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**DETERMINATION OF NURSE EDUCATORS' READINESS REGARDING
THE USE OF TECHNOLOGY FOR A NEW NURSING PROGRAMME**

Dissertation

MNurs (Advanced Nursing Education)

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With sincere appreciation

Anita Dean

ABSTRACT

Introduction

Rapidly expanding and increasing introduction of technology in nursing care necessitates the readiness of nurse educators to include technology in the presentation of a new nursing programme. Although technology resources like computers, high-fidelity manikins, and smartboards have been available for the programme that is phasing out, these equipment were not often used. As a new contemporary outcomes-based, community-focused and primary healthcare-driven nursing programme was planned, there was a serious concern about the nurse educators' readiness to incorporate technology as planned.

Technology readiness is a process by which the acceptance constructs of attitude, perceived usefulness, innovativeness of users, and many adaption factors that could have influenced the technology readiness index level, are determined. The level and aspects of readiness are used as predictors for the likelihood of success of the integration of technology in a new programme.

Aims and objectives

Therefore, the study aimed to determine the readiness regarding the use of technology by the nurse educators at the South African Military Health Service (SAMHS) Nursing College. Possible barriers and enablers that could influence the readiness will also be described.

Research design

A quantitative descriptive study was conducted to determine the readiness of nurse educators regarding the use of technology for a new programme at SAMHS Nursing College.

Methods

The sampling technique was a total population sampling of nurse educators at the SAMHS Nursing College, where all were invited to participate in the study. Data was collected through a self-administered structured questionnaire, namely the Technology Readiness Index 2.0, as obtained from the developers. The statistician used the Statistical Analysis System (SAS v.9.4) software programme to complete the data analysis.

Significance of the study

The results of this study could be used by the management of the SAMHS Nursing College to assist in planning regarding technology integration by nurse educators in the new nursing programme when

a clearer picture or statistical information and graphs are available regarding readiness. Including effective use of technology may contribute to increased academic excellence and improved quality in nursing education.

Results/Findings

The results indicated that most (77%) of the nurse educators were highly ready, 21% were moderately ready and only 2% were not ready to use technology.

Conclusion

An overall conclusion emanating from this study where information has been gathered on the use of technology in nursing education that could benefit future performances. The use of technology can potentially transform the teaching and learning environment significantly and consequently contribute to positive learning outcomes. However, this study has revealed that the SAMHS Nursing College has been challenged in incorporating technology into the instructional system.

KEYWORDS

- Nursing Programme
- Nurse Educator
- Readiness
- Technology Readiness Index

DEDICATION

This thesis is dedicated to the following:

My father was so proud of his children. I will forever remember his words of wisdom: “Do your best in everything you do”;

My mother, whose letters were in the neatest and clearest handwriting - such an example to me; and to

Jesus Christ the Almighty – the One who said: “You’ll have the strength to face all conditions by the power that Christ gives you”.

– Philippians 4:13

Anita Dean

DECLARATION

I, **Anita Dean**, declare that this dissertation entitled “**Determination of Nurse Educators’ Readiness Regarding the Use of Technology for a New Nursing Programme**” is my own work, and all the sources I have used or quoted have been acknowledged using a complete reference.

This dissertation has not been submitted for any degree at the University of Pretoria or any academic institution.

Anita Dean

19 December 2022

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LIST OF ABBREVIATIONS/ACRONYMS

Abbreviation / Acronym	Meaning
1MHREC	1 Military Hospital Research Ethics Committee
CHE	Council on Higher Education
CIT	Computerised Information Technology
DOD	Department of Defence
DOH	Department of Health
HEQSF	Higher Education Qualifications Sub-framework
HITAM	Health Information Technology Acceptance Model
IG	Inspector General
IT	Information Technology
NEIs	Nursing Education Institutions
SAMHS	South African Military Health Services
SANC	South African Nursing Council
TAM	Technology Acceptance Model
TPB	Theory of Planned Behaviour
TR	Technology Readiness
TRA	Theory of Reasoned Action
TRI	Technology Readiness Index
UTAUT	Unified Theory of Acceptance and Use of Technology

CHAPTER 1: BACKGROUND TO THE STUDY

1.1 INTRODUCTION

Educational technology was developed in the 1950s with computer-based instruction; it merged into computer-based learning with simulations and hypertext in the 80s and 90s. In the 2000s, multiple mobile technologies emerged, and they had flavoured learning situations with learning-in-context scenarios. Educational technology is a dynamic, rapidly developing field and is often in learning science referred to as e-learning or telematic education. E-learning is a comprehensive system of flexible learning, combining all the different modes of education to take the distance out of distance learning through electronic mediation to anyone, at any place and at any time (Hugo & Fakude 2016:410).

Information and communication technology has greatly impacted many parts of the world and has changed people's daily lives by providing faster and more convenient communication, easier acquisition of information and its ability to provide a better quality of life. Information and communication technology, in particular, benefits healthcare systems and education. The use of technology and related processes are, however, dependent on local context with issues such as limited infrastructure, lack of connectivity and costs for the reliability of connection that can affect the use of such competencies as experience, confidence or attitude (Lee & Clarke 2015:1182).

Today's school and university educators, including nurse educators, are expected to meet accreditation standards in teaching and modelling appropriate digital skills. Implementing new technology into instruction has been a process of acceptance and adoption, then use, which is based upon the perceived usefulness and the ease of use. Several models, such as the Theory of Reasoned Action (TRA), Rogers' Theory of Diffusion of Innovation (DOI), and the Technology Acceptance Model (TAM) and its derivatives, have been used to study the adoption of technology. It stated that a person's attitude towards a behaviour, such as using computer technology, is determined by one's beliefs about the consequences of the behaviour and the influence of multiple factors, such as culture change and attitudes towards technology (Loague, Caldwell & Balsam 2018:2).

Lee and Clarke (2015:1181) investigated nursing students' attitudes towards information and communication technology during clinical placements in South Korea by developing a shortened information technological attitude scale. The usage of information technology (IT) has gone through tremendous growth and advances in the nursing education field in the last decade (Awad, Abdullah, Ibrahim & Abdullah 2019:32). Nurse educators face great difficulties and challenges in laboratory

teaching, simulations, and the transfer of information and skills to be applied in the practice of providing direct nursing care to patients. According to Awad *et al.* (2019:32), it is clear that the simulation systems provide good educational opportunities, as seen in the study regarding nursing students' attitudes towards simulation technology done in Iraq.

The study indicated that simulation technology is also rapidly expanding, but unfortunately, it is not uncommon that, following the purchase of this equipment, such as high-fidelity manikins, the educator's use of technology stays unchanged from traditional computer-based methods. Even though opportunities to develop clinical decision-making skills in a "safe" environment could be provided by using simulation technology and manikins (Singh & Masango 2020:18). Simulation is an influential instruction method that motivates students and obliges them to think logically and use a critical thinking approach, and offers a prospect for insightful education and mixing of students' knowledge and practice. It also demonstrated limited use of these technologies in new programmes (Awad *et al.* 2019:39).

The National Strategic Plan for Nurse Education Training and Practice 2012/13-16/17 reaffirms that the primary aim of nursing education is to provide adequate numbers of competent, caring nurses to meet the healthcare needs of the Republic of South Africa (RSA). The proclamation of the new Nursing Act, Act No 33 of 2005, necessitates major changes in the education landscape of nurses in the RSA. The changes were also influenced by changes within South Africa's higher education sector. The South African Nursing Council (SANC) informed Nursing Education Institutions (NEIs) and stakeholders that the 'legacy' nursing qualifications currently being presented could no longer be offered after 30 June 2016. Circular 3 of 2009, issued in March 2009, informed NEIs and stakeholders to be prepared for implementing the new nursing qualifications that should be aligned with the Higher Education Qualifications Sub-framework (HEQSF).

For this transition to be a Higher Education Institution (HEI), dual accreditation at SANC and the Council on Higher Education (CHE) was necessary. Therefore, the SAMHS Nursing College was preparing to present a new programme, namely the Diploma in General Nursing (R171) instead of the Diploma in Nursing Science (General, Psychiatric and Community and Midwifery) (R425). The new programme will only be presented from 2021.

For the new programme to be aligned with national trends, nurse educators were encouraged to embrace the use of technology. It implies that they must be electronically competent and able to integrate new technology in teaching and learn to use creative and innovative teaching strategies for

a contemporary outcome-based, community-focused and primary health care-driven programme as stipulated by SANC (SANC Education and Training Standards 2015:81).

1.2 PROBLEM STATEMENT

The researcher was the Vice-principal at the SAMHS Nursing College, where nurse educators were preparing for the roll-out of a contemporary programme described in SANC R171, where integration of technology was planned to play an important role. The SANC and CHE were responsible for the endorsement and accreditation of the programmes where the use of technology was encouraged (DOH 2019).

Although a variety of resources have already been available for use in the training of the legacy programme (R425) that was phasing out, it was not often or optimally used. An internal audit visit was conducted by SAMHS Inspector General (IG), and the unpublished feedback report indicated that twenty-three out of thirty-four possible nurse educators seemed to be limited in the use of the high-fidelity manikins in simulation facilities as one type of technology available for use by nurse educators (IG 2018). Furthermore, the researcher observed that the educators seldom used technology, and some nursing educators were sceptical about the benefits of using technology. The reason could be the readiness to use technology in the new nursing programme. In a study in Canada, this was also found to be the situation (DeCoito & Richardson 2018:362).

The use of technology is determined by behavioural intentions or readiness to use technology. The beliefs, perceived usefulness and perceived ease of use of technology could improve job performance. Users are motivated by raises, promotions, bonuses and other reward factors for the job performance and thus also the use of technology. If a technological system does not help a person perform his/her job effectively, negative views will exist. Factors such as availability and accessibility, funding, administrative and technical support, as well as developmental opportunities will influence the user's emotional and mental perceptions, beliefs and self-efficacy for successful integration of technology activities (Pine-Thomas 2017:42). Technology is an integral part of a nurse's practice; therefore, technology must be integrated into the nursing curriculum or programme. Nursing schools or colleges are shifting paradigms by integrating technology into the teaching environment to foster active and meaningful learning experiences (Williamson & Muckle 2018:70). It was therefore critical to scientifically investigate the level of technology readiness of the nurse educators, as well as barriers and enablers that might influence the use of technology for the new nursing programme at the SAMHS Nursing College. The results could contribute to strategic planning for the preparation and implementation of the new programme.

1.3 THE RESEARCH QUESTION, AIM AND OBJECTIVES

The following research question emanated from the discussion mentioned above: What is the nurse educators' readiness regarding using technology for a new nursing programme at the SAMHS Nursing College?

The study aimed to determine the nurse educators' readiness regarding the use of technology for a new nursing programme at SAMHS Nursing College by using the technology readiness index.

Considering the purpose and aim of this study, the following objectives were formulated:

- To determine the nurse educators' readiness regarding the use of technology at the SAMHS Nursing College.
- To describe barriers and enablers that might influence nurse educators' readiness.

1.4 SIGNIFICANCE OF THE STUDY

The information regarding the level of technology readiness of nurse educators might be used by the management of the SAMHS Nursing College for strategic planning, preparation, and implementation of the new nursing programme, where the focus would be to increase the application of technology in teaching and learning by the nurse educators. Including effective use of technology may contribute to increased academic excellence and improved quality in nursing education at SAMHS Nursing College. The students attending this new programme ultimately were to benefit since they would be encouraged, connected, and equipped to use technology in clinical experience placement areas, which were primary care focused.

1.5 CLARIFICATION OF TERMS

The following concepts were used in this study:

New nursing programme

“Programme” means a purposeful and structured set of learning experiences that leads to a qualification, which may be disciplined-based, professional, career-focused, trans-, inter- or multidisciplinary (SANC Circular 8/2013:4). For this study and from here onwards, the new nursing programme referred to the qualification that will lead to registration as General Nurse with the South African Nursing Council; a nurse who holds a diploma qualification at NQF level 6 (SANC R171 of 8

March 2013). This programme would be a contemporary outcomes-based, community-focused and primary health care-driven programme and will only be presented from 2021.

Nurse educator

A nurse educator is a person who has undergone a programme of education at an approved educational institution and is registered for an additional qualification in nurse education (SANC R118 of 23 January 1987). Nurse educators referred to in this study were those employed and involved with preparing the new nursing programme at the SAMHS Nursing College.

Readiness

Readiness means being fully prepared, able or willing to do something immediately with prompt compliance and to assess one's learning need, have a goal, implement learning activities, and evaluate outcomes with ease (Concise Oxford English Dictionary 2019). In this study, readiness implied the level of preparedness of the nurse educators to use technology in a nursing programme.

The Technology Readiness Index

Technology Readiness Index (TRI) is an existing 16-item scale to measure "technology readiness" - defined as "people's propensity to embrace and use new technologies for accomplishing goals in home, life and at work" (Parasuraman & Colby 2015:59). In this study, the technology readiness index was used as the self-administered questionnaire to determine the nurse educator's technology readiness level.

1.6 CONTEXT / SETTING

In Brink, van der Walt and van Rensburg (2016:59), the research setting refers to the specific place or places in which data gathering occurs.

The South African Military Health Service (SAMHS) Nursing College is a public nursing college but resides under the Department of Defence (DOD) and thus has an additional responsibility of catering for the healthcare needs of the military community, namely the serving members, their dependents, military veterans and pensioners. The provision of quality nursing education, training and development ensures adequate and sustainable nursing practice essential in rendering health care within the internal and external borders of the country. The SAMHS Nursing College is a dynamic institution that contributes significantly toward the realization of the vision of the SAMHS, namely "A Healthy Military

Community". The nursing students start with Military Training prior to the nursing training. This training include physical fitness, marksmanship, parade work, complements and seluting, discipline as well as inspections. Communication components that enhance leadership, conventional service writing, critical thinking, decision making and planning forms part of the training as well. Attention to camaraderie (team work), endurance, resilience and independence are added. The nursing students are introduced to the Military Cultrure that include etiquette like neatness and respect, following orders and habitual execution spesifically when functioning under stress. The nursing students futher more are socialized in a Military Environment with specific Rules and Regilations and Hierachial structures where they are involved in non-nursing activities e.g. parades, regimental duties or operational instructions such as during national strikes. The nursing students' opportunities extent beyond the military environment to civilian learning settings. (Lieberman, Karl, Niro, Williams, Farina, Cable, & McClung 2014: 1113-1123). The nurse educators have the same military training and continue with same of this unique activities during the nursing training.

This study was conducted at the SAMHS Nursing College, with the main campus in Gauteng and two campuses in Bloemfontein and Cape Town, respectively. The majority (34) of the nurse educators were at the main campus in Pretoria, with three at the Bloemfontein campus and four at the Cape Town campus, and nineteen former nurse educators. These nurse educators were all involved in curriculating the new nursing programme.

1.7 THEORETICAL FRAMEWORK

Brink *et al.* (2016:26) defined a theoretical framework as propositional statements resulting from an existing theory and should be as tight as possible "fit" between the study variables and the selected theory. In this study, the technological readiness framework adopted by Kuo, Liu and Ma (2013:88) was applied.

Four personality dimensions related to technology readiness, namely optimism, innovativeness, and levels of security and comfort about technology, were demonstrated, influencing the perceived ease of use of technology and the perceived usefulness thereof. These might have influenced behavioural intention to integrate and use technology in practice (Kuo *et al.* 2013:13). The theoretical framework will be discussed in more detail in Chapter 3.

1.8 RESEARCH METHODOLOGY

A brief overview of the design, population and sampling, data-collection instrument, pilot test, reliability and validity of the study, data collection and data analysis is provided below, with a detailed discussion in Chapter 3.

1.8.1 Research design and methodology

A research design is the proverbial backbone of the study and the researcher's choice of the best way in which to answer a research question concerning several considerations, including several subject groups, the timing of data collection, and researcher intervention, if any (Gray, Grove & Sutherland 2017:193). Descriptive research provides an accurate portrayal or account of people's characteristics or circumstances and the frequency with which certain phenomena occur (Polit & Beck 2017:726).

This study followed a descriptive research design using a questionnaire to describe the nurse educators' readiness to use technology in a new nursing programme and barriers and enablers that might influence their behaviour.

1.8.2 Population and sampling

A population is described as the particular group of elements (individuals, objects, events, or substances) that is the focus of a study and from where a sample is chosen (Gray *et al.* 2017:687).

In this study, the target population incorporated all nurse educators involved in preparing a new nursing programme at the SAMHS Nursing College. Nurse educators, thirty-four (34) at the main campus, seven (7) at the other two campuses and nineteen (19) from previous personnel; thus, a total population of sixty (60) were requested to participate in this study. Because of the small numbers, an all-inclusive sample was utilised.

1.8.3 Data collection and organization

Data collection is a precise, systematic gathering of information relevant to the research purpose and the specific aim and question of a study. It usually follows a detailed plan of the chronology of interactions with the subjects (Gray *et al.* 2017:675).

1.8.3.1 Measuring instrument

The process of assigning numbers to objects (or events or situations) in accordance with some “rule” is measurement. The instrument is a device designed to measure a specific variable by information gathering (Gray *et al.* 2017:53). This study was a self-administered questionnaire. The advantage of using questionnaires is that the approach presents the opportunity to gather a large amount of data or information from a total number of respondents in a relatively short period, within reasonable limits of time and resources. Quality data could be produced when the researcher has ensured validity and reliability. The anonymity offered might improve the honesty with which the respondents answer the questions (Botma *et al.* 2016:135).

The Technology Readiness Index (TRI) 2.0 instrument was used with the permission of the developers (Annexures A & C). Initiate TRI 1.0, a 36-item scale, was developed to measure people’s propensity to embrace and use new technologies. Its development was a collaborative effort between the authors and Rockbridge Associates (a Virginia-based market research company specializing in technology and services issues). Technology readiness has emerged from studies of how new technologies are adopted. This work began with studies of telecommunications technologies by Parasuraman (2000:307). The technology readiness concept is widespread, particularly in the business marketing domain, where research focuses on identifying segments of the market that are likely to adopt new technologies such as mobile data services, distance education and online insurance, among others. As in the case of external customers, gaining a good understanding of users' technology-related attitudes and behaviours is important for making the right choices in designing, implementing, and managing the employee-technology link (Summak, Shmancioğlu & Bağlibel 2010:1725-1729). In each of these studies, the authors found the technology readiness model to be effective. The TRI can be used to assess the technology readiness of employees, for example, educators.

The changing technology environment, innovative statements, and the need to make the instrument more parsimonious contributed to the updated and streamlined TRI 2.0. It comprised 16-item Likert scale statements on the readiness dimensions. The Likert scale determines the opinion or attitude of a subject, most commonly addressing agreement options such as strongly disagree, disagree, uncertain, agree and strongly agree (Gray *et al.* 2017:411). According to Botma *et al.* (2016:138), the Likert scale is well-known in nursing research, and it is easy to complete.

The TRI 2.0 was used as Section B of the self-administered questionnaire. Sections A and C were added, Section A consisted of five questions regarding biographical information, and Section C included an open-ended question relevant to barriers and enablers to allow respondents to explain

the barriers and enablers related to the use of technology in nursing education as seen in Annexure C.

1.8.3.2 Pilot study

A pilot study is a small-scale version of the study, whereas a pilot test only tests some aspects of the study, such as the useability of the measuring tool and is usually done on a few respondents that meet the inclusion criteria (Botma *et al.*, 2016:275). A pilot study aims to determine whether the proposed methods are effective in locating and consenting subjects and collecting useful data (Gray *et al.* 2017:687). Polit and Beck (2017:624) indicated a pilot study is simply to prevent an expensive fiasco or a costly large-scale study.

Since the questionnaire was developed and used intensively in the United States of America, a pilot test was done where the respondents from the campuses evaluated the questionnaire for appropriateness and understanding, as suggested in Polit and Beck (2017:630). The lessons learned from the testing indicated no requirement to rewrite or delete questions, change response options or extend the time needed to complete the questionnaire. The data obtained in the pilot test was therefore used in the main study.

1.8.3.3 Validity and reliability

Validity and reliability are closely related (Brink *et al.* 2016:171).

Validity seeks to ascertain whether an instrument accurately measures what it is supposed to measure. According to Gray *et al.* (2017:376), face validity verified that an instrument “looks” valid and content validity refers to the extent to which the instrument includes all major elements relevant to the construct being measured.

Face validity was assured through the reviews of two experts who provided feedback on the content to increase the use in this study. A statistician was requested to provide input on the format and structure of the questionnaire before data collection. The pilot test further ensured the validity of the study. The pilot test was conducted under similar conditions as the actual study.

The content and construct validity were done by the developers of TRI 2.0 (Parasuraman & Colby 2015:72) and confirmed in the permission documents, as seen in Annexure A.

1.8.3.4 Access and collection of data

Approval was obtained from the relevant ethic committees, see Annexure G. A consent letter where arrangements for appropriate times for data collection was forwarded to the principal of SAMHS nursing college, see Annexure D. Initially, it was planned to be directly after a meeting where all of the population would be present, but due to the unavailability of all nurse educators at the same time, different sessions were scheduled. An independent person addressed the nurse educators to clarify the study's intention and the process for completing and returning the questionnaires. Respondents were then requested to sign the information leaflet, as seen in Annexure B, before the commencement of data collection. Respondents were asked to place the completed consent form and questionnaire into two separate sealed and marked boxes stationed in a manager's office at SAMHS Nursing College. The questionnaires did not contain the respondents' names. A unique number was added to the collection of completed questionnaires.

The respondents, previously personnel of the nursing college, received their questionnaires via e-mail. These respondents were included to supplement the sample size and were involved with the curriculating of the new programme but might not have been active or employed in the DOD at the time of the study. After online completion, it was presented to the researcher and was immediately available for storage and analysis. According to Gray *et al.* (2017:407), researchers frequently use an electronic data collection process.

The process was finalized within two weeks.

