Use of High Fidelity Simulation in Teaching Nursing Skills: A Phenomenological Inquiry

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Abstract: Performing High fidelity simulation (HFS) is one of the emerging tools that can be used across the nursing curriculum in order to replicate the practice of nursing profession. High-technological simulation have been introduced by many schools of nursing. Nursing educators are now able to teach real life scenarios through active learning strategies as against traditional lecture and presentations that are less desirable. This is a descriptive phenomenology. A descriptive research refers to research studies that have as their main objective the accurate portrayal of the characteristics of person, situations or groups (Polit & Hungler, 2004). The descriptive method was used in this study which dealt with the experiential meaning of nurse educators in teaching nursing students in the nursing laboratory. The descriptive phenomenology reached true meanings through engaging in-depth reality (Lopez & Willis, 2004). Husserl (as cited in Lopez & Willis, 2004) valued the experience of phenomenon as perceived by human consciousness which should be an object of scientific study. The study revealed four major themes: transition from traditional method to high-technology teaching strategy, challenges of high fidelity simulation, and benefits of high fidelity simulation and perceived flaws of high fidelity simulation.

1. Introduction

High fidelity simulation (HFS) is one of the emerging tools that can be used across the nursing curriculum to replicate nursing practice. High-technological simulation have been introduced by many nursing schools. Nursing educators are now able to teach life-like scenarios through active learning strategies as against traditional lecture and presentations that are less desirable. High-fidelity simulation refers to structured student learning experiences with the use of a technologically advanced computerized mannequin, the Human Patient Simulator (HPS). HPS is anatomically precise and reproduces physiologic responses. Students are administered sequential decision-making events within an environment that mimics a clinical setting.

This study is a descriptive phenomenology according to the perspective of Husserl (2017). A descriptive research refers to research studies that have as their main objective the accurate portrayal of the characteristics of person, situations or groups (Polit & Hungler, 2004). The descriptive method was used in this study which dealt with the experiential meaning of nursing educators in using high fidelity simulation (HFS) as a strategy in teaching nursing skills and procedures among nursing students in the schools of nursing. There are 42 participants selected through purposive sampling who agreed to participate in the study. The researcher ended its data gathering when the researcher determined that there is already saturation of data. The participants were clinical instructors, nurse educators and professors in Colleges of Nursing in Ethiopia who are applying high fidelity simulation as a strategy in teaching nursing skills and nursing procedures. The researcher interviewed the participants to gather the data. Thematic analysis was used to interpret and analyzed the data while using the seven steps used in Collaizzi’s approach.

2. Theoretical Framework

The research adopted the Technological Competency as Caring in Nursing by Locsin (2016). Technological competency as caring in nursing is a conceptual model that presents the link between technology and caring in nursing as co-existing harmoniously. According to Locsin (2016), the concept of technology and caring are within the context of competency illustrates the realities of advancing technologies in healthcare. This theory delineates the practice of nursing and the relatedness between technology, caring and nursing. Furthermore, the study used the Self-efficacy Theory developed by Bandura (1982). Self-efficacy is influenced by several sources of information: performance mastery, vicarious learning experiences, social persuasion, and psychological state. The major focus of the simulation lab is the mastery of critical thinking and technical skills through deliberate practice, where students see the consequences of their clinical decisions immediately. Bandura espoused that these mastery experiences are the most
instrumental in the development of efficacy (Bandura, 1995). Mastery is also achieved in concert with other students in an active learning environment. This is important because when a student observes success in others, who they perceive as similar to themselves, it supports their belief that they can also accomplish the task at hand. Students with increased self-efficacy have a staunch personal belief they can master an activity, attain a desired goal, and cope well in stressful situations (Bandura, 1994).

3. Statement of the Problem

The study described the lived experiences of nurse educators in using high fidelity simulation in teaching nursing skills and procedures. The researcher asked the question: “What are the lived experiences of nurse educators in teaching nursing skills and procedures?”

