

***Simulation Based Teaching:  
A Case Study on Perceptions of Nurse Educators at the University of Botswana***

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**Abstract**

*Background:* Simulation based education has gained momentum in nursing education. During the advent of COVID 19, simulation-based teaching and learning became a useful strategy employed in nursing education globally as the traditional way of delivering content was not possible. Nurse educators are pivotal to the teaching and learning environment that help learners to develop both technical and problem-solving skills essential for patient care. It is crucial therefore, to examine nurse educators' perceptions on simulation teaching and learning.

*Objective:* To explore the perceptions of nurse educators regarding the use of simulation teaching and learning strategy.

*Methods:* A qualitative exploratory case study was conducted, and four (4) nurse educators were purposively selected for data collection. With the permission of participants, individual semi-structured interviews were tape-recorded. Through content analysis, data were systematically analysed and interpreted. Four themes emerged from the study namely, simulation learning as having merits if implemented in a well-resourced environment, positive experiences of facilitating simulated learning, lack of direct interaction of students with patients and challenges of inadequate resources.

*Conclusion:* The nurse-educators perceived a well-resourced environment, simulation learning as having potential to benefit students. Further research on simulation teaching and learning strategy is needed to expose perceptions of nurse educators at a larger scale.

Keywords: Simulation Teaching, Simulation Learning, Perceptions, Nurse Educator

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## **Introduction**

Simulation as a form of clinical teaching can assist nursing students to develop essential skills required for safe patient care (Mothiba, et al., 2020). The advent of both infectious and chronic diseases has strained the nursing workforce because of high acuity and large numbers of the infected and deaths leading to a critical shortage of nurses (WHO, 2022; ICN, 2022). Hence, the demand for training institutions to increase the enrolments with subsequent need for advanced clinical teaching strategies. The focus of simulation is to promote acquisition of psychomotor and critical thinking skills that are indispensable in the nursing profession. Simulation enables nursing students to learn and practice in an environment that resembles the hospital or any purposefully designed healthcare situation before they start work as professionals (Koukourikos et al., 2021). The method allows students to develop confidence and overcome fear of performing nursing care activities in the live environment (Mothiba, et al., 2020; Relloso, et al., 2021). The demand for increased clinical staff created a discrepancy in ratio of learners to an educator. The increase in enrolment has been experienced by training institutions globally with Botswana inclusive, thereby placing a burden on teacher-student contact time (Goswami et al., 2021). Additionally, equipment and training resources are also in short supply. As a result, student enrolment that is not commensurate with human resources, student supervision, and exposure to clinical skills and assessment is a huge challenge. The recommended teacher-student ratio is 1:10 for the undergraduate program experiential learning (ICN, 2022; Goswami et al., 2021; Letourneau, 2020) and 1:3 in the live clinical area in India (Goswami et al., 2021). However, the high student to teacher ratios have led to a reduction in supervisory time, as well as the number of clinical activities demonstrated and assessed leading to the exploration of different teaching strategies such as live simulation, virtual simulation, and the use of mannequins (Zarifsanaiey et al., 2016).

There is paucity of literature on simulation teaching and learning in Botswana. Two (2) articles were found, one conducted simulation on emergency medical services (EMS) providers and the other, on medical students and intern doctors (Kosoko et al, 2019; Mwandri, 2017). The two studies proved that simulation was an effective tool to use in teaching and learning. The results of these studies are essential as they provide a clear picture of simulation in the local context, hence, they serve as the basis for bench marking by nursing schools in the country. Given the demand on training of nurses globally, studies on simulation teaching and learning are needed to inform the nurse educators. Therefore, a study on the perceptions of nursing educators regarding simulation teaching and learning is critical. The importance of this study, emerges on the dearth of studies on simulation in nursing schools in the local context.

## **Objective**

The study explored the perceptions of nurse educators regarding the use of simulation teaching and learning strategy at the University of Botswana (UB).

## **Methodology**

### ***Design***

An exploratory qualitative case study design was undertaken. Purposive sampling selected nurse educators who taught a simulation-based course-Introduction to Nursing and Practice 1

in the academic years 2020 to 2022 to examine their perceptions on the simulation teaching and learning.

