THE PERCEPTIONS OF NURSE EDUCATORS REGARDING THE USE OF HIGH-FIDELITY SIMULATION IN NURSING EDUCATION AT A SOUTH AFRICAN PRIVATE NURSING COLLEGE

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DECLARATION

By submitting this thesis electronically I declare that the entirety of the work contained therein is my own original work, that I am the owner of the copyright thereof and that I have not previously in its entirety or in part submitted it for any qualification.

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Signature   **Date**

DEDICATION

This dissertation is dedicated to

- The Lord for His wisdom and strength. Philippians 4:13: "I can do all things [a]through Him who strengthens me" *(New American Standard Bible (NASB)* helped me to persist. I held on to his assurance of "You can do it! You have all you need to fulfil your purpose." Without Him, this task would have been impossible and it is only through his grace that this could be achieved.

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ABSTRACT

Although Nurse Educators are aware of the advantages of simulation-based training, some still feel uncomfortable to use technology or lack the motivation to learn how to use the technology. The aging population of nurse educators cause frustration and anxiety. They struggle with how to include these tools, particularly in the light of faculty shortages.

Nursing education programmes are increasingly adopting simulation in both undergraduate and graduate curricula. Scoping literature reviews show that nursing practice has changed in recent years, placing demands on nurse educators to utilise different approaches in education. The fact that nurse educators are an aging population needs to be taken into consideration and acknowledge that many of them did not grow up with computers and lag behind in technological skills.

The aim of this study was to investigate the perceptions of nurse educators regarding the use of high-fidelity simulation in nursing education at a South African Private Nursing College in order to be able to determine why High-fidelity Simulators (HFS) have not yet been embraced by nurse educators and students.

A national survey of nurse educators and clinical training specialists was completed with 128 participants; but only 79 completed the survey. In addition to background information, participants were questioned about their use of simulators. They were asked to complete the Technology Readiness Index. Information was also obtained regarding their perceptions of the use of HFS.

Findings included indications that everyone is at the same level as far as technology readiness is concerned; this, however, does not play a large role in the use of HFS. This finding supports the educators' need for training to adequately prepare them to use simulation equipment.

Recommendations for further study include research to determine what other factors play a role in the use of HFS, studies to determine whether the benefits of HFS are superior to other teaching strategies warranting the time and financial commitment.

The results of this study can be used as guidelines for other institutions to prepare their teaching staff for the use of HFS.

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CHAPTER 1: INTRODUCTION AND PROBLEM STATEMENT

1.1   INTRODUCTION AND BACKGROUND

The focus of this study was on the perceptions of nurse educators regarding the use of High-fidelity Simulation (HFS) in nursing education at a South African Private Nursing College.

The face of nursing education and continuing education as we currently know it is changing at a rapid pace. Virtual reality and a continuum of various types of simulation have emerged, evolved and infiltrated healthcare education at all levels (Cannon-Diebl, 2009:128).

Nurse educators play a vital role in guiding and helping student nurses to learn competency skills, acquire knowledge, demonstrate affective attitudes and perfect psychomotor skills for safe professional practice (Baghoomian, 2014:49). They also play a pivotal role in improving the image of nursing and their focus is to facilitate learning. The main duty of nurse educators is to create a learning environment in classrooms and the clinical skills laboratory to facilitate student learning to achieve desirable outcomes (2014:51). They do, however, face the challenge of finding optimal opportunities for students to acquire the critical skills needed to care for patients with the increased acuity that is found in the healthcare systems of today, always taking the patients' safety into account. To meet all these challenges, nursing schools have to look at introducing alternative innovative teaching methods such as high-fidelity simulation into their nursing programmes (Howard, Englert, Kameg & Perozzi, 2011:e1). Besides the clinical nursing shortage worldwide, there is an accompanying shortage of nurse educators resulting in an increased lecturer: student ratio in the clinical settings. There is also no guarantee that the clinical settings provide adequate learning opportunities for students to be exposed to low-incidence but highly critical events. All these factors mentioned here could jeopardise the safety of the patient (Howard *et al.,* 2011:e2). The use of HFS will allow students to intervene in high-risk but low-occurrence situations in the acute care settings (Howard *et al.*, 2011:e2).

The utilisation of simulation as a teaching and learning strategy in nursing education is not a new concept. It is estimated that ± 300 million people around the world have been trained on simulator products and are being trained to be simulator instructors to meet educational needs (Ahmad, 2014:1). Simulation is a technique used to safely recreate the real word – with or without sophisticated technology to educate, train, assess performance, probe situations or conduct research (Doyle, 2011:1). Simulation promotes better decision making, problem solving and creative learning skills needed in nursing care (Baghoomian, 2014:55). Educators can develop clinical tasks in controlled situations and create scenarios that allow hands-on training of both students and other nurse educators (2014:2). In United States hospitals, it is estimated that between 48 000 to 98 000 patients die annually due to lack of competent care from health professionals and errors that could be prevented (2014:1). The struggle to meet regulatory requirements of standards forces health care to turn to technology to improve delivery and patient outcomes (2014:1).

The limited clinical placement positions; acceptance of simulation as a useful adjunct to clinical teaching; and the potential of simulation to improve clinical learning are some of the reasons for making use of simulation (Gordon & Buckley, 2009:491). A primary focus in health care is the safety of patients and reduction of errors. This is one of the major advantages of simulation laboratories as it gives the students the opportunity to demonstrate, practise and develop skills where the patient is not at risk. The simulators can also be programmed to respond to errors made by the students as they are able to see what happens to a real patient due to such errors. Nurse educators can also enhance student remediation via the simulator (Rothgeb, 2008: 492). In recent years, medical schools have used high-tech simulators for educational purposes, but the majority of nursing schools have not yet implemented these simulation techniques (Baghoomian, 2014:1). The reason for this could be that nurse educators fail to recognise how simulation technology could be used to provide instruction in assessment and delivery practices (2014:2).

Nurse educators are challenged on how to teach nursing students to prioritise care and think critically in the practice (Baghoomian, 2014:2). Teaching with high-tech simulators could be an alternative to the traditional teaching approach that emphasises exposure to realistic clinical situations they might not otherwise

experience in a practical setting (2014:2). There is room for errors because of the fact that simulator practice poses no direct risk to real patients (2014:2).

The role of nurse educators is to provide course content and learning objectives that are relevant and adapted to the level of training of the students. Simulation is such a versatile educational tool that the way in which it is used is more important than the tool itself (Savoldelli, Naik, Hamstra & Morgan, 2005:948). Nurse educators are aware of the advantages of simulation-based training, but some still feel uncomfortable with using technology in the clinical setting or lack the motivation to learn how to use the technology (Baghoomian, 2014:48). Those who have experience with simulation-based training have expressed frustration and anxiety about where to start, especially with high-fidelity simulators (2014:48). They struggle with learning how to include these high-technology tools within the realm of nursing education, particularly in the light of faculty shortages. Because nurse educators are already busy, they feel that they do not have the time to learn how to use high-fidelity simulators and these powerful tools remain in a box, unused. Nurse educators are also discouraged by the amount of work required to implement simulation within nursing courses, often becoming confused, frustrated and overwhelmed by the effort needed to develop scenarios for each course (2014:48). They also require assistance with simulator use and benefit from workshops that allow them to experience new learning along with their students (2014:51).

Simulation has been endorsed by professional nursing bodies (Cant & Cooper, 2009:4). Despite the fact that many nursing educational accrediting bodies around the world are evaluating the use of simulation for licensure, no standard guidelines concerning simulation implementation have been proposed (Kardon-Edgren & Starkweather, 2008:3). The South African Nursing Council (SANC) is the statutory body established by the Nursing Act, 2005 (Act No. 33 of 2005) to regulate all matters regarding Nursing Education and Training as well as practice. This body is entrusted with setting and maintaining standards of nursing education and practice in the Republic of South Africa. It is an autonomous, financially independent, statutory body, initially established by the Nursing Act, 1944 (Act No. 45 of 1944), and currently operating under the Nursing Act, 2005 (Act No. 33 of 2005). In terms of Section 3 of the Nursing Act, 2005, the Nursing Council is to establish, improve and control conditions, standards and quality of nursing education and training.

Universities and Nursing Colleges, public and private, present their curriculums to the SANC for approval and apply for accreditation to present these courses. The SANC is preparing the introduction of New Nursing Qualifications which are planned to commence in January 2018. To provide the opportunity for SANC and the providers to adequately prepare for the implementation of the New Nursing Programmes whilst phasing out the Legacy Nursing Programmes, SANC is also scaling down resources allocated for the Legacy Nursing Programmes and ensuring that there is maximum use of these resources in the implementation of the New Nursing Programmes. This will also ensure a smooth transition from the Legacy Nursing Programmes to the New Nursing Programmes. It is important that nursing students learn how to apply what was learnt in the classroom in the clinical setting. Although the South African Nursing Council does not mention high-fidelity simulation as such, it clearly states that a minimum of 60% of formative clinical assessment activities must be done in real life situations. This means that 40% of other activities, e.g. high-fidelity simulation, may be used (SANC, 2013:6). Teaching with high-tech simulators can provide an alternative to traditional teaching approaches that emphasise exposure to realistic clinical situations that students might not otherwise experience in a practical setting (Baghoomian, 2014:2). There is evidence that it is an effective learning tool, specifically in medicine, where it has been used to train doctors in a wide range of clinical skills from surgical procedures to patient communication. Cant and Cooper (2009:4) suggest high levels of student satisfaction, but with the risk of anxiety or intimidation which may have an effect on learning.

Expectations of employers for new graduates able to deliver quality and competent patient care are contributing to changes in nursing. Nursing graduates must be prepared to seek out and use evidence-based best practices and bring well-developed critical thinking abilities to the workplace. Educational accrediting bodies are raising standards for nursing education programmes as a result of these factors (Conejo, 2009:18).

Literature pertaining to this research area is limited with very few papers examining how faculties are prepared to use simulation and whether the preparation programmes follow the principles of best practice in education (Ahmad, 2014:1). Nurse educators need advanced technologies such as simulation tools to enhance

their effectiveness as practitioners (Baghoomian, 2014:2). The emphasis on simulation requires nurse educators to focus on the integration and application of competency skills, knowledge and critical thinking (2014:1). Technological changes are rapidly expanding in the healthcare setting, but there are nursing schools that have not been developing educational approaches and curricula to incorporate these changes. Nurse educators need to keep up with the changes to ensure a well-educated nurse force for the future (2014:2). Simulation techniques that are used in teaching vary from low to high fidelity. Low-fidelity simulators used to train nurses for the past 50 years are now being replaced with medium- to high-fidelity simulators (2014:3). Using these simulators in nursing education is costly. Nursing colleges are mostly under tight financial constraints, however, and have to justify the purchase and use of expensive simulators (2014:3). High fidelity takes place by using computerised manikins trying to replicate human anatomy. They are programmed to imitate vital signs (Cant & Cooper, 2009:4). These high-fidelity simulators are therefore used to develop critical thinking skills (Rothgeb, 2008: 489). The average cost of a high-fidelity simulator is between $120 00 and $200 000 (Baghoomian, 2014:3). Where these simulators have been introduced the situation could be stressful for nurse educators, especially if they have neither used them nor have been properly trained to use them. They must learn how to apply the use of simulation tools in their training to improve the safety of patients and deliver effective clinical care (2014:4). Treadwell and Havenga (2013:80) mention the lack of training of the facilitators that have been selected for teaching in an inter-professional education environment. This is very evident in Nurse Educators. Nurse educators are discouraged by the amount of work required to implement simulation within nursing courses, often resulting in confusion, frustration and being overwhelmed by the effort needed to develop scenarios for each course (Baghoomian, 2014:48).

According to Waxman and Telles (2009:231), nurse educators are receiving training in the use of high-fidelity simulators because they, although they may be experts in their own speciality, are seen as novices in simulation pedagogy.

Baghoomian (2014:48) points to the fact that it has become a great concern that nurse educators are not sufficiently prepared to take on the use of high-fidelity simulation in nursing education, especially when the aging population amongst nurse

educators is taken into consideration. It must be remembered that all the above-mentioned is happening at the same time, leaving the nurse educator very little, if any, time to prepare herself sufficiently for facilitation in a high-fidelity simulation. This, in turn, will lead to high levels of stress, not for the Nurse Educator only, but also for the students having to make use of the simulation laboratory to meet their clinical objectives. It is vital that the student being released in the clinical setting is a confident, competent student who will be able to render safe and quality patient care (2014:53).

In recent years nursing practice has changed, placing demands on nursing educators to utilise different approaches in education (Baghoomian, 2014:46). Technology advancements in healthcare have led to the increased use of computerised simulators as a teaching and learning too in nursing curricula (2014:46). These new techniques and processes present new challenges to nursing educators. One of the biggest challenges that nursing schools face is how to prepare nurse educators for this shift from clinical to simulated instruction (2014:46). The nurse educators need to have a broad understanding of types of simulators available; the scope of their use and the degree of realism; and which ones would be best to meet the needs of their students. Some nurse educators have not embraced the new technology and are not prepared to teach with simulators (2014:46).   Lack of resources is another challenge faced by nurse educators. It is therefore necessary for schools to invest time and money to support the educational and professional growth of nurse educators (2014:47). However the use of high-fidelity simulation in Nursing Education remains a challenge.

1.2 PROBLEM STATEMENT

Challenges experienced in the Private Nursing College in South Africa at which the research was conducted include inadequate clinical placements, aging population and fear of technology, lack of competence in technology simulation, lack of trained staff and lack of human and financial resources.

o **Inadequate clinical placements**

Educators are challenged to find adequate clinical experiences for their students. Opportunities for clinical experiences with real patient care situations are affected by limited clinical placement and the shortened length of stay for patients in private hospitals (Yuan, Williams & Fang, 2011:27). Finding adequate clinical experiences for students to have opportunities for working with real patients is a challenge educators are faced with. Reasons for this include limited clinical placement, the shortened length of stay in hospitals for patients and the complexity of healthcare systems that makes it difficult to ensure clinical competence.

o **Aging population and fear of technology**

A big concern in South Africa is the aging population amongst the nurse educators. It needs to be taken into consideration that many of them did not grow up with computers and lag behind in technological skill. What is very clear is the fact that nurse educators must realise that they cannot teach in the same manner as in the past. They have to find ways to integrate the innovative tools into practice as it is a method to be used across the range of nursing education (Rothgeb, 2008:493). The age of nurse educators employed at the private nursing college where the research was conducted vary from 30 to 67 years. Most of the nurse educators had not been exposed to technology during their training and have only been challenged recently to use technology in nursing education.

- ○ **Lack of competence in technology of simulation**

  While each campus received a manikin for high-fidelity simulation, the nurse educators had to rely on training from the supplier and are responsible for self-training to master every aspect of this. Their already very busy schedule gets worse with the add-ons, yet no time is planned to go to the simulation laboratory to practise the new skills needed. This is supported by a study done by Howard *et al.* in which common challenges that were identified were also inexperience with technology, time constraints in learning the technology as well as scheduling students and inadequate space to implement HFS (Howard *et al.*, 2011:e2).

- ○ **Lack of trained staff**

  Educators need training and experience to adequately prepare them to use the simulation equipment. The ideal is to have at least one member who will take on the challenge to champion the simulation laboratory experience (Rothgeb, 2008:492). Research done in 2008 concluded that most nurse educators received little or no training in the use of simulators and had little direct experience with the use thereof. Jeffries and Rothgeb (in Rothgeb 2008:492) also stated that nurse educators frequently are not prepared for innovations in nursing education. They are often expected to learn to use the equipment and computer program scenarios on their own without any formal training. To become familiar with simulation includes the reading of literature, attending conferences and training sessions, not forgetting to make use of a good network of colleagues knowledgeable in the use of simulation. The lack of trained staff is evident at the private nursing college at which the research was undertaken. The busy schedules of the staff simply do not allow time for in-service or self-training.

  For the purpose of my study the role of the facilitators was more closely examined. With inter-professional education, staff from different professional backgrounds was involved with learning and working together. These people needed to be committed to be able to engage in shared learning. The facilitators also needed to display a wide range of attributes and competencies to ensure effective functioning. It also required confidence in their knowledge base as well as their ability to facilitate divers groups of inter-professional learners and involved ability to plan, develop, implement, teach and evaluate this type of

education. The researchers advised that faculty to be included when selecting professionals to participate, needed to be creative and innovative, as well as interested in transformational change. This was one of the very few articles that mentioned the lack of training of the facilitators that were selected for teaching in an inter-professional education environment (Treadwell & Havenga, 2013:80). A study was conducted in Alabama to compare the motivation and technological readiness of those nurse educators who did and did not use HFS. Many factors influence the implementation of HFS as teaching strategy and the purpose of the study was to address the significant gaps in the literature in nurse educators' perspectives of the use of HFS, technological readiness and the motivational factors that may influence the incorporation of HFS into curricula. Recommendations were made for further study to determine what other factors played a role in the use of HFS (Duvall, 2012:iii).

- o **Lack of human and financial resources**
  Both old and new healthcare practitioners stay away from getting involved in simulated activities because of several factors. Nurse Educators are responsible for everything related to the training of their student groups, from registering them at the SANC, facilitation of study material, setting and marking tests, remedial sessions when needed, clinical accompaniment, and all administration related to their students until the completion of training documents needed by SANC to register them in the specific category. Nurse educator time and proficiency with simulation equipment is also a limitation.   Other challenges include space and availability of resources (Cannon-Diebl, 2009:134). It is important that all seven learning centres nationally have the same equipment. This factor, together with the high cost of high-fidelity simulators, makes it impossible to invest in more than one manikin per learning centre. The equipment has to be utilised by large groups of students.

  Many nursing programmes are investing hundreds of thousands of rands in human patient simulation (HPS), yet this valuable resource is often not being used to its full potential. While organisations have allocated monies for HPS equipment, few have set aside appropriate resources, time or refunds for educating personnel on how to effectively use the equipment or network with

other organisations to optimise its use. Opportunities are then missed to improve nursing education (Adamson, 2010:e75 – e76).

This result in Nurse Educators being stressed even more. Unfortunately, very little research has been done to establish the readiness of nurse educators for high-fidelity simulation, especially in the South African context, in which no literature could be found within my research field of study, i.e. the readiness of nurse educators in a private institution in South Africa in the use of high-fidelity simulation.

1.3   AIM OF THE STUDY

The aim of this study was to determine the perceptions of nurse educators regarding the use of high-fidelity simulation in nursing education at a South African private nursing college in order to determine why high-fidelity simulators have not yet been embraced by nurse educators or students.

1.3.1 RESEARCH QUESTION

The question that was formulated to initiate the research was: What are the perceptions of Nurse Educators regarding the use of high-fidelity simulation in nursing education at a South African Private Nursing College?

1.3.2 RESEARCH OBJECTIVES

The objectives of this study were to:

- Determine and describe the perceptions of Nurse Educators at a South African Private Nursing College regarding the use of High-fidelity Simulation in nursing education
- Suggest recommendations on how to prepare the Nurse Educators in a relatively short space of time to take up this role with confidence.

1.4   SIGNIFICANCE OF THE STUDY

The researcher hoped that this study would contribute to effective preparation of Nurse Educators in nursing education to use high-fidelity simulation. It should highlight the needs of Nurse Educators to emphasise the lack of training. It also aimed to look at alternative ways to prepare Nurse Educators and recommend ways to effectively prepare them. This would inevitably lead to improved quality of teaching and learning of students, thereby contributing to excellent, world class patient care.

1.5   DEFINITION OF TERMS

This section provides a brief description of some of the terms used in this study.

1.5.1 Simulation

Duvall (2012:12) defines simulation as a pedagogy using one or more typologies to promote, improve and/or validate a participant's progression in cognitive and psychomotor skills. In this study, simulation will refer to a pedagogy integrating the use of high-fidelity simulation in nursing education.

1.5.2 Fidelity

Fidelity is the term used to describe the accuracy or degree of realism of the simulation system (Bland, Topping & Wood, 2011:665). It can be classified as low, medium and high fidelity (Duvall, 2012:12). In this study, high-fidelity simulation is a type of simulation that closely mimics reality by providing cosmetic fidelity (realistic appearance) and response fidelity (the ability to simulate actual patient responses to interventions). High-fidelity simulation manikins actually breath, talk, have eye movements, palpable pulses and other features that resemble physiological features of "live" patients (Duvall, 2012:13).

1.5.3 Private Nursing College

A private nursing college is an institution that is registered by the registrar according to the Higher Education Act (Act No. 101 of 1997, Ch. 7, Sections 51 and 53), on condition that: the institution is financially viable, its programmes are higher education programmes, and it is accredited by the South African Nursing Council and the South African Qualifications Authority Act as a private nursing college to maintain acceptable standards. In this study, the private nursing college belongs to the Life Healthcare Group in South Africa.

1.5.4 Nurse educator

According to the South African Nursing Council, a Nurse Educator is a Professional Nurse with an additional qualification in Nursing Education and is registered as such with the South African Nursing.

In this study, nurse educator refers to a person who is permanently employed (from six months to 15 years) by a private nursing college and health establishment who is functioning either as nurse educator or clinical training specialist. Currently, 90% of the nurse educators in the classroom are either busy studying towards their Magister Curationis studies or are already qualified.

1.6 THEORETICAL FRAMEWORK

Theoretical literature is defined as a focus on concepts, analyses, maps, theories and conceptual frameworks that support a selected research problem and purpose (Grove, Burns & Gray, 2013:100). Grove *et al.* also define a framework as the abstract, logical structure of meaning that guides the development of a study and enables the researcher to link the findings to the body of knowledge for nursing.

To use simulation as a method of teaching requires a new pedagogy including active learning and best practices. Students who are actively involved in the learning process enhance their critical thinking skills (Waxman & Telles, 2009:232).

According to Waxman and Telles, several theories have been proposed for simulation education, e.g. by Rogers (2007), while the model of skill acquisition suggested by Dreyfus and Dreyfus (1980) identified five levels of skills competency through which students' progress: novice, competent, proficient, expert and master. Benner (1984) applied the mentioned model to nursing practice and identified the stages as novice, advanced beginner, competent, proficient and expert (Waxman & Telles, 2009:232).

- **Novice stage**

    Teaching is task orientated while teaching basic skills (Waxman & Telles, 2009: 232). Focus is placed on objective, measurable attributes, e.g. vital signs (Waldner & Olson, 2007:5).

- **Advanced beginner**

    The advanced beginner still follows lists/directions while starting to ask questions (Waxman & Telles, 2009:232). At this level exposure to practice experience is sufficient to recognise clinical vital signs manifested of a disease profile. The nurse's action is determined by guidelines and protocols associated with the disease. The focus is on organisation and prioritisation of tasks in order to maintain the status quo of the patient (Waldner & Olson, 2007:6).

- **Competent stage**

    During this stage actions start to be prioritised. The impact of measures that contribute to long-term goals for a patient is understood (Waxman & Telles, 2009: 232). The competent nurse can identify the impact of nursing actions related to more comprehensive patient care (Waldner & Olson, 2007:6). Start taking on responsibility for actions.

- **Proficiency stage**

   Decisions are based on experience while intuition starts to develop. Nurses begin to anticipate occurrences (Waxman & Telles, 2009:232). The proficient nurse will "read" a situation and decide on her actions (Waldner & Olson, 2007:6).

- **Expert**

   The situation is easily appraised; intuitive decisions are made whereby the nurse then acts accordingly (Waxman & Telles, 2009:232).

The difference amongst the levels is determined by nurses' focus of attention; involvement in the situation; and perception of responsibility/accountability based on theoretical knowledge and experience (Waldner & Olson, 2007:5).

The Benner model is applicable when training faculty members in simulation. They start at the novice stage at which they are taught how to teach with high-fidelity human patient simulators. The clinical expert as novice will learn to write scenarios using HFS. Trainers will need support and resources to become skilled using software to program high-fidelity simulation, writing scenarios and conducting a debriefing session.

To become a novice again requires the person to be dedicated to learning and to have enough confidence to return to this early stage (Waxman & Telles, 2009:232).

In her book, *From Novice to Expert,* Benner (1984) envisioned that her research and the model of development of expertise in nursing practice might lead to more autonomy for the practising nurse, staff development, staffing and clinical specialisation. Her model was met with both acceptance and rejection when applied to the development of nursing knowledge through clinical experience. She based her model on the belief that knowledge of theory enhances practice. Both nurse and patient are exposed to risks when patient care is delivered. To become skilled, nurses need to be exposed to well-planned educational programmes. Gaining skills is safe and quick when it has a sound educational base. Experience provides the context for theoretical knowledge. When exposed to practice experiences, students can apply, adapt and integrate theory with practice and create a process of skill acquisition and development (Waldner & Olson, 2007:5).

Benner's (1984) model of skill acquisition and Kolb's (1984) experiential learning theory provide frameworks (in Wax and Telles 2009) that can be used to help nurse educators guide their decisions about simulation experiences for nursing students.

A process of learning through experience starting with the learner having an experience is described by Kolb (1984). This experience is made meaningful when the learner reflects on it. By doing this, the learner learns through and from the experience by doing and by reflecting. The novice is then transformed from novice to expert by incorporating experience into existing knowledge through a process of active reflection and conceptualisation of experience (Waldner & Olson, 2007:7).

Applying Benner and Kolb's models to simulation in nursing education there is agreement that, when entering the nursing profession, nurses should be educationally prepared to work at least at the advanced beginner's level and possibly at the competent level. The progression of simulation experiences in nursing education could therefore be guided by the first three levels of Benner's (1984) model. This model, although referred to as a model of skills acquisition, focuses on the assessment of skills (Waldner & Olson, 2007:7). Simulations allow students to improve assessment skills and see consequences of their decisions (Waldner & Olson, 2007: 5). Benner's (1984) model is presented diagrammatically in Figure 1.1.

Novice-to-Expert Simulation Training
(Waxman & Telles, 2009: 233).

