ARTICLE

THE PERCEPTIONS OF NURSE EDUCATORS REGARDING THE USE OF HIGH FIDELITY SIMULATION IN NURSING EDUCATION

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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 causes 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. The aim of this study was to determine the perceptions of nurse educators regarding the use of high fidelity simulation (HFS) in nursing education at a South African private nursing college. A national survey of nurse educators and clinical training specialists was completed with 118 participants; however, only 79 completed the survey. The findings indicate that everyone is at the same level as far as technology readiness is concerned, however, it does not play a significant role in the use of HFS. These findings support the educators' need for training to adequately prepare them to use simulation equipment. There is a need for further research to determine what other factors play a role in the use of HFS; and if the benefits of HFS are superior to other teaching strategies warranting the time and financial commitment. The findings of this study can be used as guidelines for other institutions to prepare their teaching staff in the use of HFS.

Keywords: high fidelity simulation; nurse educators; quantitative research; teaching and learning

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INTRODUCTION AND BACKGROUND

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, to acquire knowledge, to demonstrate affective attitudes, and to perfect psychomotor skills for a safe professional practice (Baghoomian 2014, 49). They also play a pivotal role in improving the image of nursing. The main duty of nurse educators is to create a learning environment in classrooms and clinical skills laboratories to facilitate student learning to achieve desirable outcomes (Baghoomian 2014, 51). They do, however, face the challenge of finding optimal opportunities for students to learn critical skills needed to care for patients with increased acuity that is found in the healthcare systems of today, always considering the patients' safety. To meet all these challenges, nursing schools have to look at alternative innovative teaching methods in their nursing programmes, such as high fidelity simulation (HFS) (Howard et al. 2011, e1). Besides the shortage of clinical nurses worldwide, there is also a 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 learning opportunities for students to be exposed to low-incidence, but highly critical events. All these factors mentioned could jeopardise the safety of the patient. 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 about 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 world – with or without sophisticated technology to educate, train, assess, 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. In hospitals in the United States of America, it is estimated that between 48 000 to 98 000 patients die annually due to the lack of competent care from health professionals and errors that could be prevented. The struggle to meet regulatory requirements of standards forces healthcare to turn to technology to improve delivery and patient outcomes (Baghoomian 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 2009, 491). A primary focus in healthcare is the safety of patients and reduction of errors. This is one of the

major advantages of simulation laboratories as it gives students the opportunity to demonstrate, practice 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). 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. 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.

Nurse educators are challenged on how to teach nursing students to prioritise care and think critically in the practice. Teaching with high-tech simulators could be an alternative to traditional teaching approaches that emphasise exposure to realistic clinical situations they might not otherwise experience in a practical setting, thus the possibility of making errors as simulator practice poses no direct risk to real patients (Baghoomian 2014, 1–2).

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, as a versatile educational tool is more important than the tool itself (Savoldelli et al. 2005, 948). Nurse educators are aware of the advantages of simulation-based training, but some still feel uncomfortable to use technology in the clinical setting or lack the motivation to learn how to use the technology, attributable to frustration and anxiety about where to start, especially with high fidelity simulators, inadequate staff, busy schedules, and the amount of work required to implement simulation within nursing courses (Baghoomian 2014, 48).

Simulation has been endorsed by nursing professional bodies (Cant and Cooper 2009, 4). Despite the fact that many nursing educational accrediting bodies around the world are evaluating the use of simulation for licensure, there have been no standard guidelines proposed concerning the implementation of simulation (Kardong-Edgren, Starkweather, and Ward 2008, 3). 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 (SANC) does not mention HFS as such, it clearly states that a minimum of 60 per cent of formative clinical assessment activities must be done in real-life situations. This means that 40 per cent of other activities, for example HFS, 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 they might not otherwise be experienced 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.

Literature pertaining to this research area is limited with few studies 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 and to focus on the integration and application of competency skills, knowledge and critical thinking (Baghoomian 2014, 1). In healthcare settings, technological changes are rapidly increasing. Nursing schools need to keep abreast with the new technology in developing their educational approaches and curricula. Simulation techniques that are used in teaching vary from low to high fidelity. Using these simulators in nursing education is costly. High fidelity involves computerised manikins to replicate the human anatomy. They are programmed to imitate vital signs (Cant and Cooper 2009, 4), and to develop critical thinking skills (Rothgeb 2008, 489). Introducing these simulators could be stressful for nurse educators, especially if they have neither used them nor have been properly trained to use them. Taking the aging population among nurse educators into consideration, it has become a great concern that they are not sufficiently prepared to take on the use of HFS in nursing education (Baghoomian 2014, 48).