1.8.3.5 Data analysis

When researchers focus on what to do with the data once they have collected it, a method must be chosen for exploring and organizing the raw data, namely as a mass of numbers, as well as analysing and interpreting the data to give meaning to it. Data analysis entails categorizing, ordering, manipulating and summarizing the data and describing them in meaningful terms. (Brink *et al.* 2016:177).

For this study, data collected from sections A (biographic data) and B (Technology Readiness Index 2.0) of the questionnaire was captured on an Excel spreadsheet, double-checked for the correctness and with the help of a statistician from the University of Pretoria analysed using the Statistical Analysis System (SAS v.9.4) software programme. Descriptive statistics were obtained to explain and summarize data through frequencies, means, percentages, and averages, which are presented in

graphs. The researcher transcribed the open-ended questions from section C (barriers and enablers) in this study and analysed it through open coding to find common themes.

1.9 ETHICAL CONSIDERATIONS

To ensure human dignity, the researcher obtained approval from the Health Research Ethics Committee of the University of Pretoria.

Following the Ethical approval from the University of Pretoria (490/2021) (Annexure G), ethical approval was also obtained from Defence Intelligence (Annexure E). Approval from 1 Military Hospital (SAMHS Ethics Committee) was also granted (Annexure G). The researcher abided by the ethics statement once the ethics committees had approved the study proposal.

Furthermore, permission to conduct the study at the SAMHS Nursing College was obtained from the principal concerned (Annexure F), and consent to participate was obtained from the respondents (Annexure B).

The researcher acknowledged the importance of adhering to ethical principles in this study, as discussed in Chapter 3.

1.10 ORGANISATION OF THE STUDY

The study consists of five chapters. Chapter 1 is an introduction and overview of the study.

Chapter 2 is the literature review. Relevant literature on technology readiness and barriers, as well as enablers, was explored. Different studies which had been conducted previously were explored and documented.

Chapter 3 is a discussion of the research design and methodology. The design, instrument and method used are explained in detail. The researcher also explains the ethical considerations in this chapter.

Chapter 4 is a discussion of the findings. The researcher took the reader through the analysis of the captured data. Tables, pie diagrams and figures will be used to enhance the reader's understanding. The results were analyzed and compared to findings in the literature.

Chapter 5 is the conclusion of the study. Concluding remarks about the study were put forward. The research question was re-evaluated against the data obtained, and recommendations for future or further research were made. Limitations of the study were brought to light.

1.11 CONCLUSION

This chapter provided an overview of the study, while the next chapter will focus on the literature review.

CHAPTER 2: LITERATURE REVIEW

2.1 INTRODUCTION

The previous chapter discussed the overview of the study. This chapter explored the literature related to technology, the use thereof in education, health and nursing as well as nursing education, literature related to readiness to use technology and possible barriers and enablers.

2.2 REVIEWING AND PRESENTING LITERATURE

A literature review, or rather a review of the literature, is conducted to discover the most recent and most important information about a particular phenomenon and to identify any knowledge gaps that exist (Gray *et al.* 2017:48). According to Gray *et al.* (2017:120), “the literature review is an interpretative, organised and written presentation” of what the study’s author has read.

“In quantitative research, the purpose of the literature review is to direct the planning and execution of the study” (Brink *et al.* 2013:71–72).

2.2.1 Search method

At the beginning of the study in 2019, the researcher started with a literature review mainly regarding nursing research practice or research procedures in general. To complete the research proposal and the literature review, the researcher then focused on the readiness or acceptance of technology. Towards the middle of 2020 till date, the researcher looked more in-depth at the use of technology in various situations, including education, health and specific in nursing. Towards the end of 2021, information regarding the new nursing programme (R171) (SANC 2013) was added and integrated into all relevant sources published since the initial literature review.

The search of the scientific evidence and reference lists of the articles was carried out electronically by using the Scopus database, EBSCO Host, Science Direct, Google scholar, the Cumulative Index to Nursing and Allied Health Library (CINAHL) and the University of Pretoria library resources. The researcher consulted various sources, which include articles, reviews, books, electronic books, and printed book chapters related to the readiness to use technology.

The literature used in this study explained the views of various researchers related to the study carried out in the nursing education field and other fields and professions within South Africa and beyond.

Information from the literature used in this study was referenced accordingly to conform with the Declaration of Plagiarism as signed by the researcher (Annexure H).

2.2.2 Search terms

The search terms used for literature were constructed within the scope of the study, which is related to the readiness of nurse educators to use technology and carried out electronically using databases. The key terms used for scientific and scholarly information were: technology readiness, use of technology in nursing education, acceptance of, or intention towards technology use, attitude and innovations regarding technology use, as well as barriers or enablers in the use of technology. During the review, the researcher used keywords for different acceptance models such as perceived usefulness, perceived ease of use, behavioural intentions, performance or effort expectancy, social influence and facilitating conditions.

2.2.3 Sources year

Initially, the researcher used all years in the search due to the lack of research information on readiness regarding the use of technology in nursing. The researcher searched then for sources not older than five years, namely from 2014. Due to the long period it took to receive ethical approval, some sources became outdated, and the dates of sources shifted to accommodate more recent publications from 2017 onwards. The search was done using the English language. All published literature that was not documented in the English language and unrelated to readiness regarding the use of technology was excluded. It helped that the final documents were written clearly, correctly and concisely, as suggested by Gray *et al.* (2017:134).

2.3 NURSING EDUCATION PROGRAMMES

The Diploma in Nursing Science (General, Psychiatry and Community) and Midwifery (R425) (SANC 1985) was a legacy qualification presented at SAMHS Nursing College. This full-time programme was presented over a four-year period with two semesters per year. The curriculum consisted of subjects with outcomes for competence in general-, community-, psychiatric nursing, and midwifery. Each subject included a theoretical and a clinical component. The theoretical content was mainly presented in a classroom setting where traditional lecturing methods were used. The clinical aspect was partially presented in the classroom for a bit of theory background, partially in the simulations room for demonstrations of procedures, and placements in several hospitals for clinical experience. This

education and training of nurses were conducted within the legislative prescripts of the SANC (SANC 1985).

As mentioned in Chapter 1 that since the declaration about the last enrolment date for students into these academic programmes would have been 31 December 2019, the SAMHS Nursing College has prioritised the Diploma in General Nursing, amongst others, for future intakes to ensure sustainable health care capability within the SAMHS throughout all nine (9) provinces of the country.

This new programme was planned to be presented over three years with two semesters per year. The SAMHS Nursing College has adopted an approach with a contemporary outcomes-based, community-focused and primary healthcare-driven curriculum for this new programme.

The programme is outcomes-based to be prepared for competency-orientated, performance-based education, which is aimed at aligning education with the demands of the workplace, and at the same time, develops transferable life skills, such as problem-solving and critical thinking skills (Uys & Gwele 2005:xiv).

The programme is community-focused to provide care to all of the population they serve, its military and veteran members, as discussed in Chapter 1. The programme is intended to prepare the student as a general nurse who will be able to meet the service delivery needs of the country, taking into consideration the history of the shortage of nurses and doctors in South Africa. The qualified general nurse's practice will focus on quality service delivery in a broad spectrum of health services and settings, including rural areas, that will facilitate achieving the programme outcomes.

The programme is health care-driven to be able to render promotive, preventative and rehabilitative health care at community health centres, clinics or sickbays as well as district, regional and tertiary hospitals and deployment nationally during disasters and industrial action as part of the multidisciplinary team. The qualified general nurse will be able to function independently in these settings and be in charge of low-risk healthcare facilities with uncomplicated cases (SANC 2013).

This approach has to guide students to attain outcomes unique to this programme and its fundamental and core modules with theory (171 credits) and clinical components, including a percentage of work-integrated learning (197 credits) that integrate formal learning and workplace concerns. Cooperation between nurse educators and clinical preceptors in fostering clinical competencies is important and possible with the use of clinical teaching units with technology for use as a clinical learning environment. The students will have the opportunity to spend longer periods in various clinical settings under

supervision at the placement areas as described in the meso-curriculum. The planned starting date was 2021.

2.4 THE MEANING OF TECHNOLOGY

Technology in higher education refers to any hardware and/or software component created to reduce errors and improve confidence in attaining the preferred result. The hardware refers to all computers, laptops or electronic devices for document processing. It also refers to projectors, televisions or electronic whiteboards and include mannikins that can be connected to these devices. The software refers to all programmes e.g. word, excel and other codings that ensure efficient working of the hardware. Learning involves the use of information and communication technologies synchronously or asynchronously, which can be in-person or virtual (Botma, Brysiewicz, Chipps, Mthembu & Philips 2014:48). It is the product of the application in the sphere of activity concerned with the mechanical arts and applied sciences collectively; technological knowledge or know-how; a technological process, method, or technique. Also, machinery and equipment developed from the practical application of scientific and technological knowledge (Concise Oxford English Dictionary 2019). The use of digital technologies and social networking has grown rapidly over the last decades and has become an integral part of health care (Mohamed 2018:236).

2.5 BACKGROUND REGARDING INFORMATION TECHNOLOGY DEVELOPMENT

There is no shying from Information Technology (IT) in this digital era, and it must be more attractive and acceptable to users. The potential of technology such as computerised information technology, note boards, and mobile devices are often underestimated and underused despite providing opportunities for decision-making, critical thinking and team-building (Medley & Horne 2005:31). The readiness of educators might help to cope with the increasing demand to use technology and innovations.

There are two models of technology acceptance and, therefore, readiness was discussed in this study. The Technology Acceptance Model and The Health Information Technology Acceptance Model. The technology acceptance model was derived from the theory of reasoned action (Ajzen & Fichbein 1980 cited by Lin & Chang 2011) and the theory of planned behaviour (Ajzen & Madden 1986 cited by Lin & Chang 2011). Among these two theories, the TAM appears to be the most widely used tool to determine technology readiness. Technology readiness involves the ease of use and usefulness of

technology which together influence the user's internal factors, namely beliefs, attitudes, and behavioural intentions. External factors often include individual differences or personality traits and situational factors of readiness (Lin & Chang 2011:425). In a study conducted in China where the models above were used to determine factors influencing the people's intention to use technology such as mobile commerce, the main factors identified were the attitude, adoption of innovation, and strategies such as motivation or rigorous training to increase user attitude (Raeisi & Lingjie 2016:382).

The Health Information Technology Acceptance Model (HITAM) - as used in a study in Korea - categorized the influential factors affecting behavioural intentions into three domains: health zone, information zone, and technology zone. The focus was on attitude, intention, and behaviour regarding the use of technology. Perceived usefulness and perceived ease of use of the technology amplify the readiness of users (Kim & Park, 2012:e133).

Dwivedi, Rana, Jeyaraj, Clement and Williams (2017:719) did a critical review of the Unified Theory of Acceptance and Use of Technology (UTAUT). The authors found that attitude played a central role in the acceptance and use of technology. The user's attitude could be a motivator or inhibitor with a direct effect on behavioural intentions determined in the technology readiness index 2.0, as discussed later (Dwivedi, Rana, Jeyaraj, Clement & Williams, 2017:727).

Parasuraman and Colby determined in 2000 four dimensions as mental motivators and inhibitors that collectively contribute to technology readiness. It could be a combination of optimism towards technology, like the view of technology and belief in increasing control, flexibility, efficiency, and innovativeness with a tendency to pioneer and lead. Users could also feel overwhelmed or insecure using technology, where they view it as distracting, harmful, or not properly workable. The same authors in 2012 added technology adoption factors, namely, freedom to choose locations, the impact on relationships, dependency, and social pressures in 2012 (Parasuraman & Colby 2015:59). Kuo *et al.* (2013:88) used these dimensions together with the technology acceptance model to determine technology readiness. Since these dimensions are included in the Technology Readiness Index 2.0 for technology use, this approach will form the conceptual framework for this study.

2.6 TECHNOLOGY DEVELOPMENT IN EDUCATION

Multimedia teaching has gradually substituted traditional teaching, as educators have selected the right teaching material instead of hardcopy or static teaching material. The early traditional slides in Chiayi Country, Taiwan, were multimedia. However, along with the advance in technology, the meaning was expanded. Videos consisted of pictures, images, animations, and audio consisting of

languages, speech from background narrators, stereo sound effects and a variety of music was used, instead of the unitary narration from the educator (Weng, Yang, Ho & Su 2018:36). This brings burdens for educators in preparing the multimedia material for class and their intention to use it.

A study conducted by Kumar, Rose and D'Silva (2008:603) in Malaysia regarding readiness to use technology within education showed a significant relationship between acceptance as a factor for use as well as constructs of attitude, perceived usefulness, perceived ease of use, self-efficacy, compatibility, job relevance, and the subject norm. Gonen and Lev-Ari (2016:1-6) looked at similar components but added innovativeness.

An important factor that influences the use of technology is educators' readiness to overcome certain barriers, such as curriculum changes and demands to review instructional methods, deal with support systems, and resistance or reluctance to accept new, innovative or experiential instruction methods. A variety of resisters to change include: fear and threat, ignorance, feeling inadequate or incompetent, or clinging to tradition were given as an overview. Other reasons are inertia, conflicting values (e.g., conservatism), differences in strategic priorities, unrealistic expectations, and the lack of ineffective leadership. Therefore, it is important to determine the specific barriers and enablers that might influence the knowledge, attitudes, and skills of educators regarding using technology (Hugo & Fakude 2016:4, 37,142).

2.7 TECHNOLOGY DEVELOPMENT IN HEALTH CARE, INCLUDING NURSING

Singh and Masango (2020:19) mentioned that public and private healthcare institutions in South Africa had incorporated Information Technology (IT) in varying degrees, from computerised medical equipment to automated admission systems and stock controls. Various procedures of machinery like monitors such as ventilators and physiological monitors were first used in intensive care settings, and are now presently used in adapting forms in less acute areas, even in-home care (Mohamed 2018:233). According to Scahloli (cited by Singh & Masango 2020), healthcare practitioners believe that IT can improve healthcare processes, smooth workflow and decrease financial costs. Since nursing forms a major component of the healthcare sector, the effective and efficient utilisation of IT depends on nurses' knowledge, attitudes and facilitating conditions or competence (Nes, Steindal, Larsen, Heer, Lærum-Onsager & Gjevjon 2021:320-334). Kim and Park (2012:e133) said that for effective health promotion, using health IT, users must have the behavioural intentions to measure, store and manage their data and implement best practices. Therefore, healthcare systems are rapidly undergoing fundamental changes to deliver enhanced quality and safe care. To keep up with these changes, the nursing profession has to respond and create dynamic, highly evidence-based nurse

practitioners who can function competently in IT-driven healthcare systems (Gonen, Sharon & Lev-Ari 2016:e9). Therefore, nursing institutions must be challenged to include IT education as part of nursing programmes and meet the demands of the contemporary healthcare industry.

2.8 TECHNOLOGY DEVELOPMENT IN NURSING EDUCATION

All types of technology, such as e-books, clinical reference software on handheld devices, polling software, interactive whiteboard systems, learning management systems, and medium/high fidelity simulation devices, even mobile phones, can be integrated into the programs of nursing students to help improve their learning experience (Williamson & Muckle 2018:70). E-learning is arguably the most significant change to occur in nursing education since the move from hospital training to the tertiary sector (Button, Harrington & Belan 2014:311). The value of e-learning includes student control of the pace of learning and content presentations, consistency in the content covered, repetition as needed with multiple examples of illustrations, and sensory stimulation for different styles (Hodson-Carlton 2009:309).

Since these technologies are increasingly being incorporated into the teaching of higher education, it is instrumental that nurse educators, as facilitators and innovators of the learning process, enhance the learning experience itself by ensuring the use of technology stimulates the learning conversation through which students will construct and acquire new knowledge, be empowered, and open for opportunities. Nurse educators are responsible and pressured to identify educational technology, the instructional design process, and learning activities to integrate technology into education (Botma *et al.* 2014:51). If they are not ready to embrace the use of technology and develop with the revolutionary technology, tension might increase thus it is highly likely that any of it will be applied.

In the context of this study, technology resources are available, but the readiness of nurse educators was questionable from evidence in the internal audit report. The importance of ensuring readiness for technology could not be highlighted enough for the successful implementation of the new nursing programme in the specific setting. A growing need for technology in the professional life of users will enhance the acceptance of technology in the academic and learning environment for years to come. The two variables called perceived ease of use and perceived usefulness have a mediating role in a complex relationship between system characteristics and potential system usage leading ultimately to explaining user's behaviour towards technology (Marangunić & Granić 2015:81,92). The use of technology furthermore encourages active learning and raises efficiency in study time. It provides different approaches needed in Higher Education Institutions (Hugo & Fakude 2016:169-191).

2.9 BARRIERS AND ENABLERS AFFECTING TECHNOLOGY USE

Two beliefs positioned by TAM, perceived usefulness and perceived ease of use, influence the user's behavioural intentions. Davis, Bagozzi and Warshaw (1989), as cited by Thomas (2017:41), theorized that technology usage is determined by the behavioural intentions of the user. External variables are the major determinants of the users' beliefs about whether a particular system would be easy to use or free of effort (Thomas 2017:43).

The following are listed as possible barriers within existing environments:

Availability and accessibility: The lack of relevant features and low-quality hardware and software without onsite support personnel can lead to frustration, impaired learning and resistance to technology in nursing education. The processing speed and memory abilities might contribute to the technology's performance and, therefore, acceptance (Marangunić & Granić 2015:81-92). According to Mohamed (2018:238), high turnover of technology used in teaching-spheres influences accessibility. Computer vs user ratios might contribute to being incapable of using technology (Kuo *et al.* 2013:14). Poor infrastructure can affect Wi-Fi connections and internet access, especially in buildings without proper power to support technology devices. Educators and nurses may be concerned about whether it will cause privacy leakage or incomplete data storage (Harrell & Bynum 2018:12). Treats related to cyber viruses and malware plague the willingness to utilize technology even further (Singh & Masangu 2020:19). Even when the most sophisticated technology elements are available, they might not be accessible due to safety procedures and members responsible for storage or distribution thereof.

Funding: The availability of enough funds for purchases at first, and after that the maintenance of technology was associated with greater use of technologies in learning (Roney, Westrick, Aciri, Aronson & Rebesch 2017:114). Financial constraints might hamper the availability of appropriate technology because of the high costs of technological equipment and training. The accountability and responsibility to ensure availability are sometimes shifted to those not directly needing the specific type of technology.

Administrative support: Information and communication technology must be available for easy documentation. A college administration system is but one such example. The request to utilise the hand-out and hand-back procedure, the service and cleaning of techno-equipment, as well as the storage needs 'paper work' and the lack thereof might contribute to reluctance to use technology. If the supervision and support are good, the tendency to use technology might rise (Gonen *et al.* 2016:e12).

Technical support: Adaptions of classrooms or simulation centres must be prepared to be equipped for interactive teaching opportunities. The technological changes must have been installed and set up in the form of long power cables, light dimmers and microphones. The different programs like Word, PowerPoint, and Excel should be compatible with technology for nursing requirements to enhance the use thereof (Lupiáñez-Villanueva, Hardey, Torrent & Ficapal 2011:134).

Training: A paradigm shift from, for example, white or chalkboards to television or IT boards where face-to-face connections became lost and adoption to the technological changed environments were needed might be enhancers for some and barriers for others, obtain hands-on experience, it might be taking more teaching time than the original classroom environment, transitions with technology must not lead to fear and or disillusion within the work organizations (Roney *et al.* 2017:113). Inadequate training was indicated as a contributing factor in decisions to use technology or not because it is not only how the specific technology work but how to include it in the programme, like in the form of a high-fidelity mannikin in the basic nursing module.

Time constraints: The lack of time or considerate time spent to develop documentation, such as course design and techniques to integrate technology into education, was mentioned as a barrier in a study by Roney *et al.* (2017:113). They specifically mentioned that preparation time might be competing with the time of other work demands, thus becoming a barrier, especially if there is also a lack of IT Resources and skills to complete tasks (Gonen *et al.* 2016:e9).

Successful integration of technology: How actively technology is used. For example, if unskilled nurses are required to use the touch screens, smaller keyboard, and mouse simultaneously, they may create erroneous records due to the complexity of technology (Kuo *et al.* 2013:9). Limited knowledge of adoption to rapid technology changes might be barriers and resistance to integration or use of technology into programmes. Variation in nursing programmes needs different technological equipment, like “maternity mannikin” for midwifery programmes (Gonen *et al.* 2016:e9).

Integration in the 21st Century: Digital literacy seems to be influenced by contextual factors such as cultural diversity and gender due to their perceptions of dealing with technology (Straub, Keil & Brenner 1997 cited by Marangunić & Granić 2015:81-92). Today’s students are often millennials, individuals born after 1980, who favour creative and graphical, active learning environments that integrate purposeful technology. Millennials’ strong preference for technology has caused educators to re-evaluate their instructional techniques and build new opportunities for independent critical thinking and problem-solving to support safe patient care and overall productivity (Roney *et al.*

2017:113). Communication and collaboration could be planned properly to enhance the use of technology, or the absence of opportunities might be a barrier (Loague *et al.* 2018:1).

Technology and student learning: Studies by Roney *et al.* (2017:115) suggested that older persons are less likely to use technology in their teaching, therefore might be a barrier since technology is not already incorporated into their lives as in the case with younger millennials. On the contrary, studies by Chau 1996; Aming and Ziefle, 2007 as cited by Marangunić & Granić (2015:81-92), indicated that the older person often had higher educational levels than might particularly benefit from the utilization of technology. Health informatics is often not seen as a clinical skill, and misperception of the nurses' role in the use of technology. Therefore a lack of understanding of the contribution it brings towards quality care might be a barrier (Gonen *et al.* 2016:e12).