Level 1 & 2

(NOVICE)

LEVEL 1

BASIC TRAINING TECHNICAL

LAERDAL

(ADVANCED BEGINNER)

LEVEL 2

TRAINING SIM METHODOLOGY

FOUNDATIONS CLASS

(COMPETENT)

APPRENTICESHIPS

Level 3

SIMULATION LEADERSHIP

DEBRIEFING

TECHNICAL TRAINING

DISCIPLINE SPECIFIC TRAINING

STRENGTH

DEVELOPMENT

Level 4

(PROFICIENT)

TRAIN THE TRAINER

(EXPERT)

SCENARIO

EXPERIENCE
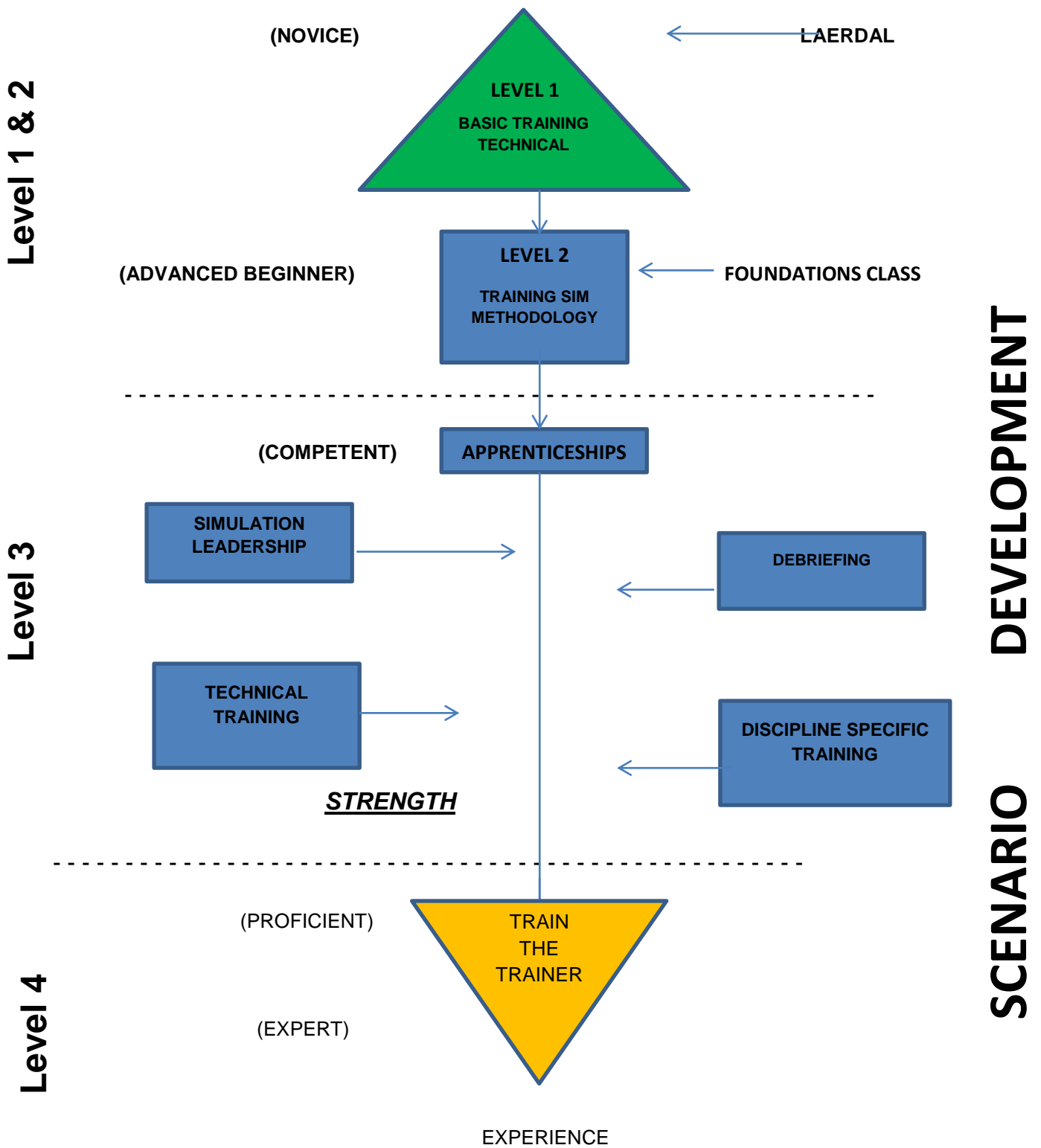
Figure 1.1: Theoretical Framework

Level 1

This starts at the novice level to ensure that trainees all acquire the same basic knowledge of simulation concepts and terminology. This training takes place over two days (Waxman & Telles, 2009:234; Benner, 1982:403; Waldner & Olson, 2007:5).

Level 2

Intermediate training follows once level 1 has been completed and requires more education in simulation. During the 2-day training sessions simulation concepts are reviewed and scenarios are written. Running simulations with debriefing afterwards includes basic technological training on the simulator (Waxman & Telles, 2009:234; Waldner & Olsen, 2007:6).

Level 3

According to the literature, competency is achieved after two to three years. This training comprises multiple classes to ensure that competency is achieved. It includes debriefing, moulage (applying mock injuries for the purpose of training) and advanced technical skills needed to teach students. An expert mentors the simulation centre that helps the faculty members to move toward becoming experts. Eventually they will become the trainers of the future (Waxman & Telles, 2009:234; Waldner & Olson, 2007:6).

Level 4

This final level solidifies the abilities of the trainers through a competency programme, experience, willingness to serve and commitment to teaching in simulation. This will ensure that on-going training needs are met.

The Benner model can also be used to develop scenarios from basic to higher levels. All levels should include decision making, problem solving and communication skills (Waxman & Telles, 2009:234; Benner, 1982:404).

1.7   DELINEATION OF CHAPTERS

The contents of the chapters in this thesis are indicated in the following that follows.

CHAPTER 1	Introduction and problem statement
CHAPTER 2	High-fidelity Simulation
CHAPTER 3	Research methods
CHAPTER 4	Presentation of results
CHAPTER 5	Discussion, Limitations, Conclusions and Recommendations

1.8   CONCLUSION

It is clear that simulation has found a place in training and is increasing as an effective teaching-learning strategy when used under the relevant conditions (Cannon-Diebl, 2009:128). This chapter has dealt with the introduction and background to the study, the problem statement, aim and objectives, the research question, the significance of the study, a definition of terms, the theoretical framework that guided the study and the delineation of chapters. The next chapter presents an extensive literature review with regard to high-fidelity simulation.

CHAPTER 2: HIGH-FIDELITY SIMULATION

2.1   INTRODUCTION

The previous chapter was focused on the introduction and background to the study, the problem statement, the aim and objectives of the study, the research question, the significance of the study, a definition of terms and the theoretical framework that guided the study.

This chapter is focused on describing the definition of simulation, the history of simulation in teaching, the context of nursing, the use of simulation in teaching, and benefits of and barriers to simulation. A literature review is the critical summary of research on a topic of interest, often to put a research problem in context (Polit & Beck, 2006:547). Grove *et al.* (2013:40) and Brink, Van der Walt and Van Rensburg (2012:54) state that a literature review aims to generate a picture of what is known and not known about a research problem and to identify gaps that exist. The researcher has utilised various sources to conduct the literature review. These included books, journal articles, theses, dissertations and internet resources. Many studies on simulation have been conducted, but literature regarding the South African context is very limited.   No literature could be found in the South African context in this research field of study, i.e. the perceptions of Nurse Educators regarding the use of high-fidelity simulation at a South African Private Nursing College.

2.2   DEFINITION OF SIMULATION

Simulation is defined by Medley and Horne as the reproduction of the essential features of a real situation (in Welman, 2013:13).   In healthcare, a more comprehensive definition described by Alspach is that simulation is an attempt to replicate some or nearly all of the essential aspects of a clinical situation so that the situation may be more readily understood and managed when it occurs for real in clinical practice settings.   The more closely the processes and conditions of the

simulation resemble the reality they are intended to represent, the greater the potential for transfer of learning to that situation (2013:13).

Simulation therefore is a technique used to safely recreate the real word – with or without sophisticated technology – to educate, train, assess performance, probe situations or conduct research (Doyle, 2011:1). McCaughey and Traynor describe simulation as a teaching strategy that enhances traditional training with real patients and equips students and health professionals to learn in ways that eliminate risks to patients (McCaughey & Traynor, 2010:827).

According to Decker, Sportsman, Puetz & Billings, (2008), simulation is not a technology but an educational strategy. Simulations are distinguished along a continuum based on the degree to which they represent reality, namely low-, moderate and high-fidelity simulation (in Welman, 2013:13).

According to Yuan *et al.* (2011), simulation is designed to encourage active participation in the learning process to allow the student to construct knowledge, explore assumptions and develop psychomotor skills in a safe environment. Yuan *et al.* describe three types of simulation with different abilities to mimic reality. The intravenous arm and intramuscular hip are examples of low-fidelity simulation where these manikins are less similar to reality. Manikins with breath, heart and bowel sounds are examples of intermediate-fidelity simulation. They allow initiation of IV therapy but lack the complexity and realism of patient scenarios. HFS uses life-size manikins with actual physiological and pharmacological responses as well as sophisticated interactive capability in realistic scenarios (Yuan *et al.*, 2011:27). They present a realistic depiction of the human body in look, feel and response to the care provided (Rothgeb, 2008:489).

Simulation techniques that are used in teaching vary from low to high fidelity.

2.2.1 High-fidelity Simulation

High-fidelity simulation is defined as the electronic reproduction of sound, especially from broadcasted or recorded sources with minimal distortion. High-fidelity simulators are technologically advanced and include human patient simulators that

not only produce recorded sounds but also physiological functions and anatomical features of real patients (Welman, 2013:14). They are programmed to imitate vital signs (Cant & Cooper, 2009:4). High-fidelity simulators are used to develop critical thinking skills (Rothgeb, 2008:489). Studies by Cant and Cooper proved that simulation is an effective method of teaching and learning when they reported improvement in knowledge/skill, critical thinking and/or confidence after simulation education (Cant & Cooper, 2009:6).

The literature has not adequately addressed the experiences of nursing faculty or perceptions of barriers and facilitators for integrating HPS into nursing curriculum (2010:e76). High-fidelity simulation is frequently described as an effective teaching tool; however, there is very little research to address the faculty's attitudes related to the use of the HFS. There are gaps in how to best train them to maximise the full potential of high-fidelity simulators as a viable and effective teaching tool (King Moseley, Hindenlang & Kuritz, 2008:1).

High-fidelity simulation uses life-size manikins with actual physiological and pharmacological responses as well as sophisticated interactive capability in realistic scenarios (Yuan *et al.*, 2011:27). They present a realistic depiction of the human body in look, feel and response to the care provided (Rothgeb, 2008:489).

2.2.2 Moderate-fidelity Simulation

Moderate-fidelity simulators allow for a more realistic context than low-fidelity simulators and are generally used as task trainers (Welman, 2013:14). Manikins with breath, heart and bowel sounds are examples of intermediate-fidelity simulation. They allow initiation of IV therapy, but lack the complexity and realism of patient scenarios (Yuan *et al.*, 2011:27).

2.2.3 Low-fidelity Simulation

Low-fidelity simulators are static and lack the detail of a real situation. The older generation of nurses will remember using oranges to practice intramuscular injections. The intravenous arm and intramuscular hip are examples of low-fidelity

simulation where these manikins are less similar to reality (Yuan *et al*., 2011:27). Paramedics also use simulation in learning to splint, bandage, package and transport patients by practising on one another. Simulation is the reproduction of essential features for the purpose of study/training. Low fidelity includes anatomical modules, case studies and role play (Cant & Cooper 2009:4). Low-fidelity simulators are used to learn, practice and achieve a designated skill. They are static, without motion and demonstrate few features with realism (Rothgeb, 2008:489).

2.3 HISTORY OF SIMULATION IN CLINICAL TEACHING

The first documented use of higher level simulators was with pilots during the Second World War. Even today it is used to train pilots in simulated situations, e.g. loss of power, engine failures and poor weather conditions. Like in nursing, safety is the reason behind using simulators in pilot training (Sanford, 2010:1006). We are quite familiar with the use of simulation in aviation where a pilot in training spends many hours in a mock-up of the aeroplane cockpit. Simulators are also used to train automobile operators, 18-wheel trucks and ships. Even soldiers are familiar with this when they are trained to fight during a war. Simulation technology has a long legacy of use for education and personnel evaluation in a variety of disciplines and professions. Apart from the mentioned pilots, illustrations include simulators also for astronauts, war games, management games for business executives and technical operations for nuclear power plant personnel. Evidence show that simulation technology provides a safe and effective mechanism to educate and evaluate professionals in these fields (Issenberg, McGaghie, Petrusa, Gordon & Ross, 2005:10).

In health care, simulation has been used for hundreds of years. Medical education has placed increased reliance on simulation technology to boost the growth of learner knowledge, provide controlled and safe practice opportunities and shape the acquisition of young doctors' clinical skills (Issenberg, *et al*., 2005:11).

A team led by Abrahamson and Denson at the University of Southern California developed the first computer-controlled simulator in 1967. SimOne was not

accepted because of its high production costs and the value of its use was not identified at the time (Nehring, 2007:110).

Although simulation for health care education is not new, the use of high-technology simulation is a recent development dating back to 1994 (Doyle, 2011:1).

Historically, nursing faculty used simulation tools to guide students in learning the skills they needed for clinical practice by using role-playing, case studies, multimedia presentations and models and manikins (Rothgeb, 2008:489). This is useful for introducing psychomotor skills (Baillie & Curzio, 2009:298).

Several South African universities have implemented high-fidelity simulation training at their institutions. Some of these include the Universities of the Free State (School of Nursing), KwaZulu-Natal (School of Medicine), Witwatersrand (Department of Anaesthesia, Johannesburg Hospital), North West University (Potchefstroom) and the Medunsa University of Southern Africa (Faculty of Medicine), as well as Nelson Mandela Metropolitan University in Port Elizabeth (Welman, 2013:1).

2.4   THE CONTEXT OF NURSING

The knowledge and skills that a student gains in the clinical setting cannot be replaced by simulation experiences and must be used to supplement them (Welman, 2013:173).   In a regulation (R 174) published by the South African Nursing Council in March 2013, the number of hours that may be spent in simulation are not specified, however, it is stated that these conditions will still be determined and published in the Gazette at the discretion of the Council (SANC, 2013:5).   The nursing context comprises legal, educational, clinical and learning aspects.

2.4.1 Legal framework

The Nursing Act (No. 33 of 2005) regulates the South African nursing profession in accordance with international guidelines provided by the International Council for Nurses (ICN) in accordance with the South African constitutional and legislative framework, with specific reference to the principles of co-operative governance and the Bill of Rights, as well as the basic health-related rights (Muller, 2009:30).   This Nursing Act authorises the South African Nursing Council to develop regulations that are published by government notice (Muller, 2009:31).

The scope of practice refers to the regulated responsibilities and roles of the nursing/midwifery practitioners within a specific country. Responsibility refers to the intentional conduct of a person based on a particular frame of reference. The scope of practice authorises practitioners to undertake and perform certain interventions, activities and engagements in accordance with the competencies, the registered category/level of the practitioners and other regulatory requirements. Omission of these responsibilities could lead to unprofessional conduct resulting in disciplinary action (Muller, 2009:31).

 The policy regarding Community Service is set out in section 40 of the Nursing Act, 2005 (Act No. 33 of 2005) and in the Regulations Relating to Performance of Community Service published in Government Notice No. 765 of 24 August 2005.

 Section 40(1) of the Nursing Act, 2005, states that, *"*A person who is a citizen of South Africa intending to register for the first time to practise a profession in a prescribed category must perform remunerated community service for a period of one year at a public health facility". (SANC Website).

Students shall receive integrated education and training throughout their programmes to achieve both theoretical and clinical outcomes (SANC, 2013:5).

In terms of assessment, the South African Nursing Council specifies that 60% of the formative clinical assessment activities should be performed on real patients (SANC, 2013:6). This has implications for the implementation of high-fidelity simulation as a learning strategy, since it is possible to prepare students for these real patient contact experiences in simulation (Welman, 2013:173).

Chapter 2 of the Constitution of the Republic of South Africa (1996) contains the Bill of Rights for all people in our country and affirms the democratic values of human dignity, equality and freedom. To ensure the realisation of the right of access to health care services as guaranteed in the Constitution of the Republic of South Africa, 1996 (Act No. 109 of 1996), the Department of Health is committed to up-holding, promoting and protecting this right and, therefore, proclaims the Patients' Rights Charter as a common standard for achieving the realisation of this right.

PATIENT RIGHTS INCLUDE THE FOLLOWING:
- Healthy and safe environment
- Participation in decision making
- Access to healthcare that includes emergency care, treatment and rehabilitation, provision for special needs, counselling, palliative care, positive disposition displayed by healthcare providers and health information
- Knowledge of one's health insurance/medical aid scheme
- Choice of health services
- Be treated by a named healthcare provider
- Confidentiality and privacy
- Informed consent
- Refusal of treatment
- Be referred for a second opinion
- Continuity of care
- Complain about health services (Meyer, Naudé, Shangase & Van Niekerk, 2009:141).

According to the regulation regarding the scope of practice of the registered nurse (Regulation R2598 of 30 November 1984), the nurse also has to prescribe nursing care (Meyer *et al.*, 2009:10). The scope of practice (Regulation R2598 of SANC as amended) is applicable to all basic training programmes. It means that the regulation has to be used to accompany both junior and senior learners in all stages of a basic programme. The practice of a nurse and midwife requires the application of knowledge and the simultaneous exercise of judgement and skill. According to the scope of practice, learners are accompanied to enable them to practice as independent practitioners at the end of their training. They will then also be able to

render patient care in a comprehensive and competent manner. In addition, they will be able to accompany their juniors and manage patient care in a safe manner (Meyer *et al.*, 2009:83). Using simulation will prepare the learner to become competent in a safe environment where a real patient cannot be harmed in any way so that they will be confident when exposed to a real patient in the practice environment. Nurses in South Africa can study nursing at a university, a public or a private education institution where simulation is used to prepare them to become competent practitioners. Preparing nurses for their community service can also be done in simulation.

2.4.2 Nursing education context

Several reasons are mentioned why simulation should be used in nursing education. These include the following: It embodies the principles of adult education; students are motivated to learn when actively involved in the process and can draw from personal experiences; they are able to solve problems and apply immediately what was learnt; and self-initiated learning facilitates knowledge acquisition more rapidly. Rogers (1969, in Nagle, McHale, Alexander & French, and 2009:20) suggested that humans learn best in a non-threatening environment

Nursing Education programmes are increasingly adopting simulation in both undergraduate and graduate curricula. Nursing, as mentioned above, can be studied through a university or a nursing college. Universities offer a basic, four-year, full-time undergraduate degree (BCur) in four career fields, namely general nursing (caring for people in hospitals, clinics and private practices); community nursing (primary healthcare and the prevention of disease in the community); psychiatric nursing (treating the mental health of individuals); and midwifery (caring for females from pre-conception until after delivery and their babies). Students also obtain clinical (practical) nursing experience at hospitals and other health services during the four years of study. Universities also offer post-basic qualifications at diploma, honours, master's and doctoral levels. The most common courses offered by public and private colleges are a two-year bridging course, one-year courses and post basic diplomas. However, the public colleges also offer a four-year diploma leading to registration as a nurse (general, psychiatric, community and midwifery).

Once the qualifications are obtained, nurses can choose the field in which they want to specialise and then receive the necessary training through an accredited college. The limited clinical placement positions, acceptance of simulation as a useful adjunct to clinical teaching and the potential of simulation to improve clinical learning are some of the reasons for making use of simulation (Gordon & Buckley, 2009:491). A primary focus in health care is the safety of patients and reduction of errors. This is one of the major advantages of simulation laboratories as it gives the students the opportunity to demonstrate, practise and develop skills where the patient is not at risk. The simulators can also be programmed to respond to errors made by the students as they will be able to see what happens with such errors to a real patient. Nurse educators can also enhance student remediation via the simulator (Rothgeb, 2008:492).

South Africa is on the verge of embarking on a new era in nursing education. The South African Nursing Council (SANC) is preparing for introduction of New Nursing Qualifications which were planned to commence in January 2015. Legacy Nursing Qualifications will be discontinued, paving the way for the implementation of the New Nursing Qualifications:

To provide the opportunity for SANC and the providers to adequately prepare for the implementation of the New Nursing Programmes whilst phasing out the Legacy Nursing Programmes, SANC also scaled down resources allocated for the Legacy Nursing Programmes to ensure that there would be maximum availability of these resources for the New Nursing Programmes and a smooth transition between the Legacy Nursing Programmes and the New Nursing Programmes. The following new nursing qualifications for inclusion in the National Qualifications Framework (NQF) are:

A Bachelor's Degree in Nursing and Midwifery that will be presented by universities over a period of four years. Nursing colleges, both public and private will present the Diploma in Nursing: Staff Nurse, a three-year diploma, and Higher Certificate: Auxiliary Nursing, a one year course. Advanced Midwifery will also replace the existing Diploma in Midwifery at nursing colleges.

Public Nursing Colleges had to start working toward gaining the status of institutions of higher education. The private nursing college used for this study has already attained this status. The relevant programmes were developed and submitted for accreditation through the Council for Higher Education, which, in turn, submits programmes to the South African Qualifications Authority (SAQA) to be registered by SAQA.

2.4.3 Clinical context

Nursing practice is a practice profession and active learning by caring for patients has been the preferred method of achieving competency in nursing practice. Faced with increasingly complex clinical situations, nurses have to respond with accurate clinical judgement. It is crucial to bridge the gap that exists between what the students learn in the classroom and how they apply what they learn in clinical practice. The major focus of clinical education is facilitating the development of knowledge application, accurate clinical judgement and skill development (Yuan*, et al.*, 2011:26).

Sufficient clinical experience is vital; however, limited availability of placements restricts opportunities for clinical learning. This is worsened by an increase in student numbers, limited faculty and over-crowded clinical sites (Al-Ghareeb & Cooper, 2015:281). Students have to comply with all clinical placement requirements of a programme as determined by the South African Nursing Council (2013:6). The Private Nursing College where this study was conducted views its responsibility to contribute to the national pool of skills seriously, especially in the fields of nursing and health sciences. The College was established 1998. It is registered as a Private Higher Education Institution with the Department of Higher Education and Training since 2008. The College is also accredited at the South African Nursing Council. The college has adopted an outcomes-based model of education and training, which promotes quality service delivery, and ensures that the Company's values are reflected in the activities of the organisation. Nursing courses offered have included:

A Certificate course leading to enrolment as an auxiliary nurse – R2176 (phasing out, no new intakes); Certificate course leading to enrolment as enrolled nurse – R2175 (phasing out, no new intakes); Diploma: Bridging Course for enrolled nurses leading to registration as a General nurse – R683 (last intake 2017) and Post Basic programmes for specialised training in areas such as intensive care, operating theatre, trauma nursing and occupational health. The Health Science course offered is the Diploma in Operating Department Assistance.

All these courses present the opportunity to do clinical activities in simulation. All learning centres have been equipped with the following manikins: Nursing Anne and SimMan, and SimMom for the two learning centres accredited for Midwifery. When starting their training, the learners are exposed to simulation to learn the skills they need before their first placement in a practice setting. In this non-threatening environment they have the opportunity to become skilled and confident in carrying out nursing procedures. While attending a theoretical block, the nurse educators take responsibility for their training in simulation. When placed in the clinical environment, the clinical training specialists become responsible for the learners and they, besides student follow-up in the different units, ensure that the required eight hours clinical accompaniment per learner per month is met.

In South Africa the universities were the first to establish simulation laboratories, to be followed by the public and private colleges. Whereas the latter have started with simulation facilities for the basic nursing programmes, the universities have simulation areas for basic nursing, midwifery, emergency nursing, critical care nursing, community nursing and neonates. At the private institution where this study was conducted, two of the learning centres have simulation facilities for midwifery. SimMan can also be used for the training of critical care nursing.

2.4.4 Context for learning

The context for learning is summarised in Table 2.1

Table 2.1: Context for learning

Context for learning	
Clinical simulation vs Clinical practice	**Clinical practice vs Clinical simulation**
Student engagement for learning is the focus	The patient is the focus Student learning secondary to patient need (safety and best medical interest)
The student can be given full responsibility for patient outcome	The licensed clinician (nurse/doctor) takes responsibility for patient
Case design can provide predictable exposure to cases (complexity/severity) with more than one exposure possible (repeat experiences)	Variable cases (complexity/severity) with variable exposure (unpredictable)
	Relatively limited practice opportunity for students compounded by growing student numbers and increasingly restricted access to patients
	Risk to patients and students (unsafe)
	Multiple competing factors (affecting understanding, interpretation and engagement)

(Berragan, 2013:252).

Table 2.1 shows that, during clinical simulation, the focus is on student engagement for learning and students can be given full responsibility for patient outcomes. Students can be exposed more than once if needed and cases designed here can range from simple to complex to severe. The scenarios can also provide predictable outcomes. When students work in the clinical setting (practice) the patient is the focus, however, and his/her safety and best interest comes before student learning. Here the doctor or nurse takes responsibility for the patient. Students are exposed to a variety of cases also varying in complexity and severity and the outcome cannot be predicated as in the simulation area. Growing student numbers and restricted access to patients limit practice opportunities for students. Both students and patients are not safe in the clinical setting. Furthermore, there also are many competing factors that affect the understanding, interpretation and engagement of students.

2.5   THE USE OF SIMULATION IN TEACHING

The use of simulation requires the development of scenarios, training of students and nurse educators, achievement of competence, assessment of students, using standardised patients, and debriefing.

2.5.1   Development of scenarios

The development of evidence-based clinical simulation scenarios and guidelines for nurses is an important step in redesigning nursing education. These scenarios are created for students to learn in a safe environment. Simulated clinical experience requires immersing students in a representative patient-care scenario, a setting that mimics the actual environment with sufficient realism to allow learners to suspend disbelief (Waxman, 2010:29). The development of appropriate scenarios is critical in high-fidelity simulation training. They need to be developed to address specific learning objectives, while not preventing other learning points from emerging. HFS as an alternative solution to overcome the challenges of learning complex competencies in high-risk clinical environments is posed by both medical and nurse educators. It is necessary to prepare the simulation area with appropriate tools to support the unfolding simulation and student performance. Scenario development time is intensive and also increases faculty time costs. For some faculty, scenario-based simulation is a new teaching methodology that requires computer proficiency and adopting a different approach to teaching and learning (Nagle *et al.,* 2009:20).

2.5.2 Training of students

The majority of nurse educators responded positively to the implementation of simulation as teaching strategy. Training provides a framework for developing and implementing simulated learning experiences. New nurse educators have found it helpful when facing challenges inherent in implementing a new teaching strategy. Experienced faculty commented on the richness of this method. It also allows for a more thorough approach to patient care (Hawkins, Todd & Manz, .2008:526). There is evidence in qualitative studies that the confidence of participants dealing with critical situations increased with the use of clinical simulation. Students were able to notice, interpret and respond appropriately in controlled simulation settings. They also attributed this to the fact that high-fidelity simulation (HFS) provides a risk-free environment where learners are able to incorporate cognitive, psychomotor and affective skills. It was clear that students' confidence increased fostering autonomy, independence and sound analytical skills after practising with a high-fidelity simulator (Yuan *et al.*, 2011:30).