STATEMENT OF THE RESEARCH PROBLEM

Challenges experienced in the private nursing college in South Africa include inadequate clinical placements for students because 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, the aging population, incompetence in technology simulation, the lack of trained staff, and the lack of human and financial resources.

A big concern in South Africa is the aging population among the nurse educators. Indeed, albeit anecdotal, most of this aging population are not computer-literate, and lack simulation-based technological skill teaching. While each campus received a manikin for HFS, the nurse educators had to rely on training from the supplier and are responsible for self-training to master every aspect of the simulation techniques. Many factors influence the implementation of HFS as teaching strategy. These include nurse educators' busy schedules (classroom teaching and clinical accompaniment) which get worse with the add-ons, yet no time is planned to go to the simulation laboratory for in-service or self-training. There are common challenges such as inexperience with technology, time constraints learning the technology as well as scheduling students and inadequate space to implement HFS (Howard et al. 2011, e2). 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). However, most nurse educators received little or no training in the use of simulators and had little direct experience in the use

thereof. Rothgeb (2008, 492) states 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. The lack of trained staff is evident at this private nursing college.

Both old and new healthcare practitioners stay away from getting involved in simulated activities. Nurse educators are responsible for everything related to the training of their student groups from preparing their documents for registration at the SANC, facilitating study material, setting and marking tests, organising remedial sessions when needed, clinical accompaniment, and all administration related to their students to completing the training documents needed by SANC to register them in the specific category. Nurse educator time and proficiency with simulation equipment is also a limitation, as their already very busy schedules, lecturing and doing clinical accompaniment do not allow them to plan time to go to the simulation laboratory to practice the new skills needed. Other challenges include space and the availability of resources (Cannon-Diebl 2009, 134). It is important that all seven national learning centres have the same equipment. Although all learning centres meet the requirements for accreditation by SANC, 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 among large groups of students.

Many nursing programmes are investing a lot of money in human patient simulation (HPS), yet this valuable resource is often not being used to its full potential. Organisations have allocated monies for HPS equipment, but few set aside appropriate resources, time of refunds for educating personnel on how to effectively use the equipment or to network with other organisations to optimise its use. Opportunities are then missed to improve nursing education (Adamson 2010, e75–e76). Also, very little research has been done to establish the readiness of nurse educators, especially in the South African context. No literature could be found in the South African context exploring the readiness of nurse educators in a private institution concerning the use of HFS. It is envisaged that findings from this study will contribute to the effective preparation of nurse educators in nursing education using HFS, which would inevitably lead to improved quality of teaching and learning of students thereby contributing to excellent, world-class patient care.

RESEARCH QUESTION

As a result, the research question for this study was:

- What are the perceptions of nurse educators regarding the use of HFS in nursing education at a South African private nursing college?

RESEARCH OBJECTIVE

The objective of the study was to determine and describe the perceptions of nurse educators regarding the use of HFS in nursing education at a South African private nursing college.

RESEARCH METHODOLOGY

Research Design

A quantitative descriptive research design was used for this study. This design was crafted to gain more information about characteristics in the particular field of study namely nursing (Brink, Van der Walt, and Van Rensburg 2012, 102; Grové, Burns and Gray 2013, 21; Parahoo 2006, 143). This design is deemed appropriate to describe the perceptions of nurse educators regarding the use of HFS in nursing education at a private nursing college in South Africa.

Research Setting

The study was conducted at the main campus of a private nursing college situated at Illovo in Johannesburg, South Africa, which has sub-campuses spread throughout South Africa. All the campuses, classrooms and affiliated hospitals are utilised. The different campuses offer various nursing programmes.

Population and Sampling

The population in this study consisted of nurse educators at the seven campuses of a private nursing college and affiliated hospitals in South Africa. The nurse educators at the learning centres all have nursing education as an additional qualification and most are currently busy with their master's studies, while a few are pursuing doctoral studies. All 118 nurse educators and clinical training specialists working at this private college of nursing and associated hospitals in South Africa were invited to participate in the study. However, only 79 of them completed the survey.

Inclusion and Exclusion Criteria

Nurse educators were included in this study if they were permanently employed by the private nursing college and its associated private hospitals, if they had already completed or were busy with the nursing education qualification, and if they had teaching experience in the classroom and clinical areas. However, nurse educators who were not permanently employed by the private nursing college and hospitals, non-practising nurse educators, and nurse educators who were the main campus personnel were excluded from the study.