Perceptions and beliefs: Emotions like anxiety or fear of failure, especially in front of experts and or audience, such as students, might be considered barriers. Being mentally resistant or afraid, being a habit or personality trait to explore new challenges like using advanced technology, might negatively influence the use of technology. Being mentally prepared and excited to try new things might contribute positively to using advanced technology. In a Belgium study by Tondeur (2020:978), he stated that it seems teachers select technological applications that align with their existing beliefs and understanding of "good education". Pajares (1992), cited by Tondeur (2020:978), indicated that beliefs affect the way teachers analyse, plan and implement their teaching and learning activities, including the use of technology or not. The subjective norm, social awareness, expectations, user participation, risks and trust might all be perceptions that further influence the internal feelings to use or not to use technology, as indicated by Amoako-Gyampah (2007) cited by Marangunić and Granić (2015:81-92).

Self-efficacy is the belief in one's ability to perform a new technologically sophisticated task or achieve a goal and actual performance. Spatial, cognitive and reasoning abilities might contribute to or hamper the deeper interest in mastering something technologically (Sun & Zhang 2006, cited by Marangunić & Granić 2015:81-92). Playfulness, perceived enjoyment, and confidence in ability affected usefulness and ability to develop tendencies or effort to use technology (Kim & Park 2012:e136). These intrinsic motivators regarding attitudes to successful acceptance of technology contribute to readiness as a strong determinant to use technology (Raeisi & Lingjie 2016:377).

2.10 READINESS FOR USE OF TECHNOLOGY

Technology readiness (TR) refers to people's propensity to embrace and use new technologies to accomplish goals at home and work (Parasuraman, 2000). The TR construct refers to an overall state

of mind resulting from a gestalt of mental enablers and inhibitors that collectively determine a person's predisposition toward technologies (Parasuraman 2000). The construct is based on four dimensions:

(1) **Optimism** is defined as a positive view of technology and a belief that technology offers people increased control, flexibility, and efficiency. It captures the general feeling that technology is a good and positive thing. Optimistic people feel new technology contributes to a better quality of life, give more freedom of mobility, and more control and makes them more productive.

(2) **Innovativeness** is defined as a tendency to be a technological pioneer and an opinion leader. It represents the degree to which a person is a trailblazer in trying new technology-based products/services and an opinion leader on technology-related issues. Innovative people feel other seeks their advice on new technologies, are the first in their friend circle to acquire new technologies, can figure out high-tech products and their service on their own and keep up with the latest technological developments.

(3) **Discomfort** refers to a perceived lack of control over technology and feeling overwhelmed by it. This construct measures the degree to which people are generally prejudiced against technology-based products and services. Feelings of discomfort are described as being taken advantage of by someone who knows more about a high-tech product. Support lines are not helpful or understandable, thus not for ordinary people and manuals or services are not in plain language.

(4) **Insecurity** is defined as distrust of technology and scepticism about its ability to work properly. It focuses on people's degree of trust in technology-based transactions (Lin & Chang 2011:426). Insecure people depend on technology to do things for them, and perceive it to be destructive or are harmful, resulting in reduced personal interaction and feeling uncomfortable doing only online business.

The first two dimensions are the positive drivers or enablers of technology readiness and hold a positive attitude towards technology, whereas the last two are the negative drivers or inhibitors making persons reluctant to use technology. According to Parasuraman's work, people with high levels of optimism and innovativeness and less discomfort and insecurity are more prone to accept and use new technology (Kuo *et al.* 2013:2). The question of whom either nurse educators comply with these criteria was forming.

2.11 CONCLUSION

The chapter reviewed related literature on readiness to use technology, including the search method, search terms and years within which the literature and books used were published. The meaning of technology and its development was explained. The use of technology in education, health and nursing specifically, and nursing education based on the systematic review and experts' input, was indicated. Lastly, the possible barriers and enablers, according to the literature, were discussed. The methodology used in the study will be presented in detail in Chapter 3.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 INTRODUCTION

Chapter 3 focuses on the research design, the research instrument, the research methods, as well as validity and reliability. These focused on the research question; whether the nurse educators of the SAMHS Nursing College were ready to use technology in a new nursing programme. The objectives were to determine the level of readiness as well as to describe the barriers and enablers that might have an influence thereon. This chapter explains how data were collected and the method used for data analysis. The researcher also explains the ethical considerations involved in this study.

3.2 RESEARCH DESIGN

According to Botma, Greeff, Mulaudzi, and Wright (2016:271), the research design provides the structure for the research methods and decisions that must be taken to plan the study. A quantitative, non-experimental, descriptive survey where the researcher collects data without introducing treatment or making changes (Polit & Beck 2017:203) was used to determine the readiness of nurse educators to use technology.

It was a quantitative descriptive study using statistics (Brink *et al.* 2016:178) to describe results in numbers and figures. It was non-experimental as there was no manipulation of variables and no intervention or controlled setting, and the sample was not divided into an experimental and control group. Quantitative research has the advantage that it encompasses the study of research questions and describes phenomena. According to Burns and Grove (2011:32), descriptive studies are often conducted when little information about a phenomenon is available. A survey was used in this real-time situation where the focus was on the process, and the researcher did not generalize the findings but tried to understand them in this context (Brink *et al.* 2016:121).

During this study, the following conceptual framework was applied as adopted from Kuo *et al.* (2013:88):

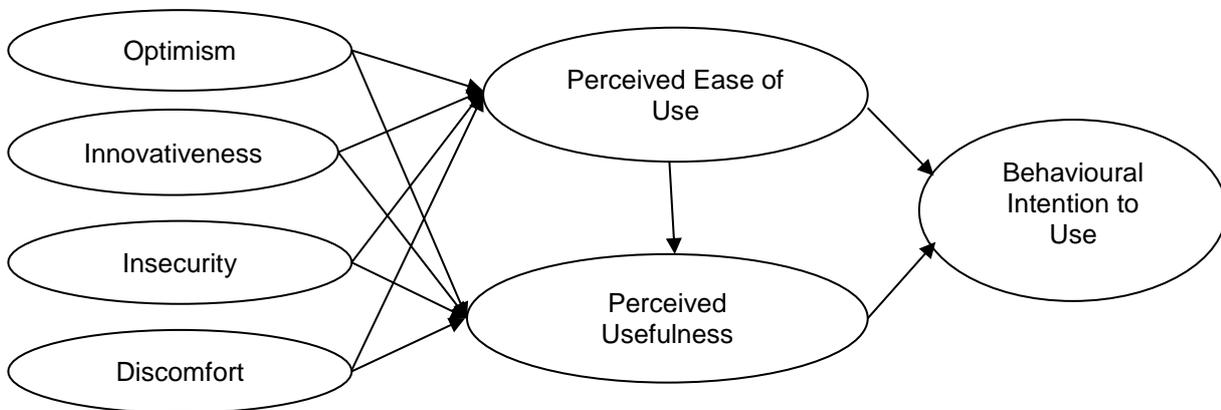


Figure 3.1: Conceptual Framework for Technology Readiness

Behavioural intention or acceptance is reliable and able to predict actual use. Attitudes toward using technology influence behavioural intention. Attitude, in turn, has two determinants: perceived usefulness (PU) and perceived ease of use (PEOU). According to the TAM, PU is specified to have an independent effect on behavioural intention, and PEOU has an effect on PU (Ajzen & Fishbein 1980; Davis 1989, cited in Lin & Chang 2011). Perceived usefulness measures how much a user thinks technology will serve to benefit his/her current performance and efficiency. It focuses on the technology's impact on overall productivity and efficiency. If PU is high, then the user will have a positive attitude toward adopting the technology. Perceived ease of use measures how much mental effort the technology will consume while in use and focuses on how difficult it would be to use the technology to gain the desired benefits (Cheng, Chen & Yen 2015; Colvin & Bullock 2014; Sánchez, Hueros & Ordaz 2013, cited by Lin & Chang 2011; Almaiah, Jalil & Man 2016; Davis, Bagozzi & Warshaw 1989; Davis & Venkatesh 1996 cited by Lin & Chang 2011).

According to Kuo *et al.* (2013:13), people demonstrate four personality dimensions related to technology readiness, namely optimism, innovativeness, and levels of security and comfort about technology. The dimensions are the same in TRI 2.0, as developed by Parasuraman and Colby (2015). These personality dimensions influence the perceived ease of use of technology and the perceived usefulness thereof. These, in turn, influence their behavioural intention to integrate technology into their practice.

3.3 RESEARCH SETTING

The nursing college where the study was conducted is situated in the Gauteng Province, with campuses in Bloemfontein and Cape Town. Preparations were made at the time of the study in progress to present the new programme, namely the Diploma in General Nursing (R171) (SANC 2013), which will be contemporary outcomes-based, community-focused and primary healthcare-driven. Technology integration will play an important role in the new programme, such as the use of high-fidelity manikins and equipment available in the work-integrated learning areas. Mobile electronic medical record systems were also described as examples of such technology (Kuo *et al.* 2013:88).

There were sixty (60) nurse educators who were all involved in the new nursing programme. It is required that all educators must be registered with the SANC as professional nurses with an additional qualification in nursing education. Demographical data was discussed in Chapter 4. The number of students for the new nursing programme was to be an intake of thirty (30) per year, increasing to fifty (50) during the candidacy phase. This is the preliminary accreditation period from the first intake of students' training on the new nursing programme till completion of training, where the nursing institution demonstrates it meets the HEQC input criteria 1-9 such as programme design, recruitment and admission of students, staffing, teaching strategy and assessment. Alternatively, it has the potential or capability to meet these criteria in a stipulated period on a critical self-evaluation of the new programme as stipulated by the Council of Higher Education (CHE 2004:4-14).

After the initial accreditation application, the institution has to submit a plan for implementing the new programme. The plan could specify, for example, the programme module implementation time frames and budgetary allocations for each phase, and the human resources for managing the implementation.

Midway through the programme, the institution must submit a progress report for evaluation by the HEQC secretariat. A site visit would be undertaken by CHE and SANC only where circumstances warrant it. If the institution fulfills the promises, specifically the output criteria 10 -15 regarding the programme coordination, academic development and teaching and learning interactions and communication, its submission is approved by the HEQC, where the programme obtains accreditation status (CHE 2004:15-24).

At this nursing college, the following, as suggested in criteria 7 regarding infrastructure and library resources, technologies were already available: 30 computers with updated software, personal mobile devices of nurse educators and students, three information technologists, and necessary support systems such as the Nursing College Administration System, approximately ten different kinds of high-fidelity simulation manikins and advanced technology such as three smart boards and three smart

televisions. Most of this technology must be used by the current 155 students, where groups have an average of 43 students, and by the above-mentioned nurse educators. All employees of the Defence Force where the operational and teaching language is English, which might be their second or third language, it contribute to difficulty in using technology. If needed, available resources will be expanded to meet the abovementioned criteria.

3.4 POPULATION

The target population is the entire aggregation of cases in which the researcher is interested (Polit & Beck 2017:249). The population for this study consisted of nurse educators at the selected nursing college who were involved with the preparation for a new nursing programme at the selected nursing college and who voluntarily agreed to participate in the study. Table 3.1 illustrates the population:

Table 3.1 Total population for this study

Campus	Nurse educators
Main campus	34
Bloemfontein campus	3
Cape Town campus	4
Former members	19
Total	60

The total population have been invited to participate in determining the readiness to use technology in the new programme. They were exposed to the same questionnaire.

3.4.1 Sampling method

Sampling is the process of selecting a portion of the population to represent the entire population, and a sample is a subset of a population selected to participate in a study (Polit & Beck 2017:250). A

convenience, nonprobability method was used for this study. The Total population sample consisted of nurse educators at SAMHS Nursing College were used to ensure the biggest possible sample. The members were easily accessible, in geographical proximity and available at a given time.

The number of returned questionnaires determined the size of the sample. The researcher invited all thirty-four (34) nurse educators from the main campus to attend the data collection process. All arrived and completed the questionnaire (100%). The questionnaires were sent electronically to the seven (7) nurse educators at the other campuses. All completed the questionnaire (100%). The researcher also sent the questionnaires electronically to the nineteen (19) nurse educators that were previously involved with the preparation of the new programme, named former members, and only twelve (12) completed the questionnaire (63%). Table 3.2 illustrates the sample size for this study.

Table 3.2 Total sample size for this study

Campus	Nurse educators
Main campus	34
Bloemfontein campus	3
Cape Town campus	4
Former members	12
Total	53

3.4.2 Criteria used in the choice of sample size

The researcher considered the total number of nurse educators at the SAMHS Nursing College. The total number of nurse educators was sixty (60). Due to the character of the specific context, all respondents were invited to attend the data collection process at a convenient date and time. According to Polit and Beck (2017:250), this is “the criteria that specify population characteristics are referred to as eligibility criteria or inclusion criteria”.

The inclusion criteria were as follows:

- Respondents had to have a post-basic qualification in nursing education.
- Respondents had to be nurse educators preparing or facilitating theoretical learning for the new nursing programme (171) at SAMHS Nursing College, where this study was conducted.

The exclusion criteria were for all respondents not meeting the above criteria. The demographic information of the respondents is discussed in Chapter 4.

3.5 THE RESEARCH INSTRUMENT

A research tool is the contraption, device or quantifying instrument used to collect data and is compelled to be trustworthy and cogent (Polit & Beck 2017:731).

Parasuraman and Colby (2015:60-74) from the United States of America (USA) have updated and streamlined the Technology Readiness Index (TRI), a scale to measure people's propensity to embrace and use cutting-edge technologies for accomplishing goals in home life and at work. This self-administered tool was obtained with the authors' written permission (see Annexure A). This tool (the 16-item questions) was used as a guideline during the compilation of the questionnaire for this study. The questionnaire was compiled in consultation with the researcher's supervisors and a statistician. The supervisors are knowledgeable about the area of study, and the statistician is knowledgeable about instrument construction. Questions were sequenced in a meaningful manner to encourage cooperation.

The questionnaire was adapted by adding a section for biographical data at the beginning, and a single open-ended question was added at the end of the initial questionnaire to enhance the understanding of barriers or enablers that might influence nursing educator's readiness to use technology in education and to ensure objectives could be met.

The nurse educators' readiness to use technology was explored through the use of structured questionnaires. Data were collected using this structured self-administered questionnaire containing three sections.

The three sections were as follows:

- Section A: Collecting demographic data consisting of five questions.

- Section B: Collecting data on technology readiness consisting of sixteen questions.
- Section C: Collecting data regarding the barriers and enablers consisting of one open-ended question.

Two nurse educators of the nursing college were invited to complete the self-administered questionnaire and give feedback regarding the usability of the data collection tool. All nurse educator respondents received the same questionnaire to respond to at the pre-arranged time at the nursing college where the study was conducted.

3.5.1 Validity of the instrument

Validity refers to how well a test measures what it is supposed to measure or how well the instrument reflects the abstract concept being examined (Polit & Beck 2017:309; Grove, Burns & Gray 2013:394).

The following were applied to ensure the content and face validity of the study:

- Content validity refers to the extent to which the questionnaire includes all key elements relevant to the phenomena being studied (Burns & Grove 2011:334). The researcher made use of an existing data collection instrument, with the permission of the originators, that confirmed validity (Parasuraman & Colby 2015:64). Parasuraman's instrument and items were modified according to experts' suggestions, a five-point Likert scale questionnaire was adopted, one cover page that briefly introduced the purpose of the study was added. It was then reviewed by experts with an in-depth interview and pretest before the modified final version was completed. This process was sufficient to determine the content validity in a Taiwan study as described by Kuo *et al.* (2013).
- Face validity refers to whether the instrument seems to measure the appropriate construct. It verifies that the instrument gives the appearance to the concept being measured (Brink *et al.* 2013:40; LoBiondo-Wood & Haber 2014:293). Therefore definitions or questions were developed clearly and logically (Man & Colby 2015:68).

Face validity was assured through the reviews of two experts who provided feedback on the content to increase the face and content validity for use in this study. A statistician was requested to provide input on the format and structure of the questionnaire before data collection.

- Construct validity, according to Parasuraman and Colby (2015:67), is the extent to which a scale fully and unambiguously captures the underlying unobservable construct it is intended to measure. The empirical assessment began with comparing TRI 1.0 and TRI 2.0 performance. The ability to consistently differentiate the variety of technology-related consumer-related behaviours further supports its construct validity and is used as such by the researcher.

3.5.2 Reliability of the instrument

Reliability is the extent to which the assessment tool produces stable and consistent results (Burns & Grove 2011:332; Polit & Beck 2017:303). Parasuraman and Colby verified the TRI 2.0 scale's reliability after several rounds of item deletions and analyses. The iterative procedure converged on a 16-item solution where all dimensions meet the minimum reliability threshold. The lowest reliability (Cronbach's values) was .70 for discomfort, and the highest was .83 for innovativeness (Parasuraman & Colby 2015:73).

3.6 PILOT TEST

Polit and Beck (2017:739) define a pilot study as a small-scale version, or trial run, done in preparation for a major study; sometimes called a feasibility study, whereas a test only looks at some aspects of the study, such as the measuring tool. Pilot testing was done to test the research instrument for the feasibility of the study and shed light on the acceptability of the interventions and clarify the frequency in a South African context.

Pilot testing was conducted at the SAMHS Nursing College campuses in Bloemfontein (three nurse educators) and Cape Town (four nurse educators) to ensure that respondents were not influenced in any way. The seven nurse educators from the sub-campus were requested to complete the questionnaire and thus participated in the testing process. This pilot testing was done to determine whether the instrument was clearly worded and that it solicited the type of information envisioned. It was found that the questionnaire was well answered by respondents. The changes in adding demographical data, numbering of questions and refrasing section C on the questionnaire were done according to the advice of the statistician who assisted with developing the questionnaire.

The pilot test was conducted under similar conditions as the actual study.

3.7 DATA COLLECTION

Initially, permission was requested to use the last half hour of a specific academic meeting for data collection, but due to clinical assessments during the period, several sessions were scheduled to maximise the participation opportunities (Annexure D). The questionnaires were handed to the 34 respondents available at the main campus.

The respondents (n=34) were given time to read through the cover letter (Annexure B), containing the explanation, purpose and significance of the study as well as the enhancement of anonymity and confidentiality management. Respondents needed approximately 20-30 minutes to complete the questionnaire (Annexure C). The independent person was available for questions to enhance the completion of the questions.

Sealed boxes were provided where the completed questionnaires were posted. Respondents completed the questionnaires and immediately placed them in an enclosed container at the door as they were leaving. The completed documents were collected after each session as soon as the respondents were finished.

Questionnaires were forwarded electronically to the 26 potential respondents not present at any session, namely seven from the sub-campus and 19 former nursing educators. Seven respondents did not return a completed questionnaire. The total number of respondents were therefore 53 (n=53).

The questionnaires were reviewed for gaps and unfinished answers, which could impact the collection and analysis of the information. Data missing at random was discovered on some questionnaires. Only three respondents did not complete the open-ended question on the barriers and enablers at the end of the questionnaire.

3.8 DATA ANALYSIS

The questionnaires were checked for completeness, and the uncompleted questions were noted in the results, even if the initial plan was to discard the so call “spoiled” responses. The statistician indicated that although some questions were not completed, the rest of the information is still valuable, especially with this small population. Therefore, raw data from all 53 completed questionnaires were captured on a spreadsheet received from the statistician.

The data were entered onto the Excel spreadsheet using the following codes:

Table 3.3:

Section A: Demographic data

Age group:		
	≤ 25 years	A
	26 – 30 years	B
	31 – 35 years	C
	36 – 40 years	D
	≥ 41 years	E
Gender:		
	Male	A
	Female	B
Race:		
	African	A
	White	B
	Asian	C
	Coloured	D
Highest Nursing Education Qualification:		
	Nursing Education Doctoral	A
	Nursing Education Masters	B
	Nursing Education Degree	C
	Nursing Education Diploma	D
Nursing Education Experience:		
	≤ 5 years	A
	6 - 10 years	B
	11 - 15 years	C
	≥ 16 years	D
Section B: Technology Readiness Index		
Questions 1-16		
	Strongly Disagree	A
	Disagree	B
	Unsure	C
	Agree	D
	Strongly Agree	E

The researcher did not fill in the missing data on the spreadsheet. The space was left blank if respondents did not answer a specific question. After all the data were entered, an independent person was asked to randomly check the entered responses to verify the accuracy of the data-capturing process. The document was sent to the statistician at the University of Pretoria.

The statistician used a Statistical Analysis System (SAS v 9.4) software programme IBM SPSS, version 2.7 (1989; 2020), a statistical computer program to do the data analysis. The data collected with the structured questions in the Technology Readiness Index: 2.0 tool (Section B) were analysed according to the developers' guidelines in Annexure A. The data from section B was also forwarded to Maimi, where the developers used a designed algorithm to place respondents into distinct segmentation groups. Parasuraman and Colby (2015) identified five groups based on TRI 2.0: Explorers (high motivation, low inhibition), Pioneers (high motivation, moderate inhibition), Skeptics (low motivation, low inhibition), Hesitators (moderate-low motivation, moderate inhibition) and Avoiders, also known as Laggards (low motivation, high inhibition). The statistician then did Cross-tabulations on the feedback from this USA analysis.

The responses (50 out of 53) to the open-ended question (Section C) were transcribed using Otter.ai App in column A, after that, key concepts from each response were subtracted to column B, and similar responses for all respondents were grouped into column C, which formed themes. Underlining issues were identified in column D, and it formed the subthemes. Data received were reduced, organized, and given meaning by being presented in tables and graphs (Gray *et al.* 2017:599), see details in Chapter 4.

To conclude that the study findings were true and accurate, the strategy discussed above has been implemented to ensure validity and reliability.

3.9 ETHICAL CONSIDERATIONS

Ethics in research is a structure of righteous principles related to the degree to which the research plan of action abides by lawful, professional and civil responsibilities to the study respondents (Polit & Beck 2017:137). In Chapter 1, it was indicated that the researcher, therefore, obtained ethical clearance as included in Annexure G to this dissertation.