Inter-professional education occurs when healthcare students learn with, from and about one another to improve collaboration and the quality of patient care, e.g. in medicine, nursing, occupational therapy and physiotherapy. A study focused on inter-professional education that was conducted at Medunsa (Medical University of Southern Africa), now known as Makgatho Health Sciences University, revealed how, because of the large groups of students, the simulation had to be repeated six times. The simulation comprised two phases. In the acute phase medical and nursing students had to manage a multi-traumatised patient on admission in the emergency room. The rehabilitation phase followed when occupational therapy and physiotherapy students joined for a consultation with the patient at a clinic (Treadwell & Havenga, 2013:80). The researchers looked at 10 key elements for a design and implementation of inter-professional education in a skills centre, namely facilitators, learners, patient simulators, content, learning resources, settings, faculty development, logistics, learning strategy and evaluation (Treadwell & Havenga, 2013: 80). The increased acuity of patients and safety issues makes simulation a very realistic substitute for student nurses to achieve their clinical competence. As mentioned in many studies, the advantages of using simulation in nursing education

include the safe environment where nursing students can practice a variety of clinical situations. In this way experiential learning occurs away from the clinical setting and nontechnical and technical skills can be consolidated. Students and staff are satisfied with simulation and student self-efficacy is increased. Although there is an increase in the use of simulation, there is limited research on how simulation should be used in the education of nurses (Gordon & Buckley, 2009: 491).

Evidence of the impact on learner self-confidence keeps on growing with the use of HFS in nursing education, but Onello & Regan (2013:1) point out that evidence to demonstrate actual, positive influences on learner competence remains inconsistent. To augment clinical practice hours, the integration of HFS in nursing education has increased over the years. This is promoted by the American Association of Colleges of Nursing and its associated Commission on Collegiate Nursing Education. HFS is also actively promoted by the Agency for Healthcare Research and Quality. It does allow practitioners to practise and enhance individual and team-based skills in a safe and controlled environment prior to working with actual patients. While students are given the opportunity to develop specific skills in a safe environment without the risk of harming patients, nurse educators are also able to expose their students to specific clinical experiences where they are not dependent on having real patients and students are able to meet their clinical objectives.

Adding to individual training, team performance is also enhanced, including developing and expanding the ability of team members to collaborate and communicate effectively to refine care management (Rothgeb, 2008:490).

The wide use of HFS is now also introduced into acute care to assist with orientation programmes, continuing education, certification courses and staff development. It is recognised as a safe way to learn and most nurses like to participate in HFS. In nursing professional development, HFS is used for high-risk, low-volume scenarios, team building and the development of leadership skills, as well as in any other area where staff need improvement. Staff development departments need to establish the best location for the stimulators to ensure ready access. Individuals are also needed to run and maintain these stimulators. While the use of HFS actually has the potential to meet many learning needs in orientation programmes and staff

development (Hallenbeck, 2012:268), the fact remains that research related to the use of HFS with practising nurses is very limited.

An advantage is that the same patient problem can be presented to a number of students without risk to actual patients. If needed, the simulation can be stopped for discussion or to replay the scenario (Abdo & Ravert, 2006:e14). Experiences are standardised, which ensures consistency across the curriculum. Communication skills with peers, healthcare providers and family members can be practised (Howard *et al.*, 2011:e2).   High-fidelity simulation furthermore is able to provide participants with a learning environment where development of non-technical skills is safe and controlled. The participants are able to make mistakes, correct those mistakes in real time, and at the same time learn from them without the fear of compromising patient safety (Lewis, Strachan & McKenzie Smith, 2012:82).

Against this background, Onello and Regan discuss the dangers of risk sensitisation and the need for a standardised framework. They concluded that simulation experiences that encompass the element of longitudinal care and patient response, along with further research identifying best practices, are needed to provide a sound basis for supporting the use of HFS in nursing education (Onello & Regan 2013:1).

2.5.3 Training of nurse educators

Nurse educators have historically valued learning while caring for patients because it allows for the direct application of theoretical knowledge in real-life situations. Despite the fact that this type of learning can be effective, a balance between the learning needs of students and the safety and care needs of patients must be maintained (Nagle *et al.,* 2009:18). Although some health care educators have been reluctant to embrace simulation, there is now a strong and growing interest in this emerging teaching-learning strategy in nursing education (2009:18). Educators can design learning interventions to maximise the benefits of each method ranging from the repeated practise of specific psychomotor skills to managing a team in crisis (2009:18).

Educators need training to adequately prepare them to use the simulation equipment and experience. The ideal is to have at least one member who will take on the challenge to champion the simulation laboratory experience (Rothgeb, 2008:492). Research done in 2008 concluded that most faculty members received little or no training in the use of simulators and had little direct experience in the use thereof. Jeffries also stated that nurse educators frequently are not prepared for innovations in nursing education. It is often expected that they have to learn to use the equipment and computer program scenarios on their own without any formal training. To become familiar with simulation includes the reading of literature, attending conferences and training sessions, not forgetting to make use of a good network of colleagues knowledgeable in the use of simulation (Rothgeb, 2008:492). They have to find ways to integrate the innovative tools into practice as it is a method to be used across the range of nursing education (Rothgeb, 2008:493).

A study revealed that the effect on knowledge with simulation education was superior in comparison with the traditional lecture as the only method of teaching. Few researchers have directly compared simulation in nursing with other teaching and learning methods, however. It is important, though, to adhere to best practice guidelines when using medium- and/or high-fidelity simulation manikins (Cant & Cooper, 2009: 11).

Alinier, Hunt and Gordon support the fact that, in addition to the cost, another major barrier to the adoption of simulation technology is the lack of trainers experienced in using it (Alinier *et al.,* 2004:2006).

Core competencies needed by health educators to use healthcare simulation effectively include the application of key learning theories to simulation; integration of simulation-based learning into the curriculum; preparing and briefing learners for simulation; conducting and debriefing a simulation event; evaluation of a simulation-based learning event; and assessing learning using simulation as an assessment instrument (Topping *et al.,* 2015:

2.5.4 Achieving competence with simulators

The simulation laboratory contributes to the transfer of knowledge from the class room to the clinical setting. Variations on clinical experiences can be created in the simulation laboratory to represent the diseases seen in real life (Rothgeb, 2008:490). It is important that nursing students learn how to apply what is learnt in the classroom in the clinical setting.   A study by Kaakinen and Arwood in 2009, reported that the use of simulation as a teaching method or strategy was discussed in 94 out of 120 nursing simulation articles found; it can be concluded that simulation is a widespread method of teaching (Kaakinen & Arwood, 2009:11).

2.5.5 Assessment of students using simulators

Benefits of including an HPS-based clinical scenario into nursing curricula, incorporates student nurses' ability to make errors in a safe setting; demonstrates the physiological concepts that students find difficult to grasp in a lecture or readings; and their ability to visualise physiological responses to medications and nursing interventions. It also helps with decision making and critical thinking.   Their confidence and self-efficacy improved after experiencing a simulated clinical scenario. There is also evidence that the Objective Structure Clinical Examination scores of undergraduate nursing students; who experienced skills training in an HPS-based learning environment improved. Students often perceive the skills and knowledge they acquire during simulated clinical scenarios as readily transferable to the clinical areas. Millennial generation nursing students need pedagogy based on collaboration, familiarity with the process of learning, and increased participation in their own learning and increasingly realistic immersion. This generation prefers learning experiences that include teamwork. Their fondness for collaboration helps them to engage and function within an increasingly complicated healthcare environment (Parker & Myrick, 2009:324). This is supported by Howard, *et al.,* stating that millennial students (aged 18 to 24) prefer the learning environment to be fun, involves teamwork and integrates technology into this learning environment,

reason being that they are familiar with technology and prefer using it while learning (Howard *et al.*, 2011:e2). At the private college where this study was conducted, the age range of students varies, with the youngest being school leavers and the oldest being in their fifties. Using high-fidelity simulation in the teaching environment can be technologically intimidating for both faculty and students, and hold back the use of high-fidelity simulation in the nursing colleges (Howard *et al.*, 2011:e2).

High-fidelity simulators are used to develop critical thinking skills (Rothgeb, 2008: 489). As shown by Cant and Cooper, simulation is an effective method of teaching and learning for improving critical (2009: 6).

Another shortcoming in simulation literature regarding self-confidence and competence concerns the validity and reliability of evaluation tools used to measure educational outcomes. The International Nursing Association for Clinical Simulation and Learning has published seven standards of best practice in simulation that highlight the importance of having a standardised approach to the design and implementation of simulation across the entire spectrum of use. With best practices in HFS, learner competence can be consistently established, evaluated and improved in both academic and practice settings, ultimately improving quality patient care and outcomes (Onello & Regan 2013:5).

Yuan *et al.*, (2011:31) also identified the deficit of formal measurement tools available to evaluate high-fidelity simulation as a limitation. Validation is needed to decide if proficiencies demonstrated in simulated environments are transferred to real clinical situations – many see simulation as not being totally realistic. Adding to this, nurse educators are challenged to implement teaching strategies that promote learners' confidence and clinical competency. According to these researchers, nurse educators should acquire the knowledge skills needed to use simulation as education strategy, develop realistic case scenarios and design as well as validate standardised and reliable testing methods (Yuan *et al.,* 2011:31).

2.5.6 Standardised patients

Implementing the use of standardised patients (SPs) is a strategy that could minimise anxiety while preparing students to enter the clinical setting. Standardised patients are trained to portray an illness or a scenario, while interacting with students to create a realistic, low-risk learning experience. Advantages of SPs for students include the realistic clinical experience in a non-threatening, low-risk environment; the integrative learning experience; the positive, meaningful experience; constructive feedback; and common learning experience for students. Advantages for faculty include control and consistency, versatility and practicality, and the constructive feedback faculty gain (Flynn, 2012:2).

2.5.7 Debriefing

Experiential learning is enriched when students are allowed to reflect on the experience to which they were exposed. The integration of theory and practice is promoted by reflection and feedback through the development of critical thinking (Welman, 2013:124). Students learn in a safe environment where the patient is not harmed when they make an incorrect decision. Reflection time afterwards provide an opportunity to discuss the experience, reflect on what was learnt and determine what changes need to be made. It was also found that debriefing and reflection is considered to be the most critical element in the simulation scenario because this is where the most learning takes place (Beauchesne & Douglas, 2011:32). This is also an area where a lot of work still needs to be done. This debriefing session is an essential part of the learning process during which students receive immediate feedback (Rothgeb, 2008:490).   Simulation allows for the standardisation of learning experiences.   It is not possible to control the type of conditions of learning experiences in the clinical setting.   With simulation, control over the events is possible and all students are exposed to the same learning (Welman, 2013:25). Most of the articles read agreed that one of the most beneficial aspects of simulation was debriefing.   Key points in Gordon and Buckley's article are the increased confidence in medical-surgical graduate nurses performing technical and non-

technical skills during clinical emergencies following simulation and that the most valuable aspect of simulation was formal debriefing and simulation, which appeared to be an engaging and effective teaching modality for graduate (Gordon & Buckley, 2009:497). Reflection after simulation occurs even if not facilitated when students discuss their experiences with peers and internally reflect on the events. When reflection is facilitated, students benefit by reviewing specific objectives, they learn through the expression of feelings and nurture critical thinking and problem-solving skills (Welman, 2013:125).

2.6 BENEFITS OF SIMULATION

Benefits from teaching clinical simulation include the development of leadership and teamwork when students are exposed to situations where they have to take on a leadership role and learn how to work together in teams in which they learn the advantages of teamwork (Al-Ghareeb & Cooper, 2016:282).

Simulation improves decision making, critical thinking, clinical skills and clinical performance by using human patient simulators in creating case scenarios that enhance critical thinking in senior nursing student. These experiences assist the novice nursing student to progress to the advanced beginner stage of practice. Patient deterioration management is also enhanced through exposing students in large numbers to different simulation scenarios (Al-Ghareeb & Cooper, 2016:282). Clinical experiences can be standardised for all students ensuring consistency. Scenarios could match course content to enhance learning of the material (Howard *et al.*, 2011:e8).

Facilitators and students agree that simulation enabled repeated skills practice enhancing confidence. In a simulated situation students are offered an opportunity to make mistakes and learn from them without any harm to patients. A procedure can also be stopped, discussed/reflected before continuing or even be replayed. Skills not often seen in practice can be simulated. Other benefits include environment familiarisation, team working and the opportunity to practice skills 'correctly' and 'work with confident, role models (Baillie & Curzio:2009:301).

Situation awareness improves when students play the major role during sessions as they should be the ones "in control" of the situation. They decide on the appropriate treatment and actions to care for the patient. It allows them to learn from mistakes and act on their own judgement. Both the practice of basic skills and the experience of scenario-based training are forms of practice. It is recognised that "practice makes perfect", but it is important that students receive feedback to ensure that they take away from the experience what was expected (Alinier *et al.,* 2005:368).

Another benefit is safe medication administration. When mistakes are viewed as learning experiences and part of a risk management process, systems theory indicates that there should not only be fewer mistakes but when mistakes do occur there will be less psychological damage to the individual involved (Zieber & Williams, 2015:9).

Al-Ghareeb and Cooper (2016:282) point out the benefit of learning in caring and cultural diversity being promoted when students are exposed to different cultures through case scenarios and role play.

2.7 BARRIERS

Barriers regarding the use of simulation that have been identified include lack of time, fear of technology, lack of human resources, deficiencies in space and equipment, lack of trained staff, lack of financial support, insufficient simulation manikins, additional workload, manikin maintenance and inapplicability to the curriculum (Al-Ghareeb & Cooper, 2015:284). Although huge amounts of money are invested in human patient simulation (HPS) equipment, this valuable resource is often not being used to its full potential (Adamson, 2010:e75). Where organisations have allocated monies for HPS equipment, very few of them set aside appropriate resources, time or funds to educate personnel on how to effectively use this equipment or network with other organisations to optimise its use with the result that opportunities for improving nursing education are missed (Adamson, 2010:e760).

The amount of money spent on maintenance and training is a very small percentage compared to the initial investment (Adamson, 2010:e77). It is evident that simulation activities and the use of simulators may not be suitable for all. Feeling uneasy

during the interaction with a lifeless manikin has been mentioned by a few students (Baxter, Akhtar-Danesh, Valaitis, Stanyon & Sproul, 2009:859). Literature has also not addressed the perceptions of barriers for integrating HPS into nursing curriculum (Adamson, 2010:e76). In a study done by Adamson (2010:e76) answers from respondents included things like "not enough time to create scenarios or to prepare and setup. A lack of dedicated simulation coordinators is also mentioned.

Results in a study done by King *et al.*, (2008:13) showed that most participants had little, if any, formal HPS training and limited or no experience in using the HPS. They also experienced negative beliefs regarding the amount of time required for preparation and ease of using HPS.

2.8 CONCLUSION

It has been revealed that the effect of simulation education on knowledge was superior to knowledge gained with the traditional lecture as the only method of teaching, but very little research has been focused on directly comparing simulation in nursing with other teaching and learning methods. What is important is to adhere to best practice guidelines when using medium- and/or high-fidelity simulation manikins (Cant & Cooper, 2009: 11).

The disadvantages to learning by means of simulation concern the lack of supporting theory and evidence-based research in support of the use of simulation and the time-consuming nature of creating scenarios, setting up the laboratory and planning for role plays for already overwhelmed instructors. It has been recommended that much more research needs to be done in the areas of simulation, especially high-fidelity simulation (Sanford, 2010:1010). The review of literature demonstrated a significant lack of research on nurse educators and high-fidelity simulation

While findings thus far on the use of high-fidelity simulation in nursing education are positive and promising, research in this area is limited and in its early stages. As a new teaching strategy, it is stretching the capacities of educators to develop the best educational experiences possible for students. With the pressure to increase the use high-fidelity simulation in nursing education continuing to increase, it is also

imperative to increase research evaluating high-fidelity simulation from the perspectives of nurse educators. It is important to learn how educators prepare for and implement high-fidelity simulation and to collect more information about students' perceptions of the experience (Conejo, 2009:49).

Simulation using the high-simulation simulators offers boundless opportunities to address patient safety issues and to aid collaboration between education and practice, however. It provides the prospect for learner-centred, contextualised, risk-free learning, which would be impossible in the clinical environment (McCaughey & Traynor, 2010:831).

The next chapter focuses on the methods that the current researcher used to conduct this study.

CHAPTER 3: RESEARCH METHODOLOGY

3.1   INTRODUCTION

The researcher presented a review of the literature on different aspects of high-fidelity simulation in the previous chapter.   This chapter describes the methods that the researcher used to conduct this study, the research design, the study population, sampling methods, instruments for data collection, data analysis and the pilot study.

3.2   RESEARCH DESIGN

A research design is said to be the blueprint for conducting a study that guides the research and maximises control over factors that could interfere with the validity of the findings (Grove 2013:692; Brink *et al.*, 2012:97). Descriptive study designs are crafted to gain more information about characteristics within a particular field of study with the purpose of providing a picture of situations as they occur naturally.   This type of design may be used to develop theory, identify problems with current practice, make judgements, or determine what others in similar situations are doing (Grove, 2013:215). A quantitative descriptive research design was used for this study.   This was designed to gain more information about characteristics in the particular field of study (Grove *et al.*, 2013:21; Brink *et al.*, 2012:102; Parahoo, 2006:143).   This design was deemed appropriate to describe the perceptions of Nurse Educators regarding the use of high-fidelity simulation in nursing education at a private nursing college in South Africa.

3.3   RESEARCH SETTING

The setting is the location where a study is conducted. In this study, a Private Nursing College with seven campuses and four classrooms was used. The main campus is situated at Illovo, Johannesburg and the sub-campuses are spread throughout South Africa, as presented in Table 3.1.

There are three common settings, namely, natural, partially controlled and highly controlled (Burns & Grove, 2013:373). Polit and Beck (2006:510) state that a setting is the location and conditions in which data collection occurs. A natural setting is an uncontrolled, real-life situation or environment (Brink *et al*., 2012:59). In this study, the researcher used a natural setting, namely the workplace that included all the campuses, classrooms and affiliated hospitals.

Table 3.1: Research Setting

Region	City/Campus	Class Room	Staff	Students
Coastal				
Western Cape	Cape Town	Mossel Bay	12	CT 110 Mossel Bay 34
Eastern Cape	Port Elizabeth		12	111
Border Kei	East London		13	128
KwaZulu-Natal	Durban	Empangeni	26	KZN 185 Empangeni 43
Inland				
Gauteng	Johannesburg West Rand	Bloemfontein	18	WR 164 Bfn 24
	Johannesburg East Rand		11	150
Northern	Pretoria	Middelburg	26	Pta 169 Midmed 26
TOTAL			**118**	**1 144**

As mentioned in Chapter 2, programmes offered at these campuses include the following:

- o Certificate leading to Enrolment as a Nursing Auxiliary (R2176) – all Campuses;
- o Certificate leading to Enrolment as a Nurse (R2175) – all Campuses;
- o Diploma in Operating Department Assistants – only at Pretoria Campus;
- o Diploma in General Nursing: Bridging (R683) – all Campuses;
- o Diploma in Midwifery (R254) – only at the East London and Pretoria Campuses;
- o Diploma in Medical and Surgical Nursing (R212):
- - Critical Care Nursing Science – at East London, KwaZulu-Natal and West Rand Campuses;
- - Operating Theatre Nursing Science – at East London and KwaZulu-Natal Campuses;
- - Emergency Nursing Science – KwaZulu-Natal Campus only;

A Grade 12 certificate is compulsory for entering any of the certificate programmes. Staff nurses wanting to enrol for the bridging course need to be registered with the South African Nursing Council and must have obtained a minimum of 60% in the examination leading to their current qualification. It is expected that those who are interested in furthering their studies through any of the post basic programmes should have at least six months' experience in the units prior to commencement of their studies.

There was no manipulation of the location. The participants were given a questionnaire to complete in their own time. The questionnaires were e-mailed to the participants at the chosen locations at the different campuses, classrooms and hospitals.

3.4   THE STUDY POPULATION

The population is defined as a particular group of people or elements that comprise the focus of research (Grove *et al.*, 2013:351).   The population in this study consisted of 128 nurse educators connected to the Private Nursing College at the seven different campuses, four classrooms and affiliated hospitals in South Africa who agreed to participate in the research, as indicated in Table 3.2.

Table 3.2: The study population of the Private Nursing College

Campuses & Classrooms	TOTAL NUMBER OF STAFF			Totals
	Learning Centre Manager	Nurse Educator	Clinical Training Specialists	
Cape Town Bay View	1	3 1	5 2	12
East London	Researcher	3	10	13
East Rand	1	2	8	11
KZN Empangeni	1	5 1	17 2	26
Port Elizabeth	1	3	8	12
Pretoria Middelburg	1	6 1	16 2	23 3
West Rand Bloemfontein	1	4 1	9 3	18
TOTALS	**6**	**30**	**82**	**118**

The population comprised 118 nurse educators and clinical training specialists working at a Private College of Nursing and associated hospitals in South Africa. The nurse educators at the Learning Centres all had nursing education as an additional qualification and most are currently busy doing Master's studies. A few are also engaged in Doctoral studies.

3.5   THE STUDY SAMPLING APPROACH AND METHOD

A portion or subset of the population is known as a sample (Parahoo, 2007:218; Botma, Greef, Mulaudzi & Wright, 2010:124; De Vos, Strydom, Fouché & Delport, 2012:223). Samples are studied in an effort to understand the population from which the sample was drawn and the most important aspect of the sample is that it should represent the population in the study (De Vos *et al*, 2012:223). The sample of this study is discussed according to Table 3.3.

Table 3.3: The sample of the total population – 10% (n = 10)

Sub-campuses of the private college	Learning Centre Managers	Nurse Educators	Clinical Training Specialists	Total
Cape Town	0	0	0	0
Bay View	Class room	1	0	1
East London	Researcher	0	2	2
East Rand	1	0	0	1
KZN	0	0	2	2
Empangeni	Class room	0	0	0
Port Elizabeth	0	1	0	1
Pretoria	0	0	1	1
Midmed	Class room	0	0	0
West Rand	0	0	2	2
Bloemfontein	Class room	0	0	0
TOTAL	**1**	**2**	**7**	**10**

Sampling is the process used to choose a portion or subset of the population (Gorard, 2001:9; De Vos *et al.,* 2012:223). This is done to enable the researcher to generalise the findings of the research. Probability and non-probability sampling are the two broad types of sampling methods for quantitative study (Polit & Beck,

2006:261). Non-probability sampling involves the selection of participants from a population using non-random procedures (Polit & Beck, 2006:504). This study used non-probability stratified sampling. Grove *et al.* (2013:359) state that stratified sampling is used when the researcher knows some variables that affect the representativeness of the population. Polit and Beck (2006:261) refer to strata as being based on a specific characteristic. The sampling procedure of this study focused on the geographical areas of the campuses where sampling was done according to each city. The first stratum focused on the different campuses and classrooms. There are seven campuses of which four have classrooms. The second stratum focused on the learning centre managers of the different campuses. Nurse educators who are responsible for the theoretical teaching made up the third stratum. The fourth stratum comprised the clinical training specialists who are responsible for the clinical accompaniment of students in the clinical settings. Non-probability sampling used by the researcher ensured that the sample was representative of all the different campuses (included the Learning Centre Manager, Nurse Educators and Clinical Training Specialists from the affiliated hospitals). Ten per cent (10%) of the population was used as a pilot sample on the advice of the statistician.

3.6 INCLUSION AND EXCLUSION CRITERIA

According to Botma *et al.*, Polit and Beck state that inclusion criteria define who should be included in the population (Botma *et al.*, 2010:124).

3.6.1 INCLUSION CRITERIA

Nurse Educators were included in this study on the basis of the following criteria:

- Being permanently employed by the Private Nursing College and its associated private hospitals.
- Having completed or being busy with the nursing education qualification and being able to give valuable opinions about their perceptions of high-fidelity simulation.
- Having had experience in the classroom and clinical areas and being add much value to this research.

3.6.2 EXCLUSION CRITERIA

Nurse Educators were excluded from this study on the basis of the following criteria:

- Not being permanently employed by the Private Nursing College and Hospitals as nurse educators.
- Being Nurse Educators with a nursing education qualification but not practising.
- Being unavailable during data collection or on sick/annual/maternity leave.
- Being main campus personnel.

3.7 VALIDITY AND RELIABILITY

Validity and reliability are the key aspects that must be used to assess the quality of research and are closely related.

3.7.1 VALIDITY

Validity refers to the degree to which the questionnaire measures what it should measure. The questionnaire was validated through face and content validity (Seekoe, 2009: 98).

- **Face validity**

Face validity is important for determining the usefulness of the questionnaire (Brink *et al.* 2012:166). In this study the researcher relied on the supervisor's guidance and a statistician to check the questionnaire and ensure face validity. To ensure validity of the questionnaire it was submitted to colleagues who made suggestions regarding the relevance of the questions.

- **Content validity**

Content validity refers to the degree which the questions in the instrument represent the phenomenon being studied (Seekoe, 2009:99). In this study, the questionnaire focused on questions that explore the nurse educators' perceptions on high-fidelity simulation in nursing education. Questions were drawn from the literature on High-fidelity Simulation. The researcher consulted with the supervisor and statistician to ensure that the questions were understandable. The constructs measured by the instrument were addressed.

3.7.2 RELIABILITY

Reliability refers to the degree to which the instrument can be depended upon to yield consistent results if used repeatedly over time on similar persons, or if used by different researchers. It deals with consistency, stability and repeatability of informants' accounts; as well as the researcher's ability to collect and record

information accurately (Brink *et al.,* 2012:166). Use of a pilot study assisted with pre-testing the instrument for reliability and ensure correct wording of the questions, so as not to influence participants' answers. This also decreased researcher bias.

Pilot Study

Cormack (2001:24) explains that a pilot study is a smaller version of the proposed study which entails a trail run before embarking on the actual study. The pilot study assists with (1) testing how long it takes the recipients to complete the questionnaire, (2) ensuring that all questions and instructions are clear, and (3) determining whether there are any items that do not yield usable data (Burns & Grove, 2013: 343).

The pilot study was conducted using 10% (n = 10) of the sample from all campuses. This study used purposive sampling of nurse educators and clinical training specialists currently employed by a Private College of Nursing and its associate hospitals. The participants in the pilot study were not included in the main study. Permission for the pilot study was obtained from the Company and Learning Centre Managers of the selected facilities.

The respondents were requested to respond to the questionnaire after giving written consent. All ethical considerations used in the main research were adhered to in the pilot study. The researcher e-mailed the questionnaires to the participants. They then returned the completed questionnaire to the researcher. The respondents indicated that all questions were understood clearly and that no problems were identified with the use of the questionnaire. No adjustments were required.