Data Collection Instrument

A self-administered, structured questionnaire was designed and used for data collection in this study. 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 or clinical training specialist. Section B consisted of enquiries regarding the use of simulators and included questions about programme taught, types of simulators available, educational level of students, role as instructor, situations using a simulator, their goals, benefits, challenges, concerns and expectations related to the use of simulators. The educators 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 HFS in nursing education. Questions one to six of this section focused on the educators' level of expertise with HFS, the type and duration of training exposed to, how often they worked with simulation, and the percentage of their workloads if their positions were identified for simulation training. It also included the Technology Readiness Index (TRI) (using the Likert scale, questions seven to 44) for which permission to use was obtained from Prof. A. Parasuraman and Rockbridge in June 2015. Responses were derived from a five-point Likert scale used for questions seven to 44 (strongly agree, agree, undecided, disagree and strongly disagree). Strongly agree = 4, Agree = 3, Undecided = 2, Disagree = 1, Strongly disagree = 0. The respondents had to place a tick (√ or x) in response to a series of statements selected to assess their technology readiness.

Data Collection

The participants were given a questionnaire to complete in their own time. The questionnaires were emailed to the nurse educators at the sub-campuses and clinical training specialists at the affiliated hospitals. Each respondent received information about the research, a consent form and a questionnaire.

Validity and Reliability

The questionnaire was validated through face and content validity by a research expert in the field of educational technology. Permission was also obtained to use questions from the TRI used for other research. The questionnaire focused on questions that explored the nurse educators' perceptions of HFS in nursing education. Questions were drawn from the literature on HFS. The research instrument was tested to determine the clarity of the questions and instructions on the questionnaire (Grové, Burns, and Gray 2013, 343). The pilot study was conducted using 10 per cent (n = 10) of the sample from all campuses. 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 chosen facilities. The responses from the pilot study indicated that the respondents clearly understood the questions, and no problems were identified with the use of the questionnaire.

Ethical Considerations

Ethical approval was obtained from the ethical committee of the University of Fort Hare. Permission was obtained from the managers of the sub-campuses and health facilities before sending the questionnaires to the participants. Informed consent was sought and obtained from the participants before data collection. The ethical principles of anonymity, autonomy, confidentiality, right to self-determination, beneficence and justice were strictly adhered to.

Data Analysis

Descriptive statistics (percentages) were applied to analyse the data. A graphical exploratory analysis was carried out using pie charts, box plots and line plots. Spearman's correlation analysis was used to test for the significance of relationships between technology readiness and age, experience and the percentage HFS workload. The Mann-Whitney test or the Kruskal-Wallis test was used for comparing the TRI across two or more than two samples, respectively. All tests for statistical significance were carried out at a 5 per cent level of significance using Statistical Analysis Systems (SAS) software version 9.4.

RESULTS

A total of 80 completed questionnaires N = 80 were returned constituting a 68 per cent response rate. The mean age of the participants was 46.9 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 or higher qualifications. The nursing experience of the nurse educators ranged between six and 59 years. The nurse educators and clinical training specialists use low, medium and high fidelity simulators in both basic and post basic programmes.

The perceptions of nurse educators regarding the use of HFS in the training of nurses in South Africa were done by assessing the technology readiness of nurse educators based on the TRI made up of four components, namely optimism, innovativeness, discomfort and insecurity. (Section C dealt with this aspect of the study.)

HFS exposure among the nurse educators comprises five measures, namely the level of expertise, the type of training received, the simulation-use experience, the weekly time commitment, and simulation-related workload. The distributions of the responses to these measures are presented in Figures 1–5.

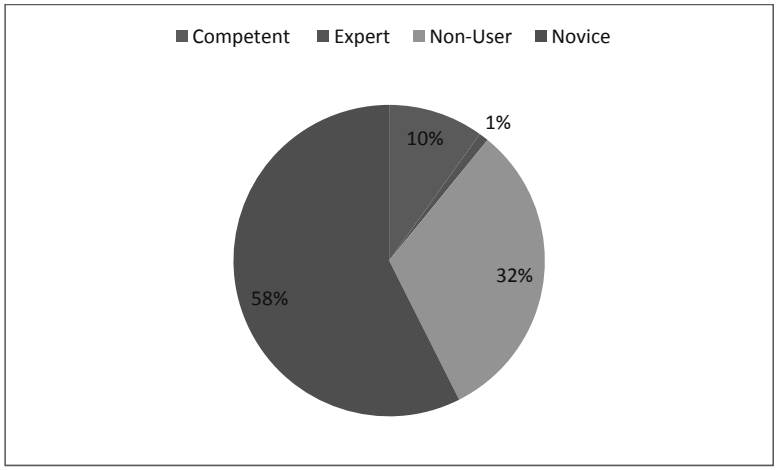

Figure 1: Level of HFS expertise

Figure 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. Only 8 (10%) are either at the competent or expert levels. The encouraging part is that the majority of the nurse educators (68%) have some exposure to HFS.