4. Results and Discussion

The major themes

Participants answered the open-ended questions, “What is your lived experiences on the use of high fidelity simulation in teaching nursing skills and procedures?” Table 1 presents the major themes that emerged from the participants’ responses through an unstructured interview.

There are four major themes that emerged namely: (a) transition from traditional method to high-technology teaching strategy; (b) challenges of high fidelity simulation as a strategy; (c) benefits of high fidelity simulation (HFS) to students; and (d) perceived flaws of high fidelity simulation (HFS).

On transition from traditional method to high-technology teaching strategy

According to Dimitrios et al. (2013), the emphasis on using innovative teaching practices such as information and communication technologies (ICTs), the Internet as well as various computer programs, high fidelity simulations, case studies on real and virtual work environments, have been investigated in an attempt to appreciate current demands and move the discipline forward.

This research is no exception. In this study, the researcher identified the first major theme which is, “transition from traditional method to high technology teaching strategy.” From the conduct of the research emerged five sub-themes namely: increase tuition fee of students, difficulty for faculty to make adjustments, unemployment to some nursing educators, dependent on technology-driven strategy and bridging the gap between theory and practice.

Table 1. Major themes.

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<th>Major Themes</th>
<th>Summary of subthemes</th>
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| Transition from traditional method to high-technology teaching strategy | Increasing tuition fee of students  
Difficulty for faculty to make adjustments  
Unemployment to some nursing educators  
Dependent on technology-driven strategy  
Bridging the gap between theory and practice |
| Challenges of high fidelity simulation as a strategy   | Focus on training of faculty to be competent  
Standardized assessment of learners  
Development of affective skills among students  
Overwhelming multiple situations  
To transform learning to real nursing practice  
Setting up the HFS laboratory                           |
| Benefits of high fidelity simulation (HFS) to students | Learner satisfaction  
High confidence level  
Faster knowledge/technology transfer  
Realistic not imaginary equipment  
Safe nursing practice before actual experience  
Great opportunity to develop competence  
Learn mistakes and correct them immediately               |
| Perceived flaws of high fidelity simulation (HFS)      | Expensive technology  
Impossible to imitate actual real life scenarios  
Readiness of faculty  
Cannot use in nursing theoretical courses                |

Increasing tuition fee of students. The first sub-theme is increasing tuition fee of students. It is a known fact that technology is expensive. In order to recoup the investment of the university, the students will have to pay a higher tuition fee for this technology. One participant said:

*High fidelity simulation using mannequins that mimics the characteristics of a human patient is expensive. The university has to purchase not one, not two but many high fidelity mannequins to support teaching according to the number of students. To purchase the technology, the university has to increase tuition fee of nursing students.*
Another participant affirmed the response of the first participant:

This is an exceptional technology that will provide better educational outcome among students, but at a steep price. The amount will be passed on to the students thereby tuition fee of students will eventually increase.

One participant when asked the same open-ended question said:

High-tech equipment but the disadvantage is for the students who will shell out additional fee for it to be continuously use for teaching.

All the answers of the participants are acceptable. In fact according to Abdulmohsen (2010), simulation-based learning is expensive, however, it is cost-effective if utilized properly because simulation has been found to enhance clinical competence at the undergraduate and postgraduate levels. It has also been found to have many advantages that can improve patient safety and reduce health care costs through the improvement of the medical provider’s competencies. On the other hand Zendejas, et al., (2013), argued in their research that cost entailed in achieving improved learner outcomes is less clear. There is a need to conduct a research to determine the additional expense needed to improve learning through high fidelity simulation.

Difficulty for faculty to make adjustments.
The second sub-theme under this major theme is the difficulty for faculty members to make adjustments. The participants are aware of the difficult adjustments they have to endure, the transition from the old practice of teaching nursing skills and procedures and the actual adoption of high fidelity simulation. One of the participants said:

I have to learn how to implement this new method of teaching. I find this difficult because I have to spend quite a number of hours or days or even more than weeks for me to familiarize myself with this technology.

Another participant forcefully said:

I find this new transition very difficult because I have to burn the midnight oil to study and familiarize myself with high fidelity simulation. Plus, I need to practice doing it myself. I experienced so much difficulty.