3.8 DATA COLLECTION

Data collection is referred to by Polit and Beck (2006:498) as the gathering of information to address a research problem. Burns and Grove (2009:45) added to the

above definition by stating that it is precise, systematic and relevant to the research purpose or the specific objectives, questions or hypotheses of a study. Data collected in quantitative studies usually are numerical.

3.8.1 Data collection instrument

A questionnaire is said to be a means of data collection by which people provide written responses. Questionnaires come in a variety of formats. A self-administered questionnaire is less susceptible to interviewer bias (Polgar & Thomas, 2008:397). A Likert scale is used in research for people to express attitudes or other responses in terms of ordinal level categories that are ranked along a continuum (De Vos, *et al.*, 2012:213; Brink, 2012:159). A Likert scale furthermore is a measurement scale that requires the participant to give an opinion on a series of statements (-& Goodman, 2009:390).

A self-administered, structured questionnaire was designed and used for data collection in this study. Responses derived from five point Likert scale used for questions 7 to 44 of Section C (strongly agree, agree, undecided, disagree and strongly disagree). Strongly agree = 4, Agree = 3, Undecided = 2, Disagree = 1, Strongly disagree = 0.

The respondents place a tick (√ or x) in response to a series of statements selected to assess their technology readiness.

The instrument had three major sections: Section A required demographic data and included questions about the participants' gender, age, race, highest nursing education qualification, number of years in the nursing profession and number of years as a nurse educator/clinical training specialist. Section B consisted of enquiries regarding the use of simulators and included questions about programmes taught, types of simulators available, educational level of students, role as instructor, situations using a simulator, their goal, benefits of, challenges, concerns and expectations related to the use of simulators. Respondents also had to indicate what steps colleges should take to improve patient safety. The names of simulators used and areas of the curriculum where simulators were used were requested. Section C consisted of the perceptions of nurse educators and clinical training specialists

regarding the use of high-fidelity simulation in nursing education. Questions 1 to 6 of this section focused on the participant's level of expertise in high-fidelity simulation; type and duration of training exposed to high-fidelity simulation; how often worked with simulation; whether the participant's position was identified for simulation; and the percentage of workload identified for this. It included the Technology Readiness Index (Likert scale, questions 7 to 44) for which permission to use was obtained from A. Parasuraman and Rockbridge and Associates in June 2015. To ensure the validity of the questionnaire, it was submitted to the statistician who would be responsible for data analysis, who made suggestions regarding the relevance of the questions (McCaughey & Traynor, 2010:828).

3.8.2 Data collection process

A self-administered, structured questionnaire with closed- and open-ended questions was used for data collection. The respondents had to place a tick (√ or x) in the Likert scale in response to a series of statements selected to assess their technology readiness.

Permission was obtained from the managers of the sub-campuses and health facilities before sending the questionnaires to the participants. The willing respondents were given time to fill out the questionnaire at their own convenience.

The researcher met all the Learning Centre Managers and Nurse Educators at a workshop for Campus staff members. She informed them about the reason for this research and its value to the nursing profession. The elements of confidentiality, anonymity and the need for honest answers were explained. The Learning Centre Managers were requested to also explain this to all the Clinical Training Specialists in their regions. The questionnaires were e-mailed to the nurse educators at the sub-campuses and clinical training specialists from affiliated hospitals. Each respondent received information about the research, a consent form and a questionnaire.

3.9 ETHICAL CONSIDERATIONS

Ethical considerations were taken into account through the principles of informed consent, anonymity, autonomy, confidentiality, right to self-determination, beneficence and justice:

3.9.1 Informed consent

Informed consent has three major elements, namely the type of information needed by the research participant; the degree of understanding that the participant must have in order to give consent; and the fact that the participant has a choice whether to give consent or not (Brink *et al.*, 2012:38). The researcher obtained informed consent from the respondents before the questionnaire had to be completed. The informed consent sheet contained a full explanation of the reason for the, the nature of participant involvement and the time commitment and was sent out together with the questionnaire to be signed prior to filling out the questionnaire. The respondents were not forced to sign the consent form.

3.9.2 Anonymity

Anonymity refers to a situation when other people do not know who you are or what your name is (Harmer, 2012:59). Names were not to be used in the questionnaire for this study. Should there be any threat to the anonymity, all records are to be destroyed.

3.9.3 Autonomy

Autonomy refers to the ability or opportunity to take a decision without being controlled by anyone else (Harmer, 2012:98). In this study the participants were allowed to answer the questions as they saw fit and they had the right to withdraw at any time, even without providing a reason.

3.9.4 Confidentiality

Confidentiality is a situation in which you trust someone not to share secret or private information with anyone else (Harmer, 2012:351). In this study, all information was kept by the researcher in a locked safe.

3.9.5 Right to self-determination

The right to self-determination refers to a person's ability to decide whether or not to participate in a study (Polit & Beck, 2006:510). The respondents had the option between deciding to be part of the study or to decline. The respondents were not forced to sign the consent form and were given the option to withdraw at any time during the process of the study.

3.9.6 Beneficence

Beneficence is an action resulting in something good (Harmer, 2012:142). This study aimed to determine whether nurse educators in a South African Private Nursing College perceived themselves as ready for the use of high-fidelity simulation in nursing education.

 If participation in this study became too stressful for the nurse educators and clinical training specialists in any way, whether emotionally, spiritually, physically, psychologically, socially or legally, they were able to withdraw at any stage. In this study the participants did not report coming to any harm or being subjected to any harmful effects.

3.9.7 Justice

Justice deals with the fairness of the way in which people are treated (Harmer, 2012:952). In this study there was no discrimination in the selection and interaction process. All the nurse educators and clinical training specialists had an equal opportunity to participate in the study if they wanted to. Participants were not coerced in any way, or at any time. If any participant had refused to continue at any stage of the research process, this would have been entertained. The participants

would be informed of how they could get hold of the results of the study and of the researcher. Records will be kept safely by the researcher. Results will not be handed to a third party without prior participant approval.

Prior to conducting the research, the researcher obtained written permission from the University of Fort Hare Research Committee, the Life Healthcare Research Committee and the seven Learning Centre Managers of the Private Nursing College, as well as from each participant in the study.

3.10 DATA ANALYSIS

Data analysis involves the systematic organisation and synthesis of research data and, in most quantitative studies, the testing of research hypotheses using those data (Burns & Grove, 2009:498). Quantitative analysis concerns the manipulation of numerical data through statistical procedures for the purpose of describing phenomena or assessing the magnitude and reliability of relationships among them (Burns & Grove, 2009:508).

The data analysis was carried out using version 9.4 of the Statistical Analysis Systems (SAS) software. Since the study was of a descriptive nature, the statistical analysis was predominantly descriptive as well. A graphical exploratory analysis was carried out using pie charts, box plots and line plots. This was followed up with tests for the significance of differences in technology readiness and its components across different characteristics of the nurse educators. The educator-specific characteristics considered were age, race, qualification, experience, level of expertise, type of training, high-fidelity simulation use experience and time committed to high-fidelity simulation on a weekly basis and overall high-fidelity simulation percentage workload. Spearman's correlation analysis was used to test for the significance of relationships between technology readiness and age, experience and percentage HFS workload. The Mann-Whitney test or the Kruskal-Wallis test was used for comparing the technology readiness index across two or more than two samples, respectively. All tests for statistical significance were carried out at a 5% level of

significance and all the statistical analysis was done using version 9.4 of the Statistical Analysis Systems (SAS) software.

3.11   CONCLUSION

In this chapter, the researcher has presented the methods used to conduct this study. The focus was on the research design, the study population, sampling methods, instruments for data collection, data collection, data analysis, the pilot study and ethical considerations.

In the next chapter, the researcher provides details of the analysis and interpretation of research data.

CHAPTER 4: PRESENTATION OF RESULTS

4.1   INTRODUCTION

The previous chapter provided a description of the methods used to conduct this study. The focus was the research design, the study population, sampling methods, instruments, data collection, data analysis, the pilot study and ethical considerations. In this chapter, the focus is on the details of the analysis and interpretation of the research data.

A total of 80 completed questionnaires N = 80 were returned, constituting a 68% response rate.

4.2   PRESENTATION OF FINDINGS

The received questionnaires were checked for completeness and errors. All but one had been completed without error. The results in this chapter are based on the participants' responses. The results generated in this study are presented in a narrative as well as in figures and graphs to allow for clear and concise presentation (Cormack, 2001:27). Background information is discussed first, followed by Section B – Use of Simulators, and Section C – Perceptions of Nurse Educators/Clinical Training Specialist regarding the use of high-fidelity simulation.

SECTION A: BACKGROUND INFORMATION

This section provides a general overview of the gender, age, race, highest nursing education qualification, length of period in the nursing profession as well as being a nurse educator/clinical training specialist.

A sample of 80 nurse educators, of which 76 (95%) were female and 52 (65%) were white, was used for the study. Their mean age was 46.9 years, ranging between 30

years and 67 years. This sample was made up of 21 (26.3%) nurse educators with a diploma in nursing education, 32 (40%) with a bachelor's degree, 11 (13.8%) with an honours qualification and the rest had a master's degree or a higher qualification. The nursing experience of the nurse educators ranged between 6 years and 59 years with a mean of 25.9 years. Age was found to be significantly positively correlated with nursing experience ($r = 0.93$; $p < 0.0001$) and nurse education experience ($r = 0.62$; $p < 0.0001$). This means that older nurse educators also have more nursing and nursing education experience.   This indicates a very experienced group of nurse educators and clinical training specialists. It supports literature that present nurse educators as an aging population (Baghoomian, 2014:48) and (Rothgeb, 2008:492).

SECTION B: USE OF SIMULATORS

This section provides an overview of the use of simulators - Responses to Questions 1 to 14 on the use of simulators (n = 80).   Information obtained in section B highlighted the use of simulators by the nurse educators and clinical training specialists in the private nursing college. It does not have a significant influence on the research itself and is information that could be utilised by the private nursing college and will therefore not be discussed further. The nurse educators and clinical training specialists use low-, medium- and high-fidelity simulators in both basic and post basic programmes.

SECTION C: PERCEPTIONS OF NURSE EDUCATORS/CLINICAL TRAINING SPECIALISTS REGARDING THE USE OF HIGH-FIDELITY SIMULATION

The perceptions of Nurse Educators regarding the use of high-fidelity simulation in the training of nurses in South Africa were captured by assessing the technology readiness of Nurse Educators based on a Technology Readiness Index (TRI) made up of four components, namely optimism, innovativeness, discomfort and insecurity. Section C addresses this aspect of the study. This report presents the findings of

research carried out at one Private Nursing College that has seven campuses throughout South Africa.

HIGH-FIDELITY SIMULATION (HFS) EXPOSURE

High Fidelity Simulation (HFS) exposure among the nurse educators through five measures, namely, level of expertise; type of training received; experience in the use of simulation; weekly time commitment; and simulation-related workload. The distribution of the responses to these measures is presented in the pie charts below.
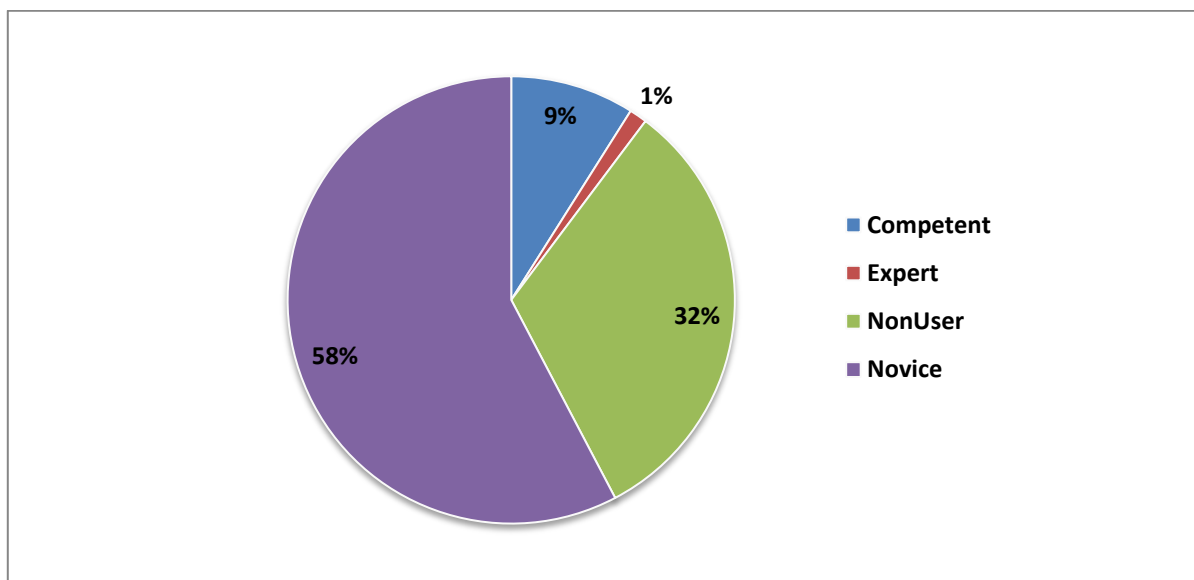
Figure 4.1: Distribution of respondents by level of HFS expertise (n = 80)

Figure 4.1 shows that 45 (58%) of the nurse educators are at the novice level of expertise while 25 (32%) do not use HFS at all in their nurse training duties and only 8 (10%) are either at the competent or expert levels. The encouraging part is that the majority of the nurse educators (68%) have had some exposure to HFS. This is supported by other studies that indicate that 70% of respondents were reported to be novices or advanced beginners (Duvall, 2012:25). Since there are very few respondents in the competence and expert levels, this variable was redefined to represent HFS use in the onward analysis. In that case users become those with

some form of exposure to HFS (novice, competent and expert) and the rest are non-users. Dreyfus and Dreyfus (1980) also identified these levels of competency while Benner (1984) applied it to nursing practice (Waxman & Telles, 2009:232).
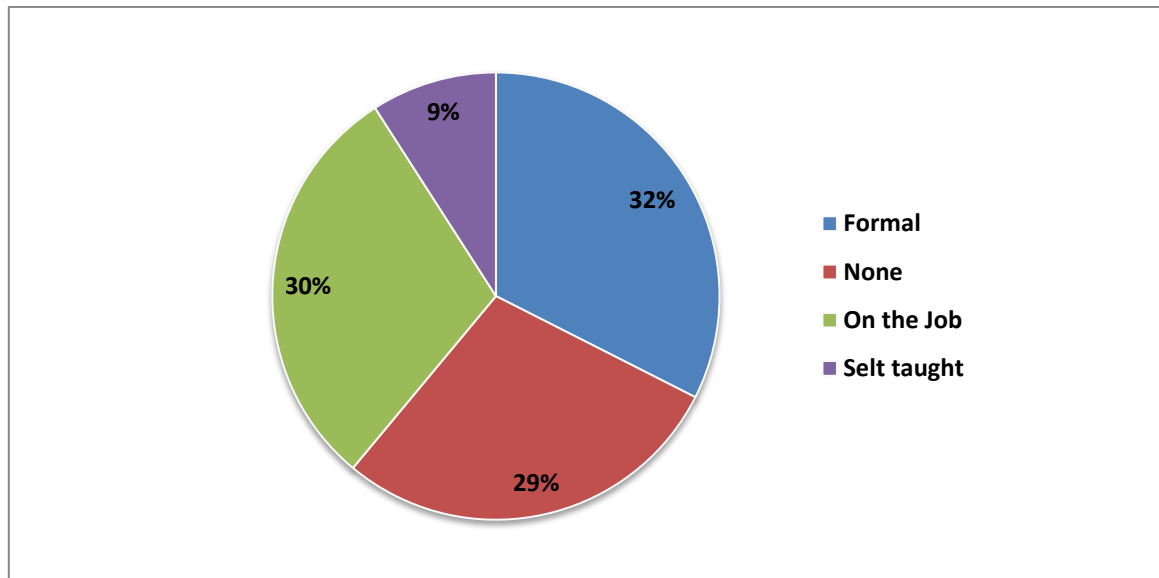
Figure 4.2: Distribution of respondents by HFS training (n = 80)

Figure 4.2 shows that 32% of those who use HFS in their nurse education programmes have had formal HFS training while 30% received on-the-job training. About one third (29%) of the respondents had received no training at all. Note that this percentage is very close to 32%, the proportion of non-users of HFS. Those who and taught themselves made up 9%. This means that, while most of the respondents might have had exposure to HFS, some of them do not use it in their day-to-day activities as nurse educators. In her study, Duvall also reported a need for further training (Duvall, 2012:25).
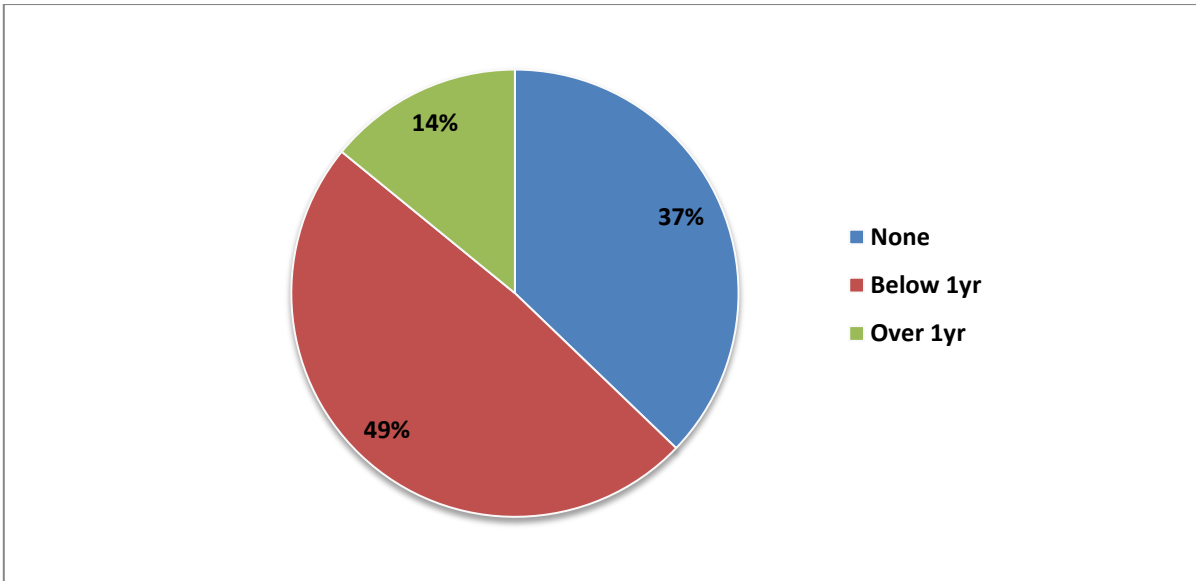
Figure 4.3: Distribution of respondents by HFS experience (n = 80)

In looking at the distribution of respondents by HFS experience and the distribution by weekly HFS use, it is clear that the 29 (37%) who do not have HFS experience are the same 37% who do not have weekly HFS exposure. Note that 28 (37%) of the respondents have no experience of high-fidelity simulation, suggesting that some of those who have received some form of training in HFS use have not yet started using it in the training of nurses. That the percentages are equal is a consequence of rounding off.

The majority of the 49 (63%) who have HFS experience have less than one year's experience (38 or 49%) and only 11 (14%) have more than one year of experience. In a study done overseas, 25% or fewer of the faculty used HFS (Duvall, 2012:17). Another study done indicated a much higher usage, 68% (King *et al.*, 2008:5).
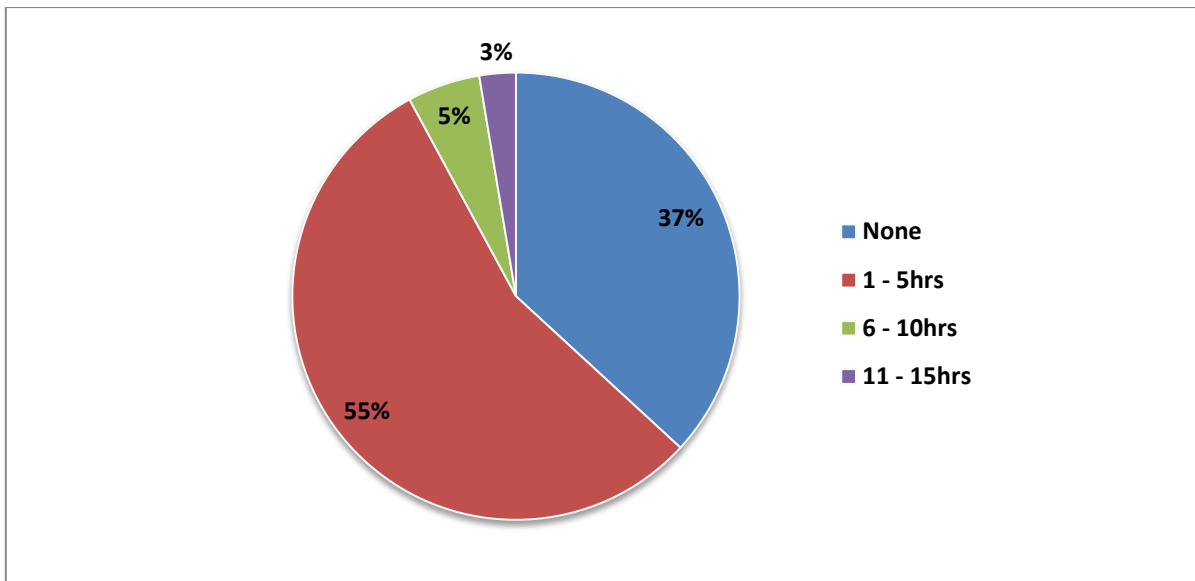
Figure 4.4: Distribution of respondents by weekly HFS use (n = 80)

Figure 4.4 shows that the majority (42 or 55%) of the respondents use high-fidelity simulation for five hours at most in a given week while four (5%) use it for between six and ten hours per week. Another researcher found that faculty age, educational level or teaching institution were not associated with the frequency of use or knowledge of simulation technology (Duvall, 2012:25). According to King *et al.* (2008), those who used the HFS, frequencies ranged between 1 and 11 times during an academic year (King *et al.*, 2008:5).
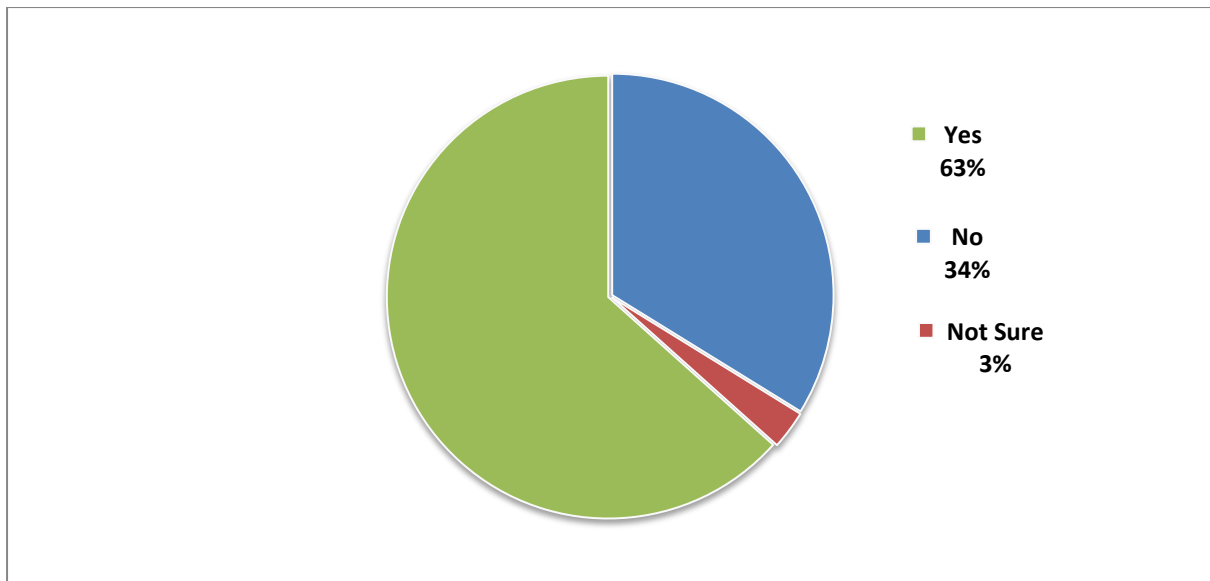
Figure 4.5: Distribution of respondents by identification of position for HFS use (n = 80)

Figure 4.5 above shows that the positions of 45 (63%) of the respondents are identified for simulation, while it is not so for the remaining 26 (37%). This indicates that the majority of the respondents' positions have been identified for use of simulation. There is no current literature to validate this, however.

PERCEPTIONS REGARDING HFS

This section was to establish the perceptions of nurse educators regarding the use of high-fidelity simulation and this was done by assessing technology readiness of nurse educators based on a technology readiness index (TRI). This index is made up of four constructs, namely optimism, innovativeness, discomfort and insecurity. Optimism is defined as "a positive view of technology and a belief that it offers people increased control, flexibility and efficiency in their lives". Innovativeness is defined as a "tendency to be a technology pioneer and thought leader". Discomfort is "a perceived lack of control over technology and a feeling of being overwhelmed by it". Insecurity is "distrust of technology and scepticism about its ability to work properly" (Parasuraman, 2000:311).

Table 4.1: Tests for normality of technology readiness and its components (n = 80)

VARIABLE	Shapiro-Wilk's statistic	p-value
Optimism	0.983	0.346
Innovation	0.969	0.049
Discomfort	0.981	0.273
Insecurity	0.984	0.407
Technology readiness index	0.967	0.034

The technology readiness index and its components were tested for normality using the Shapiro-Wilk's W test and the results are shown in the table above. The results show that optimism, discomfort and insecurity are normally distributed while the innovation and technology readiness indices are not normally distributed. Based on the results of the above test, parametric statistical tests were used for all tests involving the components optimism, discomfort and insecurity, while nonparametric tests were used for innovation and technology readiness. Parasuraman found that, although people are generally optimistic regarding technology, there is also a great deal of insecurity about the role of technology (Duvall, 2012:24).

All tests for normality were carried out at a 5% significance level. In the test for normality, the null hypothesis is that the variable is normal. This hypothesis is rejected when the p-value of the test is less than the significance level of 5%, that is, if p-value is less than 0.05. In this case, the p-values for optimism, discomfort and insecurity are NOT less than 0.05. Therefore, the hypotheses that say optimism, discomfort and insecurity are normally distributed cannot be rejected. This means these variables are normally distributed. For the technology readiness index, the p-value is 0.034 (3.4%), which is less than 0.05 (5%). In this case the hypothesis that says the technology readiness index is NOT normally distributed is rejected. Based on that, one can then choose the most appropriate statistical test. For normally distributed variables, parametric statistical methods are used. If not normally distributed, the nonparametric methods are used.