Brink *et al.* (2016: 34) described three fundamental ethical principles that guided researchers during the research process. It includes respect for persons, beneficence and justice. The principle of respect for a person explains that individuals are autonomous. That is, they have the right to self-determination. They decide whether or not to participate in a study (Brink *et al.*, 2016:35). An information leaflet about the character and purpose of the study was provided together with the data collection instrument (Annexure A). The informed consent document was included, and the nurse educators needed to read the document before completing the questionnaire. An independent person

handed the information leaflet and data collection instruments to the potential respondents to reduce dynamics related to the researcher's authority.

To adhere to the principle of beneficence, the researcher needs to secure the well-being of respondents, who has the right to protection from discomfort and harm- be it physical, psychological, economical, spiritual, economic, social or legal (Brink *et al.*, 2016:35). The contact information of the supervisor and co-supervisor was provided, should the respondents wish to discuss any matter related to the study. The supervisor and co-supervisor were not known to the respondents and were independent of the Nursing College where the study was conducted. This hopefully prevents coercion and limits any potential discomfort should a respondent wish to ask any questions or make any comments.

For the principle of justice, which refers to the respondents' right to fair selection and treatment (Brink *et al.*, 2016:36), the researcher selected respondents for reasons directly related to the research problem. The researcher did obtain permission to be available at specific time sessions. The researcher was punctual and respectful, thus time agreements and cultural values. Respondents further have the right to privacy. No information was shared without their knowledge, and confidentiality was maintained, which established a positive influence on minimising risks or feelings of exploitation.

Nurse educators might have perceived a power differential between them and the researcher and might have felt obliged to participate in the study, thus using an independent person to distribute the data collection instruments. No data was linked to a particular person since the instruments were returned without any identification details. Nurse educators were assured of their anonymity and that their responses would be collated into one set of data instead of being individualized.

The principle of respect for human dignity was maintained at all times. Respondents were assured of their right to withdraw at any given time without any penalty, prejudicial treatment, or negative effect.

Respondents did not receive monetary incentives for participating in the study.

3.10 CONCLUSION

Chapter 3 explained in detail the research design based on the conceptual framework according to Kuo *et al.* (2013:13) where people demonstrate four personality dimensions related to technology readiness, namely optimism, innovativeness, and levels of security and comfort about technology. These personality dimensions influence the perceived ease of use of technology and the perceived

usefulness thereof. These, in turn, influence their behavioural intention to integrate technology into their practice. The dimensions are the same in TRI 2.0, as developed by Parasuraman and Colby (2015) used for the instrument construction, validity and reliability of the research instrument. Then the ethical considerations of this study were also discussed.

In Chapter 4, the researcher will take the reader through the analysis and findings of the captured data.

CHAPTER 4: FINDINGS

4.1 INTRODUCTION

The purpose of this study was twofold: to investigate (a) the readiness of nurse educators regarding the use of technology in a new nursing programme and (b) the perceived understanding of the barriers and enablers that might impact the usage of technology in this new programme.

In this chapter, the study's findings are presented according to the three sections of the questionnaire, namely demographic factors, the technological readiness of the nurse educators and perceived barriers and enablers that impact the usage of technology. Tables, bar diagrams, histograms and percentages were used to describe the findings.

4.2 DATA ANALYSIS

A statistician from the University of Pretoria analysed and interpreted the data. Data were analysed to determine the technology readiness segmentation according to Parasuraman and Colby's work as well. The segments were named according to the respondents' grade of use of technology and some psychographic measures. Explorers are heavy users and curious about the world and thus highly technology orientated. Skeptics are moderate users and deliberate under pressure, dispassionate. Pioneers are heavy users and impulsive, strongly engaged and success-orientated. Hesitators are lighter users and lack curiosity. Avoiders are light users and present technology resistance (Ramírez-Correa *et al.* 2020:4). No other tests were done, as the objectives were purely descriptive, and the statistician was only mandated to analyse the data by the approved objectives in the protocol.

4.3 SECTION A: DEMOGRAPHIC FACTORS

In this section, the personal data of the respondents, such as age, gender, race, highest nursing education qualification and nursing education experience, are presented.

4.3.1 Age groups (n=53)

The first question was asked to determine the average age of nursing educators at SAMHS Nursing College. The respondents' ages ranged between 31 years of age or older, as indicated in Figure 4.1.

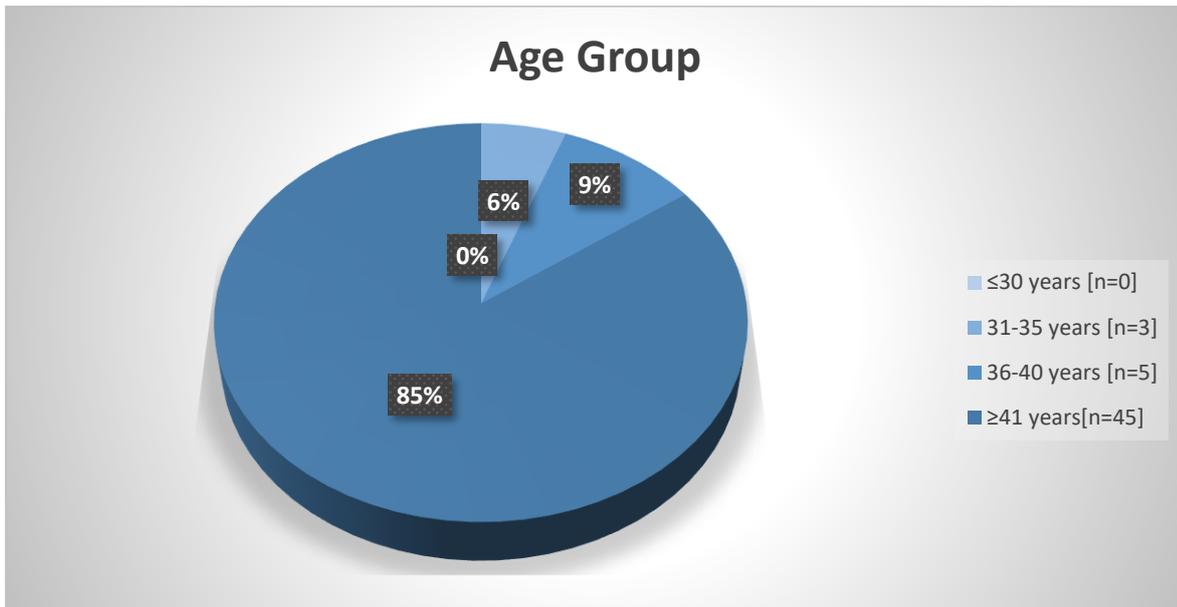


Figure 4.1: Nurse educators' age distribution

Most of the respondents, namely 45 (85%), were above 41 years of age. The ages of the rest of the respondents were between 36-40 (9%) and 31-35 (6%). None of the respondents was between 20 and 29. Thus the group of nursing educators can be regarded as mature personnel.

The findings in a study by Smit *et al.* (2021:6) show a clear trend whereby older persons are less likely to adopt and use technology than younger persons. This trend was confirmed in the findings of this study.

Table 4.1: TRI Segment * Age Crosstabulation

		Age			Total
		31-35	36-40	≥ 41	
Explorer	Count	2	3	22	27
	% Within Age	66,7%	60,0%	48,9%	50,9%
Hesitator	Count	0	0	5	5
	% Within Age	0,0%	0,0%	11,1%	9,4%
Pioneer	Count	1	2	9	12
	% Within Age	33,3%	40,0%	20,0%	22,6%
Skeptic	Count	0	0	9	9
	% Within Age	0,0%	0,0%	20,0%	17,0%
Total	Count	3	5	45	53
	% Within Age	100,0%	100,0%	100,0%	100,0%

In Table 4.1, most nurse educators (51%) were Explorers, of which 67% were the younger ones (31-35 years). The older nurse educators, older than 40 years, were either Hesitators (11%), Pioneers or Skeptics (20% respectively). No one was an Avoider. In a study by Kim, Chiu and Chow (2018:141) similar results were noted.

4.3.2 Gender (n=53)

The next question was asked to determine the ratio between male and female educators and possible differences in readiness amongst genders at the SAMHS Nursing College.

As shown in Figure 4.2, the majority of the nurse educators, 50 (94%), were females, and only three (6%) were male educators. This is like many countries where women comprise over 75% of the workforce in the health sector (WHO 2008:1).

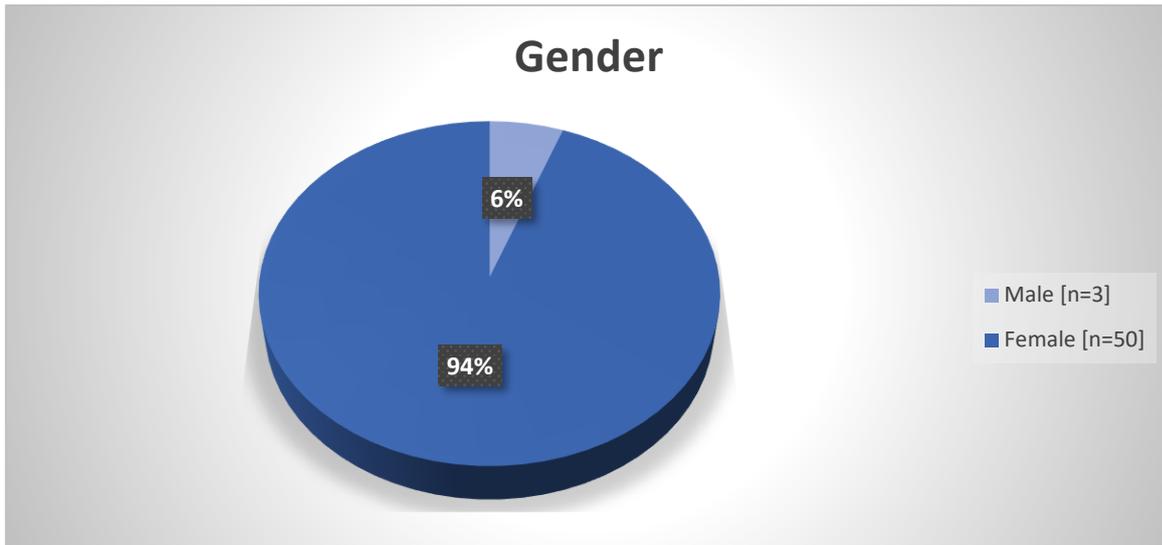


Figure 4.2: Nurse educators' gender distribution

The result was in line with the proof that gender differs in terms of technology acceptance and adaptation (Koivisto & Hamari, 2014:180), where females accept technology relatively easier than males. However, in this study, it was reversed, as seen in Table 4.2, where 67% of males were in the Explorer group. The Explorers were described as the early adopters when new technology-based products or services were introduced (Kim *et al.* 2018:136).

Table 4.2: TRI Segment * Gender Crosstabulation

		Gender		Total
		Male	Female	
Explorer	Count	2	25	27
	% Within Gender	66,7%	50,0%	50,9%
Hesitator	Count	0	5	5
	% Within Gender	0,0%	10,0%	9,4%
Pioneer	Count	1	11	12
	% Within Gender	33,3%	22,0%	22,6%
Skeptic	Count	0	9	9
	% Within Gender	0,0%	18,0%	17,0%
Total	Count	3	50	53
	% Within Gender	100,0%	100,0%	100,0%

4.3.3 Race (n=53)

The question here was asked to determine the different race groups at the SAMHS Nursing College. Figure 4.3 shows that the majority, 37 (70%) of the respondents, belonged to the African race group, eight (15%) were Coloured, six (11%) were White, and one (2%) belonged to the Asian race group. One (2%) participant did not indicate his or her race group.

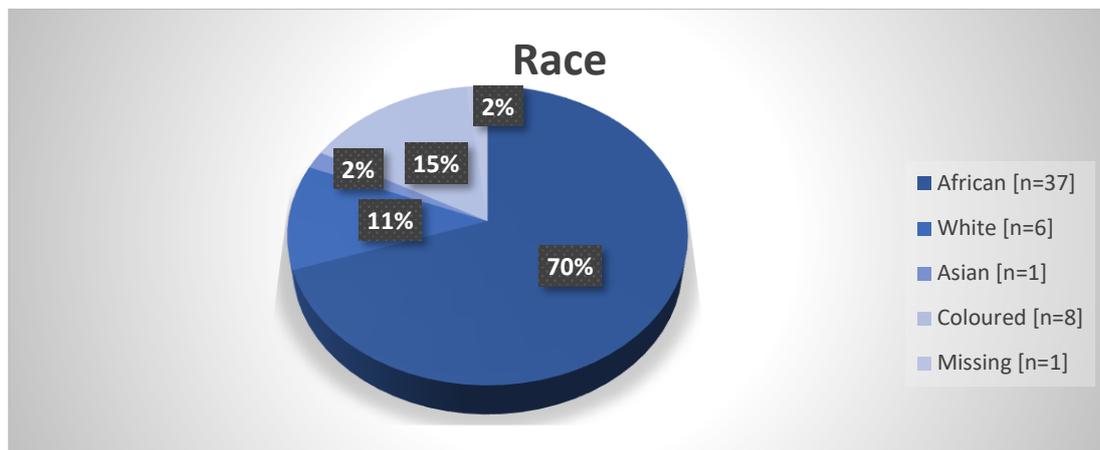


Figure 4.3: Nurse educators' race indication

The effects of different environments and cultural differences may predict technology usage and acceptance (Marangunić & Granić 2015:90). In this study, a significant difference in the readiness or acceptance could not be confirmed or disconfirmed.

Table 4.3: TRI Segment * Race Crosstabulation

		Race				Total
		African	White	Asian	Coloured	
Explorer	Count	15	5	1	5	26
	% Within Race	40,5%	83,3%	100,0%	62,5%	50,0%
Hesitator	Count	5	0	0	0	5
	% Within Race	13,5%	0,0%	0,0%	0,0%	9,6%
Pioneer	Count	10	0	0	2	12
	% Within Race	27,0%	0,0%	0,0%	25,0%	23,1%
Skeptic	Count	7	1	0	1	9
	% Within Race	18,9%	16,7%	0,0%	12,5%	17,3%
Total	Count	37	6	1	8	52
	% Within Race	100,0%	100,0%	100,0%	100,0%	100,0%

However, in Table 4.3, all of the Hesitators (14%) and the Pioneers (27%), as well as 19% of Skeptics were African. One White and one Coloured were also in the Skeptic group. In a study by Ramírez-Correa, Grandón and Rondán-Cataluña (2020:6) in Chile, cultural differences and values may influence the acceptance of a country's technology, thus confirming the above findings since this study results were similar.

4.3.4 Highest nursing education qualification (n=53)

Nurse educators were asked to indicate their highest qualification from the list provided. The SANC requires nurse educators to be registered as a registered nurse, with either a diploma or a degree in Nursing Education as an additional qualification (SANC 2014). All respondents were qualified nursing educators, who were part of the inclusion criteria. Figure 4.4 shows that half of the respondents, 27 (51%), held a basic degree in Nursing Education, 16 (30%) had Master's degrees, and seven (13%) held a Nursing Education diploma as the highest qualification. Three of the respondents (6%) are highly qualified with doctoral degrees.

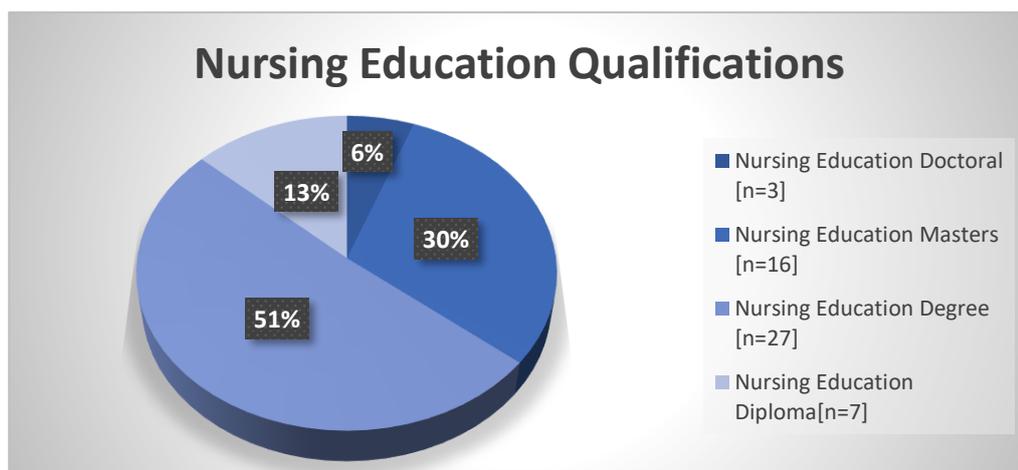


Figure 4.4: Nurse educators' highest nursing education qualification

The results of a study by Matarirano, Yeboah and Gqokonqana (2021:135) showed that higher education levels prepared persons better for technology and remote learning. Findings in this study were similar and confirmed nurse educators with higher qualifications were readier to use technology. Table 4.4 also indicated that 100% of Nurse educators with Doctoral Qualifications and 38% with a Masters were Explorers. The 38% of Pioneers with Masters have optimistic and innovative beliefs about new technologies however revealed high levels of discomfort and insecurity. Most Hesitators (9%) and Skeptics (17%) have either a degree or Diploma in Nursing Education. Kim *et al.* (2018:142) found similar results in a South Korean study.

Table 4.4: TRI Segment * Qualifications Crosstabulation

		Qualification				Total
		Nursing Etd Doctoral	Nursing Etd Masters	Nursing Etd Degree	Nursing Etd Diploma	
Explorer	Count	3	6	13	5	27
	% Within Qualification	100,0%	37,5%	48,1%	71,4%	50,9%
Hesitator	Count	0	2	3	0	5
	% Within Qualification	0,0%	12,5%	11,1%	0,0%	9,4%
Pioneer	Count	0	6	5	1	12
	% Within Qualification	0,0%	37,5%	18,5%	14,3%	22,6%
Skeptic	Count	0	2	6	1	9
	% Within Qualification	0,0%	12,5%	22,2%	14,3%	17,0%
Total	Count	3	16	27	7	53
	% Within Qualification	100,0%	100,0%	100,0%	100,0%	100,0%

4.3.5 Years of nursing education experience (n=53)

The last question was asked to determine the years of nursing education experience each nurse educator at SAMHS Nursing College had. Figure 4.5 shows that 19 (36%) of the respondents had more than 16 years of nursing education experience, 16 (30%) had 6-10 years of experience in nursing education, 14 (26%) had 11-15 years of experience, and only four (8%) had less than 5 years of nursing education experience.

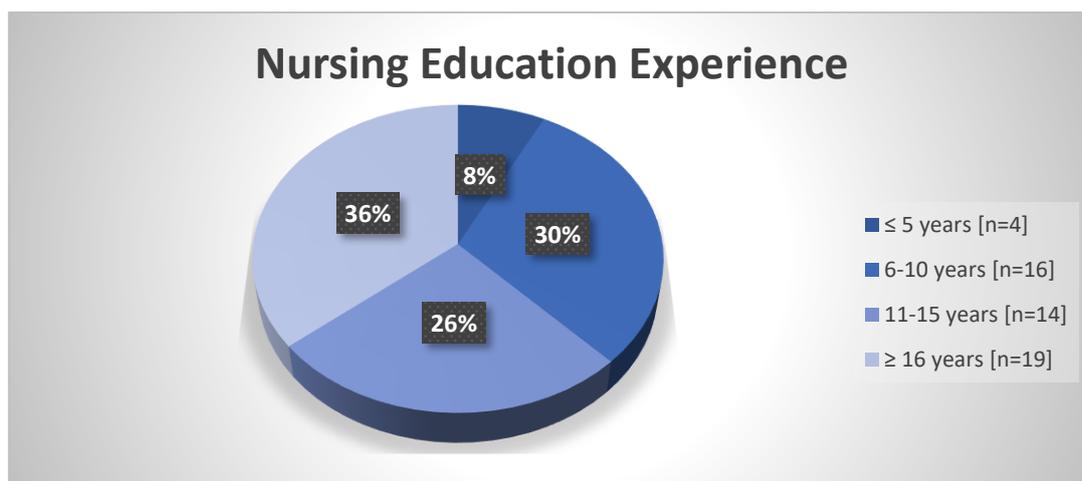


Figure 4.5: Nurse educators’ years of nursing education experience

Kim and Park (2012:e133) reported the higher the self-efficacy, perceived enjoyment and playfulness that came with years of experience, the greater the perceived ease of technology use. Although the respondents have a reasonable period of nursing education experience, it could not be directly linked to readiness to use technology.

Table 4.5 indicated that 63% of Explorers have more than 15 years of nursing education experience, and 26% were Skeptics which is similar to a study of school teachers by Badri, Rashedi, Yang, Mohaidat and Hammadi (2014:265). The nurse educators with less than 15 years of nursing experience were either Explorers (52%) or Pioneers (92%). Nineteen percent were Hesitators with less than 10 years of nursing education experience. The challenge of helping them overcome their inhibitions about using technology could be through support, encouragement, training, friendly design and reassurance, according to Badri *et al.* (2014:264).

Table 4.5 TRI Segment * Experience Crosstabulation

		Experience				Total
		≤ 5 yrs	6-10 yrs	11-15 yrs	≥ 16 yrs	
Explorer	Count	2	6	7	12	27
	% Within experience	50,0%	37,5%	50,0%	63,2%	50,9%
Hesitator	Count	0	3	1	1	5
	% Within Experience	0,0%	18,8%	7,1%	5,3%	9,4%
Pioneer	Count	1	6	4	1	12
	% Within Experience	25,0%	37,5%	28,6%	5,3%	22,6%
Skeptic	Count	1	1	2	5	9
	% Within Experience	25,0%	6,3%	14,3%	26,3%	17,0%
Total	Count	4	16	14	19	53
	% Within Experience	100,0%	100,0%	100,0%	100,0%	100,0%

4.4 SECTION B: TECHNOLOGY READINESS

In this section, the readiness to use technology is discussed under the four dimensions of the TRI, namely optimism, innovativeness, discomfort, and insecurity, based on the results (Parasuraman & Colby 2015:60-74).