Still another participant said:

At first, I have difficulty learning and adjusting with the new technology. It is an experience I will never forget. But it turned out that it is worth it. I gained many perspectives in this strategy.

There is really an adjustment problem whenever there is a change. Changes in the educational landscape by using new technology can be very difficult. On the contrary, high fidelity simulation technology is being used as an alternative way to expose students to complex patient care. Research has shown that simulation experiences can improve critical thinking skills and increase students’ self-confidence (Jeffries & Rizzolo, 2006). Therefore, nursing administrators have to weigh in and balance the concern of faculty and its benefits to its learners. Conejo (2009) suggested that to address this concern, there should be a creation of work group of faculty with different clinical assignments in order to encourage communication in order to better prepare students to the complexities of practice.

Unemployment to some nursing educators.
The transition from the old to the new method may cause unemployment to some faculty. Since technology will lessen the use of humans, it may cause lay-off of employees. It seems that this is something bad for the economy and for the family of the employee. One participant expressed her apprehension when she said:

I have seen colleagues in the profession received their release papers because, the technology itself can replace their works. That’s not good for us. It is bad for my fellow clinical instructors. It seems there is something wrong with this technology. It also drives away employees.

It seems that this sub-theme is validated by another participant when she said:

I have seen colleagues in the profession received their release papers because, the technology itself can replace their works. That’s not good for us. It is bad for my fellow clinical instructors. It seems there is something wrong with this technology. It also drives away employees.

Dependent on technology-driven strategy.
One of the sub-themes of this major theme is the dependent of nurse educators to technology. Normally, technology is connected to an electrical source to make it work. The problem happens when there is no electricity. The nurse educator may not use it after all. They have to wait for the time that is electricity or power. A participant mentioned her disgust:
I think if we as nurse educators are only using high technology simulation, we can be just life drug dependents. Without it, we will not be able to teach our students. Of course that is not good for us and the students themselves.

Another participant expressed her view on this sub-theme when she said:

Very attractive strategy indeed, but wait, there are certain aspects of this strategy that is not good at all. We become dependent to the technology as if it is perfect until we discovered that there are disadvantages. We become dependent on this technology.

Bridging the gap between theory and practice. The last sub-theme is bridging the gap between theory and practice. While thinking that there are advantages of high-fidelity simulation, there is still a point to think how to bridge the gap between theory and practice. One participant said:

I find it unusual because, I thought this is easy, but I was wrong. It is difficult to bridge the gap between nursing theory and nursing practice. Sometimes, it is important to understand it better before it can be implemented in the nursing curriculum.

Still another participant said:

One thing that is difficult in this transition phase from the old method of teaching and the use of high-fidelity simulation is the problem on how to really close the gap of theory and practice.

However, in the research conducted by Fawaz & Hamdan-Mansour (2016), the use of high fidelity simulation is effective in improving clinical judgment and motivation. Furthermore, the authors recommended that high fidelity simulation should be implemented in the nursing curricula where its integration can bridge the gap between theoretical knowledge and nursing practice and enhance the critical thinking and motivation among nursing students.

Focus on training of faculty to be competent. The first challenge is on the training of faculty members teaching nursing skills and procedures to use high fidelity simulation. According to Nehring, Wexler, Hughes & Greenwell (2013), it is essential that the faculty are competent to provide instruction with high-fidelity patient simulation. When using a new technology, this requires training and orientation to ensure that nurse educators will be able to perform according to expected outcomes. This is an important challenge. It causes domino effect.

One participant said:

To be able to maximize the use high fidelity simulation, nurse educators handling skills demonstration should first be trained by an experience trainer, or else, the nurse educator will not teach the skills or procedure properly.

Furthermore, one participant said:

Training for the high fidelity simulation is the first step towards implementation of the strategy. Without training, it becomes useless that the technology is purchased. It has to be able to provide complete personnel with the appropriate training of how to utilize it well.