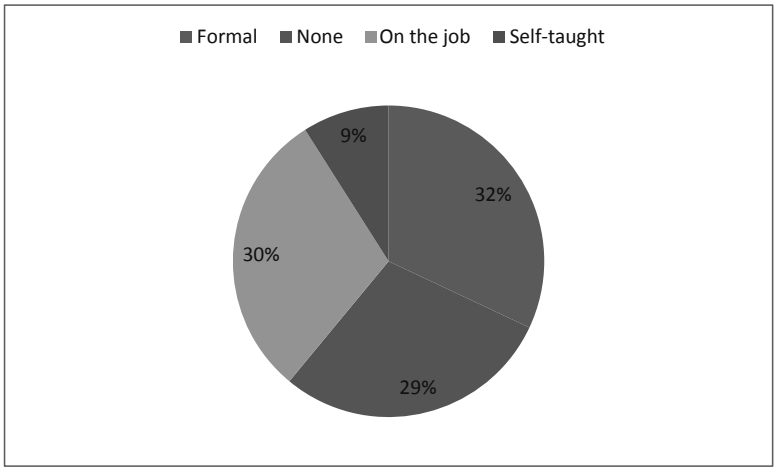

Figure 2: HFS training

Figure 2 shows that 32 per cent of those educators that use HFS in their nursing education programmes have had formal HFS training while 30 per cent received on-the-job training. About one third (29%) of the respondents had received no training at all.

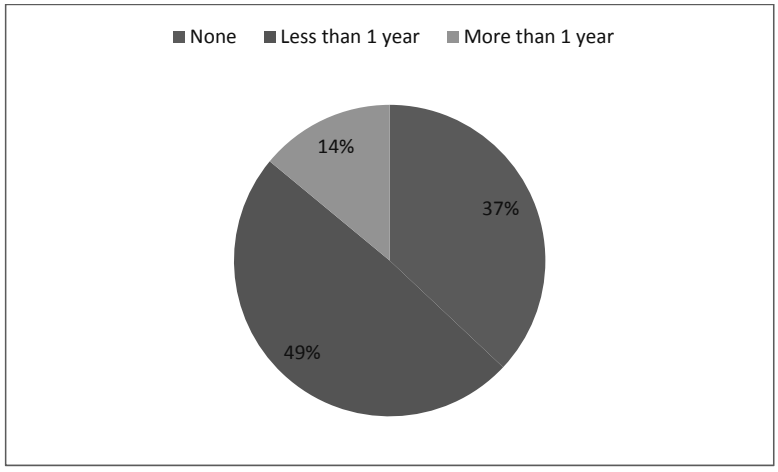

Figure 3: HFS experience

About 29 (37%) educators who do not have HFS experience are the same 37 per cent who do not have weekly HFS exposure. The majority, 49 (63%), that have HFS experience have less than one year's experience (38, 49%) and only 11 (14%) have more than one year's experience.

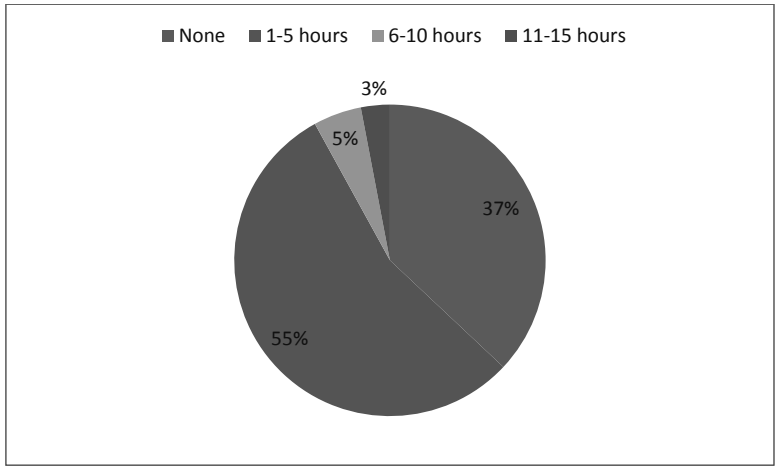

Figure 4: Weekly HFS use

Figure 4 shows that the majority, 42 (55%), of the respondents use HFS for at most five hours in a given week while four (5%) use it for between six and 10 hours per week. This indicates that the majority of the respondents' positions have been identified for use of simulation.