### ***Study Setting***

The study was conducted in the School of Nursing, Faculty of Health Sciences, University of Botswana. The school of nursing offers undergraduate and graduate programs that are taught by the nurse educators mostly prepared at masters and doctoral levels, while also supported by clinical nurse educators who hold masters degrees.

### ***Participants***

There were eight nurse educators eligible for participation, five (5) declined while three consented and in addition, out of four clinical nurse educators, only one (1) consented. In total, the study sample constituted four (4) participants who facilitated the simulation-based course (Introduction to Nursing and Health Practice I) in the academic years 2020 to 2022 at UB. Introduction to nursing and health practice 1 is one of the basic foundational courses offered to first year nursing students.

### ***Data Collection***

Faculty at the School of Nursing were informed through email about the study and invited to participate. A semi-structured interview guide which contained three (3) questions was used. The guide was pre-tested on two nurse educators who were not part of the study. Two (2) trained research assistants collected data. One was responsible for asking questions, and the other one was taking field notes and recording the interviews. Arrangements were made with eligible participants, and they were met to sign the consent form after the study was explained to them. An online meeting link was shared on the date and time suitable for them on Microsoft Teams 365. Participant responded to the following interview questions: i).What are your experiences about simulation teaching? ii). What are the challenges that you have experienced during simulation teaching? and iii). Has simulation affected students' critical thinking ability?.Data were collected on-line, and audio recorded using Microsoft Teams 365 platform. The interviews lasted 30-45 minutes.

### ***Data Management and Analysis***

Data were kept safe by the principal investigator using a google protected password. Audio recordings were listened to and compared with fields notes by an independent experienced qualitative researcher. Data were analysed by independent experienced qualitative researcher. The content analysis method involving analysing narrative data for prominent themes in sentences was done. Initial units were coded and named as per the content that was gleaned, then collapsed into categories which were later collapsed into themes or the sub-headings that were used to organize the findings.

### ***Ethical Considerations***

Ethical clearance was granted by Institutional Research Board (IRB) in the University of Botswana. Nurse educators consented to participate in the study.The principal investigator and co-authors are faculty members at the School of Nursing, too uphold confidentiality and

avoid bias, two independent research assistants collected data while an independent retired nurse educator transcribed and analysed the data.

## Results

Four participants were interviewed. The sample comprised 1 male (25%) and 3 females (75%). Their ages ranged between 51 and 61 years and 50% had attained masters' degree while the remaining a doctoral degree.

**Table 1: A Summary of Participants' Demographic Characteristics**

	Variable
1	Age (N = 4) Range: 51-61 years Mean: 57 Years (SD= 4.24) Median: 58 Years
2	Male/Female (N = 4) Male: 1 (25%) Female: 3 (75%)
3	Educational Qualification (N = 4) Masters' Degree: 2 (50%) Doctoral Degree: 2 (50%)
4	Religion (N = 4) Christianity: 4 (100%)

## Themes Emerging From the Data

### *Merits of Simulation Learning*

Participants reported that if the nursing laboratory was well resourced, it would have merits that include the following: (1) reduction of chances of reality shock as simulation provides learners with an opportunity to translate theory to practice before they encounter real world practice, (2) an opportunity for learners to satisfy their inherent curiosity as they can repeat skill rehearsal and rectify any errors in skill practice without any fear of causing harm to patients, and (3) immediacy of feedback because both learners and educators can make on-spot reflection on skill performance such that the learners get immediate feedback on their skill performance. (4) One participant mentioned, that when implemented in an ideal environment, simulation teaching and learning can ease the burden of work in situations where there are staff shortages because students can go into the laboratory and rehearse skills without the company of educators.