DESCRIPTIVE ANALYSIS OF TECHNOLOGY READINESS AND ITS COMPONENTS

Table 4.2: Summary statistics for technology readiness index and its Components (n = 80)

COMPONENT	Median	Mean	Stdev	Stderr
Optimism	3.9	3.9	0.439	0.049
Innovation	3.4	3.4	0.677	0.076
Discomfort	3.0	3.0	0.571	0.064
Insecurity	2.7	2.7	0.439	0.049
Technology readiness index	3.1	3.2	0.305	0.034

The summary statistics presented in Table 4.2 show that the respondents scored highest on the optimism component with a mean score of 3.9 and lowest on the insecurity component with a mean of 2.7. The two positive components, optimism and innovation, had mean scores greater than 3.0, the neutral score of the Likert scale. Discomfort and insecurity are the negative components of technology readiness and the respondents scored 3.0 and 2.7 on these components, respectively. As mentioned earlier, it was found that there is insecurity about the role of technology and even technology optimists and innovators experience technology-driven anxieties (Duvall, 2012:24).   According to a study done by King *et al.* (2008) a small percentage OF 18% believed the HPS was easy to use while 82% did not.

4.3   COMPARISON OF MEANS OF TECHNOLOGY READINESS AND ITS COMPONENTS

On realising that the respondents scored higher on the positive components than on the negative ones, a follow-up test for the significance of these differences was carried out. Analysis of variance was used to test whether the scores differed across the four components. The results showed that the scores differed significantly depending on the component of technology readiness being measured (F = 70.2; p < 0.0001). A Tukey's multiple comparison procedure was used in order to determine

which components had significantly different mean scores. It is one of the methods used for identifying groups that differ.

4.4 TECHNOLOGY READINESS AND NURSE EDUCATOR'S BIOGRAPHICAL CHARACTERISTICS

After finding that nurse educators are acceptably ready to adopt technology in the training of nurses, it became relevant to determine whether this technology readiness depended on their biographical characteristics. The biographical characteristics considered were age, race, qualification, experience, level of expertise, type of training, HFS use experience, time committed to HFS on a weekly basis and overall HFS percentage workload.

Boxplots were used as an exploratory graphical analysis tool and were followed up with tests for statistical significance. The results for each of the categorically measured biographical characteristics are presented below, followed by the quantitatively measured characteristics like age and experience.

As indicated above, Parasuraman found that, although people are normally optimistic about technology, there is also a great deal of insecurity about the role of technology and even technology optimists and innovators experience technology-driven anxieties (Parasuraman, 2000). A large number of faculty members agreed that they would use the HPS more if they were trained (King *et al.*, 2008:6).
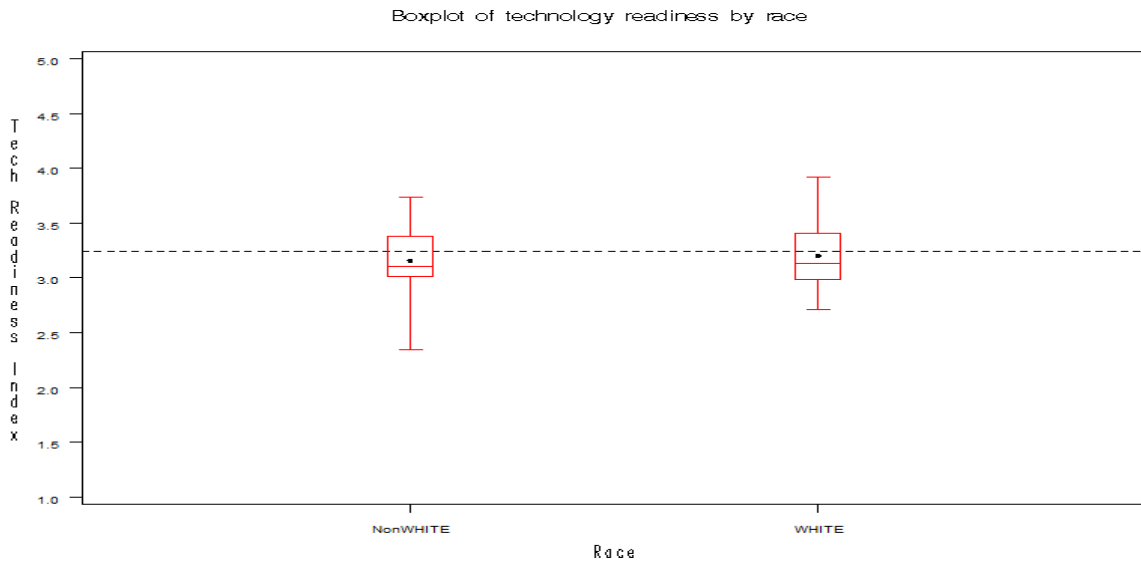
Figure 4.6: Race and technology readiness (n = 80)

Figure 4.6 shows that the technology readiness index does not seem to differ depending on race. The Mann-Whitney normal approximation was used to test for the race effect and it turned out not to be statistically significant (Z = 0.36; p = 0.716). No study to compare race and high-fidelity simulation has been done.
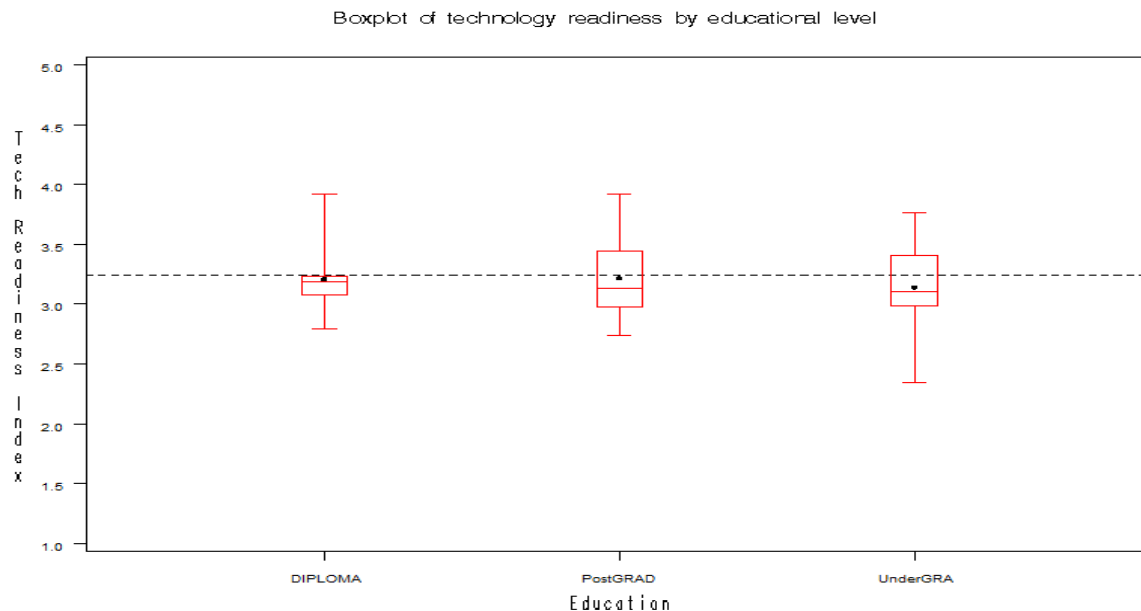
Figure 4.7: Educational qualification and technology readiness (n = 80)

According to Figure 4.7, the nurse educators with an undergraduate qualification reveal a slightly lower technology readiness index than holders of a diploma and postgraduate qualification. This difference is so small, however, and probably not

statistically significant. To test for the significance of the difference the Kruskal-Wallis chi-squared test was used. The results showed that the difference is actually not statistically significant (χ^2 = 1.03; df = 2; p = 0.598). The literature indicates that researchers found faculty educational level was not associated with knowledge of simulation technology (Duvall, 2012:25).
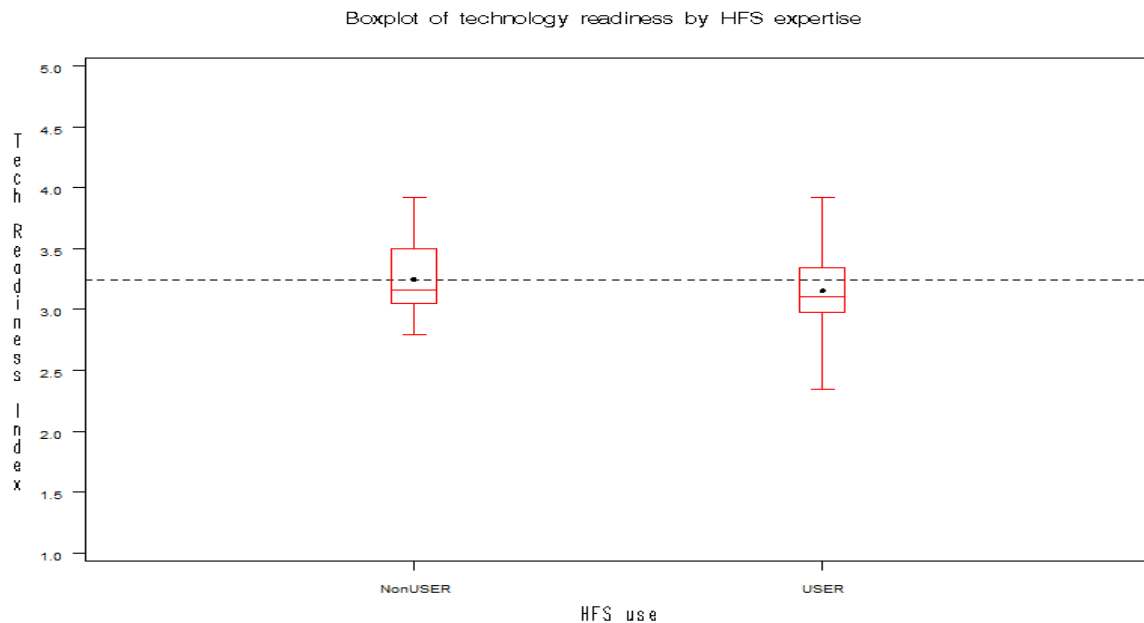
Figure 4.8: HFS expertise and technology readiness (n = 80)

According to Figure 4.8, users and non-users of high-fidelity simulation have the same mean technology readiness index. This is clear from both the graphical representation above and the Mann-Whitney test (Z = 1.30; p = 0.192). This is in contrast to a study conducted by Alinier, Hunt and Gordon (2004:206), which indicated that the facilitator's training skills are of great significance for what can be learnt during and after simulation.
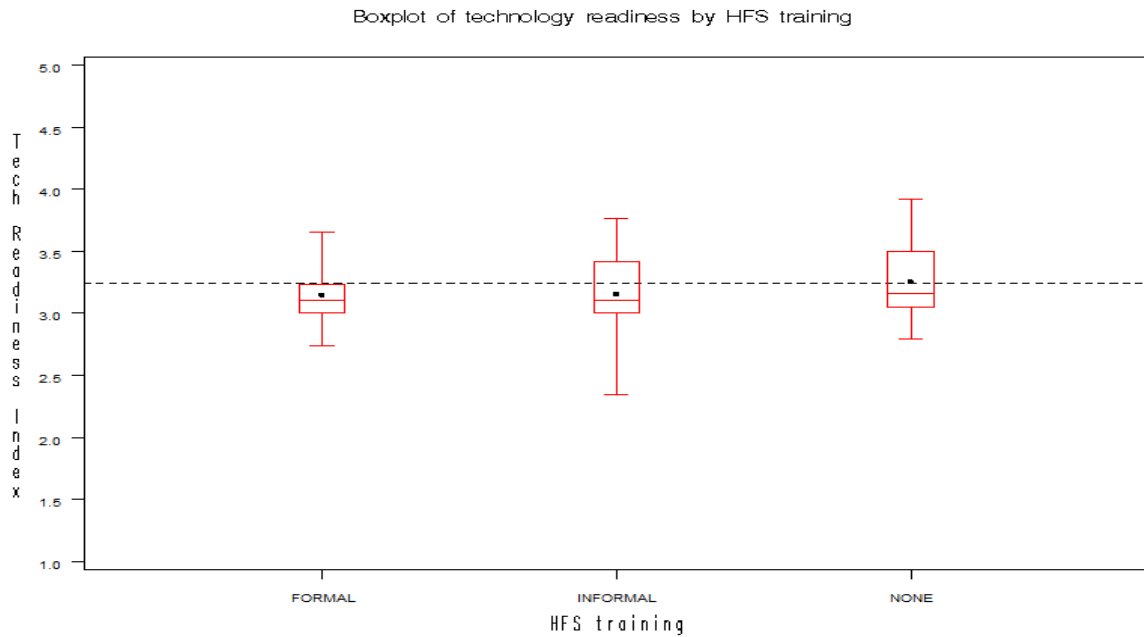
Figure 4.9: HFS training and technology readiness (n = 80)

Figure 4.9 shows that the training status of a nurse educator does not seem to have any influence on the nurse educator's technology readiness index (χ^2 = 1.02; df = 2; p = 0.598).   According to Punch (2013:1), nurse educators need to have special training for this avenue of training.

Boxplot of technology readiness by HFS experience
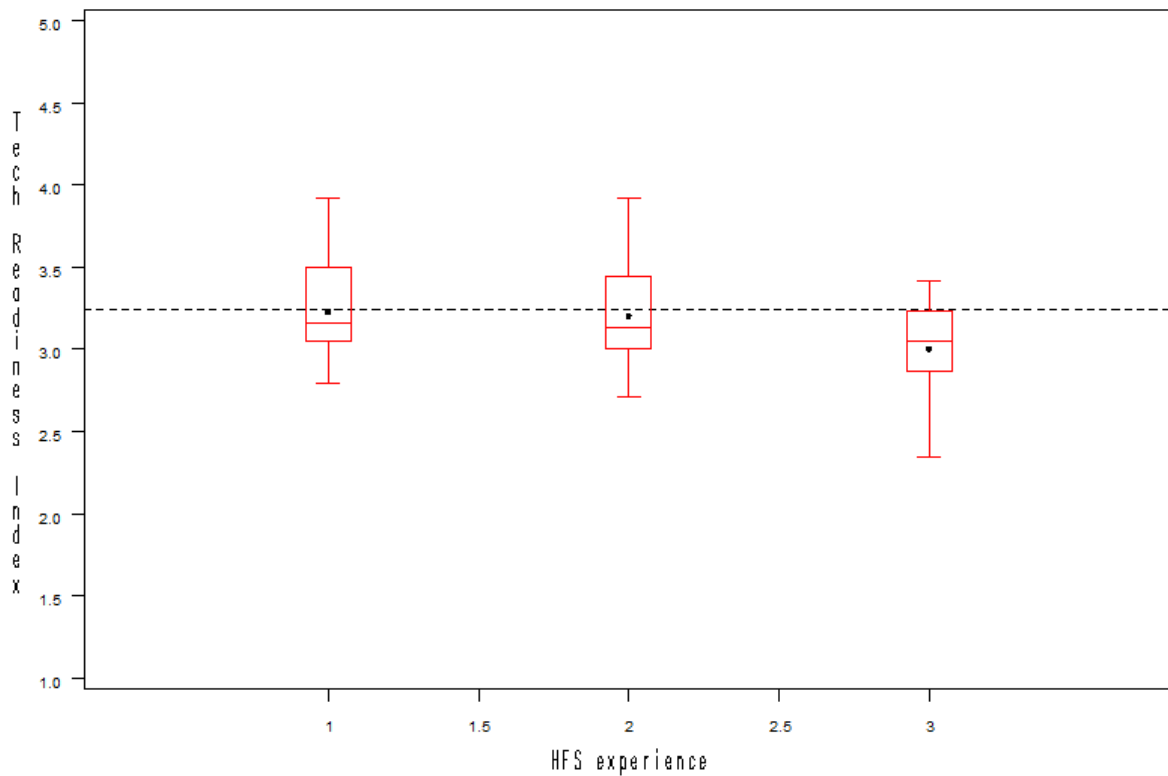
Figure 4.10: HFS experience and technology readiness (n = 80)

Figure 4.10 seems to suggest that those with no experience in HFS use or who have less than a year's experience reveal a higher technology readiness index than those with more than a year of experience. However, on carrying out a Kruskal-Wallis test for significance, it was found that HFS use experience does not affect the readiness index (χ^2 = 3.43; df = 2; p = 0.180). Researchers found that nurse educators, in general, indicated that they were not comfortable in utilising HFS as a teaching strategy (Duvall, 2012:19).
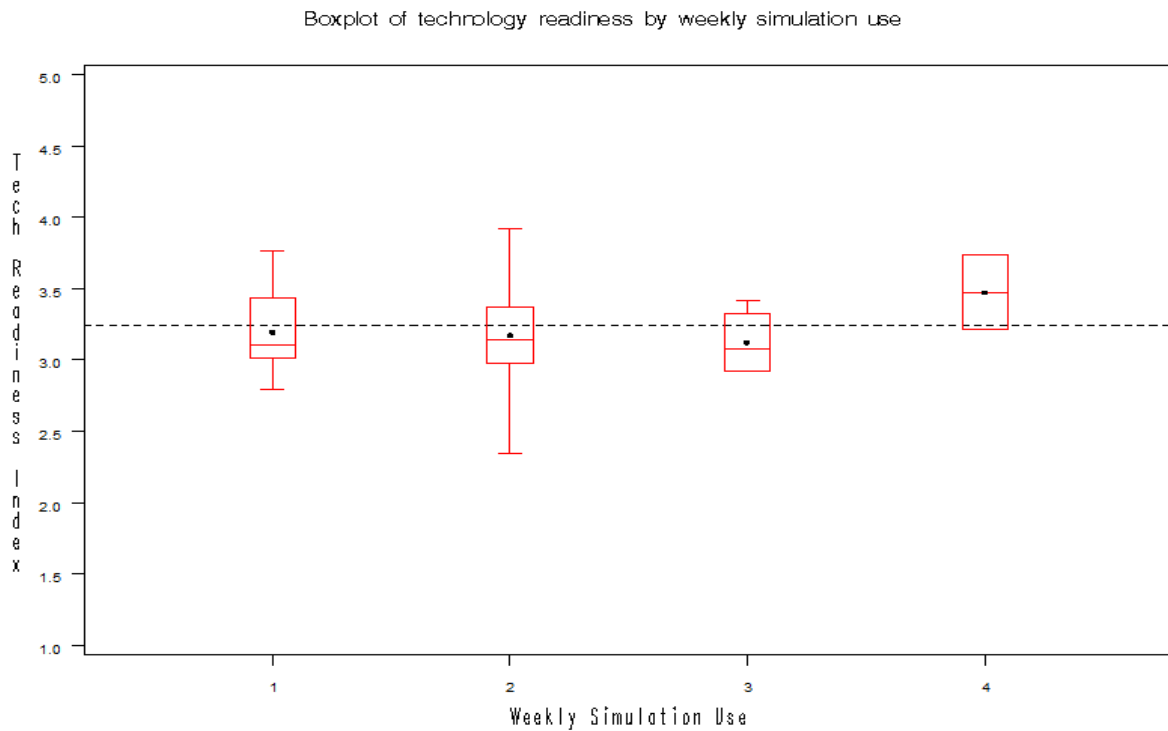
Figure 4.11: Technology readiness by weekly simulation use (n = 80)

Figure 4.11 above seems to suggest that those with more than 10 hours of high-fidelity simulation in a week have significantly a higher technology readiness index than the rest of the participants. On using the Kruskal-Wallis test for significance it turned out that the suggested difference is not statistically significant (χ^2 = 2.17; df = 3; p = 0.537). King, Moseley, Hindenlang and Kuritz (2008:14) found that high-fidelity simulation users would gain more confidence with increased use of the simulators.

4.5 TECHNOLOGY READINESS COMPONENTS BY BIOGRAPHICAL VARIABLES

The analysis for the technology readiness components was carried out using line plots and some tests for statistical significance. The results are presented below, starting with a graph for each component that is followed by an interpretation and tests for statistical significance.

- **Racial group**

Since there were 52 (65%) whites in the sample with the remaining 28 (35%) being Black, Asian or Other, the variable was redefined to have two racial groups, namely whites and other (non-white). The following analysis is based on the new binary race variable.
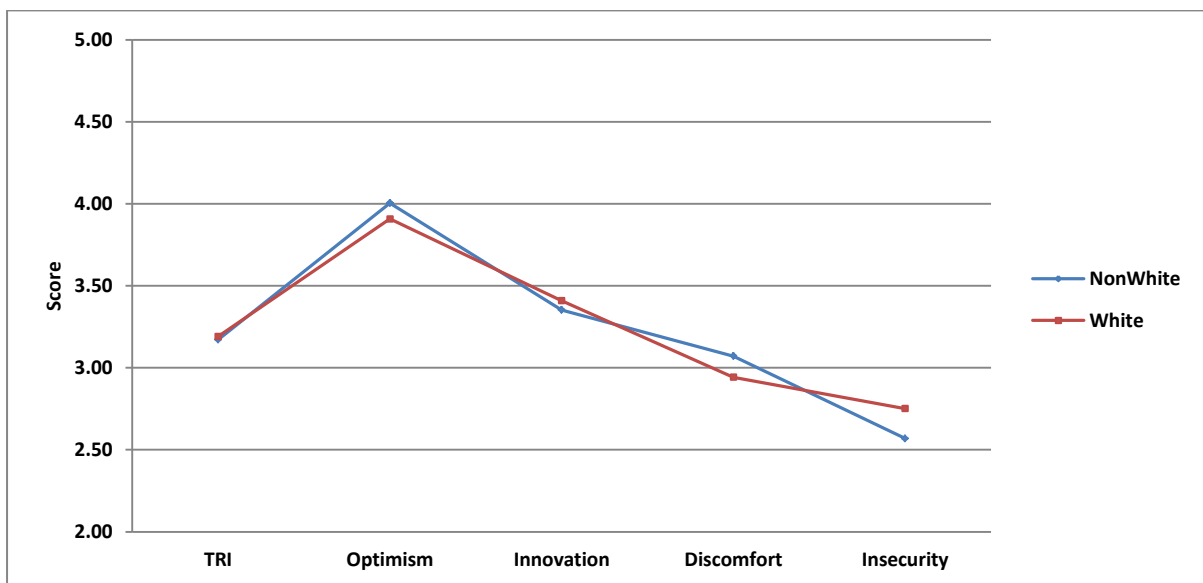
Figure 4.12: Technology readiness component means by race (n = 80)

Figure 4.12 above shows that the two race groups were not very different from each other in terms of the different components of technology readiness. The only visible difference is between the scores of the components. The t-tests of two independent samples were used for comparing the two race groups in terms of optimism, discomfort and insecurity, while the Mann-Whitney normal approximation was used for innovation. The results showed that race does not have any significant effect on

optimism (t = 0.93; p = 0.360), discomfort (t = 0.96; p = 0.338), insecurity (t = -1.8; p = 0.070) and innovation (Z = -2.4; p = 0.812).   This means that whites and non-whites are equally optimistic, innovative, uncomfortable and insecure, that is, the score on the different components cannot be attributed to race. There is no evidence to support technology readiness when comparing racial factors.

- **Educational level**

The sample contained many holders of diploma and undergraduate degree qualifications and a few postgraduate qualification holders. As such, for onward analysis, Master's and PhD holders were combined to form one group called postgraduate. It is this new education variable that is used in the analysis below.
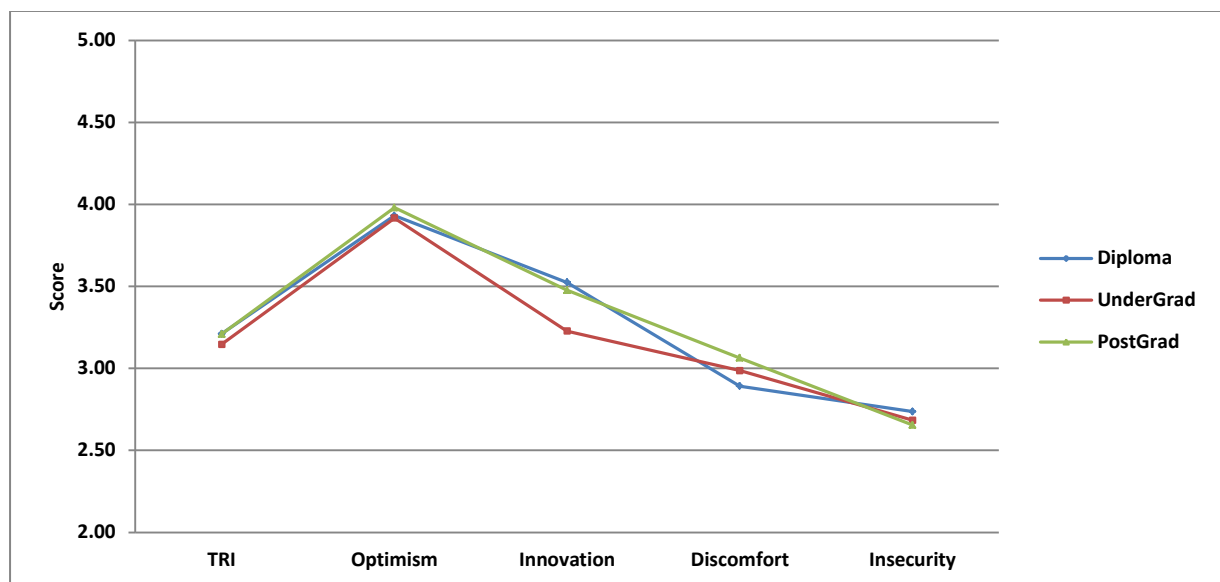
Figure 4.13: Technology readiness component means by educational level (n = 80)

According to Figure 4.13, the scores of the participants on the technology readiness components do not seem to differ with regard to the educational level of the participant, except for innovativeness. The graph suggests that nurse educators with an undergraduate education have lower innovativeness than those with a diploma or postgraduate education. On carrying out the one-way analysis of variance (ANOVA) based on the Kruskal-Wallis test, it turned out that the educational levels are not

significantly different in terms of innovativeness (χ^2 = 2.5; df = 2; p = 0.285). The results from the classical one-way ANOVA of each component on educational level showed that optimism (F = 0.15; p = 0.858), discomfort (F = 0.53; p = 0.589) and insecurity (F = 0.21; p = 0.815) do not depend on educational level. According to Saaranen *et al.* (2013:9), people are expected to understand pedagogy and its principles to be able to present HFS successfully; these components are covered in the basic nursing courses. Hence it supports the findings in this study.