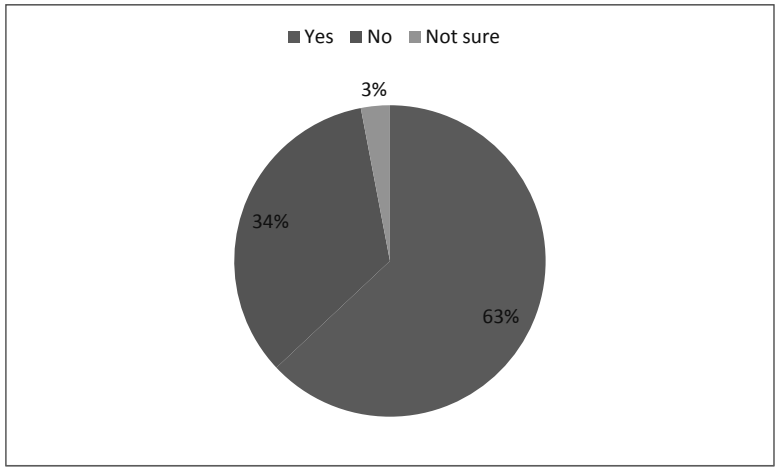

Figure 5: Identification of position for HFS use

Figure 5 shows that the positions of 45 (63%) of the respondents are identified for simulation while it is not so for the remaining 26 (37%).

The TRI and its components were tested for normality using the Shapiro-Wilk's test (Table 1). The results show that optimism, discomfort and insecurity are normally distributed while innovation and the TRI are not normally distributed. For the TRI the p-value is 0.034 (3.4%) which is less than 0.05 (5%). In this case the hypothesis that says the TRI is not normally distributed is rejected. The respondents scored highest on the optimism component with a mean score of 3.9 and lowest on the insecurity component with a mean score of 2.7. The two positive components, optimism and innovation, had mean scores greater than 3.0. Discomfort and insecurity are the negative components of technology readiness and the respondents scored 3.0 and 2.7 on these components, respectively.

Table 1: Technology readiness and its components

Variable	Median	Mean	SD	Shapiro-Wilk's statistic	p-value
Optimism	3.9	3.9	0.439	0.983	0.346
Innovation	3.4	3.4	0.677	0.969	0.049
Discomfort	3.0	3.0	0.571	0.981	0.273
Insecurity	2.7	2.7	0.439	0.984	0.407
Technology readiness index	3.1	3.2	0.305	0.967	0.034

In order to determine if the technology readiness depends on the nurse educators' biographical characteristics (age, race, qualification, experience, level of expertise, type of training, HFS use experience) and time committed to HFS on a weekly basis and overall HFS percentage workload, box plots were used as an explanatory graphical analysis tool (Figures 6 to 10).

Figure 6 shows that the TRI 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 that it is not statistically significant ($Z = 0.36$, $p = 0.716$). The nurse educators still busy with their studies towards a degree or diploma in nursing education have a slightly lower TRI than the diploma and postgraduate holders. However, this difference was not statistically significant ($\chi^2 = 1.03$, $df = 2$, $p = 0.598$) (Figure 7). Users and non-users of HFS have the same mean TRI ($Z = 1.30$, $p = 0.192$) (Figure 8). Figure 8 shows that the training status of a nurse educator does not seem to have any influence on the nurse educator's TRI ($\chi^2 = 1.02$, $df = 2$, $p = 0.598$). Figure 9 indicates that those with no HFS use experience or less than a year's experience have a higher TRI than those with more than a year's experience. However, experience of HFS use does not affect the readiness index ($\chi^2 = 3.43$, $df = 2$, $p = 0.180$). Figure 10 shows that those with more than 10 hours of HFS in a week have a significantly higher TRI 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 ($\chi^2 = 2.17$, $df = 3$, $p = 0.537$).

