poorly understood phenomenon (Kim *et al.*, 2017). It is deemed most appropriate since the study aimed to stay close to and straightforwardly describe the nurse educators' experiences and perceptions of not utilizing HFS and does not require deep theoretical context (Doyle, 2020). The study was conducted at a higher education institution (HEI) in a large metropolitan city in the Philippines where a Bachelor of Science in Nursing (BSN) curriculum is offered. Further, the HEI has a laboratory that houses high-fidelity mannequins for simulation. Research participants were recruited based on a purposive sampling technique with the following inclusion criteria: a clinical instructor who has utilized HFS once or not at all within an academic year, has undergone training on HFS, is willing to share his or her views on the reasons for non-adoption to HFS, and is able to express his or her views and comprehend them in the local dialect or the English language.

Data Collection and Generation

An ethics review clearance was obtained before the commencement of the study. The selection of the participants was based on the inclusion criteria to ensure the richness of the data. Afterward, informed consent was obtained from the participants before data collection by sending an electronic copy of the consent form to their email for their perusal and signature. Voluntary participation in the study was emphasized, and the participant could withdraw from the study at any time without repercussions. The data were gathered through a focus group discussion (FGD) with seven nurse educators via Google Meet. An FGD group is usually composed of five to ten people who can provide their opinions in

an organized manner (Polit & Beck, 2018). The FGD was facilitated mainly by the investigator following a semi-structured interview guide. It lasted for two hours and was deemed sufficient to draw out their views on the phenomenon of inquiry. Open-ended questions were utilized to focus on their perceptions and experiences with HFS, which led to poor adoption in nursing education. Sample questions asked were, *"What is your perception of using HFS as a pedagogy in nursing?"* and *"What is your reason for not using high-fidelity simulation in your teaching-learning activity?"* A few of the participants were re-contacted to clarify some information that provided depth to the analysis. With the participants' permission, note-taking and audio-video recording were done during the FGD to allow data review, resulting in better analysis. After the FGD, verbatim transcriptions of the discussion were completed before doing the analysis.

Thematic analysis was employed to make sense of the data gathered. It is defined as a method for identifying, analyzing, and reporting patterns within data, This type of analysis allows one to describe data that leads to insightful findings of the inquiry (Braun & Clark, 2006). Following the steps by Braun & Clark (2006), familiarization was done first, which included interview transcription and reading the transcripts while listening to the audio recording. Coding came next based on the significant phrases or sentences from the participants. The study specifically used open coding with an inductive approach. Codes were added as the transcripts were read and analyzed. Next, themes were searched by examining the generated codes and identifying patterns in the text. Codes with a shared pattern of meaning formed the themes relevant to the research question. For instance, this highlighted statement *"It was emphasized that it costs millions of pesos. I might damage the simulator and pay for the costs."* was coded as "fear and apprehension of paying for a damaged simulator". This same code and other similar codes form part of the theme "Fear and Apprehension". Themes were subsequently reviewed to ensure that they were accurate representations of the data and not a product of the author's biases. Thereafter, themes were named and defined to provide an understanding of the data based on the meanings conveyed by the participants. Lastly, findings were reported on the transparency and trustworthiness of the process.

To ensure trustworthiness, the study was guided by the four criteria according to Lincoln & Guba (1985), namely: credibility, transferability, dependability, and confirmability. This promotes confidence that accurate recordings of the phenomenon under scrutiny have been achieved. To guarantee credibility or "truth" in the findings, prolonged engagement, peer debriefing, and member checking were employed. Researcher triangulation was done to lessen subjectivity in the attempt to describe the experience. Member checks also clarified and verified the findings of the study. Further, the transferability of the study was ensured by generating a thick description of the inquiry being studied (Korstjens & Moser, 2018). Descriptions included contexts to ensure that behaviors and experiences became meaningful to others.

Lincoln & Guba (1985) also advocated for ensuring dependability and confirmability. Dependability was guaranteed by going back to the participants to clarify points shared during the FGD. This was meticulously done to demonstrate that the findings are indeed supported by data. Confirmability was established by keeping an audit trail and, likewise, by doing an inquiry audit by an expert in the processes of data collection and analysis. Records of interviews and other information were kept as support for the operational steps and for traceability purposes. Lastly, reflexivity was achieved by jotting down the researcher's comments, views, and thoughts during the data generation and analysis to avoid biases that can affect the confirmability of the study.

Ethical Consideration

This study was approved by the CNU Research Ethics Committee (CNU-REC) on 31st March 2022 with reference number 1089/2022-02-Castillo.