4.4.1 Optimism

Four of the items that measured optimism, namely the contribution to the quality of life, freedom of mobility, control, and productivity of lives as part of optimism, were referred to in this part.

4.4.1.1 New technologies contribute to a better quality of life (n=53)

As shown in Figure 4.6, about half, 27 (51%), strongly agree, and the other halves, 26 (49%), agree that new technology contributes to a better life.

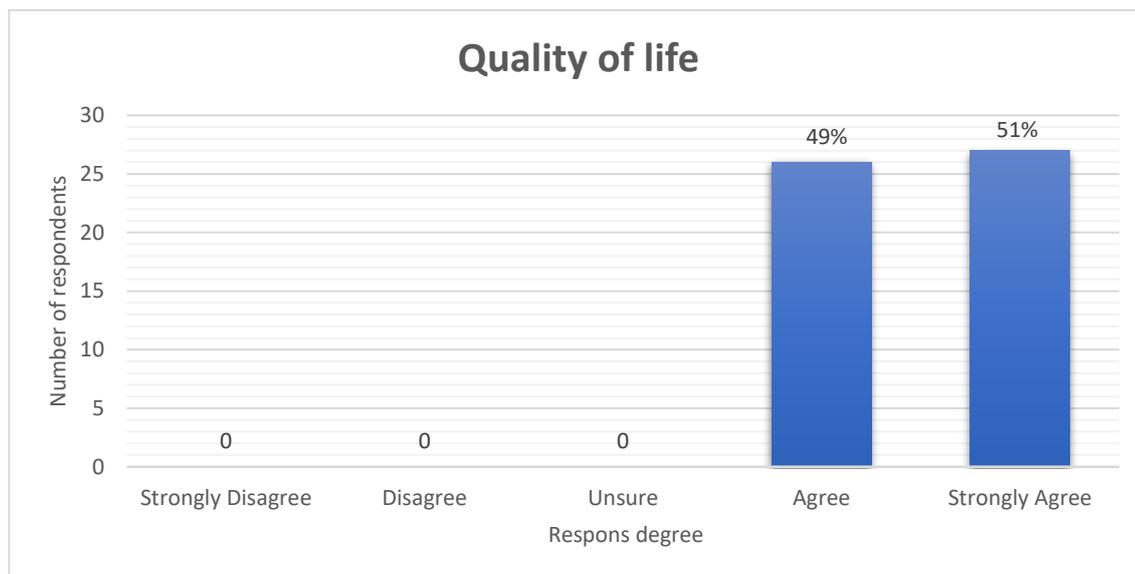


Figure 4.6: New technology's contribution to a better quality of life

According to Kim *et al.* (2018:141), technology such as sports and wearables improve health or lives. This study confirmed the same belief where technology such as bloodpressure- or glucose monitors were used.

4.4.1.2 Technology gives more freedom of mobility (n=53)

As shown in Figure 4.7, the majority, 30 (56%) of the respondents strongly agreed, and 20 (38%) agreed that the use of technology gives them more freedom of mobility, while two (4%) respondents were unsure, and one (2%) participant disagree with this statement.

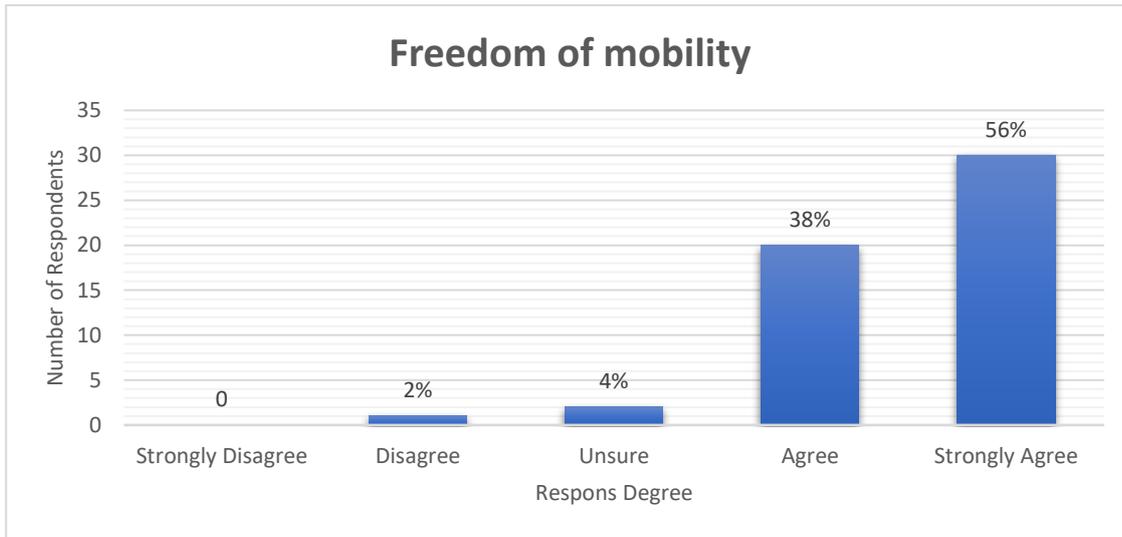


Figure 4.7: Technology gives more freedom of mobility

According to Lin and Chang (2011:430), technology was perceived as more useful, whereas freedom of mobility was higher. The results of the study confirmed this positive view.

4.4.1.3 Technology gives more control over daily lives (n=53)

As shown in Figure 4.8, about half, 26 (49%) respondents strongly agree, and the other half, 23 (43%), agree that new technology gives people more control over their daily lives, while three (6%) respondents were unsure, and one (2%) participant disagree with this statement.

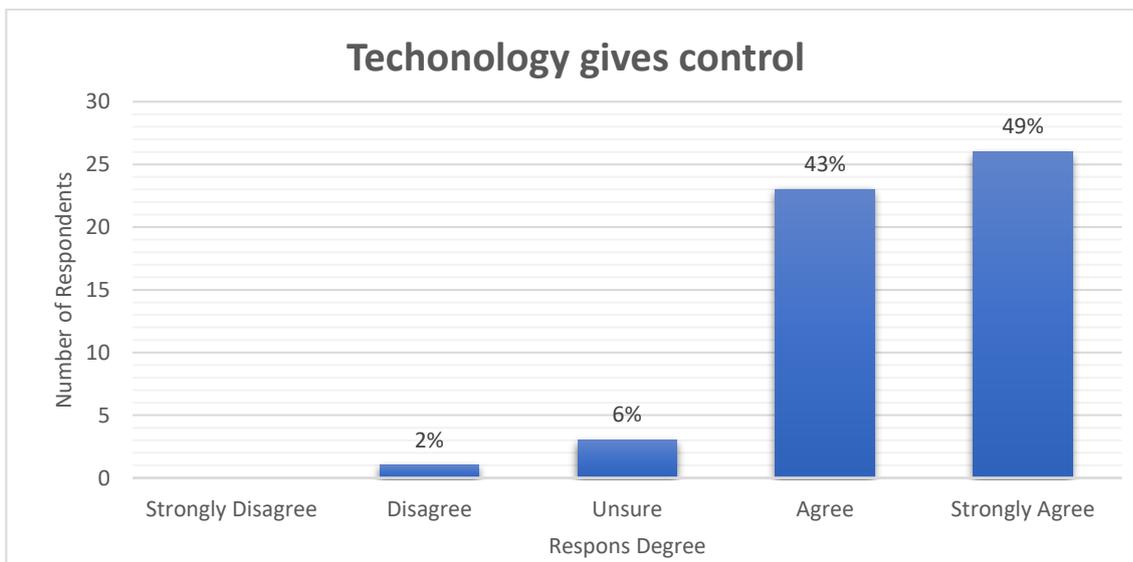


Figure 4.8: Technology gives more control over daily lives

According to Lin and Chang (2011:425), technology offers people increased control, flexibility and efficiency. The results of the study also confirmed this view.

4.4.1.4 Technology makes me more productive (n=53)

As shown in Figure 4.9, the majority, 28 (53%) of the respondents agreed, and 21 (39%) strongly agreed that the use of technology makes them more productive in their personal life, while three (6%) respondents were unsure, and one (2%) participant disagree with this statement.

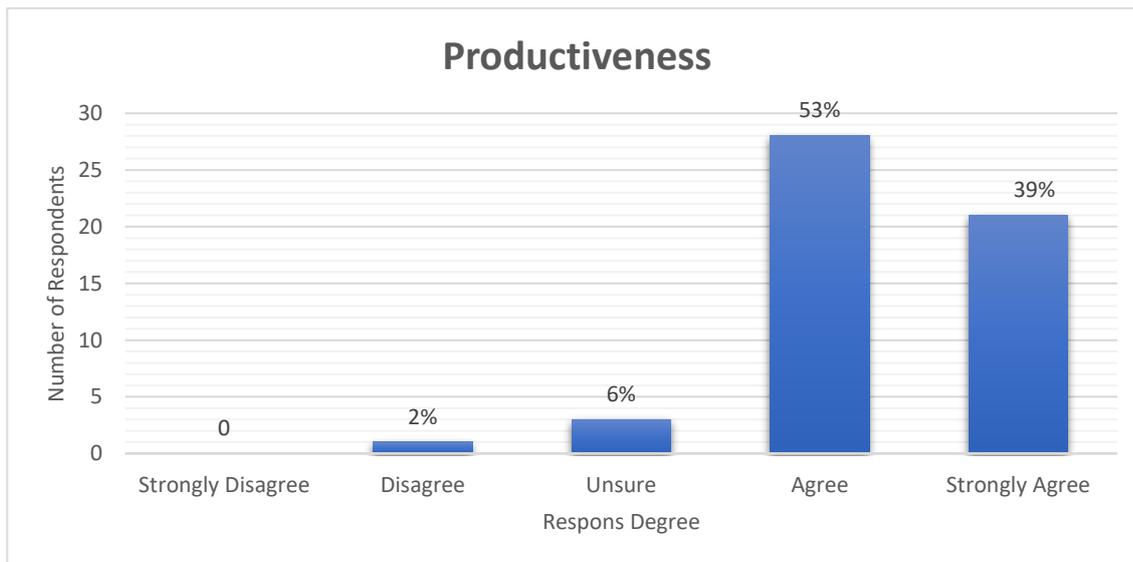


Figure 4.9: Technology improves productivity

In a study by Badri *et al.* (2014:268), it is clear that anxiety reduces the time spent using new technology; thus, it did not improve productivity. In this study, it seemed to disconfirm the statement because respondents agreed or strongly agreed productivity was improved by technology use.

4.4.2 Innovativeness

In this part, advice on new technologies, first to acquire new technologies, figure out new high-tech products and services without help and upkeep of new developments in technology, as part of innovativeness were discussed.

4.4.2.1 Other people come to me for advice on new technologies

Most of the respondents, 28 (53%), agreed and seven (13%) strongly agreed, but seven (13%) were unsure whether other people come for advice on new technologies, while nine (17%) disagreed and

one (2%) strongly disagreed with the statement, as shown in Table 4.10. One (2%) participant did not answer the question.

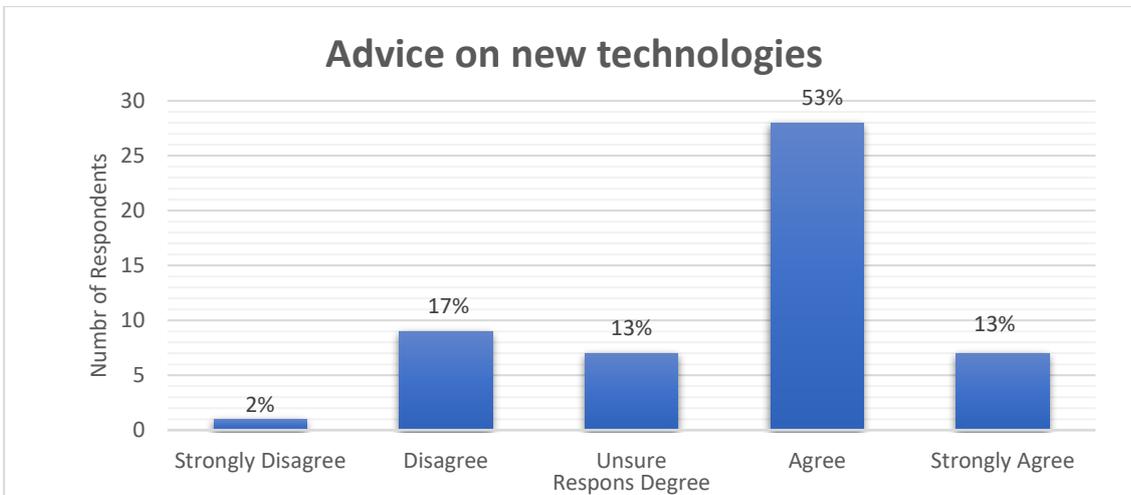


Figure 4.10: Approach to advice regarding new technologies

According to Kim *et al.* (2018:142), those with a positive experience using technologies could strategically encourage others. This study confirmed that 66% would share positive intentions since others approached them for advice.

4.4.2.2 First to acquire new technologies (n=53)

As shown in Table 4.11, most of the respondents 21 (40%), agreed and 14 (26%) disagreed that people acquire advice on new technologies from them, while only three (6%) strongly agreed and one (2%) strongly disagreed with the statement. 13 (24%) of the respondents answered the question as being unsure. One (2%) participant did not answer the question.

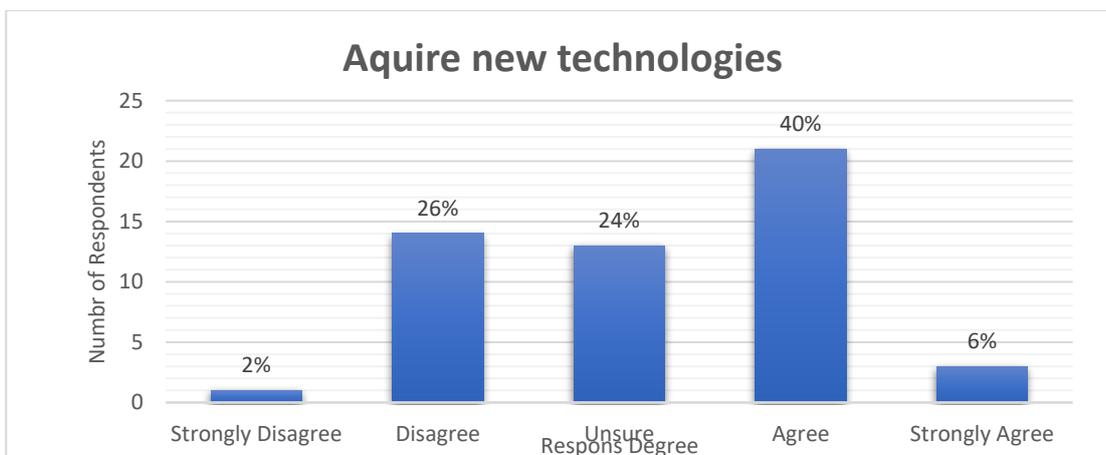


Figure 4.11: First to acquire new technology

A strategically planned program for introducing technologies should target those who were the first to acquire new technologies, similar to a study by Kim *et al.* (2018:142).

4.4.2.3 Figure out new high-tech products and services without help (n=53)

As shown in Table 4.12, most of the respondents, 26 (49%), agreed, and 13 (25%) disagreed that they can figure out new high-tech products and services without help, while only five (9%) strongly agreed with the statement. Nine (17%) respondents answered the question as being unsure.

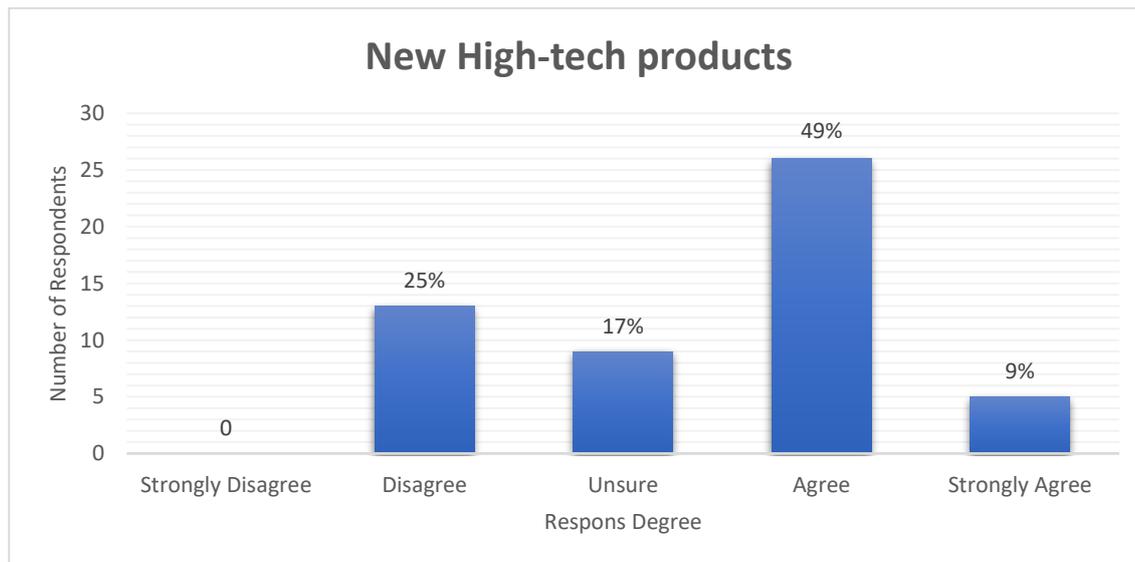


Figure 4.12: Figure out new high-tech products and services

It was not clear whether the respondents had to figure out how high-tech products and services worked. These results confirmed about half of the respondents (58%), without help, figured out how new high-tech products and services worked. Kim *et al.* (2018:143), in the South Korean study, suggested these types of individuals could subsequently serve as change agents.

4.4.2.4 Keep up with the latest technological developments (n=53)

As shown in Figure 4.13, the majority of the respondents, 37 (70%), agreed that they keep up with the latest technological developments in their area of interest, while nine (16%) strongly agreed. Three (6%) respondents were unsure, and three (6%) respondents disagreed. One (2%) participant did not answer the question.

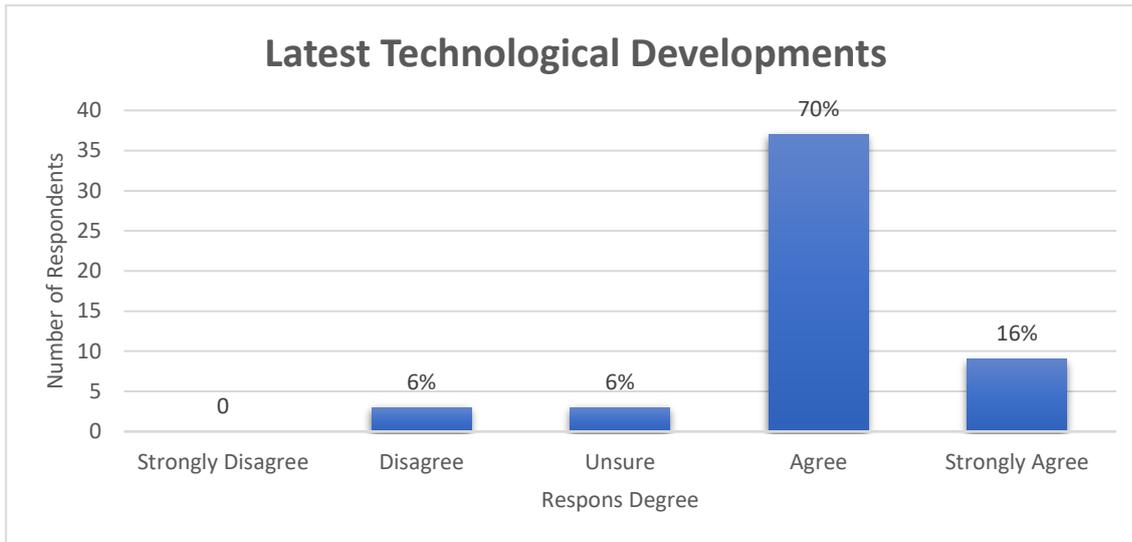


Figure 4.13: Keep up with the latest technological developments

Kim *et al.* (2018:142) indicated that more positive beliefs towards using technology will result in more “ready” users. This study confirmed similar results with a high percentage (86%).

4.4.3 Discomfort

In this part, the discomfort was discussed with an indication of the advantage taken by the technical support provider, unhelpful support lines, technology system design and language of high-tech manuals.

4.4.3.1 Advantage of technical support provider (n=53)

As seen in Figure 4.14, most of the respondents 30 (57%) disagree, 10 (19%) of the respondents strongly disagree, six (11%) respondents agree, and two (4%) respondents strongly agree, while five (9%) of the respondents felt that when they get technical support from a provider of a high-tech product or service, they sometimes feel as if the advantage was taken off by someone who knows more than them.

Avoidance of new technology was found after negative comments on using new technology in a study by Badri *et al.* (2014:268). In this study, 76% reported disagreement about the advantage taken by technical support providers, thus disconfirming the statement.