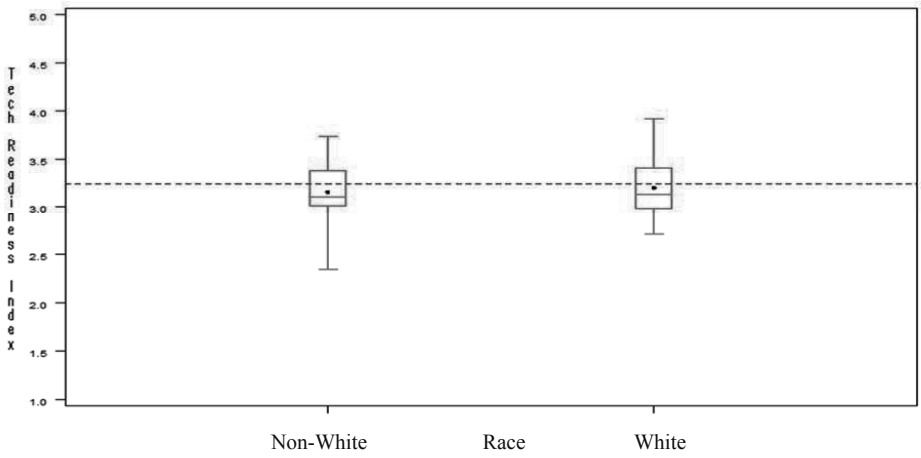

Figure 6: Box plot of technology readiness by race

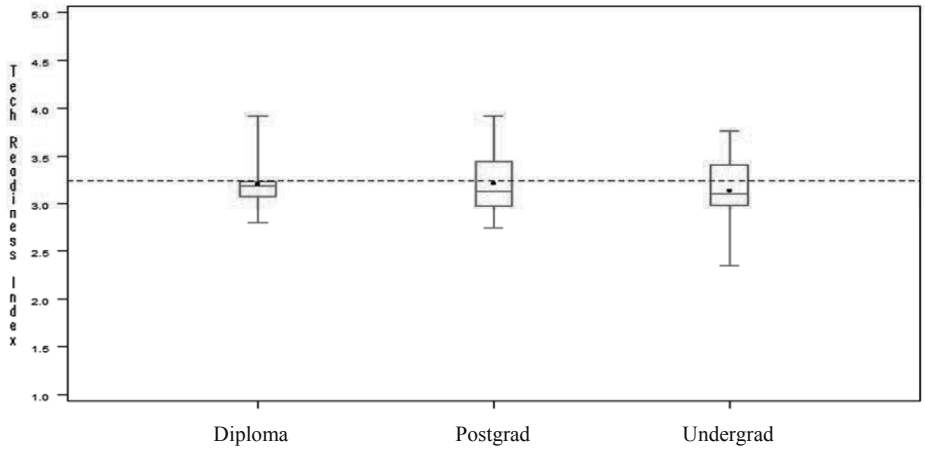

Figure 7: Box plot of technology readiness by educational level

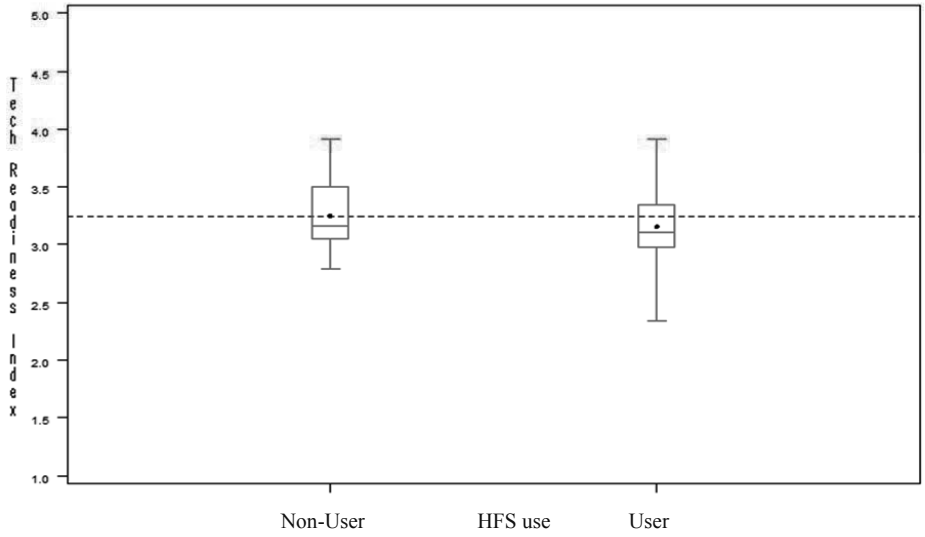

Figure 8: Box plot of technology readiness by HFS expertise

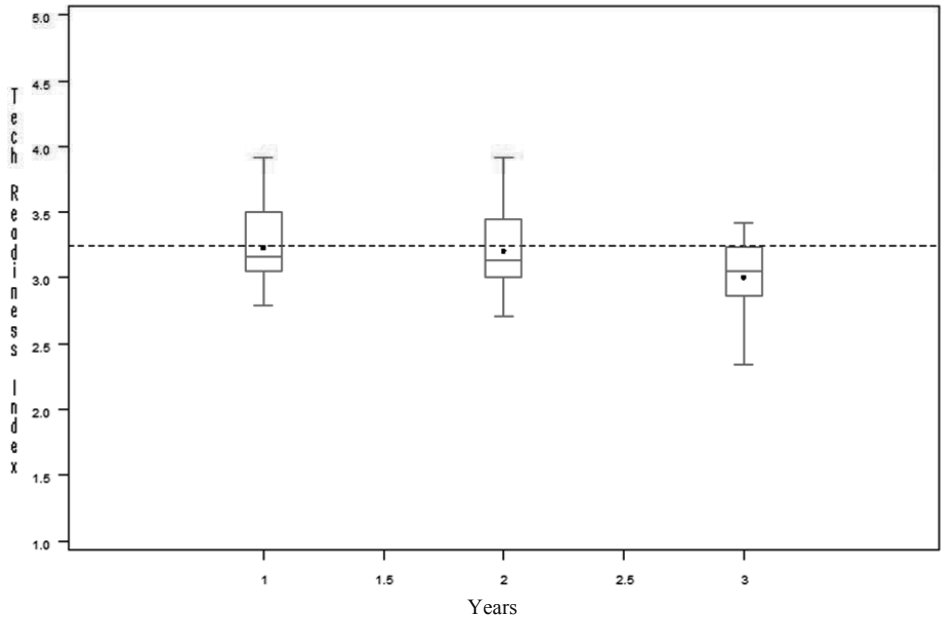

Figure 9: Box plot of technology readiness by HFS experience

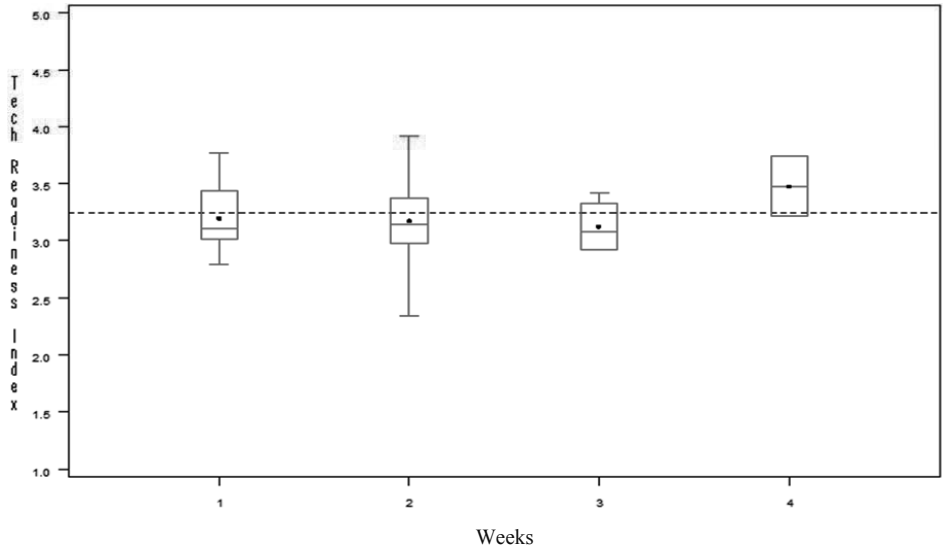

Figure 10: Box plot of technology readiness by weekly simulation use

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 nursing education experience ($r = -0.28$, $p = 0.012$). It was also found that technology readiness is significantly correlated with all of 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 ($r = -0.13$, $p = 0.242$), and HFS percentage workload ($r = 0.13$, $p = 0.281$). The innovativeness component was found to be negatively significantly correlated with nursing education experience ($r = -0.26$, $p = 0.022$). Discomfort was found to have a significant positive correlation with insecurity ($r = 0.26$, $p = 0.016$).

DISCUSSION

The findings of the present study indicated that nurse educators carry a heavy workload by teaching more than one group of students at a time. Also, in the hospitals in some areas, there was a critical shortage of clinical training specialists who ensure a competent workforce through clinical teaching and student accompaniment. They are also responsible for competency assessments of students and qualified staff.

Clearly, the nurse educators have not explored more ways in which simulation-based training can be applied. Low and medium fidelity simulators are widely utilised both in the classroom as well as clinical settings. The nurse educators could not fathom what the goals of simulators are; they only used those specified in the instrument and none suggested more or different goals.

The majority of respondents agreed on the benefits of high fidelity simulators in comparison with low or medium fidelity simulators. However, consistent with Baghoomian's (2014, 119) study, the "need for ongoing training and lack of time" was a limiting factor in using high fidelity simulators. The fact that most participants agreed that high fidelity simulators help to reduce errors and to improve teaching shows that patient safety is also a priority. Using simulators helps students to practice in a safe environment where the safety of patients is 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 learning centres and associated classrooms used low and medium fidelity simulators more than high fidelity simulators in clinical practice. These simulators are utilised depending on the type of clinical situation. Seemingly, the Learning Centres that possessed the high fidelity simulators are not fully utilised. From the responses received it is clear that the use of HFS is still a rather new experience to the faculty of this private institution, but that they are optimistic regarding the use and benefits thereof.