### *Staff's Positive Experiences*

There was not much that could be labelled "staff's positive experiences" in facilitating simulated teaching and learning. One participant indicated that students often created own time to be at the skills laboratory to hone their skills and that equipment was always at the students' disposal under the supervision of the nurse educator. The participant reflected that:

*students often create extra time during off-hours or weekends to come and practice... equipment is always available and offers them an opportunity to hone their skills. use it without fear of overriding on human rights. (Participant ID 1)*

### **Challenges Experienced by Staff**

Participants reported shortage of resources as the main challenge they met in facilitating simulated teaching and learning. The shortage of resources was said to be compounded by the large numbers of students, that resulted in too many students for an individual staff member at skill demonstrations and rehearsal sessions. Under inadequate resources, participants listed space, staff, and equipment that was poorly maintained and not usually serviced on time. Inadequate resourcing of the laboratory often meant that students could not rehearse skills. Participants reported that it was not unusual to find 24 students to a laptop watching a video; and each one struggling to position him/herself so he/she could have a space to view the small screen. Other hassles frequently encountered in the learning environment were shortage of wash basins, electrical outlets or plugs to connect gadgets such as computer and electronic monitors, and water. One participant rhetorically lamented:

*The space is not enough, the resources are scant...., you would find that there are 20 students per lecturer, making it difficult to demonstrate to students and watch all of them return demonstrate.... if it were 5 students per lecturer, maybe it could work. (Participant ID 2)*

The participants also observed that the high number of students studying under a poorly resourced environment was compromising learning as it was limiting students' contact hours. Faced with high number of students to whom an educator needs to demonstrate a skill within a given time, educators found it difficult to ensure that each student performed return skill demonstration to their satisfaction. A concerned participant stated:

*I had to demonstrate bed making to students; but because of time, students did not do it as I would have loved; as they did not do full-scale; if it were 5 students per educator, maybe it could work. (Participant ID 3)*

The inadequate time for return demonstrations resulted in many students going for assessment when they had not mastered nursing practice skills thus challenging them to achieve the required competences. As the same respondent said:

*Students do a return demonstration (time allowing) ...not all of them. We just go straight into assessment, which is not okay because rightfully, they are supposed to do three return demonstration before the educator can assess, especially that we are doing a critical course 'nursing' which is about life.... (Participant ID 4)*

Participants unanimously indicated that in a well-resourced simulation learning environment, students would usually go into the laboratory at their private time and rehearse skills. However, as the situation obtained at the nursing school laboratory, such an opportunity was limited for only two main reasons: (1) the laboratory did not have personnel constantly to see to it that students came in, and engaged with mannequins. (2) because the student numbers were high, and mannequins were limited, the laboratory was always booked for students-staff sessions; if students were not booked for the simulation laboratory, then they were attending classes for theory classroom teaching and learning.

The use of low fidelity mannequins in the simulation laboratory was a concern to staff members; with three of them raising the same concern and one of those bringing up the issue more than once during the interview. Participants felt that the mannequins were not challenging the students to think as they were not programmed to behave in a particular way to stimulate some form of interaction that would resemble real-life situations. They reported that talking mannequins could bring students experiences nearer to the real-world situation than what they were working with. The low fidelity mannequins were said to stifle students' critical thinking and limiting their ability to transfer what they were learning to clinical situations. The participants' frustration was echoed by the following comments:

*...students were not able to analyze the situations effectively and critically because of several reasons..... lack of high-fidelity mannequins impeded the learners to acquire more practical sense of real scenarios. (Participant ID 4)*

The participants tended to use the phrase, "it's not working for us" that may translate to "intended learning is not being realized." It was not working to use mannequins that could not communicate; it was not working to have 24 students at a laptop; it could work if there were five students to a lecturer or educator.

Lack of training in facilitation of simulated based teaching and learning was a challenge that cropped up as observed by one participant. The participant reported that lack of knowledge about using the equipment as he/she had not been given any orientation and was learning during engagement with students. A situation that created a lot of discomfort to the educator.

### **Limitations of Simulated Learning**

Most participants did not say much about shortcomings of simulated learning as a teaching strategy, but one participant reported that simulation learning compromised the students' opportunity to learn the etiquette of interacting with patients in real clinical settings. Other remarks, rather than being perceived as attributes of simulation learning, were a function of the learning environment as participants experienced it, and they were discussed at their appropriate place.