Standardized assessment of learners. The next challenge is how to evaluate the performance of nursing students while using high fidelity simulation as a strategy of teaching. This is an important challenge because, there must be a uniform method of evaluation. This has to be determined by the team who is in-charge of teaching nursing skills and procedures. One of the participants said:

On challenges of high fidelity simulation as a strategy

While there are many benefits of using high fidelity simulation, there are also challenges. Nurse educators have embraced the role of guide and facilitator, nevertheless supporting simulations necessitates a new skill set best learned through a series of educational and mentoring opportunities. The time required to develop and incorporate simulation as a teaching strategy is intensive. Moreover, the price of initial equipment, potential space limitations, and the necessity for personnel to manage and maintain the high fidelity simulators is significant (Rice & Gonzales, 2007).
This is a challenging endeavor. We have a high fidelity simulation laboratory, we execute it well, we follow all the instructions, we learned how to operate it, then, that time, we find ourselves looking for answers – how to assess their performance after using high fidelity simulation.


**Development of affective skills among students.** Another challenge is how to develop among students their affective skills. The use of high fidelity simulation will develop the nursing students’ psychomotor skills and cognitive skills. According to Bloom (2015), a student has to learn three aspect of leaning namely cognitive, psychomotor and affective. In this case, it is a challenge to develop the affective skills. One of the participants offered her view on this theme when she said:

*Oh, we have to develop a tool that will measure affective domain of learning. This is serious, but it is also a challenge for us nurse educators.*

Another participant agreed and said:

*I thought everything about high fidelity simulation was positive, good, exciting and magnificent. There is another experience that I see can depict high fidelity simulation – how to develop affective domain among the nursing students.*

**Overwhelming multiple situations.** Another challenge experienced by the participants pertains to the many multiple situations that is really overwhelming to nurse educators. In one high fidelity simulation, it can perform multiple skills, demonstrate various symptoms and so on. It’s surreal. It can’t imagine that this could happen. One of the participant said:

*This is crazy! I am overwhelmed! One mannequin can mimic many actions of a human being. You can use it 24 hours if I liked it. But it is very overwhelming.*

**To transform learning to real nursing practice.** Another relevant challenge faced by nurse educators is how to transform learning to actual real nursing practice. This will happen when the nursing student will perform the nursing skill or procedure in direct patient care to a human patient, no longer a mannequin. One participant said:

*High fidelity simulation is an excellent tool for teaching, the next problem is how to ensure that the nursing students perform well in the clinical practice.*

Still another participant of the research said:

*The real problem lies when the learner performs the nursing skill to a human being who is a patient with the actual disease.*

Likewise, another participant said:

*I have some reservations, if the student will be able to perform well after using high fidelity simulation. Well, it is really different when the learner meets the real patient. The problem starts there.*

**Setting up the HFS laboratory.** Another challenge by nurse educators is how to set up the high fidelity simulation laboratory. The in-charge of the laboratory and the nurse educators requires that they know how to set it up, how to operate, how to maintain and how to act when a problem with the mannequin occurs. One participant argued:

*Oh that could be a problem. In my experience, we helped in setting the high fidelity simulation laboratory. This is necessary to ensure that we can troubleshoot when something goes wrong. It was a challenge because at first we are at a lost.*

**On benefits of high fidelity simulation (HFS) to students**

The third major theme of the research is the benefits of high fidelity simulation among the nursing students. According to Webster (2013), simulation offers the opportunity for nursing students to practice skills, techniques and communication, problem solving and critical thinking is a safe environment.

The sub-themes of this major theme are learner satisfaction, high confidence level, faster knowledge/technology transfer, realistic not imaginary equipment, and safe nursing practice before actual experience, great opportunity to develop competence and learn mistakes and correct them immediately.