RESULTS

The study included seven full-time nursing faculty who are currently employed at an HEI offering BSN. They have been with the institution for an average of twelve years, with a mean age of 46 years. Among the participants, two were males, and the rest were females. All of them have post-baccalaureate degrees in various fields (e.g., Maternal and Child Nursing, Leadership in Nursing, Medical-Surgical Nursing, etc.) but are also teaching nursing subjects outside their

fields of expertise. Four of them have utilized high-fidelity mannequins in the past for simple skill demonstrations such as handling deliveries, but they have not used them twice or more for real-life situational experiences and assessment of related clinical or decision-making skills. In terms of income, the average monthly income of the participants is Php 36,257.00 (≈ 614 USD).

Pseudonyms were used to mask the identities of the participants. The first one is Olive, who was introduced to HFS through trainings conducted in the past. She and the next four participants, Piper, Queen, Rose, and Sam, have been with the HEI for more than a decade, and similarly, their first encounter with HFS was when the university bought a high-fidelity simulator and conducted an orientation thereafter. The last two participants were Tina and Uriel, who have been with the university for more than three years and became familiar with HFS when they attended related trainings on simulation.

From the highlighted phrases, 92 codes were identified. Codes that formed patterns uncovered the themes that explained the inquiry. The study showed six themes that summarized the factors that contributed to the poor adoption of HFS in a higher educational institution offering BSN, namely: (1) technological complexities and difficulties, (2) lack of training and application, (3) need for expert support, (4) inadequate resources, (5) fear and apprehensions; and (6) not a requirement but an option (see table 1).

Table 1: Summary of Themes and Subthemes on the Factors that Affect HFS Adoption

Themes and Subthemes
Theme 1: Technological complexities and difficulties,
Theme 2: Lack of training and application,
Theme 3: Need for expert support,
Theme 4: Inadequate resources
Subtheme 1: Human Resources
Subtheme 2: Non-Human Resources
Theme 5: Fear and Apprehension
Theme 6: Not a requirement but an option

Technological Complexities and Difficulties

The first theme that explained one of the reasons for the poor adoption of HFS was technological complexities and difficulties, which have seventeen codes. The technology introduced to the faculty is perceived to be complicated, requiring technological competencies, as Rose and Uriel shared.

> *"I am having a hard time adapting to the process. It is not easy to learn how to manipulate it (simulator)."* (Rose)
>
> *"Maintenance of the machine is very complicated."* (Uriel)

Further, the hesitancy in using HFS stemmed from previous difficult experiences of other nurse educators which was expressed by Tina and Queen.

> *"When the simulator overheats, it stops working and you are left with a disrupted teaching-learning process, wasted time, and a non-functioning machine."* (Tina)
>
> "The technicalities in the use of the high-fidelity simulator are complicated." (Queen)

Lack of Training and Application

The second factor affecting the adoption of HFS is the lack of training and immediate application with nine coded

statements. The nursing educators had orientations and trainings relevant to the use of HFS, however, they still felt the need to have additional trainings specifically on how to operate the simulator.

> *"I needed more training…another three days maybe on how to operate the simulator."* (Olive)

Moreover, less exposure to HFS and minimal opportunity for the application of learnings also resulted in the non-use of the mannequins.

> *"I guess because I am not exposed to it (HFS) always, I have difficulty using it."* (Rose)
>
> *"I have indeed attended orientation and everything but then during the application, for example in the simulation, I was not able to apply it to my students because I was on leave (academic leave)."* (Piper)
> *"The trainings on simulation were forgotten since they are not immediately practiced."* (Sam)

Needed Expert Support

Besides the training related to the use of HFS, the participants deemed it necessary to have expert support (12 coded statements). In the earlier discussion, the faculty perceived the technology to be complex and difficult, hence, all of them have also expressed that adoption was hindered by the lack of support from experts, both technical and procedural.

> *"We need technical support… If the laboratory technician is absent, I cannot proceed with using the mannequin."* (Queen)
>
> *"There should be somebody — a laboratory assistant who is more competent, more confident, who can help troubleshoot."*(Olive)
> *"True, sometimes there is no one readily available to help in setting up or if there is a need to troubleshoot something."* (Rose)

Moreover, an expert faculty or mentor is being sought in addition to the technical support mentioned.

> *"If I have the right coach or I have a mentor who's supportive of me, I can learn it."* (Tina)

This also resonated with Olive and Uriel who explicitly said that the lack of an expert faculty who can guide and give corrections in the actual simulation procedure hindered their use of HFS.