- **High-fidelity Simulation expertise**

High-fidelity simulation expertise was defined over four levels on the data collection instrument. However, it turned out that there was a substantial number of nurse educators with no expertise in HFS, another substantial number being in the novice category and few in the competent and expert levels. For the purposes of the analysis, this variable was redefined to reflect use of HFS with those with some level of expertise being defined as users and the rest as non-users. In another similar study, 17.9% of the respondents did not use HFS, 36.3% regarded themselves as being novices, while 25.8% saw themselves as competent. Only 15.9% were experts (Duvall, 2012:37).
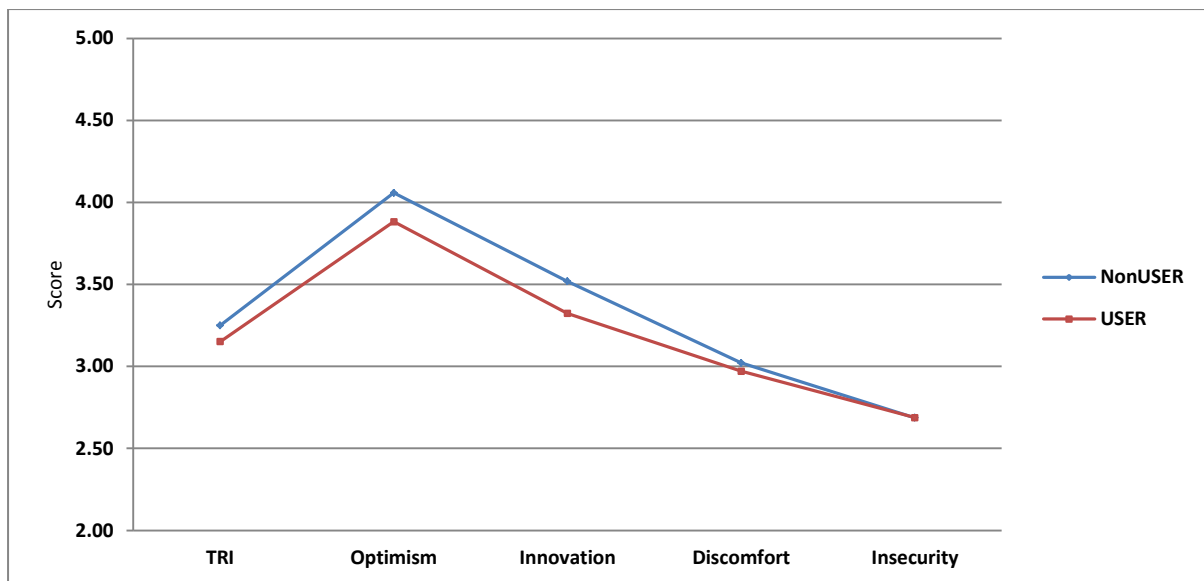
Figure 4.14: Technology readiness component means by HFS use (n = 80)

Figure 4.14 shows that discomfort and insecurity are the same, regardless of whether one uses HFS or not. However, some slight differences are visible for innovation and optimism. To determine whether these visible slight differences were statistically significant, the t-test and Mann-Whitney test were used for the normally distributed components and the non-normal ones, respectively. The results showed that optimism (t = 1.7; p = 0.093), discomfort (t = 0.4; p = 0.709), insecurity (t = -0.02; p = 0.988) and innovativeness (Z = 0.7; p = 0.487) were not significantly affected by whether one uses HFS or not. King *et al.*, (2008:14) found that high-fidelity simulation users would gain more confidence with increased use of the simulators.

- **High-fidelity Simulation training**

High-fidelity simulation training was classified into four categories in the data collection instrument. On running the frequency analysis, it turned out that only seven (9.1%) of the participants had trained themselves. Since these were very few, they were combined with the on-the-job trained and the new category was called the informal training category. The new HFS training variable considered in the onward analysis is the one with three categories, as described above. The literature shows that most of the training of faculty was done by simulations vendors who are salespeople and not experts in education (Duvall, 2012:29).
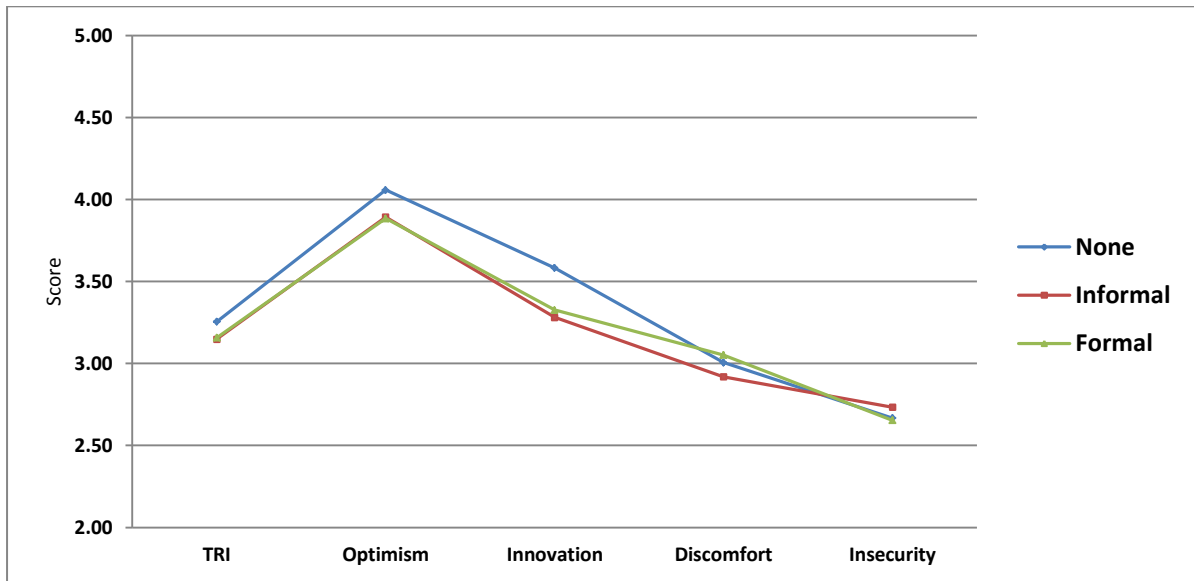
Figure 4.15: Technology readiness component means by HFS training (n = 80)

Figure 4.15 above shows that those with some form of training in HFS (formal or informal) are the same in terms of optimism, innovation and insecurity. They all have lower scores than those with no HFS training at all. However, on carrying out a test for statistical significance it turned out that type of HFS training does not have a significant effect on optimism (F = 1.28; p = 0.284), discomfort (F = 0.38; p = 0.686) and insecurity (F = 0.26; p = 0.770). The Kruskal-Wallis test also found that innovativeness also does not depend on HFS training (χ^2 = 1.13; df = 2; p = 0.568). In a study conducted by Duvall in 2012, 18.5% of participants had received no training, 11.2% were self-taught, 39.4% had been trained on the job and only 26.7% had received formal training (Duvall, 2012:37).

- **HFS use experience**

  Although HFS experience was measured on five categories, none of the participants had more than five years' HFS use experience. As such, only the first three categories of the variable were used in the following analysis.
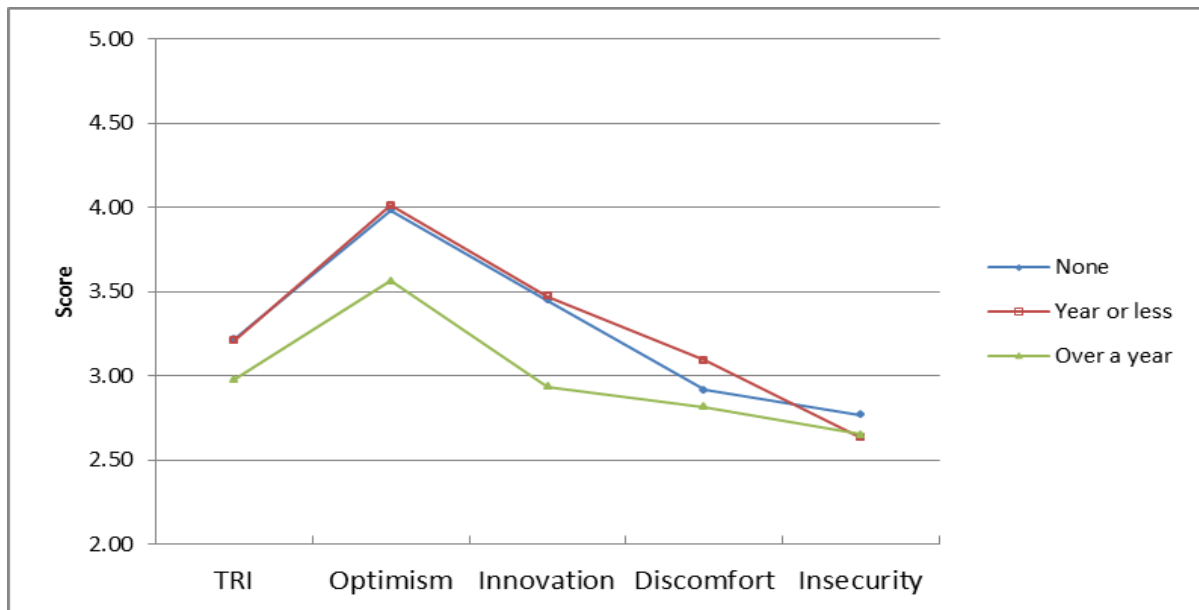
Figure 4.16: Technology readiness component means by HFS experience (n = 80)

Figure 4.16 show that those with a year or less and those with no experience have the same scores on optimism and innovativeness, with some slight differences in discomfort and insecurity. The above graph seems to suggest that those with more than a year's experience had lower values on all components. Tests for statistical significance revealed that optimism depends on HFS experience (F = 5.2; p = 0.008) and that discomfort (F = 1.4; p = 0.254), insecurity (F = 0.9; p = 0.429) and innovativeness (χ^2 = 5.93; df = 2; p = 0.052) do not depend on HFS experience. It has been reported by Onello and Regan (2013) that an effect of high-fidelity simulation is increased self-confidence and developing clinical competence. King *et al.* (2008:13) had earlier come to a different conclusion, since their study revealed that the respondents with little or no experience experienced high levels of discomfort and insecurity coupled with low levels of optimism.

- **Weekly HFS workload**

Figure 4.17 below shows that those with a higher workload have higher optimism, innovativeness and discomfort and lower insecurity than those with less or no weekly HFS workload.

Figure 4.17 Technology readiness component means by HFS weekly load (n = 80)

- **Correlation analysis**

The results of the correlation analysis showed that technology readiness had no significant correlation with age (r = -0.17; p = 0.123), nursing experience (r = -0.17; p = 0.129) and HFS percentage workload (r = -0.15; p = 0.205). Though rather weak, a significant negative correlation was detected for technology readiness and nurse education experience (r = -0.28; p = 0.012). It was also found that technology readiness is significantly correlated with all its four components, namely optimism (r = 0.66; p < 0.001), innovativeness (r = 0.74; p < 0.001), discomfort (r = 0.60; p < 0.001) and insecurity (r = 0.57; p < 0.001).

The optimism component was found to have no significant correlation with age (r = -0.12; p = 0.286), nursing experience (r = -0.13; p = 0.242), nursing experience (r = -0.14; p = 0.195) and HFS percentage workload (r = 0.13; p = 0.281). The innovativeness component was found to be negatively significantly correlated with nurse education experience (r = -0.26; p = 0.022). Discomfort was found to have a significant positive correlation with insecurity (r = 0.26; p = 0.016). Wilson and Klein (2012:57) cited increased workload in the form of debriefing as a disadvantage of simulation.

4.6   CONCLUSION

In this chapter the researcher has provided details of the analysis and interpretation of the research findings. The data analysis was carried out using version 9.4 of the Statistical Analysis Systems (SAS) software.   The results were presented in pie charts, box plots and line plots.

HIGH-FIDELITY SIMULATION (HFS) EXPOSURE

HFS exposure was measured through level of expertise, type of training received, experience in simulation use, weekly time commitment and simulation related workload.   Although the majority of nurse educators had some exposure to HFS nearly half did not use HFS at all in their nurse training duties.   The nurse educators in this study function mostly at the novice level of expertise.   Duvall has also indicated that 70% of educators were either novices or advanced beginners (Duvall, 2012:25).

According to this study, one third of respondents had formal training while very few of them taught themselves.   Another third of the respondents received no training at all. The nurse educators mostly had less than one year's experience and a very small percentage had more than one year's experience.   Studies conducted overseas have shown that 25% or less of the faculty use HFS (Duvall, 2012:17). Most of the respondents indicated use HFS for five hours in a given week.   From a study by Duvall it is clear that variables like age, educational level and teaching institution were not associated with the frequency of use of simulation technology (Duvall, 2012:25).   Interesting was the fact that, although it would be expected of the respondents to make use of simulation technology in both classroom and practice, there were a few who indicated that it was not needed for their position.

TECHNOLOGY READINESS AND NURSE EDUCATOR'S BIOGRAPHICAL CHARACTERISTICS

The biographical characteristics considered included age, race, qualification, experience, level of expertise, type of training, experience in HFS use, time committed to HFS on a weekly basis and the HFS workload.

Technology readiness does not differ with regard to race. Results revealed that the slightly lower technology readiness difference between nurse educators with an undergraduate qualification and those with a diploma and postgraduate qualification is not of much significance. This is supported by literature reporting that researchers found that faculty educational level was not associated with knowledge of simulation technology (Duvall, 2012:25).

The findings in this study regarding expertise and technology readiness are in contrast with a study by Alinier *et al.* They found the facilitator's training skills to be of great significance for what can be learnt with simulation (Alinier *et al.,* 2004:206). The training status of a nurse educator does not seem to have any influence on their technology readiness.

Despite the fact that researchers in general found that nurse educators are not comfortable with utilising HFS as a teaching strategy, this study suggested that those with no or little HFS experience have a higher technology readiness index that those with more than one year of experience (Duvall, 2012:19). Those with more than 10 hours of HFS in a week have significantly higher technology readiness than the rest of the participants.

TECHNOLOGY READINESS COMPONENTS BY BIOGRAPHICAL VARIABLES

Race was redefined to two racial groups that turned out not to be very different from each other in terms of the different components of technology readiness, meaning that whites and non-whites are equally optimistic, innovative, uncomfortable and insecure.

Of the technology readiness components, innovativeness seems to be the only component to show difference in the scores of the participants according to **educational level**. Optimism, discomfort and insecurity did not depend on educational level.

This study revealed that there are nurse educators as well as those who are novices with no **expertise** and that very few regard themselves as experts. Results also indicated that discomfort and insecurity are the same regardless of whether one uses HFS or not. Slight differences were noted for innovation and optimism.

Those with some form of **training,** whether formal or informal, are the same in terms of optimism, innovation and insecurity, with lower scores than those with no training at all and this had no statistically significant effect on optimism, discomfort and insecurity. Innovativeness also does not depend on HFS training.

In terms of HFS **experience,** tests revealed that optimism depends on experience while discomfort, insecurity and innovativeness do not. Those with a higher **workload** had higher optimism, innovativeness and discomfort and lower insecurity than those with a lesser or no weekly workload.
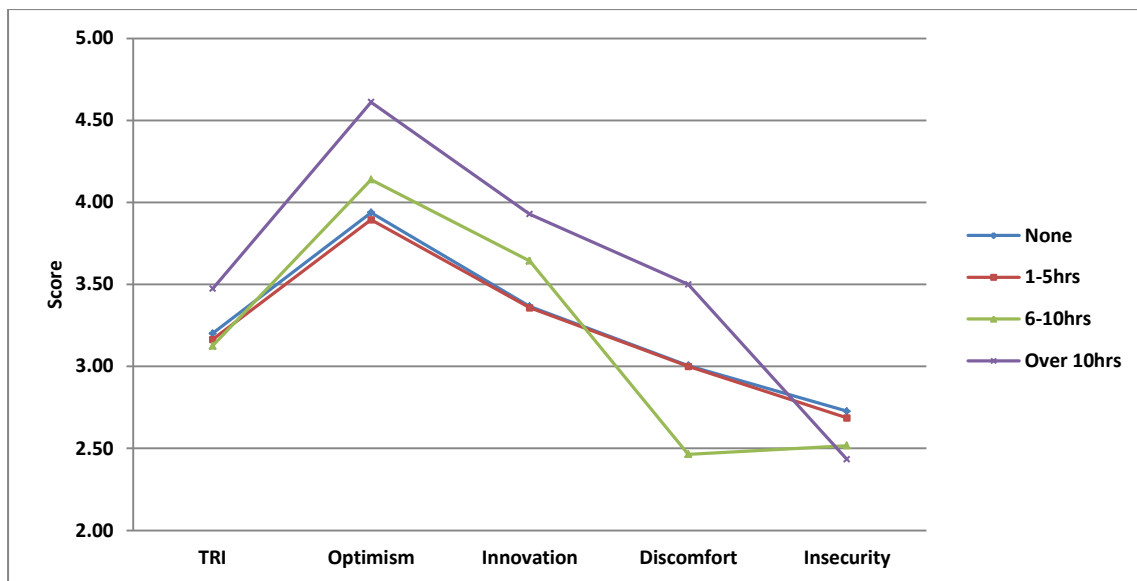
Correlation analysis showed that technology readiness has no significant correlation with age, nursing experience or workload. A significant (although rather weak) correlation was detected for technology readiness and nurse education experience. Technology readiness is significantly correlated with all four components, namely optimism, innovativeness, discomfort and insecurity.

The researcher achieved the objective to determine and describe the perceptions of Nurse Educators regarding the use of high-fidelity simulation in nursing education at a South African Private Nursing College.

CHAPTER 5: DISCUSSION, LIMITATIONS, CONCLUSIONS AND RECOMMENDATIONS

5.1   INTRODUCTION

In the previous chapter, the researcher provided details of the analysis and interpretation of research findings. The results were presented in pie charts, box plots and line plots.

This chapter contains a discussion of the findings of this research and the limitations of the study. It also includes recommendations and suggestions for further research.

5.2   DISCUSSION

The questionnaire that was used to gather information for the study was divided into different sections and this discussion addresses each section individually.

The research question for this study was: What are the perceptions of Nurse Educators regarding the use of high-fidelity simulation in nursing education at a South African Private Nursing College?

The objectives of the study were to (1) determine and describe the perceptions of Nurse Educators regarding the use of high-fidelity simulation in nursing education at a Private Nursing College in South Africa and (2) to suggest recommendations on how to prepare the Nurse Educators in a relatively short space of time to take up this role with confidence.

SECTION A – BACKGROUND INFORMATION

It still appears that there is a lack of males in the nursing profession. This is evident from the fact that there were 76 (95%) female respondents and only 4 (5%) males, which indicates that nursing remains a female dominated profession (Ozdemir Akansel & Tunk, 2008:159).

Age was found to be significantly positively correlated with nursing experience and nursing education experience. This implies that older nurse educators also have more nursing and nursing education experience. The highest number (33 or 42%) of respondents was in the 40 to 49 year age group and only 17 (22%) were younger than 40 years. While 20 (25%) of the respondents were in the 50 to 59 year age group, 9 (11%) were over 60 years old. These numbers are supportive of literature indicating that nurse educators are an aging profession (Buerhaus *et al.*, 2000:2953).

There were 52 (65%) white respondents while 28 (35%) were redefined as non-whites in a group made up from Black, Asians and Others to create only two racial groups for statistical purposes.

For this study, respondents with a diploma, bachelor or honours degree were classified as undergraduate degree qualification holders. Respondents holding a Master's or PhD degree were very limited and were combined to form one group called postgraduate. The most commonly reported level of education was a bachelor's degree. It is compulsory for all nurse educators/clinical training specialists working at this private college to have nursing education as a post basic qualification at least while those working at the learning centres have to have a Master's degree. In her study, Duvall found that faculty age, educational level or teaching institutions were not associated with frequency of use or knowledge of simulation technology (Duvall, 2012:25).

SECTION B – USE OF SIMULATORS

It was clear from the responses that the nurse educators carry a heavy workload in having to teach more than one group of students at a time. In some areas in the hospitals, there also seems to be a critical shortage of clinical training specialists.

As mentioned in Chapter 4, the responses that were received seemed to indicate that not all of the respondents had clarity on the differences between the different types of simulators.

As can be seen in the responses to questions 1 and 3, the respondents teach combinations of programmes, therefore the educational levels of students will also be different.

It is also clear that the respondents have not yet looked or explored further ways in which simulation-based training can be applied. Low- and medium-fidelity simulators are widely utilised in the classroom as well as in clinical settings.

Not all are clear regarding what the goals of simulators are. They only made use of those specified in the instrument and none suggested more or different goals.

The responses to question 7 clearly support literature studies in which the challenges and problems experienced here have also been encountered by others who also use simulators.

The study revealed most of the challenges mentioned in the questionnaire, and that factors like a "need for on-going training and lack of time" could limit the use of high-fidelity simulators. These findings support studies done elsewhere (Baghoomian, 2014:119). The majority of respondents agreed on the benefits of high-fidelity simulators in comparison with low- or medium-fidelity simulators.

The fact that most participants agreed that high-fidelity simulators help to reduce errors and improve teaching shows that patient safety is also a priority and that using simulators helps students to practise in a safe environment where the safety of patients are not a concern.

Nurse educators used different types of simulators in different situations in their facilities. Most educators reported that they used low-fidelity simulators (28.6%); some (13%) used medium-fidelity simulators, while others (24.6%) used all three types. Nurse educators across the seven learning centres and associated classrooms used low- and medium-fidelity simulators more than high-fidelity simulators in clinical practice. These simulators were utilised depending on the type of clinical situation. The Learning Centres that possessed the high-fidelity simulators did not seem to all utilise them fully. From the responses received it is clear that the use of high-fidelity simulation still is a rather new experience for the faculty of this private institution, but that they are optimistic regarding the use and benefits thereof. If the suggested recommendations are implemented, the usage will increase, students' confidence will increase and patient safety will no longer be jeopardised.

SECTION C – PERCEPTION OF NURSE EDUCATORS/CLINICAL TRAINING SPECIALISTS REGARDING THE USE OF HIGH-FIDELITY SIMULATION

- ## HIGH-FIDELITY SIMULATION (HFS) EXPOSURE

  - ### HFS expertise

The encouraging part of the findings is that the majority of the nurse educators (53 or 68%) have some exposure to HFS. Since there were very few respondents on the competence and expert levels, this variable was redefined to represent HFS use in the onward analysis. In that case, users became those with some form of exposure to HFS (novice, competent and expert) and the rest were identified as non-users. Dreyfus and Dreyfus (1980) also identified these levels of competency while Benner (1984) applied it to nursing practice (Waxman & Telles, 2009:232). While most of the respondents might have had exposure to HFS, some of them did not use it in their day-to-day activities as nurse educators. In a similar study conducted by Duvall, 17.9% of the participants were not using HFS while 36.3% saw themselves as novices, 25.8% regarded themselves as being competent and 15.9% were experts (Duvall, 2012:37).

  - ### HFS training

While half of those who use HFS in their nurse education programmes have had formal HFS training, the other half either taught themselves or received on-the-job training. About a third of the respondents had no training at all. This means that, while most of the respondents might have had exposure to HFS, some of them do not use it in their day to day activities as nurse educators. This suggests that, while high fidelity has been used in nurse education, it is only recently that the majority of nurse educators have adopted it for use in their training of nurses. Duvall's similar study on nurse educators in the United States of America validates these results. She found that nurse educators lacked on-the-job training, with a few, only 18.5%, having had no training and a small group of 11.2% has been trained on the job. While only 26.7% received formal training, 4.3% of the respondents chose not to answer this question (Duvall, 2012: 39).

o **HFS experience**

It is clear from the distribution by HFS experience and weekly use that those who do not have HFS experience do not have weekly HFS exposure. This shows that the respondents were honest and therefore consistent and reliable in their responses. The results also agree that about half of the educators (38 or 49%) have gained less than one year of HFS experience and are probably still exploring how best to take advantage of HFS in their daily activities. Based on Tukey's multiple comparisons, the dependence of optimism on HFS experience is such that those with more experience are more optimistic than those with little or no experience.

o **Weekly use**

Note that 49 (63%) of respondents have some HFS experience, 48 (63%) use HFS weekly, 55 (71%) have some training of which 48 (62%) are either formally or on-the-job trained and 68% have some level of expertise in high-fidelity simulation. The consistency in the responses in this section is evidence of the reliability of the respondents.

● **PERCEPTIONS REGARDING HFS**

o **Descriptive analysis of technology readiness and its components**

This analysis shows that the respondents are keen to adopt technology in their daily work-related activities, as evidenced by the high optimism and innovation scores and low discomfort and insecurity scores. It means that nurse educators have faith in the benefits of using technology in the training of nurses and have moderate to low fear of the potential disadvantages associated with the use of technology. Power cuts are one of the disadvantages of utilising technology-intensive training. However, such interruptions may not be of serious consequence as nurse training takes place in hospital environments where standby generators are installed. These results suggest some differences among the means of the technology readiness index and its components.

o **Comparison of means of technology readiness and its components**

Based on the multiple comparison procedure, the optimism component was found to be significantly higher than all the other components, and the innovation component was significantly higher than the two negative components. Discomfort was measured as not significantly different from the overall technology readiness index and was significantly higher than insecurity. Parasuraman found that, although people are generally optimistic about technology, there is also a great deal of insecurity about the role of technology. Even technology optimists and innovators experience technology-driven anxieties (Parasuraman, 2000; Duvall, 2012:24).

- **TECHNOLOGY READINESS AND NURSE EDUCATORS' BIOGRAPHICAL CHARACTERISTICS**

o **Race**

Technology readiness does not seem to differ with race.

o **Educational qualification**

Nurse educators with an undergraduate qualification have a slightly lower technology readiness index than the holders of diploma and postgraduate qualifications. This difference is very small and probably not statistically significant.

o **Expertise**

Users and non-users of high-fidelity simulation present the same mean technology readiness index.

o **Training**

The training of a nurse educator does not seem to have any influence on the nurse educator's technology readiness index. This is rather strange because it could reasonably be expected that those with some training would have a significantly higher technology readiness index. The finding suggests that there

probably are some factors other than training that influence a nurse educator's technology readiness index.

- o **Experience**

It was found that experience in HFS use does not affect the readiness index. As in the previous case, it seems reasonable to expect that those with more experience in HFS use would have significantly higher readiness. Again, this suggests the existence of other factors besides just one's experience with technology.

- o **Weekly simulation use**

It turned out all the components are not significantly affected by the extent of the weekly HFS workload.