**Learner satisfaction.** The first benefits of high fidelity simulation is the satisfaction of the learner. The experiences felt by the participants in using high fidelity simulation is very evident. According to Katz, Peifer & Armstrong (2010), mannequin-based
Clinical simulation education potentially offers nursing students varied clinical patient simulation that are comparable with an acute setting. Participants relayed that when using this technology, students are happy, comfortable and at ease in using it. As verbalized by the participants, there is less pressure and students feel excited every time they use high fidelity simulation. One participant of the research said:

When I used the high fidelity simulation, I experienced a feeling of happiness among my students. I believed that they are satisfied with the use of the new technology.

Likewise, another participant openly expressed her experiences in using high fidelity simulation and he has this to say:

My students are all smiles when they used the high fidelity simulation. It seems that they are satisfied with the new technology to teach them nursing skills.

Yet another participant added:

This is first time I see my students feel happy and contented. There is a feeling of satisfaction among them. I am happy for them, I really do. Hopefully this will turn out good for them.

High confidence level. It is an accepted fact that with modern technology, it can help boost the morale of everyone. When using a new technology, people including nurses are happy because it improves their confidence level. One participant said:

High fidelity simulation in my experience, boosted the morale and confidence of my students because they need not worry if they commit mistake, anyway it is only a mannequin. They can repeat the procedure until they are perfectly done.

Faster knowledge/technology transfer. Another benefit of high faster knowledge learned and transfer of technology. One of the purposes of education is learning. Through this technology, students learn knowledge faster. Likewise, the learners will also learn the new technology, thereby technology is transferred. This was affirmed by one of the participants when she said:

With my experience, knowledge is learned faster. The students when using the technology more often, also learn the new technology and they can use it independently with the supervision of the nurse educator.

Realistic not imaginary equipment. One of the relevant sub-themes is that the new technology is real not imagined. The technology is there, it can be manipulated, it can be operated, and it can be used to teach students. This sub-theme important because nursing education must adhere to real equipment not assumed equipment and materials. In the past, nursing educators will teach students to just assume, where in fact, it must not be assumed, rather it must be done by the students for them to experience it. Seropian, Brown, Gavilanes & Driggers, (2004) said that high fidelity simulation provide a realistic clinical environment for the learners. One of the participant said:

This technology is real, it is concrete, it is an effective method of teaching. It must be noted as per experience that working with students require that they experience the real scenario for them to learn.

Safe nursing practice before actual experience. According to Weaver (2011), simulation reflects the clinical setting and can imitate both expected and unexpected patient responses, it makes for an excellent learning environment for nursing students, yet occurs in a controlled, more secure, setting. It facilitates exploration of the consequences of clinical judgments without the fear of actually harming patients.

A participant has this to say on say nursing practice before actual experience:

I find this to be an interesting teaching strategy for teaching students nursing skills. They learn a lot in a safe environment, no pressure, no anxieties, they can commit mistakes, they are not scolded, and they can repeat and repeat the procedure until they will perfect the skill. This is done before they go to the actual clinical area.

Still another participant agreed and said:

With high fidelity simulation as a strategy, the student learns it in a harmless environment, they are safe, and they don’t injure clients, because it is not a human person they are dealing with. They work until they are master the nursing skills and procedures.

Great opportunity to develop competence. According to Rutherford-Hemming (2009), high fidelity simulation allows for exposure to prevalent patient conditions, basic skills and foundational knowledge. Furthermore, students are given more
advanced opportunities, such as starting intravenous fluids in response to a patient’s declining condition, detecting subtle changes in the patient’s status, and being exposed to emergency scenarios (Nehring, Ellis, & Lashley, 2001). A participant verbalized:

In my experience, the nursing students felt they have learned a lot to make them competent before they work in the hospital. This strategy is really amazing, it helps students master the procedure, and it is an opportunity for them to be competent and able to work well in the clinical area. With this experience, I recommend this and I will continue to use it.

Learn mistakes and correct them immediately. A benefit of high fidelity simulation according to the participants is that students learn mistakes and correct them immediately. This is an important benefit. Nurse educators allow mistakes to happen during practices, not during actual nursing care. According to Walsh (2010), through high fidelity simulation, learners learn from and solve problems in a realistic complex situation. Likewise, Kuehster (2010) said that experimentation and failure are allowed.