Inadequate Resources

Perceived inadequacy of resources is another theme that explains the poor HFS utilization among nurse educators. Relative to the needed training and expert support, the faculty have also recognized the lack of various resources that prevented them from using HFS. This theme is divided into two subthemes: human resources and non-human resources.

The first subtheme with eleven codes is human resources, which pertain to knowledge, skills, or abilities possessed by a person. The faculty have acknowledged that factors such as time, workload issues, and their inability to create scenarios and secure a schedule for the activity, affect the process of simulation.

> *"Given the workload that we have right now, it is really a burden if the instructor has to devise the scenario or module and at the same time sets up the simulator."* (Sam)
>
> *"The schedule is too tight. We have many things on our plate."* (Rose)

Furthermore, Uriel, Queen, Rose, and Sam shared that the process of learning, preparing, and performing simulation takes more of their time and thus they prefer not to do it.

> *"The scenario-making takes time. You have to analyze well so that the learning outcomes are met and that students will be more competent because of the different scenarios."* (Uriel)
>
> *"It (simulation) takes time…that is why it should be properly planned out and not just done out of whim."* (Queen)

The second subtheme with 23 coded statements refers to non-human resources, which deal with material resources such as space, machines, money, and methods. Certain factors outside their abilities have prevented them from utilizing HFS. For instance, the lack of space and simulators discouraged the participants from using HFS. Tina, Uriel, and Queen shared the same thoughts.

> *"The number of simulators is limited versus the number of faculty and students who will be using it. The laboratory is also small."* (Tina)

> *"The students can crowd at the same laboratory while waiting for the other group to finish."* (Uriel)

Likewise, financial support and procedural guidelines were highlighted. Queen specifically acknowledged that if additional simulators are needed, then the administration has to see the necessity to purchase more and this requires money. Sam also emphasized that the system has to be in place on top of the required budget.

> *"It (simulation laboratory) should be treated as a laboratory that needs special attention and budget...*

> *Simulation has to be integrated into the system of the agency and clear guidelines should also be in place."* (Sam)

Fear and Apprehension

The next theme is fear and apprehension with nine codes. Primarily, the fears of Olive, Queen, Piper, and Uriel sprang from the lack of knowledge and technical know-how.

> *"I am afraid of using the simulator because I feel that I am not an expert."* (Olive)

> *"There is that fear of not knowing what to do and how to manage."* (Queen)

In addition, another source of fear that was predominant in the discourse is the fear of damaging the simulator and paying for the costs. Olive, Queen, Rose, Uriel, and Sam have this common notion.

> *"I have the same fear. It was said that if the simulator gets damaged, the faculty has to pay."* (Uriel)

Fear also came from the inability to use the pedagogy appropriately to achieve intended learning outcomes. Olive and Sam have apprehensions about their ability to facilitate and assess authentic learning using HFS.

Not a Requirement but an Option

The last theme that elucidated the non-adoption of HFS is the fact that simulation, as a pedagogy, is not a requirement in the BSN curriculum but an option (11 coded statements). The faculty have expressed that the use of HFS to transform theoretical knowledge into skills is not mandatory.

> *"We were not required to use HFS. The related learning exposure (RLE) is usually allocated for clinical placement."* (Rose)

Further, realizing the current technological inadequacies and limitations in the resources, participants opted to use other alternatives. There is yet no legal basis that considers HFS to be equivalent to clinical practicum in the Philippine Nursing curriculum.

"By the time that the competencies have to be practiced, I'd rather bring my students to the clinical setting." (Tina)

DISCUSSION

The themes discovered while trying to understand the reasons behind the poor adoption of HFS are unique and, at the same time, interrelated with one another. To start with, the distinctive complexity of the technology being used in HFS is a primary concern among users (Al-Ghareeb & Cooper, 2016). Highly complex patient simulators or mannequins utilized in HFS require technological adeptness from the end users. Relatively new simulation instructors often experience overwhelming technological complexities and difficulties, especially in operating the simulator. If one perceives ease in the use of a certain technology, the more confident and competent a person will be in adopting the same (Davis, 1989).