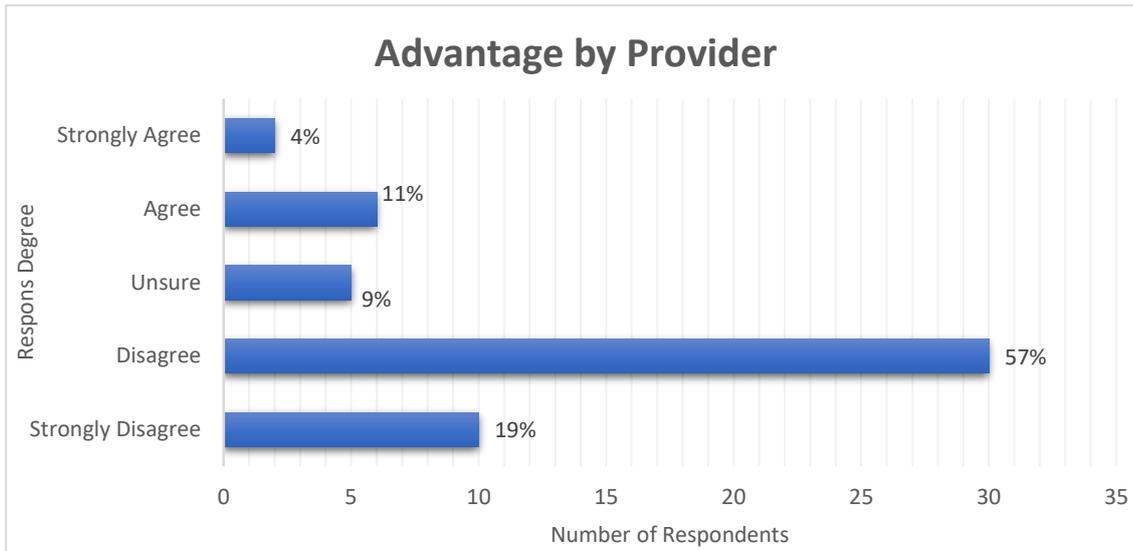


Figure 4.14: Advantages of technical support provider

4.4.3.2 Technical support lines (n=53)

As seen in Figure 4.15, technical support lines or teams are not helpful because they do not explain things in terms. I understand the statement - most of the respondents 29 (55%) disagree, 15 (28%) of the respondents agree, five (9%) respondents strongly disagree, and one (2%) participant strongly agree, while three (6%) of the respondents were unsure.

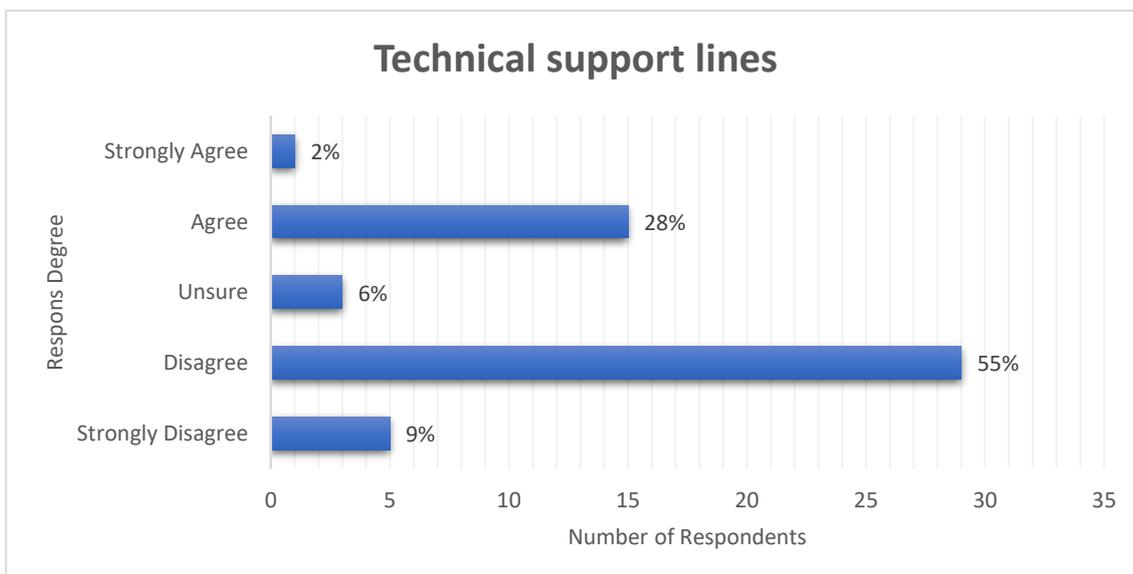


Figure 4.15: Technical support lines are not helpful

This study confirmed that 64% of respondents disagree or strongly disagree that technical support lines were not helpful, and 36% agree to it. These results were part of the discomfort dimension and were more complex and challenging to measure, same as in the study by Parasuraman and Colby (2015:67).

4.4.3.3 Technology systems designs (n=53)

As seen in Figure 4.16, most of the respondents 29 (54%) disagree, nine (17%) of the respondents agree, nine (17%) respondents strongly disagree, and three (6%) respondents strongly agree that technology systems are not designed for use by ordinary people while three (6%) of the respondents were unsure.

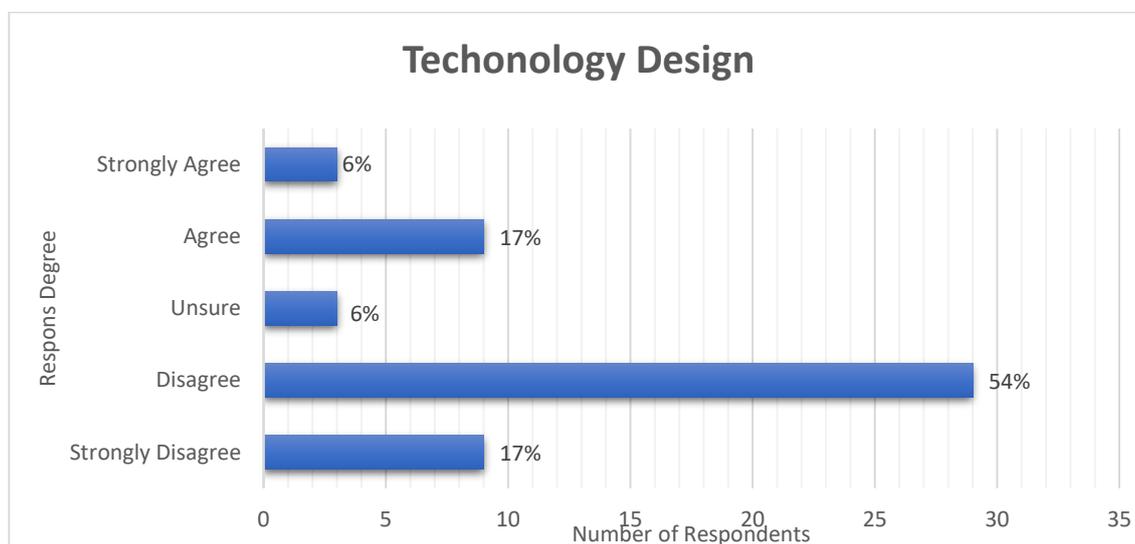


Figure 4.16: Technology systems design not for ordinary people

Parasuraman and Colby (2015:72) indicated that users were satisfied with the basic functionality but would need more support and reassurance. This study confirmed the same needs since 29% of nurse educators responded negatively.

4.4.3.4 Manual for high-tech product or service (n=53)

As seen in Figure 4.17, most of the respondents 21 (40%) disagree, 10 (19%) of the respondents agree, five (9%) respondents strongly disagree, and two (4%) respondents strongly agree that technology systems are not designed for use by ordinary people while 15 (28%) of the respondents were unsure.

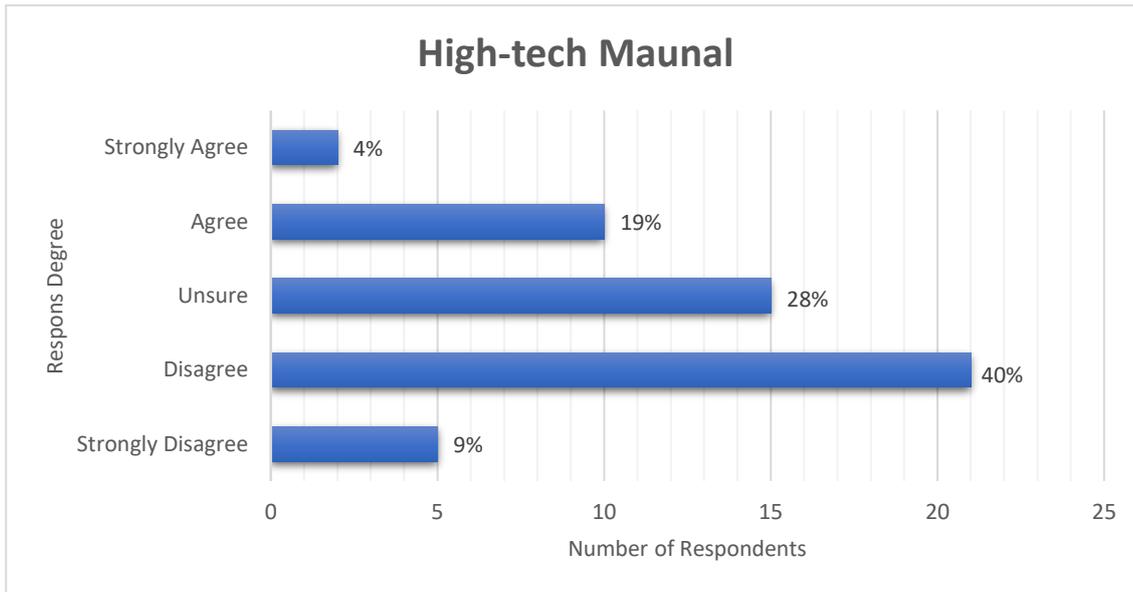


Figure 4.17: No manual for high-tech products or services

Users require more support to be satisfied and adopt technology, according to Parasuraman and Colby (2015:72). This belief was confirmed by the results of this study.

4.4.4 Insecurity

Here dependence on technology, harmful destruction, quality of relationships and online business was discussed as an indication of insecurity in using technology.

4.4.4.1 Dependence on technology to do things (n=53)

In Figure 4.18, 21 (40%) of the respondents disagree, 17 (33%) agree, five (9%) strongly disagree, and five (9%) strongly agree, while five (9%) were unsure whether people are too dependent on technology to do things for them.

The above 49% 'disagree or strongly disagree' - responses disconfirm dependency. The 33% 'agree'-response confirmed dependency on technology and technological savvy or not as well as user involvement in operating it properly. This could be a critical issue for them, as indicated in the study by Parasuraman (2000:316).

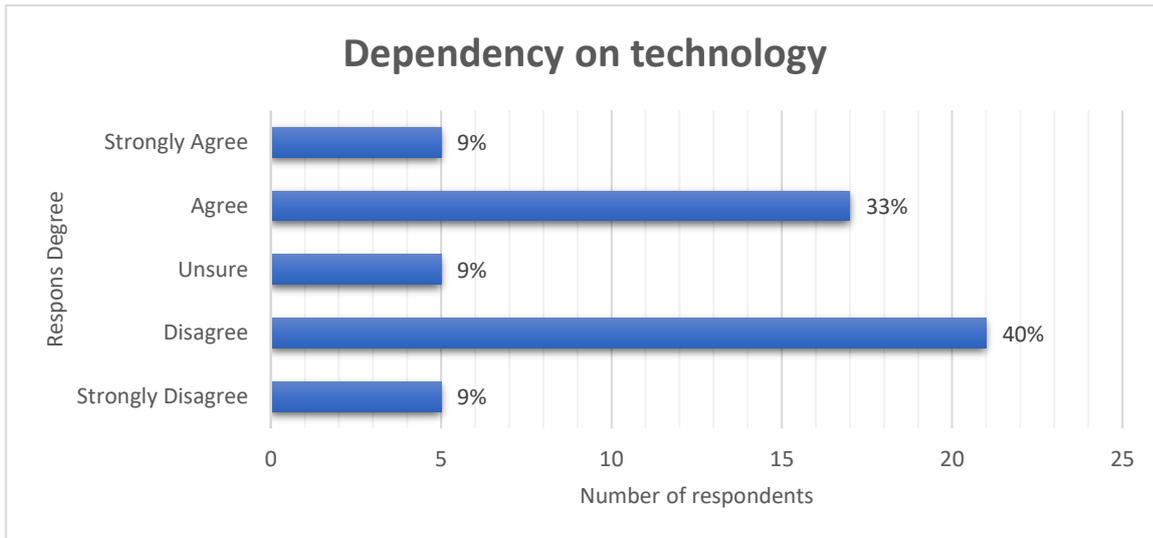


Figure 4.18: People are too dependent on technology to do things for them

4.4.4.2 Technology destructs people (n=53)

As shown in Figure 4.19, 22 (42%) of the respondents disagree, 13 (25%) agree, seven (13%) strongly agree, and five (9%) strongly disagree, while six (11%) were unsure whether too much technology destructs people to a harmful point.

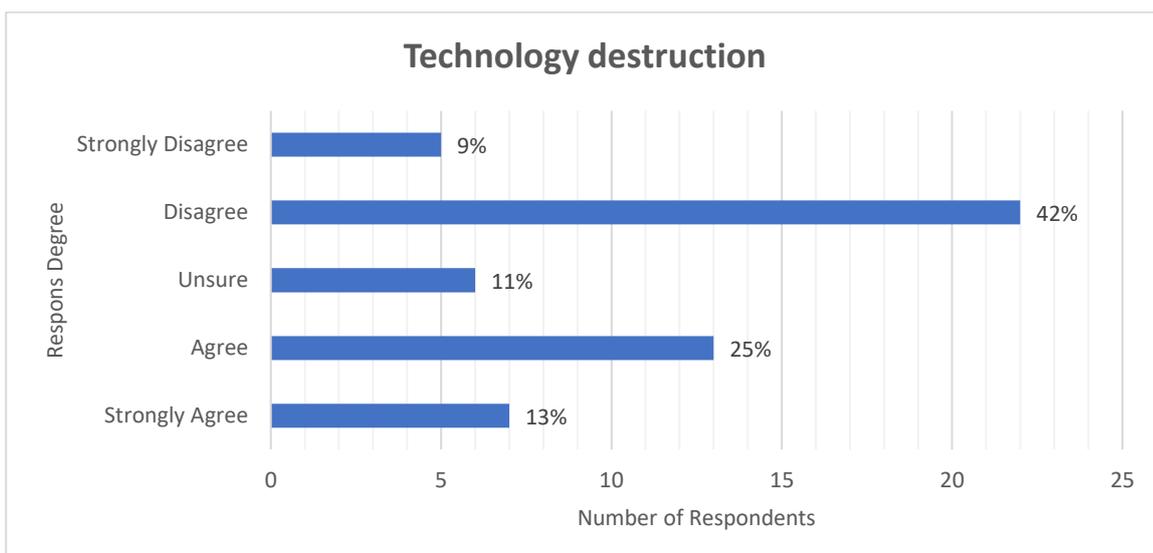


Figure 4.19: Too much technology destructs people to a harmful point

The tremendous growth of technology-based products and services calls for a thorough assessment of users' readiness and people's reactions to technology (Parasuraman, 2000:317). This study confirmed that respondents embraced the technological products rather than being scared of possible destruction.

4.4.4.3 Technology lowers the quality of relationships (n=53)

As shown in Figure 4.20, 19 (36%) of the respondents agree, 17 (32%) strongly agree, 12 (23%) disagree, and one (2%) strongly disagree, while four (8%) were unsure whether technology lowers the quality of relationships by reducing personal interaction.

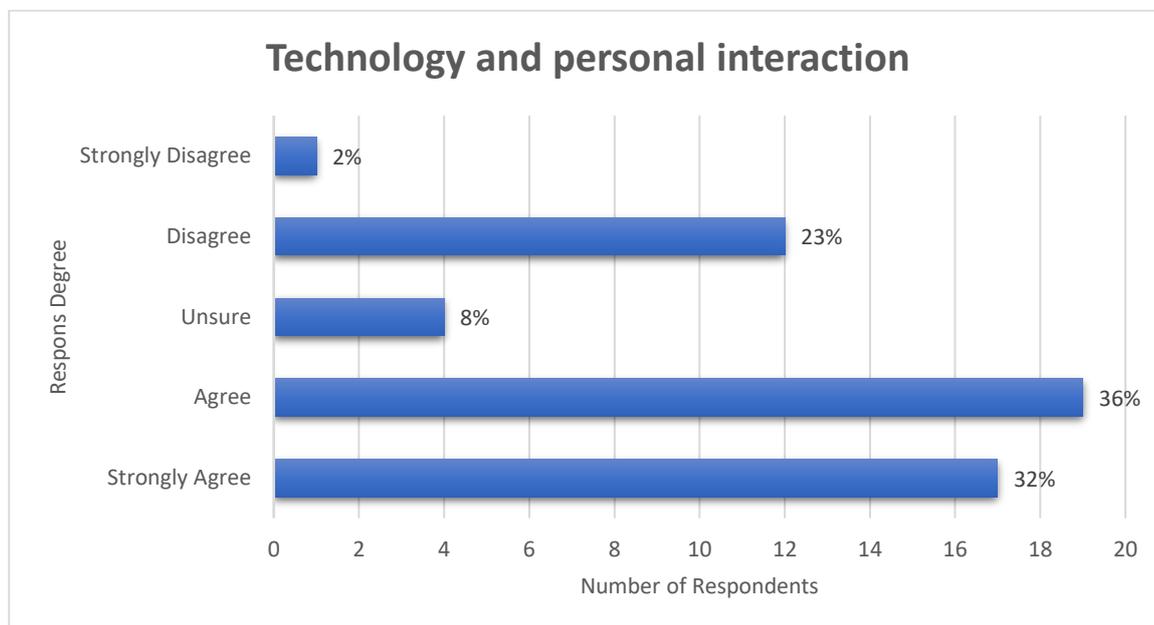


Figure 4.20: Technology lowers the quality of relationships by reducing personal interaction

The results of this study clearly confirmed that respondents' interaction was with technology and not with people. Parasuraman (2000:319) asked what the implications of such differences in an interaction where technology plays a major role were.

4.4.4.4 Confidence in doing online business (n=53)

As shown in Figure 4.21, 21 (40%) of the respondents agree, 10 (19%) disagree, nine (17%) strongly agree and four (7%) strongly disagree, while nine (17%) were unsure whether they feel confident doing business with a place that can only be reached online.

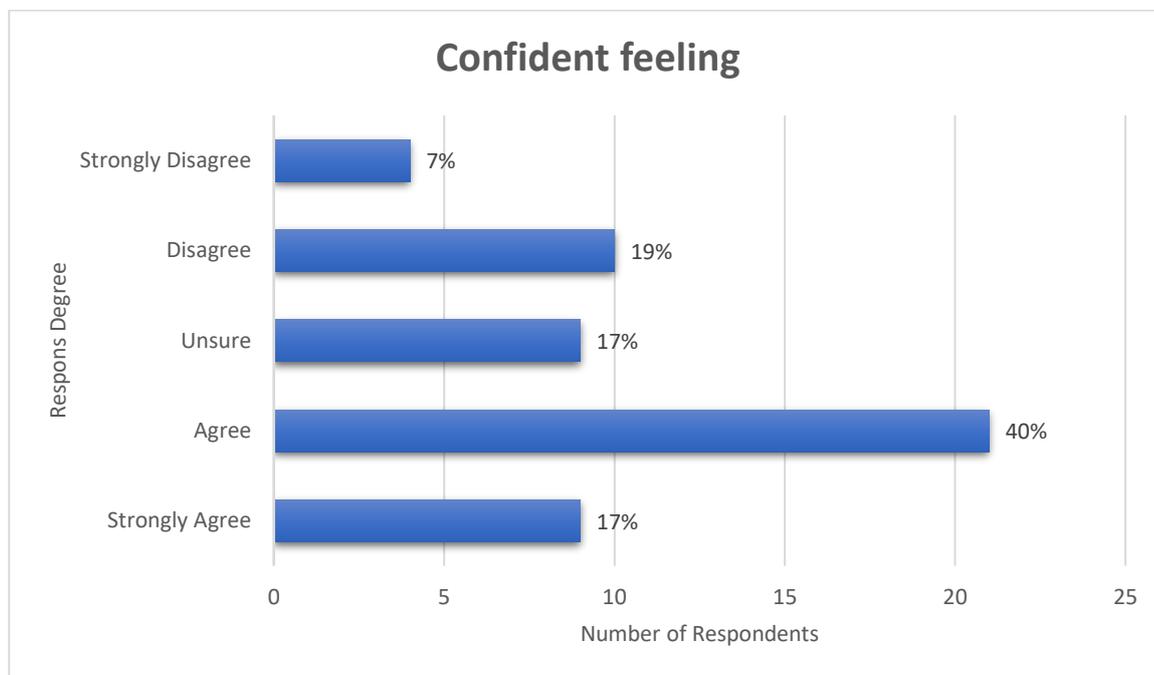


Figure 4.21: Confident feeling doing business with a place that can only be reached online

Most respondents confirmed their interest in learning more about using online technology, although 43% were sceptical about the benefits of online business, especially in nursing education. This tendency was also noted among teachers in a study by DeCoito and Richardson (2018:372).

4.4.4.5 Descriptive statistics for the dimensions of technology readiness (n=53)

The technology readiness statistics are presented in Table 4.6. The overall mean for these dimensions was 3.56, indicating that most of the respondents demonstrated a medium overall level of technology readiness (>2.2) and were, therefore, likely to adopt technology used for the new nursing programme. The dimension for which respondents indicated their highest level of agreement with the presented statements was the optimism dimension, with the overall mean as 4.42, which indicates that the sample group generally displayed high levels of optimism towards technology in general. The statement that respondents agreed with the most was statement B1: 'New technology contributes to a better quality of life', where the mean was 4,51 and the standard deviation of 0,44. The dimension for which respondents indicated their lowest level of agreement with the presented statements was

the discomfort dimension, where the overall mean was 2,48, which indicates that the sample group was generally just comfortable with technology. The statement with which respondents agree the least was the statement B9: 'When I get technical support from a provider of a high-tech product or service, I sometimes feel as if I am taken advantage of by someone who knows more than I do' with a mean of 2.25 and standard deviation of 1.017. In a study regarding technology readiness in the airline industry, similar results were observed (Smit, Robert-Lombard & Mpinganjira 2018:12).