### **Discussion**

The study provides insight into the perceptions of nurse educators regarding simulation-based teaching and learning in the local context. Study participants demonstrated that simulation-based teaching and learning is important in nurse training and education and also identified specific merits, challenges and limitation associated with the approach. The nurse educators expressed positive perceptions about simulation-based learning and teaching provided the necessary resources are available. They perceived simulation-based teaching and learning to be an effective strategy for the development of critical skills required for safe practice in the nursing profession. Similarly, nurse educators in Kenya, Madagascar and Tanzania have applauded simulation-based learning and teaching because it provides learning opportunities to students that extend beyond traditional classroom (Nyamu et al., 2018; Tjoflåt et al., 2012). This is especially valuable in low and middle income settings where resources are often limited. Other health-related professions have also reported the proliferation of simulation centers in medical schools as they provide a safe environment for acquisition of skills (Touchie, Humphrey-Murto & Varpio, 2013). Simulation allows learning of the skill with a simulated patient thus providing an opportunity to practice at a full scale. In the current study,

merits of simulation based teaching and learning have been reported. Nurse educators perceived the strategy as helpful in the reduction of reality shock which could otherwise undermine the development of confidence on a novice learner in their first encounter with real patients in clinical settings. The results are similar to the systematic review by Alrashidi et.al (2023) who showed that simulation learning was strongly associated with improvements in self-confidence when nursing students were communicating with patients and their colleagues thereby uplifting the standard of patient care.

The findings are also supported by studies conducted in various parts of the globe. For instance, a study conducted in Norway by Solheim & FloView (2021) and another in Lesotho by Moabi et al., (2021). Further, simulation not only reduce chances of reality shock, but takes place in an environment that is less threatening and supportive hence no risk of harming the patient. Simulation allows learners to repeat skills until they are perfected, and the learner is satisfied. Similar results have been cited by Campos et al., (2020), who confirms that simulation software and tools enhance the teaching and learning proceses by allowing learners to use clinical practice scenarios .Nurse educators in our study shared that there was immediacy of feedback for both learners and educators that comes with simulated teaching and learning. However, literature has buttressed on limited feedback opportunities that is common when learners are left to perform self-directed learning processes (Touchie, et al., 2013). In terms of number of patients, simulation was found to ease the burden of limited resources as learners share the same mannequins without the risk of causing fatigue and invading privacy of patients. Simulation allows learners to develop skills and gather hands-on experience simultaneously.

Although simulation-based learning and teaching is deemed one of the best tools to combine theory and practice as well as learning from mistakes in a safe supportive environment (Akselbo et al, 2023), it is not without challenges. The current study highlighted challenges such as inavailability of resources pertaining to laboratory space, limited number of the nurse educators to cater for the large student population, lack of high-fidelity mannequins, reduced contact time with students and lack of skill in using available machines and equipment by those facilitating simulation teaching and learning. These challenges have been reported regionally and internitionlly in studies conducted in Lesotho (Moabi & Mtshali, 2022), Ghana (Salifu et al 2022) and in Greece(Koukourikos et al., 2021) and in some parts of India (Kim et al., 2020). However, in most developed countries, these were not reported as challenges because their nursing laboratories are well resourced with high fidelity mannequins (Sofer, 2018). High-fidelity simulation has been reported to enhance attainment of skills such as communication, problem -solving, critical thinking and workng as a team (Mishra & Trivedi, 2023). In this study, nurse-educators reported being overwhelmed by the student to staff ratios that were linked to reduced contact time because educators strived to fulfil the teaching learning requirement to cover content and skills.

Some scholars noted that despite the upward trend in the use of technological systems in nursing education, there is still a gap in its acceptance (Gause, Mokaola & Rakhudu, 2022) because it is scarce, and it is not well understood (Alt-Gehrman, 2019). The lack of acceptance may be attributed to factors relating to finance, shortage of faculty, decreased clinical sites for learning and the increase in number of students applying to nursing schools (McKitterick, Jayasekara, & Parker, 2023: Alt-Gehrman, 2019). These challenges were experienced in the current study. One other attribute leading to lack of acceptance is failure of implementors to adapt simulation tools owing to resistance to change from traditional teaching to technological one (Baayd, et al., 2023). The results, however, were also consistent

with the local study conducted on medical trainees where low-cost simulation was reported as useful for training and assessment in a resource-constrained country like Botswana (Mwandri et al., 2017). In contrast, elsewhere, simulation even with high fidelity mannikins was perceived with some contempt by students as they regarded the simulated patient situation as artificial and thus were not able to accept the purposes and objectives of simulated teaching and learning (Au, et. al., 2016).