Furthermore, these inherent difficulties entail additional support from experts and faculty training (Al-Ghareeb &

Cooper, 2016; Janse van Vuuren *et al.*, 2018). Formally training educators can promote HFS and remove the stigma caused by the educator's non-use or improper use of HFS (Munangatire & Naidoo, 2017; Paige & Daley, 2009). In addition, providing opportunities for nurse educators to be exposed to HFS can increase knowledge and skill retention related to this modality. In a humanistic and constructivist lens, experience is critical to developing knowledge through active involvement (Kolb, 1984). Without the application of concepts, learning is less facilitated. Kolb (1984) further emphasized that beyond experience, the ability to reflect on oneself and an individual's learning process are similarly significant. Hence, faculty training for HFS should likewise consider the instructor's training needs to target the adoption of technology (Luo *et al.*, 2021). As nurse educators strive to provide the best learning experience to their students, they also communicate the need for assistance from experts. Expert feedback can help them achieve the competencies required for effective simulation (Luo *et al.*, 2021). In addition to the required training and subsequent application, a mentor or dedicated simulation coordinator is desired (Al-Ghareeb & Cooper, 2016).

Along with providing support, HFS also requires vast resources and careful planning (Carey & Rossler, 2021). For instance, the nursing faculty, as an important resource, should be prepared to do HFS. Similar to other studies, their perceived lack of time, the difficulty in crafting case scenarios, and workload issues are barriers to HFS utilization (Al-Ghareeb & Cooper, 2016). Similarly, other resources such as space, money, materials, and methods impact the use of HFS (Ray, 2017; Munangatire & Naidoo, 2017). If these remain unmet, educators may become frustrated and discouraged from using HFS. Therefore, the adequacy of these resources must be considered during the planning phase.

Fear or apprehension is another intrinsic factor that influences the uptake of technology (Al-Ghareeb & Cooper, 2016). With HFS, the state of fear is evident when confronted with its complexities and technical difficulties. This apprehension is similar to the dimension of "discomfort," which encompasses the encounter of fear and concerns in people challenged with technology. An effect of the "discomfort" would be reduced technological readiness and a hindrance to technology adoption (Parasuraman, 2000). More so, the fear may stem from the lack of information on the most effective way to structure HFS to address the desired transfer of skills and assess the achievement of the learning outcomes.

With fear, nurse educators opt for an alternative. Before the COVID-19 pandemic, access to clinical sites for skill application remained unhampered in the Philippines. The Commission on Higher Education (CHEd) provided the policies, standards, and guidelines for the BSN program, which advocates for skills transfer in the clinical areas (CHEd Memo No. 15, series 2017). As part of the nursing curriculum, related learning exposure (RLE) in the clinical or community setting is highlighted, and the use of HFS as a teaching-learning strategy is not mandatory. These situational factors that are true to nursing in the Philippines can determine the extent to which nurse educators rely on HFS and its technology (Yoon & Choi, 2020). And so, concerning the task of skills transfer and the standards of the nursing curriculum in the Philippines, HFS is encouraged as an alternative pedagogy.

Overall, the themes that were uncovered espouse the innate complexity of HFS and its adoption. They have also supported the idea that the process of adopting a new idea or practice practically begins with a few who are open to it. However, the lack of constant communication and networks led to poor adoption and failure after the initial progress (Rogers, 2010). This underscored the need for nurse educators' support in terms of additional training, exposure, expert assistance, and other resources (e.g., time, space, money, and methods). Further, the phenomenon of simulation is largely dependent on the institution's circumstances and background, which shape the purpose and design of simulation, consequently determining its impact. For instance, how it fits into the larger curriculum is critical to combining simulation-based education with the rest of the pedagogy (Jeffries *et al.*, 2015). The themes resonate with previous studies, but the perception of fear and paying for the damaged simulator was something unique in this group of participants, which reflects their socioeconomic background. It can be a vital demographic consideration in the conduct of simulation.

Limitations of the Study

The researcher would like to share that this study also has its limitations. First, it was discussed in light of the socio-economic context of the participants. Second, there were seven participants interviewed who represented an educational institution within a single locale. Despite these limitations, the results provided an in-depth description of

their views and perceptions, leading to an understanding of the phenomenon.

CONCLUSION

The use of HFS among nursing educators in a lower middle-income country is affected by various factors. The poor adoption of technology is primarily triggered by the inherent complexity of HFS and the lack of adequate resources, training, experience, and expert support. Moreover, the fear of not knowing, committing mistakes, and damaging the mannequins hindered the use of HFS, consequently reducing it to a lesser option for skills application compared to clinical placements. Hence, for adoption to be facilitated, a structured program that takes into account the context, faculty expertise, needs, and resources might be helpful.

Recommendation

In light of the findings, it is also recommended to explore the perspective of the administration, whose support is crucial to the process of simulation. Finally, the likelihood of integrating HFS into the Philippine undergraduate nursing curriculum as an equivalent to clinical placements can be explored to future-proof nursing education from the effects of a pandemic.

Conflict of Interest

The author declares no conflict of interest.

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