Table 4.6: Overall descriptive statistics for technology readiness

Variable	Mean	Standard Deviation
B1.	4,51	0,505
B2.	4,49	0,669
B3.	4,40	0,689
B4.	4,30	0,668
Optimism	4,42	0,44
B5.	3,60	0,995
B6.	3,21	0,977
B7.	3,43	0,971
B8.	4,00	0,686
Innovativeness	3,55	0,63
B9.	2,25	1,017
B10.	2,58	1,064
B11.	2,40	1,132
B12.	2,68	1,015
Discomfort	2,48	0,85
B13.	2,92	1,222
B14.	2,91	1,260
B15.	3,74	1,195
B16.	3,40	1,198
Insecurity	3,24	0,87
TRI 2.0	3,56	0,42

4.4.4.6 Descriptive statistics for the TRI segmentation (n=53)

Based on the TRI and using the data obtained, the responding nurse educators were categorized into four different segments, namely Explorers, Pioneers, Skeptics and Hesitators, as shown in Table 4.7.

Table 4.7: Overall TRI segmentation

	Frequency	Percent
Explorer	27	51
Hesitator	5	9
Pioneer	12	23
Skeptic	9	17
Total	53	100

Explorers make up 51% of the sample. These 27 nurse educators were the most techno-ready of all the segments, and this group was strongly motivated to adopt technology with few inhibitions. Parasuraman and Colby (2001) assert that Explorers are an easy group to attract when new technology is introduced.

Of the sample of nurse educators, twelve (23%) fall into the Pioneer group, which was highly motivated to adopt technology, but at the same time, they were inhibited by a high level of discomfort and insecurity.

Skeptics represent nine (17%) of the sample. This group of nurse educators were not too far behind the Pioneers; however, these had little motivation to adopt technology and also had few inhibitions about it.

The Hesitator group comprised five (9%.) of the nurse educator sample. This group believed in technology's benefits but was constrained by a high level of discomfort and insecurity. According to Badri et al. (2014), Hesitators would be concerned about the risks of technology use.

There were no Avoiders identified; thus, none of the nurse educators were not techno-ready.

4.5 SECTION C: BARRIERS AND ENABLERS

In this section, the respondents had an opportunity to add comments related to barriers and enablers on what makes or might make it difficult or prevents them from using technology and or what makes it easier or supports them to use technology in nursing education. A total of fifty (50) nurse educators provided some responses to the open-ended question at the end of the questionnaire. The data and

responses were transcribed, similar responses grouped, and themes as discussed below were identified. The direct quotes from the responses received are indicated to support the subthemes. The indication of P refers to 'Participant', and the number represents the codes given to the respective respondents. The barriers and enablers are depicted in Table 4.9.

Table 4.9: Barriers and enablers of technology use

THEMES	SUBTHEMES
Barriers	
4.5.1 Technology-related barriers	4.5.1.1 Technological resources 4.5.1.2 Electrical supply 4.5.1.3 Technological changes 4.5.1.4 Security systems 4.5.1.5 Financial resources 4.5.1.6 Time availability
Enablers	
4.5.2 Technology-related enablers	4.5.2.1 Training and development 4.5.2.2 Data access and retrieval 4.5.2.3 Information technology support 4.5.2.4 Managerial support 4.5.2.5 Communication 4.5.2.6 Attitudes

4.5.1 Technology-related barriers

Although not all the respondents clearly differentiated between barriers and enablers, barriers challenging the use of technology as identified by the nurse educators were indicated.

4.5.1.1 Technological resources

Thirty-four respondents responded regarding resources in general. Technologically related resources were mentioned in 72% of the response, although not specifically the mentioning of computers. It was clear that the focus was primarily on computers, laptops or tablets. Technology in nursing education also includes high-fidelity mannikins, monitors, smart boards etc. The use was reported as very negative due to limited internet, poor networks and data restrictions.

Supportive quotes:

“One of the factors making it difficult to use technology in the workplace is limited resources The need to use e-learning should be based on the availability of hardware, software and systems that support e-learning, e.g., unavailability or limited Internet access will make it impossible or difficult to use technology” (P01)

“Being in an area where there is no network reception and or having insufficient data can make it difficult to use technology” (P34)

“Poor Internet connection and access in certain areas will make it impossible or difficult to use technology” (P53)

Smit *et al.* (2018:3) found that demand factors, such as access to the Internet and mobile technology, have also provided additional barriers to the success of technologies.

As in this study, Terkes *et al.* (2019: 24) confirmed the introduction of the Internet, especially the easy-to-use Web, demonstrated access to knowledge and provides opportunities for untraditional providers to offer learning services to meet the educational needs of the workforce. One of the most obvious and significant changes was the online classes and programme transformation to use various educational technologies for facilitation. However, access to computers and websites was identified as an external barrier described in a study by DeCoito *et al.* (2018:373).

4.5.1.2 Electrical supply

Load-shedding is an action to reduce the load on something, especially the interruption of an electricity supply, to avoid excessive load on the generating plant as a way to distribute the demand for electrical power across multiple sources. This requires switching off parts of South Africa’s electric grid in a planned and controlled manner due to insufficient capacity or to avoid a countrywide blackout,

although the subsequent electricity failure made it impossible or difficult to use technological resources.

Supportive quotes:

“Technology is dependent on electricity and load[-]shedding cripples it [it’s] functionality, especially without backup generator and exposes dependability” (P11)

Students and faculty (educators) in Pakistan from remote areas face frequent power breakdowns. It affects their learning and teaching, especially during the days of the COVID-19 pandemic. Technology use and online learning have become a problem due to load-shedding (Kakepoto, Talpur, Memon, Halepoto & Jalbani 2021:1151).

Bester, Smit, de Beer and Myburgh (2021:5) indicated other reasons for limited connectivity were theft and intermittent electricity load-shedding schedules, prominent in South Africa, which also impede access to information communication technology.

4.5.1.3 Technological changes

Seventeen (34%) respondents raised technology changes that are so rapid, constantly and becoming absolute. The feeling was that it was difficult to keep pace, made things complicated, and you forget how to stay technologically literate. There were 50% positive and 50% negative feelings regarding constant changes.

Supportive quotes:

“The fast-paced technological changes make it difficult for one to keep pace” (P01)

“It is sometimes difficult to keep up with the rapid changing technology” (P27)

Lived experiences with the transition from teaching in a classroom to teaching with technology were discussed, where adapting to change and finding new ways of teaching were indicated as not handled correctly, therefore, can lead to fear and disillusionment about using technology within organizations (Roney *et al.* 2017:114).

4.5.1.4 Security systems

Security classification prohibits fraud and exploitation of sensitive information and requires it to be managed correctly. Twenty percent of respondents reported concerns about protecting information via technology sources.

Supportive quotes:

“Untrustworthy sites, security bridge to get confidential info” (P05)

“The work environment which is the military often time restrict[s] its members a lot, especially with certain programs, we are not free to use any program as we must be considerate of the sensitivity of our information” (P07)

A study in Australia by McInerney and Druva (2019:73) showed a more secure environment where the “Tamper proof” signatures cannot be forged. Students who are not able to take advantage of staff members or educators who can't be bothered to check their work and sign everything off were discussed.

Lupiáñez-Villanueva *et al.* (2010:136) also noted concerns about the security and confidentiality of computer-based information and communication inhibited over a third (36%) of nurses from using technology.

4.5.1.5 Financial resources

Financial aspects like how expensive technological products and information (software) are, including costs of the latest inventions, were reported. Seventeen (34%) respondents reported specifically on budget allocation and constraints such as a decline in money.

Supportive quotes:

“Using technology in education is expensive and the constant decline in budget allocation progressively makes it more difficult to get all the equipment and systems necessary to use technology to full capacity” (P01)

“Budget constraints in the workplace restricts the use of technology” (P32)

Gonen *et al.* (2016:110) stated limited funding and high costs of informatics education that need to be accommodated within the curriculum, including different types of electronic health records as barriers.

Introducing technology in clinical environments poses challenges for educators as much as it does for students. These range from; costs, security of the devices and the data on them as well as pedagogical challenges (McInerney & Druva 2019:73).

The lengthening procurement and purchasing processes in the Department of Defense were indicated as a contribution to frustrations and the unavailability of efficient technological products. It was not

even for new products advertised or promoted for advancement, but basic needs such as ink, toners or printers, were unavailable due to lack of finances.

Supportive quotes:

“Till recently we had a big problem with computers and laptops, printers and printer cartridges remain a challenge as well as the photocopy machine that is not working at regular intervals” (P16)

“Technological equipment is not cost effective if not continuous updated thus purchase of latest technology. The difficulty in procuring state-of-the-art technology compromises the quality of education and this is of the barriers to utilising technology” (P43)

Smit *et al.* (2021) indicated that adoption rates have been slow despite the financial investment in and benefits of technological applications. This study found that the readiness of nurse educators to use technology depended on financial investments.

4.5.1.6 Time availability

Only 4% mentioned technological use as an opportunity to promote a better quality of documents for the new nursing programme.

Supportive quotes:

“Time is also a barrier e.g., to figure something out or try to utilise a new programme/ Excel takes time so I resort to what I know best” (P10)

It was, however indicated that creating new innovative learning material takes time, and considering the amount of personnel and work expectations, the use of technology was neglected due to individual differences and situational factors, as also confirmed by Lin and Chang (2011:425).

Thomas (2017:58) indicated that if educators do not have enough time for additional planning to incorporate technology into their curriculums and lesson strategies and are not comfortable using technology, they will not use technology. They may have second-order barriers of negative perceptions, beliefs, and self-efficacy.

4.5.2 Technology-related enablers

The nurse educators indicated that if barriers are addressed, they can become enablers. There were, however a few mentioned to be more positive than negative.

4.5.2.1 Training and development

Twenty (40%) of the respondents talked about their level of competence, knowledge and skills, being updated or staying abreast with various technology such as computer programmes. Respondents indicated they were unsure about techniques and strategies. Help from each other and mentors are not sufficient to fill the gap when difficulties are encountered.

It was indicated that a dedicated team should be available to help prepare learning material, assessment documents and additional research information, which could enhance productivity. Cultural inclusive considerations were mentioned by one respondent (2%).

Supportive quotes:

“I do understand that our living conditions and standards will never be the same but we are fortunate in South Africa that different types of technologies are available for communities to access. Thus, cultural inclusive training” (P12)

The majority of teachers in the United States reported feeling adequately trained to operate technology equipment (68%) and to search on the Internet (71%) (Ruggiero & Mong 2015:163). These findings supported that those skills became advanced with training and readiness to use technology..

Fourteen (28%) of the respondents said that in-service training and development were available, but they would prefer more workshops and guidance. The training must be intensified and continuous as well as specific.

Supportive quotes:

“I would consider continuous development programmes with regards to technology or Inservice training that is considered to be able to support me in using technology” (P09)

“Training and development in e.g., smart boards are NOT ongoing and if not familiar with it you forget how to utilise it” (P10)

“Young staff members are always willing to help where there is a need” (P20)

“Free technology lessons are [to be] given by IT Departments to help lecturers with technology” (P31)

DeCoito *et al.* (2018:374) emphasise more ongoing professional development in the area of technological integration. This study indicated that considering educational purposes of technology,

providing opportunities to learn from peers and building confidence in and exploring benefits of using technology rather than focusing on skills could contribute to technology readiness.

In a study by Orton, Nokes, Scott and Hickey (2015:10), the educators believed that blended learning is a useful teaching strategy. Although the technology-based aspects are limited, they intended to adopt such strategies to their particular subjects or programmes with the correct interactive learning support.

4.5.2.2 Data access and retrieval

Although information access was also mentioned as a barrier, respondents would like to be able to retrieve the massive, interesting and creative world of information to include in the presentations.

Supportive quotes:

“Other aspects that support the use of technology in research include access to massive information on any topic, enhancing teaching through the use of visual materials, the ease of writing and keeping notes, minutes and other correspondence” (P01)

“There are so many creative ideas in newest technologies, one can use however a lot of playing around with the app or equipment is needed” (P08)

“Latest information (research) available, no need to wait e.g., for library to open – Information needed can be accessed at any time from any location [thus] save time in preparation of lecturers, assessments and other training activities” (P18)

In a study by Bester *et al.* (2021:5), respondents elucidated that information is immediately and on-demand accessible from their phones which is the first source to consult when confronted with unknown information. It was found that browsing the Internet is user-friendly compared to referring to textbooks and visiting libraries.

4.5.2.3 Information technology support

Service delivery was relevant for 26% of the respondents. These fourteen respondents emphasized the importance of ongoing information technology support, preferably on-site technological experts or technicians. Since instalments and updates are currently not done at the SAMHS Nursing College, it takes time to replace or fix damaged technological ‘gadgets’.

Supportive quotes:

"Just like in other academic institutions the SAMHS Nursing College should have IT support allocated to the College" (P07)

"On-site IT person to assist is needed" (P23)

It was reported that new technologies are being supported regularly, although there might be a delay between implementation and training. Challenges must be addressed through professional development and opportunities. Support must be readily available to incorporate technologies early in practice (DeCoito *et al.* 2018:373).

4.5.2.4 Managerial support

The respondents indicated good planning and proper schedule where time allocation support attendance will be enablers. Shortage of staff should be getting attention from management to not force respondents to do uncompromised training instead of normal workload. It was also indicated that groups were formed, and you, as outsiders, are embarrassed to ask for help from those, although it was said there was some support amongst the nurse educators.

Supportive quotes:

"Young staff members are always willing to help where there is a need" (P20)

"Involving staff in decision making regarding the acquisition of technological aspects/resources" (P22)

"Technology does not dictate the physical location and allows one to schedule work and social life according to their needs, with good planning together with management" (P25)

"Less travel for effective management" (P42)

Strong leadership and good communication between nursing practice, education and policy groups are necessary to foster a positive clinical environment for learning. The need for integrating information technology and informatics into the nursing curriculum has received much support and should be considered in strategic planning (Gonen *et al.* 2016:110).

4.5.2.5 Communication

Communication was important to help with time management and liaison between nurse educators, service providers, or clients. One of the factors that helped a lot regarding the use of technology in education was the ease of communication, which was enhanced through the virtual platform.

Supportive quotes:

“Meetings and communication with stakeholders such as CPASSA [College Principals and Academic Staff of South Africa], SANC [South African Nursing Council], Department of Health, could continue through a virtual platform and ensured continued service delivery. On the other side communication restrictions and classification of information inherent within the functioning of the SANDF [South African National Defence Force] restricted full exploitation of the virtual platform” (P01).

“The individual stays abreast with global tendencies and can communicate with stakeholders at a convenient time” (P47)

Outdated or limited connectivity of technology hampers communication and collaboration via e-mail, etc. Consistent with findings on technology readiness by Smit *et al.* (2018:9), this study provided insights into how positive nurse educators are about introducing new products or services and identified the key drivers and inhibitors of final adoption to use the products and services.

4.5.2.6 Attitudes

Lack of knowledge and skills leads to fear and discomfort regarding technology use, which negatively influences their attitude. In a study by Terkes, Celik and Bektas (2019:20), positive attitudes towards technology were described, which disconfirms the result of the study. From fear, pressure, or being afraid of trying new ways, as described by the unsure ones, towards interest, patience, and excitement for creative ideas to be coming forward.

Supportive quotes:

“To utilize and “play” with technology without fear of breaking and messing up the equipment programs helps to make me feel more secure and skilful. In using technology more (practise makes perfect)” (P27)

“What makes it difficult [but], phobia of technology to be eradicated“ (P29)

A study in Canada by DeCoito *et al.* (2018:372) discussed a programme that primarily targeted students to develop their awareness and positively impact attitudes towards science, technology and mathematics. Educator professional development focusing on attitudes and interest towards technology use was a secondary outcome. Thus, considering a change in attitudes might contribute significantly to change in technology use.

In accordance with other studies (Chow *et al.* 2013 as cited by Gonen *et al.* 2016:110), significant positive correlations were noted between nursing students' attitudes towards computers and reported self-efficacy. Consequently, nurse educators need to train and build the self-efficacy of new-generation students, which can only happen if they respect information technology and other aspects of computer use in the nursing profession.

The analysis of the open-ended responses assisted the researcher in gaining insight into the additional emphasis placed on what could restrict or help nurse educators' readiness to use technology. The lack of resources, support and training confirmed that it is not effectively utilized or easy to access and use.

However, as indicated in Table 4.8, according to the results of the questionnaire, the nurse educators seemed ready to use technology despite the barriers mentioned in the open-ended responses.

Table 4.8: Overall TRI tier

	Frequency	Percent
High	41	77
Moderate	11	21
Low	1	2
Total	53	100

The results indicated that 41 (77%) respondents were highly ready, 11 (21%) moderate ready and only one (2%) on the low end of the readiness continuum.

4.6 CONCLUSION

In Chapter 4, the researcher analysed the data and explored the views of the nurse educators relating to their readiness to use technology for a new programme. Responses were illustrated in pie diagrams, figures and tables to facilitate understanding.

In Chapter 5, the research findings from both the literature and the respondents will be summarised, implications will be highlighted, and shortcomings will be discussed. Recommendations for future studies will also be included in Chapter 5.

CHAPTER 5: DISCUSSION, RECOMMENDATIONS, LIMITATIONS AND CONCLUSION

5.1 INTRODUCTION

In Chapter 4, the data were analysed, interpreted and discussed according to the arrangement of the questions in the questionnaire. Chapter 5 summarises the results, recommendations are made, limitations are outlined, and an overall conclusion of the study is provided.

5.2 RESEARCH QUESTION, AIM AND OBJECTIVES

This study aimed to determine the nurse educators' readiness regarding the use of technology in a new programme. Integration of technology was planned to play an important role. Although a variety of resources have already been available for use in the training of the legacy programme (R425) that was phasing out, it was not often or optimally used. Furthermore, the researcher observed that the educators seldom used technology, and some nursing educators were sceptical about the benefits of using technology. The reason thereof could be the level of readiness to use technology in the new nursing programme emanating from the following objectives:

- To determine the nurse educators' readiness regarding the use of technology at the SAMHS Nursing College, where data was obtained with a questionnaire containing demographical information and TRI 2,0 statements to be responded to.
- To describe barriers and enablers that might influence nurse educators' readiness. This data was obtained from an open-ended question.

Conclusions were based on the findings of the research study. The conclusions and recommendations will be linked to the research questions and objectives, which are presented in Chapter 1.

5.3 SUMMARY OF FINDINGS

Results from the data collection instrument were discussed in the previous chapter according to the variables. The variables included demographic data, the readiness of nurse educators and possible barriers or enablers to the use of technology.

This was a quantitative research study that used a descriptive survey as a design. Data was collected through a self-administered questionnaire, as described in Chapter 3. This self-administered tool was obtained with the authors' written permission (see Annexure A). This tool (the 16-item questions) was

used as a guideline during the compilation of the questionnaire for this study. This part determined four dimensions of readiness as indicated in results later in this chapter. The questionnaire was adapted by adding a section for biographical data at the beginning, and a single open-ended question was added at the end of the initial questionnaire to enhance the understanding of barriers or enablers that might influence nursing educator's readiness to use technology in education and to ensure objectives could be met.

5.3.1 Demographic profile of the respondents

The demographic data presented showed that females (n=50) were predominantly employed as nurse educators at the SAMHS Nursing College where the study was conducted. Of the fifty-three (53) respondents, 45 (85%) were more than 41 years of age, hence the need for succession planning. The majority of the respondents, 37 (70%), were African, according to the transformation plan of the DOD. Twenty seven (51%) of respondents were Bachelor's degree holders that seemed to be ready for the use of technology in the new nursing programme. In assessing work experience, 33 (62%) have worked as a nurse educator for more than ten years. Therefore, there is a need to incorporate technology and train them to use it to be on par with other higher education institutions in South Africa.

5.3.2 Readiness to use technology

The TRI 2.0 instrument was used to determine readiness to use technology. The results were reflected in the four dimensions, where the first two were the motivators, and the last two were the inhibitors (Parasuraman & Colby 2015:60-74). As observed from the results of the study, it seems that the respondents were positive regarding the motivators.

5.3.2.1 Optimism dimension

This dimension had four statements the nurse educators had to respond to. As seen in the dimension regarding optimism, where the majority either agree or strongly agree that new technology contributes to a better quality of life, gives more freedom of mobility, gives more control and makes them more productive in daily lives. Only eleven (5%) of the responses disagreed or were unsure.

5.3.2.2 Innovative dimension

In the innovative dimension, the respondents agree that people came to them for advice regarding new technology and can figure out new products or services. The majority agree or strongly agree that they keep up with technological development. About half (53%) of the respondents were not convinced about being the first to acquire new technology when it appears.

5.3.2.3 Discomfort dimension

The part regarding the inhibitors was not clearly for or against new technology. In the discomfort dimension, the respondents (25%) indicated that their technical support provider of a high-tech product or service gave a feeling of being 'taken advantage of' by those who know more. The respondents (36%) indicated technical support lines or teams were not helpful and understandable and (28%) respondents felt technology systems were not designed for ordinary people. Fifty-one percent disagree and 49% agree, respectively, that a manual for high-tech products or services was not written in plain language.

5.3.2.4 Insecure dimension

The insecure dimension showed respondents (58%) disagree that people depend on technology to do things for them, 68% of the respondents agree that technology lowers the quality of relationships by reducing personal interaction and half of the respondents indicated that too much technology destructs people to the point of harmfulness. The respondents (17%) were unsure and (57%) agreed or strongly agreed, a total of 74%, that they did not feel confident doing business only online.