One participant agreed and said:

I feel high fidelity simulation is an effective strategy because students themselves discover their mistakes and eventually while practicing procedures, the correct their mistakes almost immediately. They can repeat until they master the nursing procedure. It is really an awesome method.

Still another participant said:

I allowed my students to commit mistakes, in fact it is an added strategy and I will ask them to determine their mistakes and let them discover how to correct it instantaneously.

On perceived flaws of high fidelity simulation (HFS)

The fourth major theme speaks about the perceived flaws of the new technology. From this major theme, the participant revealed four sub-themes namely: expensive technology, impossible to imitate actual real life scenarios, readiness of faculty and cannot use in nursing theoretical courses.

Expensive technology. The first perceived flaw of high fidelity simulation is its affordability. Of course, technology is expensive. The university should spend a fortune in order to get hold of the new technology in teaching. One participant has this to say.

Oh, the university spent a fortune just to avail of these high fidelity simulation mannequins. Plus the expense on building a laboratory, storage, maintenance and supplies needed to operate it. This is expensive technology. I doubt if other schools can purchase this technology.

Impossible to imitate actual real life scenarios. All in all, even though how high is the fidelity of the technology, it can never imitate the actual real life scenario. A human being is unique, and the mannequin is not human who is unable to replicate its movements, actions and of course feelings. According to high fidelity simulation can never perfectly replicate the actual clinical setting and patient care (Hurst, 2015). One participant said:

It’s a marvel if it can really imitate the actions of a human patient. But in my experience, the mannequin cannot do it. It really cannot. Therefore, this is a flaw of the technology. The mannequin can never replace the human as a patient.

Readiness of faculty. If the nurse educator/faculty is not ready, there lies the problem of high fidelity simulation. Eventually the faculty members will be the one to operate the high fidelity mannequins. If they are not ready yet, of course it is a big problem. The mannequin cannot provide everything. It is still under the command of a human being. One of the participant said:

Too bad, one of my colleagues was not ready, so she eventually went back to the old system of teaching nursing skills. This is because, she was not prepared to use the technology. She is simple unprepared to make it work.

On the contrary, Hicks, Coke & Li (2009) revealed that the use of high fidelity simulation provides an opportunity to increase the speed of the acquisition of nursing skills by allowing repetitive nursing practice through return demonstration at the learner’s own pacing.

Cannot use in nursing theoretical courses. Of course, high fidelity simulation cannot be applicable in all subjects in nursing. These includes social science course such as philosophy, sociology, history and so on. Likewise, in the nursing curriculum, it
cannot be used in nursing theoretical courses. One of the participants said:

Too bad, high fidelity simulation cannot do it all. Simply put, it is not perfect, it has flaws also.

Another participant of the research also voice her concern about high fidelity simulation by saying:

I doubt if it can be used in areas such as nursing theories and other liberal education subjects. I myself finds it difficult to apply in this subject matter. It is only for skills-oriented subjects in nursing.

Clearly, the use of this technology in other subjects in nursing may not be applicable. In other words, the nurse educator will go back to the old system. This was affirmed by one of the participants when she said:

I am not against this technology, it is excellent I believe, but not in nursing theories by Nightingale, Orem, Roy, Henderson, Benner and all the nursing theories. Plus it may not be good in subjects such as history or psychology etc...

It is understandable that the use of high fidelity simulation (HFS) is more focused on teaching clinical nursing skills to nursing students. It is a daunting task to use it to courses that are not focused on clinical nursing skills. As described by Hicks, Coke & Li (2009), there are documented advantages and disadvantages of high fidelity simulation.

Conclusions

After the conduct of the research, the following conclusions are hereby distilled. The application of high fidelity simulation (HFS) is an excellent method of teaching nursing students specifically on clinical skills but faculty members have to exert efforts to address the challenges and flaws that the participants have expressed. The researcher also strongly emphasized the relevance of using high fidelity simulation (HFS) in improving nursing students competence, confidence and caring behaviors as this will improve patient outcomes and reduce errors in clinical practice.

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References