Simulation was perceived as limited in that it denied students the opportunity of interacting with patients. In our study, nurse educators perceived that the use of low fidelity simulators did not challenge students' critical thinking abilities. Literature has provided that high fidelity simulators enhanced learner intrinsic motivation and inculcated solid foundation in knowledge, clinical reasoning, critical thinking, and reflection (Becnel, 2022), and skills, and attitude needed during real patient care (Koukourikos et al., 2021). It can enhance active participation of learners in knowledge building (Solheim & FloView, 2021). Learners in the current study are limited in this regard. But other sources have buttressed that even with high fidelity simulators some learners misunderstood simulation as they tended to treat the SimMan as not real human being (Alu, et.al., 2016).

### **Study Limitations**

This study is not without limitations. The sample size was small hence a case study. Face to face interviews were not possible due to time constraints on the part of participants. The self-selection of participants limited to those who had only participated only in the teaching and learning in a simulated environment has limited our sample size. Also, due to the arrangement of the bachelor of nursing science program, only a few number of nurse educator can participate in simulated teaching and learning in a given academic year.

### **Implications for the School of Nursing**

Participants suggested a few approaches that they believed could improve learning.

1. Blending simulation and real-life learning in one semester such that the two-run side-by-side could ease transfer of theory to practice.
2. Making provision for controlled rooms such that staff can observe students' skill rehearsal in such a way that the latter will feel less intimidated.
3. The school needs to have diverse mannequins such that each would be appropriate for a given skill that a student wants to learn at a particular point in time. For instance, skills such as intravenous infusion, physical assessment, and cardio-pulmonary resuscitation need mannequins that are appropriately designed for the purpose.
4. Having dedicated personnel to see to it that equipment is functioning and that it is regularly serviced.
5. Having realistic student-staff ratios to ensure that both staff skill demonstrations and students' return demonstrations are allotted realistic time. For instance, ratios could be decongested from 20 students per staff member to about 5 students per staff member. Improved ratios could make it possible that each student to perform three return demonstrations per a given nursing practice skill.

### **Implications for the University of Botswana**

Avail the budget to develop a highly equipped simulation laboratory with needed human and material resources. Some of the material resources can be secured in short or medium term

are laptops to enable students to have access to observe and watch procedural skills demonstrations and also perform return demonstrations.

### **Implications for Nursing Education**

The study presents evidence that simulation teaching and learning is a useful strategy that can improve learning outcomes. But nurse educators have also pointed to some limitations of the strategy if certain conditions are not met. This therefore, implies that a conducive environment should be advocated for to ensure that simulation teaching and learning is fully exploited for nursing education in the context of Botswana.

### **Implication for Research**

There is need for replication studies that will use large sample sizes, evaluate the uptake of simulation from many educators perspective and those that focus on patient outcomes and the need for researchers with similar research agenda to collaborate and to conduct multisite studies on simulation.

### **Conclusion**

This was the first study to explore the perceptions of nurse educators regarding the use of simulation teaching and learning strategy in the local context. It was premised on the adoption of simulation as a teaching and learning strategy to address challenges that accompanied nursing education since the advent of COVID-19.

The findings showed that nurse educators had some positive experiences, merits as well challenges with simulation teaching and learning. The highlighted points were simulation provided a safer environment for learning skills before students were confronted with live-situations, as well development of critical thinking ability. However, the limited resources for securing adequate equipment such as computers, high-fidelity mannikins and shortage of nurse educators were perceived as hinderances for enhanced simulation teaching and learning. Taking into consideration the limitation of the current study, further robust investigation is recommended.

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