- **TECHNOLOGY READINESS COMPONENTS BY BIOGRAPHICAL VARIABLES**

- o **Race**

Whites and non-whites are equally optimistic, innovative, uncomfortable and insecure, that is, the score on the different components cannot be attributed to race.

- o **Educational level**

The results from the classical one-way ANOVA of each component on the educational level showed that optimism, discomfort and insecurity do not depend on educational level.

- o **Expertise**

It turned out that there was a substantial number of nurse educators with no expertise in HFS, another substantial number in the novice category and a few in the competent and expert levels.

o **Use**

The results showed that optimism, discomfort, insecurity and innovativeness were not significantly affected by whether one uses HFS or not. A study conducted in Canada showed that participants were generally positive regarding the use of high fidelity, but a need for additional support related to time and resources to successfully implement it as a teaching strategy remains (Howard, *et al.*, 2011: e2).

o **Training**

Nurse educators with some form of training in HFS (formal or informal) are the same in terms of optimism, innovation and insecurity. They all have lower scores than those with no HFS training at all. However, a test for statistical significance showed that the type of HFS training does not have a significant effect on optimism, discomfort and insecurity. Innovativeness also does not depend on HFS training. An absence of formal training was believed to have contributed to the lack of comfort and competence on the part of faculty participants (King *et al.,* 2008:8).

o **Experience**

Nurse educators with more experience are more optimistic than those with little or no experience. Study results indicated that most participants had little, if any, formal HPS training and limited or no actual experience in using HFS. Unsurprisingly, they lacked positive attitudes regarding their own level of comfort and competence when using HPS with students. It is interesting to note that, while the majority of faculty had neither formal training nor experience in using HPS, they still believed that HPS provided an effective teaching strategy. Overall, they had positive intentions to use the HPS, but had negative beliefs regarding the amount of time required for preparation and ease of using this. (King *et al.,* 2008:13).

o **Workload**

It was found that all the components are not significantly affected by the extent of the weekly HFS workload.

- **CORRELATION ANALYSIS**

The correlation suggests that the relationship is such that those with more nurse education experience displayed lower technology readiness. It was also found that technology readiness is significantly correlated with all four of its components, namely optimism, innovativeness, discomfort and insecurity.

- **CONCLUSION**

The results of this analysis show that technology readiness lies between 3.0 and 3.5 on the Likert scale, depending on the biographical characteristic considered. The technology readiness of nurse educators was found to be independent of race, educational qualification, level of expertise in HFS use, type of HFS training, experience with HFS and weekly usage of HFS. This means that everyone is at the same level, as far as technology readiness is concerned.

The different components of technology readiness were found to be independent of the biographical characteristics of nurse educators. The only significant result came from optimism, which was found to be significantly dependent on HFS experience. The results showed that those with more experience with high-fidelity simulation are highly optimistic about adopting technology for the purpose of training nurses. The correlation analysis showed that age, nursing experience and percentage HFS workload were not significantly correlated with the technology readiness index and all its components. However, high nursing education experience was found to be significantly associated with low innovativeness and a low technology readiness index.

5.3   LIMITATIONS

This study was limited by only being focused on one private nursing college in South Africa, which means that the results cannot be generalised to all private nursing colleges in South Africa. Only the nurse educators and clinical training specialists employed by this nursing college and its affiliated hospitals furthermore participated in this study, hence the investigation focused on their perceptions and results cannot be generalised for all nurse educators and clinical training specialists.

5.4   RECOMMENDATIONS

Based on the findings of this study, the following recommendations for nursing education and research are proposed:

5.4.1   Nursing Education

- It is recommended that adequate space equipped with one-way mirrors around the simulation area should be identified and provided apart from the classroom to allow viewing of the entire simulation without disruption (Howard *et al.*, 2011:e2).
- A vision for the start-up of a workable simulation programme should be developed. This vision should include the following:
  - o Size of faculty
  - o Collaboration with other disciplines
  - o Budget
  - o Population to be served
  - o Type of simulation to be used to guide training, purchasing, budget and scope of the project
  - o Structure of "ownership"
  - o Governance (Seropian, Brown, Gavilanes & Driggers, 2004:171).

- Funds must be made available for the buying and maintenance of the manikins and necessary supplies.

- Faculty members need time for training to learn this technology. Training time may be given in the form of reimbursing faculty to attend simulation conferences or the reduction in workload in order to develop simulation scenarios.

- Expert performance is built on experience. The nurse educators responsible for the implementation of high-fidelity simulation at the Private Nursing College campuses need to be trained to use high-fidelity software, write scenarios, and facilitate reflection of students. Simulation trainers may be expert nurses in the clinical setting, but are novices when it comes to the writing and execution of the simulation scenarios (Waxman & Tellas, 2009: 232). Without expertise, individuals gain only a basic understanding of the equipment. They lack understanding of the equipment's potential and limitations as well as the context of use (Seropian *et al.,* 2004:172). The time of greatest learning for simulation experts is when they are actually using the equipment in real scenarios. They will learn here how to engage with students as well as how to provide realistic simulation and debriefing through trial and error (Seropian *et al.,* 2004:172).

- Nurse educators and clinical training specialists must be given time to learn the scope of the equipment and have access to simulation experts to help them integrate simulation into their training programmes (Seropian, *et al.,* 2004:172).

- Two to three simulation champions, at least, should be identified amongst the Private Nursing College campuses and sent for training on the development and implementation of both high-fidelity simulation and standardised patient experiences. They will then be equipped to run the trainer workshops at the different campuses to empower their colleagues to explore new ways of implementing interactive teaching modalities into their curriculum (Welman, 2013:164). These workshops should also include the clinical training specialists accompanying students at the affiliated hospitals. Other literature supports the idea that a full-time coordinator would be ideal to examine the curriculum and identify suitable simulations for use and also assist with

running the simulations. This coordinator could also be responsible for teaching new faculty members on the use of technology and on how they can include simulation in the course they facilitate (Howard *et al.*, 2011:e2).

- A staff member from one of the campuses has done the "Clinical simulation laboratory manager" semester course offered by the Nelson Mandela Metropolitan University. She should develop a "teaching with simulation" short course and then travel to all the campuses to offer a two-day course to provide a greater comfort level with the application and technical aspects. Simulation-naïve practitioners from practice can join this training. Another study viewed technical support as crucial (Howard *et al.*, 2011:e2).

- Existing literature should be consulted to integrate key concepts and help make some critical decisions (Starkweather & Kardong-Edgren, 2008:8).

- Nurse educators also need to attend nursing education conferences to disseminate simulation research results obtained and to learn more about simulation as a learning strategy (Welman, 2013:163).

- Continuing education is needed to encourage faculty to participate (King *et al.* 2008:8). Qualitative data results revealed that facilitators would make more use of high-fidelity simulators if they had more time, support from the laboratory personnel and more education or training. They perceive the disadvantages of HPS as lack of time, support, education and the limited number of students at a time. Suggestions should be included in an educational programme on how to operate and utilise simulators with students, as well as hands-on training, together with printed instructions (King *et al.* 2008:7).

- The nurse educators and clinical training specialists should meet on a monthly basis to discuss and develop simulation implementation plans and guidelines for educators and to share ideas across programmes (Welman, 2013:164). This could be done at campus level or nationally on a quarterly basis by tele- and/or video-conferences. It is important to share successes.

- Effective management of venues and maintenance of equipment are important aspects that add to the success of high-fidelity simulation as a learning strategy and a technical and laboratory assistant is needed at each campus. This staff member will then be responsible for the maintenance of

the simulation and recording equipment. Bookings of the simulation laboratory and lectures venues will be part of this person's responsibilities (Welman, 2013:164). Hawkins *et al.* support the importance of an assistant to prepare the simulation room and run the simulation from a technological standpoint as it will allow faculty the freedom to truly evaluate and teach students (Hawkins *et al.,* 2008:527).

- Ways to partner with colleagues of other nursing education institutions, school and healthcare systems should be considered for the benefit of cost sharing and to learn from each other (Seropian *et al.,* 2004:171). The Lancet Commissions describes collaboration as a potentially powerful instrument of academic systems to identify opportunities to enhance educational quality and productivity through information sharing, academic exchange, pursuit of joint work and synergies between institutions. It can serve many purposes, utilise several instruments and take place at different levels. Collaboration involves the relationship between individuals and can be structured and upheld through formalised institutional arrangements that promote finance and maintain relationships over time (The Lancet Commissions, 2010:1940). At least one member should take up the challenge to champion the simulation laboratory experience (Rothgeb, 2005:492).

5.4.2 Research

- It is important that the nurse educators evaluate the effectiveness of simulation and instruments for this and research purposes can be obtained for free for NLN members from the National League for Nursing website (NLN) (Welman, 2013:165).

- On-going research on the different aspects of implementing high-fidelity simulation at the Private Nursing College is required and can be extended to the perceptions of nurse educators working at other nursing education institutions and experiences of students.

- The impact on placement performance should be evaluated to avoid the danger of students becoming skilful in dealing with the training technology (human patient simulator) rather than with real patients. It is essential to

evaluate the impact of simulation-based training on actual patient outcomes (Welman, 2013:166).

- Further research on the topic of high-fidelity simulation and its implementation within the Private Nursing College should be undertaken.

- Further studies need to obtain faculty values and input regarding the uses of this educational methodology (Bremner, Aduddell, Bennett & Van Geest, 2006:173).

- Research in simulation should be expanded to include settings where practising nurses are using HPS technology for continuing education. More nursing agencies may want to include simulation if research evidence proves it to be a valid and reliable method for providing on-going education (Kuznar, 2007:52).

- Further research is recommended to explore the challenges nurse educators face in adopting new technology into their teaching cache (King *et al.* 2008: 15).

- As very little empirical data related to faculty beliefs in relation to the HPS are available in the literature, this should be extended (King *et al.,* 2008:15).

5.5   CONCLUSION

The aim of this study was to determine the perceptions of nurse educators regarding the use of high-fidelity simulation in nursing education at a Private Nursing College in South Africa, in order to be able to examine why high-fidelity simulators have not yet been embraced by nurse educators or students.

Objective: The objectives were:

(1) To determine and describe the perceptions of Nurse Educators regarding the use of high-fidelity simulation in nursing education at a Private Nursing College in South Africa.

(2) To suggest recommendations on how to prepare the Nurse Educators in a relatively short space of time to take up this role with confidence.

Research Question: What are the perceptions of Nurse Educators regarding the use of high-fidelity simulation in nursing education at a Private Nursing College in South Africa?

This study has revealed that nursing education has embraced technology-based learning as a tool designed not only to improve instruction, but also to meet the learning needs of the incoming generation of nursing students (Parker & Myrick, 2009:327). Using simulation effectively involves more than just buying a manikin. It involves organisation, curricular considerations, simulation skill and a whole new view of health care education and clinical experience (Seropian *et al.,* 2004:174).

There seemed to be a lack of research on nurse educators, perspective on the use of HFS in nursing education, as well as a gap in the literature identifying the technological readiness of nurse educators in the use of HFS (Duvall, 2012:4, 11). As the pressures to increase the use of HFS in nursing education continue to grow, it is imperative that more research be completed to evaluate HFS from the perspective of nurse educators (Duvall, 2012:25-26).

The results of this study can be used as guidelines for other institutions to prepare their teaching staff in the use of high-fidelity simulation.

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ANNEXURE A: LETTER REQUESTING PERMISSION TO CONDUCT RESEARCH AT UNIVERSITY OF FORT HARE

University of Fort Hare

School of Nursing

P.O. Box 7426

EAST LONDON

5200

18 March 2015

The University Research Ethics Committee

University of Fort Hare

P.O. Box 7426

EAST LONDON

5200

REQUEST TO CONDUCT RESEARCH AT A COLLEGE OF NURSING

I am a Master's student at the above university and I am requesting permission to conduct research at the Learning Centres of Life College of Learning with nurse educators and clinical teaching specialists.

The title of my study is "The perceptions of nurse educators regarding the use of high fidelity simulation in nursing education at a South African Private Nursing College".

The purpose of the study is to determine and describe the perceptions of nurse educators in a South African Private Nursing College regarding the use of high fidelity simulation in nursing education and to suggest recommendations on how to prepare the nurse educators in a relatively short space of time to take up this role with confidence.

This study hopes to contribute to effective preparation of nurse educators in nursing education using high fidelity simulation. It should highlight the needs of nurse educators to emphasise the lack of training. It also aims to look at alternative ways to prepare

nurse educators and recommend ways to effectively prepare them. This would inevitably lead to improved quality of teaching and learning of students, thereby contributing to excellent, world class patient care.

Should you grant me permission; I propose to administer a structured questionnaire to all the nurse educators and clinical training specialist. The questionnaire should take the participants 20 – 30 minutes to complete.

My intention is to collect the data in the second week in July 2015, after my pilot study in the first week of July 2015.

In order to protect the identity of the institution, no name will be mentioned in the questionnaire or the publication. The nurse educators are under no obligation to participate in this study and have the right to withdraw at any stage of the research. They will not be subjected to any harm by participating in this study.
The results of this research will be made available to you on request and on completion.

Should you have any queries please feel free to contact me on the details below.
Thanking you.

Yours Sincerely

_____

Mrs Viola Janse van Vuuren
M Cur student
Cell: 082 446 4140
E-mail: violajvv54@gmail.com

ANNEXURE B: UNIVERSITY OF FORT HARE ETHICAL CLEARANCE

University of Fort Hare
Together in Excellence

ETHICAL CLEARANCE CERTIFICATE
REC-270710-028-RA Level 01

Certificate Reference Number: SEE091SJAN01

Project title: **The Perceptions of Nurse Educators regarding the use of High Fidelity Simulation in Nursing Education at a South Africa Private Nursing College**

Nature of Project: Masters

Principal Researcher: Stephanie Viola Janse van Vuuren

Supervisor: Prof E Seekoe

Co-supervisor:

On behalf of the University of Fort Hare's Research Ethics Committee (UREC) I hereby give ethical approval in respect of the undertakings contained in the above-mentioned project and research instrument(s). Should any other instruments be used, these require separate authorization. The Researcher may therefore commence with the research as from the date of this certificate, using the reference number indicated above.

Please note that the UREC must be informed immediately of

- Any material change in the conditions or undertakings mentioned in the document

- Any material breaches of ethical undertakings or events that impact upon the ethical conduct of the research

The Principal Researcher must report to the UREC in the prescribed format, where applicable, annually, and at the end of the project, in respect of ethical compliance.

Special conditions: Research that includes children as per the official regulations of the act must take the following into account:

Note: The UREC is aware of the provisions of s71 of the National Health Act 61 of 2003 and that matters pertaining to obtaining the Minister's consent are under discussion and remain unresolved. Nonetheless, as was decided at a meeting between the National Health Research Ethics Committee and stakeholders on 6 June 2013, university ethics committees may continue to grant ethical clearance for research involving children without the Minister's consent, provided that the prescripts of the previous rules have been met. This certificate is granted in terms of this agreement.

The UREC retains the right to

- Withdraw or amend this Ethical Clearance Certificate if
  - Any unethical principal or practices are revealed or suspected
  - Relevant information has been withheld or misrepresented
  - Regulatory changes of whatsoever nature so require
  - The conditions contained in the Certificate have not been adhered to

- Request access to any information or data at any time during the course or after completion of the project.

- In addition to the need to comply with the highest level of ethical conduct principle investigators must report back annually as an evaluation and monitoring mechanism on the progress being made by the research. Such a report must be sent to the Dean of Research's office

The Ethics Committee wished you well in your research.

Yours sincerely

Professor Gideon de Wet
Dean of Research

01 July 2015

ANNEXURE C: LETTER REQUESTING PERMISSION TO CONDUCT RESEARCH AT LIFE HEALTHCARE ETHICS COMMITTEE

<div align="right">

University of Fort Hare

School of Nursing

P.O. Box 7426

EAST LONDON

5200

10 June 2015

</div>

Life Healthcare Ethics Committee

P.O. Box 11187

Southernwood

EAST LONDON

5213

Dear Dr Irene Lubbe

REQUEST TO CONDUCT RESEARCH AT YOUR COLLEGE OF NURSING

I am a Master's student at the University of Fort Hare and I am requesting permission to conduct research at your colleges of nursing with the nurse educators and clinical training specialists.

The title of my study is "The perceptions of nurse educators regarding the use of high fidelity simulation in nursing education at a South African Private Nursing College."

The purpose of the study is to determine and describe the perceptions of nurse educators in a South African Private Nursing College regarding the use of high fidelity simulation in nursing education and to suggest recommendations on how to prepare the nurse educators in a relatively short space of time to take up this role with confidence.

This study hopes to contribute to effective preparation of nurse educators in nursing education using high fidelity simulation. It should highlight the needs of nurse educators to emphasise the lack of training. It also aims to look at alternative ways to prepare nurse educators and recommend ways to effectively prepare them.   This would inevitably lead to improved quality of teaching and learning of students, thereby contributing to excellent, world class patient care.

Should you grant me permission; I propose to administer a structured questionnaire to all the nurse educators and clinical training specialist. The questionnaire should take the participants 20 – 30 minutes to complete.

My intention is to collect the data in the second week in July 2015, after my pilot study in the first week of July 2015.

In order to protect the identity of the institution, no name will be mentioned in the questionnaire or the publication. The nurse educators are under no obligation to participate in this study and have the right to withdraw at any stage of the research. They will not be subjected to any harm by participating in this study.
The results of this research will be made available to you on request and on completion.

Should you have any queries please feel free to contact me on the details below.
Thanking you

Yours Sincerely

_____
Mrs Viola Janse van Vuuren
M. Cur student
Cell: 082 446 4140
E-mail: violajvv54@gmail.com

ANNEXURE D: LIFEHEALTHCARE ETHICAL CLEARANCE

Life Group
HEALTH CARE

15 July 2015

ATTENTION: Viola Janse van Vuuren

SUBJECT: APPLICATION TO CONDUCT RESEARCH

TITLE: **The perceptions of nurse educators regarding the use of high fidelity simulation in nursing education at a South African private nursing college.**

This letter serves as authorisation from the Life Healthcare Research and Scientific Committee for the conduct of your research within company facilities.

The Research and Scientific Committee hereby conditionally approves your request.
Approval number: 20150504-04.   Valid until 2016/07/30.

The approval is conditional to your agreement on the following provisos:
1. You must request permission (in writing) from the Learning Centre Manager of the Life Healthcare (LHC) facility in which you intend conducting your research, accompanied by this letter.
2. LHC will not be liable for any costs incurred during or related to this study.
3. Should patient or institutional confidentiality be compromised, LHC has the right to withdraw the permission and take legal action.
4. No direct reference is made to LHC or its various facilities in the research report or any publications thereafter.
5. The Company and its facilities are not in any way identifiable in the study.
6. Placement of the research proposal on the Company's research register.
7. On completion, an electronic (.pdf) copy of the study will be provided to LHC. This copy will be uploaded to the institutional repository.

Please sign this letter as indicated below and return to the sender within 5 working days:

We wish you the best in your studies and look forward to the results.

Yours sincerely

[signature]

Anne Roodt
on behalf of the Research and Scientific Committee.

Please sign this letter as indicated below and return to the sender within 2 working days:

I, _Viola Janse van Vuuren_ , hereby agree to the provisos (points 1-7) as listed above.

Signature: *[signature]*

Date: 15/07/2015

ANNEXURE E: LETTER REQUESTING PERMISSION TO CONDUCT RESEARCH AT LIFE COLLEGE OF LEARNING EAST LONDON LEARNING CENTRE

<div align="right">

School of Nursing

P.O. Box 7426

EAST LONDON

5200

16 July 2015

</div>

Life College of Learning

East London Learning Centre

P.O. Box 11187

Southernwood

EAST LONDON

5213

Dear Mrs Cunze

REQUEST TO CONDUCT RESEARCH AT YOUR COLLEGE OF NURSING

I am a Master's student at the above university and I am requesting permission to conduct research at the East London learning centre with the nurse educators and clinical training specialists.

The title of my study is "The perceptions of nurse educators regarding the use of high fidelity simulation in nursing education at a South African Private Nursing College."

The purpose of the study is to determine and describe the perceptions of nurse educators in a South African private college of nursing regarding the use of high fidelity simulation in nursing education and to suggest recommendations on how to prepare the nurse educators in a relatively short space of time to take up this role with confidence.

This study hopes to contribute to effective preparation of nurse educators in nursing education using high fidelity simulation. It should highlight the needs of nurse educators

to emphasise the lack of training. It also aims to look at alternative ways to prepare nurse educators and recommend ways to effectively prepare them. This would inevitably lead to improved quality of teaching and learning of students, thereby contributing to excellent, world class patient care.

Should you grant me permission; I propose to administer a structured questionnaire to all the nurse educators and clinical training specialists. The questionnaire should take the participants 20 – 30 minutes to complete.

My intention is to collect the data in the last week of July 2015, after my pilot study in the third week of July 2015.

In order to protect the identity of the institution, no name will be mentioned in the questionnaire or the publication. The nurse educators are under no obligation to participate in this study and have the right to withdraw at any stage of the research. They will not be subjected to any harm by participating in this study.
The results of this research will be made available to you on request and on completion.

Should you have any queries please feel free to contact me on the details below.

Thanking you.

Yours Sincerely

_____

Mrs. Viola Janse van Vuuren
M. Cur student
Cell: 082 446 4140
E-mail: violajvv54@gmail.com

ANNEXURE F: PERMISSION TO CONDUCT RESEARCH AT LIFE COLLEGE OF LEARNING EAST LONDON LEARNING CENTRE

Life HEALTH CARE **Group**

Life College of Learning
Head Office
Oxford Manor, 21 Chaplin Road, Illovo 2196
Private Bag X13, Northlands 2116
Telephone: +27 11 219 9000
Telefax: +27 11 219 9001
www.lifehealthcare.co.za

15 August 2015

V van Vuuren
School of Nursing
P.O. Box 7426
East London
5200
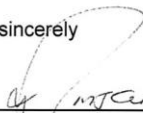
Dear Viola

APPLICATION TO CONDUCT RESEARCH AT THE LIFE COLLEGE OF LEARNING – EAST LONDON LEARNING CENTRE

Your request to conduct research at the East London Learning Centre with the Nurse Educators and Clinical Training Specialists has been granted.

We look forward to seeing the results of your research once it has been completed.

Good luck with your studies.

Yours sincerely

M CUNZE
National Education Manager

ANNEXURE G: LETTER REQUESTING PERMISSION TO CONDUCT RESEARCH AT LIFE COLLEGE OF LEARNING CAPE TOWN LEARNING CENTRE AND BAYVIEW CLASS ROOM

School of Nursing

P.O. Box 7426

EAST LONDON

5200

16 July 2015

Life College of Learning

Cape Town Learning Centre

P.O. Box 23905

CLAREMONT

7735

Dear Mrs Berning

REQUEST TO CONDUCT RESEARCH AT YOUR COLLEGE OF NURSING

I am a Master's student at the above university and I am requesting permission to conduct research at your learning centre and Mossel Bay classroom with the nurse educators and clinical training specialists.

The title of my study is "The perceptions of nurse educators regarding the use of high fidelity simulation in nursing education at a South African Private Nursing College."

The purpose of the study is to determine and describe the perceptions of nurse educators in a South African private college of nursing regarding the use of high fidelity simulation in nursing education and to suggest recommendations on how to prepare the nurse educators in a relatively short space of time to take up this role with confidence.

This study hopes to contribute to effective preparation of nurse educators in nursing education using high fidelity simulation. It should highlight the needs of nurse educators to emphasise the lack of training. It also aims to look at alternative ways to prepare nurse educators and recommend ways to effectively prepare them.   This would inevitably lead to improved quality of teaching and learning of students, thereby contributing to excellent, world class patient care.

Should you grant me permission; I propose to administer a structured questionnaire to all the nurse educators and clinical training specialist. The questionnaire should take the participants 20 – 30 minutes to complete.

My intention is to collect the data in the last week of July 2015, after my pilot study in the third week of July 2015.

In order to protect the identity of the institution, no name will be mentioned in the questionnaire or the publication. The nurse educators are under no obligation to participate in this study and have the right to withdraw at any stage of the research. They will not be subjected to any harm by participating in this study.
The results of this research will be made available to you on request and on completion.

Should you have any queries please feel free to contact me on the details below.

Thanking you.

Yours Sincerely

_____

Mrs. Viola Janse van Vuuren
M. Cur student
Cell: 082 446 4140
E-mail: violajvv54@gmail.com

ANNEXURE H: PERMISSION TO CONDUCT RESEARCH AT LIFE COLLEGE OF LEARNING CAPE TOWN LEARNING CENTRE AND BAYVIEW CLASS ROOM

Life Group
HEALTH CARE

Life College of Learning
Head Office
Oxford Manor, 21 Chaplin Road, Illovo 2196
Private Bag X13, Northlands 2116
Telephone: +27 11 219 9000
Telefax: +27 11 219 9001
www.lifehealthcare.co.za

13 August 2015

V van Vuuren
School of Nursing
P.O. Box 7426
East London
5200

Dear Viola

APPLICATION TO CONDUCT RESEARCH AT THE LIFE COLLEGE OF LEARNING – CAPE TOWN LEARNING CENTRE & MOSSEL BAY CLASS ROOM

Your request to conduct research at the Cape Town Learning Centre and Mossel Bay class room with the Nurse Educators and Clinical Training Specialists has been granted.

We look forward to seeing the results of your research once it has been completed.

Good luck with your studies.

Yours sincerely

B BERNING
Learning Centre Manager

ANNEXURE I: LETTER REQUESTING PERMISSION TO CONDUCT RESEARCH AT LIFE COLLEGE OF LEARNING PORT ELIZABETH LEARNING CENTRE

School of Nursing

P.O. Box 7426

EAST LONDON

5200

16 July 2015

Life College of Learning

Port Elizabeth Learning Centre

P.O. Box 12051

Centrahill

PORT ELIZABETH

6006

Dear Ms S Choonara

REQUEST TO CONDUCT RESEARCH AT YOUR COLLEGE OF NURSING

I am a Master's student at the above university and I am requesting permission to conduct research at your learning centre with the nurse educators and clinical training specialists.

The title of my study is "The perceptions of nurse educators regarding the use of high fidelity simulation in nursing education at a South African Private Nursing College."

The purpose of the study is to determine and describe the perceptions of nurse educators in a South African private college of nursing regarding the use of high fidelity simulation in nursing education and to suggest recommendations on how to prepare the nurse educators in a relatively short space of time to take up this role with confidence.

This study hopes to contribute to effective preparation of nurse educators in nursing education using high fidelity simulation. It should highlight the needs of nurse educators to emphasise the lack of training. It also aims to look at alternative ways to prepare nurse educators and recommend ways to effectively prepare them. This would inevitably lead to improved quality of teaching and learning of students, thereby contributing to excellent, world class patient care.