The majority (68%) of the nurse educators have some exposure to HFS. While most of the respondents might have had exposure to HFS in the past, some of them do not use it in their day-to-day activities as nurse educators. In a similar study by Duvall (2012, 37), 17.9 per cent of the participants were not using HFS, 36.3 per cent viewed themselves as novices, 25.8 per cent as being competent and 15.9% as experts.

While half of those that use HFS in their nursing education programmes have had formal HFS training, others 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 HFS has been used in nursing 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 they lacked on-the-job training, with a few, 18.5%, who had no training and a small group of 11.2% who received training on the job. While only 26.7 per cent received formal training, 4.3 per cent of the respondents chose not to answer this question (Duvall 2012, 39).

It is clear in 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 (49%) have less than one year's HFS experience and are probably still exploring how best they can take advantage of HFS in their daily activities. Based on the 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.

The findings of the study demonstrated that nurse educators are keen on adopting 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 fears of the potential disadvantages associated with the use of technology. Power cuts are one of the disadvantages of having 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 TRI and its components.

Based on the multiple comparison procedure, the optimism component was found to be significantly higher than all the other components, while innovation was significantly higher than the two negative components. Discomfort was not significantly different from the overall TRI and both were significantly higher than insecurity. According to Parasuraman (2000), 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 (Duvall 2012, 24; Parasuraman 2000).

Nurse educators who are still busy with their studies towards a degree or diploma in nursing education have a slightly lower TRI than the diploma and postgraduate holders, while users and non-users of HFS have the same mean TRI. Besides, training of a nurse educator does not seem to have any influence on the nurse educator's TRI. This is rather strange because it would be reasonably expected that those with some training would have a significantly higher TRI and suggests that there are probably some other factors that influence a nurse educator's TRI other than training.

It was found that experience of HFS use does not affect the readiness index. It appears reasonable to expect that those with more experience of HFS use would have significantly higher readiness. Again, this suggests the existence of other factors besides just experience with technology.

The results showed that optimism, discomfort, insecurity and innovativeness were not significantly affected by whether HFS is used or not. A study conducted in Canada showed that participants were generally positive regarding the use of HFS, but that there remains a need for additional support related to time and resources to successfully implement it as a teaching strategy (Howard et al. 2011, e2). 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, 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. The absence of formal training was believed to have contributed to the lack of comfort and competence of faculty participants (King et al. 2008, 8).

Those educators with more experience are more optimistic than those with little or no experience. Study results indicated most participants had little, if any, formal HPS training and limited or no experience of actually using HPS. Not surprising they had a lack of positive attitudes to their own level of comfort and competence when using HPS with students. Interesting to note is that while the majority of the faculty had neither formal training nor experience using HPS, they still believed the HPS was 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 the HPS (King et al. 2008, 13).

LIMITATIONS

This study only focussed on one private nursing college in South Africa and can therefore not be generalised for all private nursing colleges in South Africa. Only the nurse educators and clinical training specialists employed by this nursing college and its affiliated hospitals participated in this study hence the results focused on their perceptions and cannot be generalised for all nurse educators and clinical training specialists.

CONCLUSIONS

This study 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 and Myrick 2009, 327). Using simulation effectively involves more than just buying a manikin. It involves organisation, curricular consideration, simulation skill and a whole new view of healthcare education and clinical experiences (Seropian et al. 2004, 174). The technology readiness of nurse educators was found to be independent of race, educational qualification, level of experience of 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 results showed that those with more experience with HFS are highly optimistic of adopting technology for training purposes. The correlation analysis showed that age, nursing experience and percentage HFS workload were not significantly correlated with the TRI and all its components. However, high nursing education experience was found to be significantly associated with low innovativeness and low TRI. It was also found that technology readiness is significantly correlated with all of its four components, namely optimism, innovativeness, discomfort and insecurity.

RECOMMENDATIONS

Based on the findings of this study, there is a need to identify and provide adequate space apart from the classroom, with one-way mirrors around the simulation area to allow viewing of the entire simulation without disruption (Howard et al. 2011, e2). Also, 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). Training time may be given in the form of a reimbursing faculty to attend simulation conferences or the reduction in workloads in order to develop simulation scenarios. The nurse educators responsible for the implementation of HFS at the private nursing college campuses need to be trained on the high fidelity software, writing of scenarios and facilitated 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 and Telles 2009, e232). 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 how to engage with students as well as how to provide realistic simulation and debriefing through trial and error (Seropian et al. 2004, 172). Additionally, there is 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).

Ongoing research on the different aspects of implementing HFS 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. Further studies need to obtain faculty values and input regarding the uses of this educational methodology (Bremner et al. 2006, 173), and to explore the challenges nurse educators face in adopting new technology into their teaching cache (King et al. 2008, 15).

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