Should you grant me permission; I propose to administer a structured questionnaire to all the nurse educators and clinical training specialist. The questionnaire should take the participants 20 – 30 minutes to complete.

My intention is to collect the data in the last week of July 2015, after my pilot study in the third week of July 2015.

In order to protect the identity of the institution, no name will be mentioned in the questionnaire or the publication. The nurse educators are under no obligation to participate in this study and have the right to withdraw at any stage of the research. They will not be subjected to any harm by participating in this study.
The results of this research will be made available to you on request and on completion.

Should you have any queries please feel free to contact me on the details below.

Thanking you.

Yours Sincerely

_____
Mrs. Viola Janse van Vuuren
M. Cur student
Cell: 082 446 4140
E-mail: violajvv54@gmail.com

ANNEXURE J: PERMISSION TO CONDUCT RESEARCH AT LIFE COLLEGE OF LEARNING PORT ELIZABETH LEARNING CENTRE

Life Group HEALTH CARE

Life College of Learning
Head Office
Oxford Manor, 21 Chaplin Road, Illovo 2196
Private Bag X13, Northlands 2116
Telephone: +27 11 219 9000
Telefax: +27 11 219 9001
www.lifehealthcare.co.za

5 August 2015

V van Vuuren
School of Nursing
P.O. Box 7426
East London
5200

Dear Viola

APPLICATION TO CONDUCT RESEARCH AT THE LIFE COLLEGE OF LEARNING – PORT ELIZABETH LEARNING CENTRE

Your request to conduct research at the Port Elizabeth Learning Centre with the Nurse Educators and Clinical Training Specialists has been granted.

We look forward to seeing the results of your research once it has been completed.

Good luck with your studies.

Yours sincerely

S CHOONARA
Learning Centre Manager

ANNEXURE K: LETTER REQUESTING PERMISSION TO CONDUCT RESEARCH AT LIFE COLLEGE OF LEARNING KZN LEARNING CENTRE AND EMPANGENI CLASS ROOM

School of Nursing

P.O. Box 7426

EAST LONDON

5200

16 July 2015

Life College of Learning

Kwa Zulu-Natal Learning Centre

P.O. Box 2230

DURBAN

4000

Dear Ms N Cassim

REQUEST TO CONDUCT RESEARCH AT YOUR COLLEGE OF NURSING

I am a Master's student at the above university and I am requesting permission to conduct research at your learning centre and Empangeni classroom with the nurse educators and clinical training specialists.

The title of my study is "The perceptions of nurse educators regarding the use of high fidelity simulation in nursing education at a South African Private Nursing College."

The purpose of the study is to determine and describe the perceptions of nurse educators in a South African private college of nursing regarding the use of high fidelity simulation in nursing education and to suggest recommendations on how to prepare the nurse educators in a relatively short space of time to take up this role with confidence.

This study hopes to contribute to effective preparation of nurse educators in nursing education using high fidelity simulation. It should highlight the needs of nurse educators to emphasise the lack of training. It also aims to look at alternative ways to prepare nurse educators and recommend ways to effectively prepare them. This would inevitably lead to improved quality of teaching and learning of students, thereby contributing to excellent, world class patient care.

Should you grant me permission; I propose to administer a structured questionnaire to all the nurse educators and clinical training specialist. The questionnaire should take the participants 20 – 30 minutes to complete.

My intention is to collect the data in the last week of July 2015, after my pilot study in the third week of July 2015.

In order to protect the identity of the institution, no name will be mentioned in the questionnaire or the publication. The nurse educators are under no obligation to participate in this study and have the right to withdraw at any stage of the research. They will not be subjected to any harm by participating in this study.
The results of this research will be made available to you on request and on completion.

Should you have any queries please feel free to contact me on the details below.

Thanking you.

Yours Sincerely

_____

Mrs. Viola Janse van Vuuren
M. Cur student
Cell: 082 446 4140
E-mail: violajvv54@gmail.com

ANNEXURE L: PERMISSION TO CONDUCT RESEARCH AT LIFE COLLEGE OF LEARNING KZN LEARNING CENTRE AND EMPANGENI CLASS ROOM

Life Group HEALTH CARE

Life College of Learning
Head Office
Oxford Manor, 21 Chaplin Road, Illovo 2196
Private Bag X13, Northlands 2116
Telephone: +27 11 219 9000
Telefax: +27 11 219 9001
www.lifehealthcare.co.za

22 August 2015

V van Vuuren
School of Nursing
P.O. Box 7426
East London
5200

Dear Viola

APPLICATION TO CONDUCT RESEARCH AT THE LIFE COLLEGE OF LEARNING – KZN LEARNING CENTRE AND EMPANGENI CLASS ROOM

Your request to conduct research at the KZN Learning Centre and Empangeni Class room with the Nurse Educators and Clinical Training Specialists has been granted.

We look forward to seeing the results of your research once it has been completed.

Good luck with your studies.

Yours sincerely

N CASSIM
Learning Centre Manager

ANNEXURE M: LETTER REQUESTING PERMISSION TO CONDUCT RESEARCH AT LIFE COLLEGE OF LEARNING WEST RAND LEARNING CENTRE

School of Nursing

P.O. Box 7426

EAST LONDON

5200

16 July 2015

Life College of Learning

West Rand Learning Centre

P.O. Box 2181

FLORIDA

1710

Dear Dr V van Niekerk

REQUEST TO CONDUCT RESEARCH AT YOUR COLLEGE OF NURSING

I am a Master's student at the above university and I am requesting permission to conduct research at your learning centre and Bloemfontein classroom with the nurse educators and clinical training specialists.

The title of my study is "The perceptions of nurse educators regarding the use of high fidelity simulation in nursing education at a South African Private Nursing College."

The purpose of the study is to determine and describe the perceptions of nurse educators in a South African private college of nursing regarding the use of high fidelity simulation in nursing education and to suggest recommendations on how to prepare the nurse educators in a relatively short space of time to take up this role with confidence.

This study hopes to contribute to effective preparation of nurse educators in nursing education using high fidelity simulation. It should highlight the needs of nurse educators to emphasise the lack of training. It also aims to look at alternative ways to prepare nurse educators and recommend ways to effectively prepare them.   This would inevitably lead to improved quality of teaching and learning of students, thereby contributing to excellent, world class patient care.

Should you grant me permission; I propose to administer a structured questionnaire to all the nurse educators and clinical training specialist. The questionnaire should take the participants 20 – 30 minutes to complete.

My intention is to collect the data in the last week of July 2015, after my pilot study in the third week of July 2015.

In order to protect the identity of the institution, no name will be mentioned in the questionnaire or the publication. The nurse educators are under no obligation to participate in this study and have the right to withdraw at any stage of the research. They will not be subjected to any harm by participating in this study.
The results of this research will be made available to you on request and on completion.

Should you have any queries please feel free to contact me on the details below.

Thanking you.

Yours Sincerely

_____
Mrs. Viola Janse van Vuuren
M. Cur student
Cell: 082 446 4140
E-mail: violajvv54@gmail.com

ANNEXURE N: PERMISSION TO CONDUCT RESEARCH AT LIFE COLLEGE OF LEARNING WEST RAND LEARNING CENTRE

Life Group
HEALTH CARE

Life College of Learning
Head Office
Oxford Manor, 21 Chaplin Road, Illovo 2196
Private Bag X13, Northlands 2116
Telephone: +27 11 219 9000
Telefax: +27 11 219 9001
www.lifehealthcare.co.za

10 August 2015

V van Vuuren
School of Nursing
P.O. Box 7426
East London
5200

Dear Viola

APPLICATION TO CONDUCT RESEARCH AT THE LIFE COLLEGE OF LEARNING – WEST RAND LEARNING CENTRE AND BLOEMFONTEIN CLASS ROOM

Your request to conduct research at the West Rand Learning Centre and Bloemfontein class room with the Nurse Educators and Clinical Training Specialists has been granted.

We look forward to seeing the results of your research once it has been completed.

Good luck with your studies.

Yours sincerely

DR. VASTI VAN NIEKERK
Learning Centre Manager

Life Healthcare Group (Proprietary) Limited
Reg. no. 2003/024367/07 Registered address Oxford Manor, 21 Chaplin Road, Illovo 2196, Private Bag X13, Northlands 2116
Directors: A Meyer (Chief Executive Officer), CLW Bekker, D Scheublé, PP van der Westhuizen

Life Healthcare Group (Pty) Ltd is registered as a Private Higher Education College with the DHET. Reg. no. 2008/HE07/003

ANNEXURE O: LETTER REQUESTING PERMISSION TO CONDUCT RESEARCH AT LIFE COLLEGE OF LEARNING EAST RAND LEARNING CENTRE

School of Nursing

P.O. Box 7426

EAST LONDOON

5200

16 July 2015

Life College of Learning

East Rand Learning Centre

15 Middlesex Street

SPRINGS

1559

Dear Ms J Pillay

REQUEST TO CONDUCT RESEARCH AT YOUR COLLEGE OF NURSING

I am a Master's student at the above university and I am requesting permission to conduct research at your learning centre with the nurse educators and clinical training specialists.

The title of my study is "The perceptions of nurse educators regarding the use of high fidelity simulation in nursing education at a South African Private Nursing College."

The purpose of the study is to determine and describe the perceptions of nurse educators in a South African private college of nursing regarding the use of high fidelity simulation in nursing education and to suggest recommendations on how to prepare the nurse educators in a relatively short space of time to take up this role with confidence.

This study hopes to contribute to effective preparation of nurse educators in nursing education using high fidelity simulation. It should highlight the needs of nurse educators to emphasise the lack of training. It also aims to look at alternative ways to prepare nurse educators and recommend ways to effectively prepare them. This would inevitably lead to improved quality of teaching and learning of students, thereby contributing to excellent, world class patient care.

Should you grant me permission; I propose to administer a structured questionnaire to all the nurse educators and clinical training specialist. The questionnaire should take the participants 20 – 30 minutes to complete.

My intention is to collect the data in the last week of July 2015, after my pilot study in the third week of July 2015.

In order to protect the identity of the institution, no name will be mentioned in the questionnaire or the publication. The nurse educators are under no obligation to participate in this study and have the right to withdraw at any stage of the research. They will not be subjected to any harm by participating in this study.
The results of this research will be made available to you on request and on completion.

Should you have any queries please feel free to contact me on the details below.

Thanking you.

Yours Sincerely

_____

Mrs. Viola Janse van Vuuren
M. Cur student
Cell: 082 446 4140
E-mail: violajvv54@gmail.com

ANNEXURE P: PERMISSION TO CONDUCT RESEARCH AT LIFE COLLEGE OF LEARNING EAST RAND LEARNING CENTRE

Li͏fe *Group*

HEALTH CARE

20 August 2015

V van Vuuren
School of Nursing
P.O. Box 7426
East London
5200

Dear Viola

APPLICATION TO CONDUCT RESEARCH AT THE LIFE COLLEGE OF LEARNING – EAST RAND LEARNING CENTRE

Your request to conduct research at the East Rand Learning Centre with the Nurse Educators and Clinical Training Specialists has been granted.

We look forward to seeing the results of your research once it has been completed.

Good luck with your studies.

Yours sincerely

J Pillay
Learning Centre Manager

ANNEXURE Q: LETTER REQUESTING PERMISSION TO CONDUCT RESEARCH AT LIFE COLLEGE OF LEARNING PRETORIA LEARNING CENTRE

<div align="right">

School of Nursing

P.O. Box 7426

EAST LONDON

5200

16 July 2015

</div>

Life College of Learning

Pretoria Learning Centre

P.O. Box 73928

LYNNWOOD RIDGE

0040

Dear Ms M Scheepers

REQUEST TO CONDUCT RESEARCH AT YOUR COLLEGE OF NURSING

I am a Master's student at the above university and I am requesting permission to conduct research at your learning centre and Middelburg classroom with the nurse educators and clinical training specialists.

The title of my study is "The perceptions of nurse educators regarding the use of high fidelity simulation in nursing education at a South African Private Nursing College."

The purpose of the study is to determine and describe the perceptions of nurse educators in a South African private college of nursing regarding the use of high fidelity simulation in nursing education and to suggest recommendations on how to prepare the nurse educators in a relatively short space of time to take up this role with confidence.

This study hopes to contribute to effective preparation of nurse educators in nursing education using high fidelity simulation. It should highlight the needs of nurse educators

to emphasise the lack of training. It also aims to look at alternative ways to prepare nurse educators and recommend ways to effectively prepare them.   This would inevitably lead to improved quality of teaching and learning of students, thereby contributing to excellent, world class patient care.

Should you grant me permission; I propose to administer a structured questionnaire to all the nurse educators and clinical training specialist. The questionnaire should take the participants 20 – 30 minutes to complete.

My intention is to collect the data in the last week of July 2015, after my pilot study in the third week of July 2015.

In order to protect the identity of the institution, no name will be mentioned in the questionnaire or the publication. The nurse educators are under no obligation to participate in this study and have the right to withdraw at any stage of the research. They will not be subjected to any harm by participating in this study.
The results of this research will be made available to you on request and on completion.

Should you have any queries please feel free to contact me on the details below.

Thanking you.

Yours Sincerely

_____

Mrs. Viola Janse van Vuuren
M. Cur student
Cell: 082 446 4140
E-mail: violajvv54@gmail.com

ANNEXURE R: PERMISSION TO CONDUCT RESEARCH AT LIFE COLLEGE OF LEARNING PRETORIA LEARNING CENTRE

11 August 2015

V van Vuuren
School of Nursing
P.O. Box 7426
East London
5200

Dear Viola

**APPLICATION TO CONDUCT RESEARCH AT THE LIFE COLLEGE OF LEARNING –
PRETORIA LEARNING CENTRE AND MIDMED CLASS ROOM**

Your request to conduct research at the Pretoria Learning Centre and Midmed Class room with the Nurse Educators and Clinical Training Specialists has been granted.

We look forward to seeing the results of your research once it has been completed.

Good luck with your studies.

Yours sincerely

M Scheepers
Learning Centre Manager

ANNEXURE S: LETTER REQUESTING PERMISSION TO USE TECHNOLOGY READINESS INDEX

School of Nursing

University of Fort Hare

P.O. Box 7426

EAST LONDON

5200

7   June 2015

Dr A Parasuraman

parsu@miami.edu / aparasur@bus.miami.edu

Dear Dr Parasuramen

REQUEST PERMISSION TO USE TECHNOLOGY READIENSS INDEX

I am a Master's student at the University of Fort Hare. I would like permission to use Technology Readiness Index.

The title of my study is "The perceptions of nurse educators regarding the use of high fidelity simulation in nursing education at a South African Private Nursing College."

The purpose of the study is to determine and describe the perceptions of nurse educators regarding the use of high fidelity simulation in nursing education at a Private Nursing College in South Africa and to suggest recommendations on how to prepare the nurse educators in a relatively short space of time to take up this role with confidence.

This study hopes to contribute to effective preparation of nurse educators in nursing education using high fidelity simulation. It should highlight the needs of nurse educators to emphasise the lack of training. It also aims to look at alternative ways to prepare nurse educators and recommend ways to effectively prepare them. This would inevitably lead to improved quality of teaching and learning of students, thereby contributing to excellent, world class patient care.

Should you grant me permission; I propose to administer a structured questionnaire to all the nurse educators and clinical training specialists.

The results of this research will be made available to you on request and on completion.

Should you have any queries please feel free to contact me on the details below.

Thanking you.

Yours Sincerely

_____

Mrs. Viola Janse van Vuuren
M. Cur student
Cell: 082 446 4140
E-mail: violajvv54@gmail.com

ANNEXURE T: PERMISSION TO USE TECHNOLOGY READINESS INDEX

Viola,

You now have a license to use the TRI scale for your academic research. Attached is a list of scale items and suggested instructions for use. If you send me data when you are finished, I can score this for you.

Regards,

Charles L. Colby

Principal, Chief Methodologist and Founder

Rockbridge Associates, Inc.

10130-G Colvin Run Road

Great Falls, VA 22066

703-757-5213, x12

Fax: 703-757-5208

January 24, 2016

Viola Janse van Vuuren
East London Learning Centre Manager

Dear Viola,

This letter is to confirm that you have an academic license to use the TRI 2.0 scale for your dissertation project. You are allowed to use the scale one time for a non-profit, academic research study. If you wish to use it for subsequent research, there should not be a problem with obtaining a new license but you should reapply. The forms that you returned to us with a signature specified the conditions for the license.

Let me know if you have questions.

Sincerely,

Charles L. Colby
Principal, Chief Methodologist and Founder
Rockbridge Associates, Inc.
10130 G Colvin Run Road
Great Falls, VA 22066

ANNEXURE U: PARTICIPANT INFORMATION SHEET

University of Fort Hare

School of Nursing

P.O. Box 7426

EAST LONDON

5200

Dear Participant

REQUEST FOR CONSENT FROM PARTICIPANT

I am a Masters student at the University of Fort Hare. I am conducting research regarding HIGH FIDELTIY SIMULATION IN NURSING EDUCATION.

I am interested in finding out more about THE PERCEPTIONS OF NURSE EDUCATORS REGARDING HIGH FIDELITY SIMULATION IN NURSING EDUCATION. I am carrying out this research to:

- Highlight lack of training and needs of nurse educators
- Contribute to effective preparation of the nurse educator using high fidelity simulation
- Find alternative ways to prepare nurse educators
- Improve quality of teaching and learning of students
- Contribute to excellent, world class patient care

Please understand that you are not being forced to take part in this study and the choice whether to participate or not is yours alone. However, I would really appreciate it if you do share your thoughts with me. If you choose not to take part in answering these questions, you will not be affected in any way. If you agree to participate, you may stop me at any time and tell me that you don't want to go on with the answering of questions. Should you do this there will also be no penalties and you will NOT be prejudiced in ANY way.

I will not be recording your name anywhere on the questionnaire and no one else will be able to link you to the answers you give. The information will remain confidential.

A self-administered questionnaire will be sent to you by e-mail. You should take about 20 – 30 minutes to complete the questionnaire. The questions are related to your use of high fidelity simulation.

I thank you for reading this information sheet and participation in this research.

_____

Mrs. V. Janse van Vuuren

M. Cur student

Cell: 082 446 4140

E-mail: violajvv54@gmail.com

ANNEXURE V: PARTICIPANT CONSENT FORM

Researcher: Viola Janse van Vuuren

Student No.: 201414715

Cell phone no.: 082 446 4140

E-mail: violajvv54@gmail.com

CONSENT

I hereby agree to participate in research regarding THE PERCEPTIONS OF NURSE EDUCATORS REGARDING THE USE OF HIGH FIDELITY SIMULATION IN NURSING EDUCATION AT A SOUTH AFRICAN PRIVATE NURSING COLLEGE. I understand that I am participating freely and without being forced in any way to do so. I also understand that I can stop this completion of questionnaire at any point should I not want to continue and that this decision will not in any way affect me negatively.

I have received the telephone number of a person to contact should I need to speak about any issues which may arise in the completion of this questionnaire.

I understand that this consent form will not be linked to the questionnaire and that my answers will remain confidential.

I understand that if at all possible, feedback will be given to my community on the results of the completed research.

………………………………   …………………….

Signature of participant   Date

ANNEXURE W: QUESTIONNAIRE

SECTION A: BACKGROUND INFORMATION

Please complete this survey.   All answers will be kept anonymous and confidential. No unauthorised third party will be allowed access to these details. Completion of the survey implies consent. It will take 20 - 30 minutes to complete the survey. Thank you in advance.

1.   Gender:

Male	Female

2.   Age:

…………. years

3.   Race:

African	Asian	White	Other

4.   Highest nursing education qualification:

	Degree				
Diploma	**Bachelor**	**Honours**	**Masters**	**Doctorate**	**None**

5.   How many years have you been a nurse?

……….. year/s	………… months

6.   How many years have you been a nurse educator/clinical training specialist?

……….. year/s	………… months

SECTION B: USE OF SIMULATORS

1. **What type of program do you teach? Select all that apply.**

Certificate leading to enrolment as nursing auxiliary	
Certificate leading to enrolment as a nurse	
Diploma in General Nursing	
Diploma in Midwifery	
Diploma in Operating Department Assistants	
Diploma in Medical & Surgical Nursing: Critical Care	
Diploma in Medical & Surgical Nursing: Theatre Nursing Science	
Diploma in Medical & Surgical Nursing: Emergency Nursing Science	

2. **What type of simulators do you use in your learning centre/class room? Select all that apply.**

Low-fidelity	
Medium-fidelity	
High-fidelity	
Other, please specify	

3. **What is the educational level of your students? Select all that apply.**

First year	
Second year	
Third year	
Fourth year	
Post basic	

4. **What is your role as an instructor with simulation-based training?**
   Select all that apply.

Writing scenarios	
Running the scenario	
Planning prep work for students	
Debriefing	
Other, please specify	

5. **In which of the following situations would you use a simulator?**
   Select all that apply.

Patient assessment and vital signs	
Foley catheter insertion	
IV insertion/removal	
Emergency situations, e.g. cardiac arrest, haemorrhage	
Cardiac resuscitation	
Suctioning	
Administration of IV, IM, SQ and oral medications	
Birthing instruction	
Emergency decision-making	
Other, please specify	

6. What are the goals of the use of simulators in your facility?
   Select all that apply.

Building students' self-confidence	
Increasing students' competency skills	
Teaching effective communication and feedback	
Helping students acquire and retain knowledge	
Encouraging teamwork and collaboration	
Other, please specify	

7. **What are some challenges or problems related to the use of simulators?**

Need technical support	
Developing scenarios	
Creating individualised lessons	
Cost of equipment	
Repairs to equipment	
Rapid changes in technology	
Need for ongoing training and education	
Other, please specify	

8. **What are your major concerns regarding the use of simulators in practice? Rank in order of priority.**

Lack of space	
Lack of experienced faculty to use simulators	
Lack of technical support	
Need for ongoing faculty training	
Lack of time to practice	
Addition to workload	
Cost	
Other, please specify	

9. **What are expected simulation learning outcomes in your facility? Select all that apply.**

Increased self-confidence for students	
Increased competency skills for students	
Students will gain decision-making and critical-thinking skills	
Enhanced interaction, feedback with students	
Increased teamwork and collaboration	
Safe patient care	
Other, please specify	

10. **What are the benefits of using high-fidelity simulators in comparison with low- or medium-fidelity simulators? Select all that apply.**

More realistic simulations of patient reactions	
More realistic simulations of patient pain	
Changes in patient condition and vital signs	
More realistic simulations of patient reactions to intervention	
More realistic simulations overall	
Multiple errors can be made safely	
Other, please specify	

11. **Why did your learning centre/class room select high-fidelity simulators? Select all that apply.**

To help reduce students' medical errors	
To improve faculty teaching	
To improve technical skills of students	
Required by College policy	
Other, please specify	

12. **What steps do you think colleges should take to improve patient safety? Select all that apply.**

Incorporate more high-fidelity simulation in nursing curricula	
Provide more training and continuing education for nursing faculty	
Provide more faculty support	
Facilitate more discussion and feedback	
Other, please specify	

13. **What simulators are you using? Please name.**

14.   In what areas of your curriculum do you use simulation, e.g. medical-surgical didactic; medical-surgical clinical; obstetrics, etc.?

_____

_____

_____

Questions 2 – 14 (Baghoomian, 2014: 152 - 154).

SECTION C: PERCEPTIONS OF NURSE EDUCATORS/CLINICAL TRAINING SPECIALISTS REGARDING THE USE OF HIGH FIDELITY SIMULATION (HFS).

1.   Level of expertise with HFS.

Not using	Novice	Competent	Expert

2.   Type of training you had to use HFS

None	Self-taught	On-the-job	Formal training

3.   How long have you used HFS?

Never	< than 1 year	2 – 5 years	6 – 10 years	> than 10 years

4.   How much time per week do you work with simulation?

None	1 – 5 hours	6 – 10 hours	11 – 15 hours	> than 15 hours

5.   Is your position identified for simulation?

Yes		No	

6.   What percentage of your workload is identified for simulation?

%

PLEASE READ EACH STATEMENT AND INDICATE HOW STRONGLY YOU AGREE OR DISAGREE.

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7.   Technology gives people more control over their life.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

8.   The human touch is very important when dealing with patients.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

9.   Other people come to me for advice on technologies.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

10. Technical support lines are not helpful.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

11. Technical support lines do not explain things in terms I understand.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

13.   Technology systems are not designed for use by ordinary people.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

14.   New technologies are much more convenient to use.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

14. When I call a business, I prefer to talk to a person rather than a machine.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

15. I prefer to use the most advanced technology available.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

16. There is no such thing as a manual for a high-tech product that is written in plain language.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

17. Doing business via computers does not limit one to regular business hours.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

18. If I provide information to a machine or over the internet, I can never be sure it gets to the right place.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

19. When I get technical support from a provider of high tech services, I sometimes feel I am being taken advantage of by someone who knows more than I do.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

20. I like computer programs that allow me to tailor things to my own needs.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

21. I do not consider it safe giving out a credit card number over a computer.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

22. It seems my peers are learning more about the newest technologies than I am.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

23. Technologies make me more efficient in my occupation.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

24. If I buy a high-tech product or service, I prefer to have the basic model over one with lots of features.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

25. I do not consider it safe to do any kind of business online.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

26. It is embarrassing when I have trouble with a high-tech gadget while people are watching.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

27. In general I am among the first in my circle of friends to acquire new technology when it appears.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

28. I find new technologies to be mentally stimulating.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

29. There should be caution when replacing important people-tasks with technology because technology can break down or get disconnected.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

30. I can usually figure out new high-tech products and services without help from others.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

31. I worry that information I send over the Internet will be seen by other people.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

32. Technology gives me more freedom of mobility.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

33. Many new technologies have health or safety risks that are not discovered until after people have used them.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

34. Many new technologies have health or safety risks that are not discovered until after people have been affected.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

35. I keep up with the latest technological developments in my areas of interest.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

36. I do not feel confident doing business with a place that can only be reached online.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

37. Learning about technology can be as rewarding as the technology itself.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

38. Any business transaction I do electronically should be confirmed later with something in writing.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

39. I enjoy the challenge of figuring out high-tech gadgets.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

40. New technology makes it too easy for governments and companies to spy on people.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

41. I feel confident that machines will follow through with what I have instructed them to do.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

42. Whenever something gets automated, I need to check carefully that the computer or machine is not making mistakes.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

43. I find I have fewer problems than other people making technology working for me.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

44. Technology always seems to fail at the worst possible times.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

Please include any comments. The information you are providing regarding current simulation use in nursing education will be very helpful in developing a snapshot of HFS usage.

_____

_____

_____

_____

_____

Thank you for completing this survey.

V. Janse van Vuuren