5.3.2.5 Conclusion

Although the two motivators indicated a positive attitude and, therefore, readiness towards technology, the two inhibitor were perceived as uncomfortable by some and as insecure by more than half (58%) of respondents, therefore an inconclusive result regarding the readiness.

5.3.3 Barriers and enablers to the use of technology

In the section containing the open-ended question about the barriers and enablers, technology related barriers were identified. With technology resources, availability and accessibility were reported as the most influential factor. With electrical supply, load-shedding contributed to havoc and fast changes in technology together with security systems, was reported by 26 (12%) of the respondents. Financial resources or lack thereof were mentioned by 34% of respondents. Last but not least, time availability to learn and become acquainted with technology was indicated as a possible barrier.

Development and training to build knowledge and skills were the first contributor (40%), indicating enablers. Data access and retrieval were seen as a positive contribution to the use of technology. Information technology support and managerial support could enhance the use of technology. Communication and other factors like attitudes, feelings, opportunities and motivation were mentioned as possible enablers. Cultural influences were the least reported upon (2-4%).

5.4 DISCUSSION

A description of the demographics and readiness of the nurse educators to use technology for a new programme was provided. The demographic data of the respondents was reported in terms of age, gender, race, academic qualifications and the nursing education experience of the respondents with the use of technology.

The observations leading to this study were the roll-out of a contemporary programme described in R171 (SANC, 2013), where integration of technology was planned to play an important role, as well as the unpublished feedback report that indicated limited use of the high-fidelity manikins in simulation facilities as one type of technology available. Furthermore, the researcher observed some nursing educators were sceptical about the benefits of using technologies. It was therefore critical to scientifically investigate the level of technology readiness of the nurse educators, as well as barriers and enablers that might influence the use of technology for the new nursing programme at the SAMHS Nursing College.

Based on the results of the TRI 2.0 instrument as developed by Parasuraman and Colby (2015:74), the respondents' readiness to use technology was determined. The results indicated that most (77%) of the nurse educators were highly ready, 21% were moderately ready and only 2% were not ready to use technology. It implies an exceptional group of nurse educators implementing the new nursing programme with flair. The continuous focus on training and development, IT and managerial support, effective communication and positive encouragement and motivation could enhance the use of technology.

However, respondents indicated that the availability of technology and financial resources, limitation of load-shedding and security procedures for access and retrieval of data would be of great importance to the use of technology in the new programme at the SAMHS Nursing College.

5.5 RECOMMENDATIONS

5.5.1 Recommendations for dissemination

The information will be disseminated in recognized nursing publications as an article. The researcher planned to present the results at least at the annual national nursing conference and in the specific nursing education institution where the research was conducted. The developers requested copies of the publishing results from this study.

5.5.2 Recommendations for nursing education and SAMHS

- The implementation of continuous technology used to be supported by the availability and access to educational and technological sources and facilities. Without the necessary resources, it is nearly impossible to ensure the utilization of technologies in the new nursing programme.
- Planning and budgeting by middle and top management should be implemented to ensure the availability of resources, not only computers, but all types of educational technology. The conditions of the teaching environment should be assessed and upgraded.
- The Nursing College to ensure optimum staffing to prevent excessive workload and effective time management.
- All nurse educators, irrespective of their years of experience in nursing education, should receive continuous training regarding the use of technology. Nurse educators could implement self-development principles to develop themselves professionally and personally.
- Specific attention to communication to ensure support by higher authorities, technology component and, where needed, handling of psychological issues such as fears.
- Implementation research to implement recommendations.
- Follow-up study once R171 is implemented to describe the use of technology.
- Comparison study to determine the association between readiness and actual implementation once R171 is rolled out.

5.5.3 Recommendations for nursing research

- It is recommended that similar studies should be carried out in other nursing education institutions in South Africa. This will provide a true reflection of the facilitators and barriers to using technology among nurse educators in nursing education institutions across South Africa.
- In addition, studies can be done using a qualitative approach to explore the experience of nurse educators concerning barriers and what can facilitate the initiation of effective use of technology in nursing education institutions.

- The outbreak of Covid-19 has redefined how educators carry out their daily activities with emphasis on safety measures like social distancing, face masks and proper hygiene. With nursing personnel at the forefront of combating the menace created by the pandemic, it is vital to embrace the use of technology by all to carry out safe nursing practice and training. Therefore, readiness and willingness to accept and use technology must also be assessed amongst nursing students in a South African context. It could be similar to a study done in Morocco by Bahri, El Mili, Akande, Kerkeb and Madrane (2021:2352).

5.6 LIMITATIONS

Limitations are specific types of study weaknesses reported by the researchers, which can reduce the quality of study findings, and reduce the ability to generalize findings (Gray *et al.* 2017:432).

This study was confined to a single nursing college in the Gauteng province and its campuses in Bloemfontein and Cape Town respectively; accordingly, the results require prudent interpretation. The enquiry was also limited to fifty-three (53) nursing educators preparing the new nursing programme at the SAMHS Nursing College. Since the meagre resources (time, capital, people and supplies) restricted the study to one nursing college with a relatively small sample, hence the results cannot be generalised to the whole population of nursing education institutions. Despite these limitations and lack of generalisability, the study was deemed worthwhile as it provided answers to a contextual research problem identified.

5.7 FINAL CONCLUSION

This study aimed to determine the nursing educators' readiness to use technology and the barriers and enablers that might influence its use in a new nursing programme at the SAMHS Nursing College. The objectives guided the discussions of the study. This study followed a quantitative, nonexperimental, descriptive survey to collect data from the respondents.

This chapter draws overall conclusions emanating from this study. Information has been gathered on the benefits of using technology in nursing education. The use of technology can potentially transform the teaching and learning environment significantly and consequently contribute to positive learning outcomes. However, this study has revealed that the SAMHS Nursing College has been challenged in incorporating technology into the instructional system.

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ANNEXURE A: PERMISSION LETTER FROM DEVELOPERS

Order Form for Academic Uses	
Name: (if different from above)	
Project Contact Name: (if different from above)	
Mailing Address: <div style="padding-left: 40px;">P.O. Box 17583</div> <div style="padding-left: 40px;">Lyttelton</div> <div style="padding-left: 40px;">0140</div> <div style="padding-left: 40px;">South Africa</div>	
Phone: (+27) 82 852 4327	Fax: (+27) 012 674 6046
e-mail: anita.dean14@gmail.com	
Nature of Use:	
<input checked="" type="checkbox"/> Academic/Scholarly Use (No Charge)	NO CHARGE:
<input type="checkbox"/> One-time use (first use) (US \$999-)	ACADEMIC
<input type="checkbox"/> Repeat use within the same year (US \$499 per additional use)	USE LICENSE
<input type="checkbox"/> Other uses (need to arrange with Rockbridge)	NA
Total (to be invoiced)	

Study Background

(This is optional, but will be treated as strictly confidential)

Survey Method: Telephone Mail Online Other(specify)

Self-administered questionnaires

Population: Consumer Markets Business/Professional Markets

Employee Manager Other (specify) MNur Studies

Country: United States Other (specify) South Africa

Is your survey about technology at: Home Work Both?

Please email, fax or mail this form along with the signed terms and conditions to:

Charles Colby

Rockbridge Associates, Inc.

10130 G Colvin Run Road

Great Falls, VA 22066

ccolby@rockresearch.com

Fax: 703-757-5208

Phone: 703-757-5213, x12

TECHNOLOGY READINESS INDEX 2.0: INSTRUCTIONS FOR USE IN A SURVEY

July 24, 2014

BACKGROUND

The Technology Readiness Index 2.0 (TRI 2.0) is a survey research scale that measures and classifies individuals by their propensity to adopt and embrace technology at home and work. The scale can be used with any population (consumer, business, employee) and in any type of survey (telephone, mail, web, mobile, self-administered). To use the TRI 2.0, you merely insert the appropriate questions in a survey. You can compute your own scores for analysis and/or return the data to Rockbridge for scoring.

There are two versions of the scale, depending on the level of depth in which you wish to explore techno-readiness. These include:

- 1) A full 16 item scale used for studies focusing primarily on technology readiness (TR); this scale provides measures on four TR dimensions, optimism, innovativeness, discomfort and insecurity;
- 2) A 10 item scale for studies where TR is one of the variables for the analysis, but not the main focus of the research; the 10 item scale allows you to create an overall measure of TR and classify respondents into one of five technology belief segments.

The following link, <https://rockresearch.com/techqual/>, contains information on the TRI 2.0, including a "Technology Readiness Primer" and a technical paper on the 10 item scale. We recommend you provide this link when referring to the scale, which allows other researchers to reach us and request use of the scale. You are welcome to include this on your university website.

FIELDING INSTRUCTIONS

1. Note: In most cases, licensees collect their own data. If you are in need of data collection and/or analysis services, feel free to ask Rockbridge for a cost estimate. We can implement any kind of survey, including web, mobile, telephone, mail or in-person.
2. It is essential to stick to as closely as possible to the original wording of the scale, since the questions have been thoroughly tested and are compared to norms where they were asked in another survey. This includes the respondent instructions, attribute wordings and scale anchoring. Non-English translations should be as close to the English meaning as possible.

3. If using a computerized survey form (e.g., web or CATI), randomize the statements. If the randomization is not possible, we recommend that you randomize the statements in your instrument and consider at least two versions with different ordering.
4. The Technology Readiness Index is copyrighted. On all versions of the questionnaire used for managing and reporting your survey, indicate a note by the scale saying: "These questions comprise the Technology Readiness Index 2.0 which is copyrighted by A. Parasuraman and Rockbridge Associates, Inc., 2014. This scale may be duplicated only with written permission from the authors." On web-based versions, include a note in the program.
5. Other suggestions:
 - The TRI works well in different situations. It may be helpful to add a note on the context for which respondents are describing their technology beliefs.
 - We also recommend changing the statements to first person (e.g., I, me, mine) for a self-administered questionnaire, and to second person (e.g., you, yours) for interviewer-administered questionnaires. Third person (e.g., they) should not be changed.

TECHNOLOGY READINESS 2.0 INDEX QUESTIONS

Note: These questions comprise the Technology Readiness Index 2.0 which is copyrighted by A. Parasuraman and Rockbridge Associates, Inc., 2014. This scale may be duplicated only with written permission from the authors.

RESPONDENT INSTRUCTIONS

Telephone/Interviewer Administered: We are interested in your views on how technology influences your life [OR ALTERNATIVE CONTEXT, SUCH AS "your work."] I will read you a series of statements. For each one, please tell me whether you "strongly agree," "somewhat agree," are "neutral," "somewhat disagree," or "strongly disagree" The first statement is: READ FIRST STATEMENT. Do you "strongly agree," "somewhat agree," are "neutral," "somewhat disagree," or "strongly disagree" with this statement? GET RESPONSE AND READ FOR NEXT ITEM: The next statement is...READ. REPEAT SCALE AS OFTEN AS NEEDED.

- 5 Strongly Agree
- 4 Somewhat Agree
- 3 Neutral
- 2 Somewhat Disagree
- 1 Strongly Disagree
- 6 DK
- 7 REFUSED

Self Administered (mail, web, mobile, etc.): We are interested in your views on how technology influences your life. Please indicate how much you agree with the following statements.

5 POINT SCALE (DO NOT SHOW NUMBERS)

- 1 Strongly disagree
- 2 Somewhat disagree
- 3 Neutral
- 4 Somewhat agree
- 5 Strongly agree

OPTIONAL:

- 6 Not Sure

ATTRIBUTE LIST

[IF POSSIBLE, RANDOMIZE THE LIST ACROSS ALL 16 ATTRIBUTES FOR EACH RESPONDENT]

16 Item Scale

[OPTIMISM STATEMENTS]

- a. New technologies contribute to a better quality of life [OPT1]
- b. Technology gives me more freedom of mobility [OPT2]
- c. Technology gives people more control over their daily lives [OPT3]
- d. Technology makes me more productive in my personal life [OPT4]

[INNOVATIVENESS STATEMENTS]

- e. Other people come to me for advice on new technologies [INN1]
- f. In general, I am among the first in my circle of friends to acquire new technology when it appears [INN2]
- g. I can usually figure out new high-tech products and services without help from others [INN3]
- h. I keep up with the latest technological developments in my areas of interest [INN4]

[DISCOMFORT STATEMENTS]

- i. When I get technical support from a provider of a high-tech product or service, I sometimes feel as if I am being taken advantage of by someone who knows more than I do [DIS1]
- j. Technical support lines are not helpful because they don't explain things in terms I understand [DIS2]
- k. Sometimes, I think that technology systems are not designed for use by ordinary people [DIS3]
- l. There is no such thing as a manual for a high-tech product or service that's written in plain language [DIS4]

[INSECURITY STATEMENTS]

- m. People are too dependent on technology to do things for them [INS1]
- n. Too much technology distracts people to a point that is harmful [INS2]
- o. Technology lowers the quality of relationships by reducing personal interaction [INS3]
- p. I do not feel confident doing business with a place that can only be reached online [INS4]

10 Item Scale

[MOTIVATOR STATEMENTS]

- a. Technology gives me more freedom of mobility [OPT2]*
- b. Technology makes me more productive in my personal life [OPT4]*
- c. Other people come to me for advice on new technologies [INN1]
- d. In general, I am among the first in my circle of friends to acquire new technology when it appears [INN2]*
- e. I keep up with the latest technological developments in my areas of interest [INN4]*

[INHIBITOR STATEMENTS]

- j. Technical support lines are not helpful because they don't explain things in terms I understand [DIS2]
- k. Sometimes, I think that technology systems are not designed for use by ordinary people [DIS3]*
- m. People are too dependent on technology to do things for them [INS1]*
- n. Too much technology distracts people to a point that is harmful [INS2]
- o. Technology lowers the quality of relationships by reducing personal interaction [INS3]

**Suggestions for a six item scale that measures total TR.*

ANALYSIS INSTRUCTIONS/COMPUTING YOUR OWN SCALES

The following are steps for calculating indexes from the scales for your own analysis:

1. Determine the number of missing values across all statements (TR items). Compute new variables for all items and make missing data (don't know or refused) equal to "3" or a neutral response. We recommend excluding respondents who do not answer more than 3 items.
2. Compute the average for each of the four dimensions. Note: two of the dimensions are positive themes (optimism and innovative) and two are negative themes (insecurity and discomfort).
3. To calculate a total TR Score, first reverse the insecurity and discomfort dimensions by subtracting from 6. Next, compute the average for the four sums.

$$TRI\ 2.0 = (Innovative + Optimism + (6 - Insecurity) + (6 - Discomfort)) / 4$$

The lowest possible score is 1.0 and the highest is 5.0. A higher score indicates higher techno-readiness.

4. There is also a technology segmentation, which classifies respondents into one of 5 categories based on their pattern of beliefs about technology. This classification is created using a proprietary algorithm. If Rockbridge is provided a SPSS dataset, the cases can be classified and the dataset returned to you with the information. We can also provide normative comparisons from the most recent National Technology Readiness Survey in the U.S.

REFERENCE:

An Updated and Streamlined Technology Readiness Index: TRI 2.0

DOI: 10.1177/1094670514539730

Journal of Service Research published online 22 June 2014

A. Parasuraman and Charles L. Colby

DATA PROCESSING INSTRUCTIONS

You must send a completed data set to Rockbridge for scoring in order to obtain normative data and segment classifications. We will send back the same dataset, with additional variables appended. Please adhere to the following protocols (which are pretty standard for survey research):

1. Data must be in SPSS, Excel, or other easily readable electronic format.
2. Data must be sent electronically (preferred) or shipped on a storage device.
3. We require numeric codes corresponding to the documentation below; example, "strongly agree," should equal 5, "don't know" should equal 6, etc.
4. Data should be clean and free of errors. For example, when valid codes are 1 through 7, there should not be a 9 or a letter in the data field.
5. We strongly recommend you include a unique identifier as the first variable in the file.
6. Besides the identifier, the only variables we require are the TRI scale items, not your entire survey. This is preferred if the data are sensitive or the database is large.
7. The variables should be in the order presented in the documentation below. We suggest labeling the variables by the letters in the documentation below (a variable name in SPSS, a column header in Excel).
8. **Tip:** be careful that the scale points are not reversed. Strongly Agree should = 5 and Strongly Disagree should equal 1, not the other way around. If the final results seem counterintuitive (say, a low-tech population seems very tech-savvy), we suggest you check your data for possible coding errors. As a reference, in the 2014 National Technology Readiness Survey by Rockbridge and Parasuraman, the mean TR Score was 3.2.

Please send your data set to:
ccolby@rockresearch.com, or

Attn: TRI Dept.
Rockbridge Associates, Inc.
10130-G Colvin Run Road
Great Falls, VA 22066
703-757-5213, x12

ANNEXURE B: INFORMATION LEAFLET AND INFORMED CONSENT

ICD 1A

**PARTICIPANT'S INFORMATION & INFORMED
CONSENT DOCUMENT**

STUDY TITLE:

DETERMINE NURSE EDUCATOR'S TECHNOLOGY READINESS IN NEW NURSING PROGRAMME

Sponsor: N/A

Principal Investigators: Mrs Anita Dean

Institution:

DAYTIME AND AFTER HOURS TELEPHONE NUMBER(S):

Daytime number/s: 012 [REDACTED]

Afterhours number:082 [REDACTED]

DATE AND TIME OF FIRST INFORMED CONSENT DISCUSSION:

date	month	year

:
Time

Dear Prospective Participant

1) INTRODUCTION

Mrs A. Dean is registered for a Masters degree in Advance Nursing Education at the University of Pretoria and doing research as required. You are invited to participate in a study titled “Determine Nurse Educators’ Technology Readiness for a new Nursing programme”. This information in this document is to help you to decide if you would like to participate. Before you agree to take part in this study you should fully understand what is involved. If you have any questions, which are not fully explained in this document, do not hesitate to ask the researcher. You should not agree to take part unless you are completely happy about all the procedures involved.

2) THE NATURE AND PURPOSE OF THIS STUDY

The aim of this study is to determine the level of readiness to use technology in the new nursing programme. By doing so I wish to learn more about the optimism, innovativeness, discomfort and insecurity regarding technology. It is my hope that your experience will assist me in reaching this aim.

3) EXPLANATION OF PROCEDURES AND WHAT WILL BE EXPECTED FROM RESPONDENTS.

As a nurse educator, you will be required to participate in completing the self-administered data collection instrument. The instrument requires responses to close ended questions. The instrument will be distributed by an independent person. Section A will include biographic information as requested by the Ethic committee and Section B will include questions regarding to use of technology in your work environment. Please do not leave any unanswered questions. It will take about 30 minutes to complete the questions. The completed document will be posted in the sealed box for collection by the researcher.

4) POSSIBLE RISKS AND DISCOMFORTS INVOLVED

Besides requiring some of your time and effort, it is not foreseen that you will be exposed to any risks. Should anything during the course of the study cause you any physical, psychological or emotional discomfort, you should feel free to communicate this to the researcher. You are not required to do anything or answer any questions that you are not completely comfortable with.

5) POSSIBLE BENEFITS OF THIS STUDY

There may be no direct benefits for you for participating in this study; however, the knowledge gained through the study may be of future value to nurse educators and ultimately to students in the new programme as well.

6) COMPENSATION

You will not receive any form of payment or reward for participating in this study. Participation is strictly voluntary. There will also be no costs to you for participating in this research.

7) YOUR RIGHTS AS A RESEARCH PARTICIPANT

Your participation in this study is entirely voluntary. If you agree to participate you may choose to withdraw from this study at any time and for any reason. If you choose to withdraw from the study, all your research records will be destroyed, and you will not be penalised in any way.

8) ETHICS APPROVAL

This Protocol was submitted to the Faculty of Health Sciences Research Ethics Committee, University of Pretoria, telephone numbers 012 356 3084 / 012 356 3085, 1 Military Ethics Committee and written approval has been granted. Permission was obtained from the Nursing College Principal as well as Defense Intelligence. The study has been structured in accordance with the Declaration of Helsinki (last update: October 2013), which deals with the recommendations guiding doctors in biomedical research involving human/subjects. A copy of the Declaration may be obtained from the investigator should you wish to review it.

9) INFORMATION

If I have any questions concerning your participation this study, you should contact the researcher, Anita Dean.

Work telephone: 012 [REDACTED]

Cell phone: 082 [REDACTED]

Email address: anita [REDACTED]

Alternatively, you may contact my supervisor Prof C.M. Maree at:

Work telephone: 012 [REDACTED]

Email address: [REDACTED]

10) CONFIDENTIALITY

All information obtained during the course of this study will be regarded as confidential. Each participant that is taking part will be provided with an alphanumeric coded number e.g. A001. This will ensure confidentiality of information so collected. Only the researcher will be able to identify you as participant. Results will be published or presented in such a fashion that respondents remain unidentifiable. The hard copies of all your records will be kept in a locked facility at, The University of Pretoria.

11) CONSENT TO PARTICIPATE IN THIS STUDY

- I confirm that the person requesting my consent to take part in this study has told me about the nature and process, any risks or discomforts, and the benefits of the study.
- I have also received, read and understood the above written information about the study.
- I have had adequate time to ask questions and I have no objections to participate in this study.
- I am aware that the information obtained in the study, including personal details, will be anonymously processed and presented in the reporting of results.
- I understand that I will not be penalized in any way should I wish to discontinue with the study
- I am participating willingly.
- I have received a signed copy of this informed consent agreement.

Participant's name (Please print)

Participant's signature Date

Witness name (Please print)

Witness signature Date

Researcher's name (Please print)

Researcher's signature Date

ANNEXURE C: QUESTIONNAIRE

QUESTIONNAIRE FOR READINESS REGARDING THE USE OF TECHNOLOGY

SECTION A: BIOGRAPHIC DATA

Age group:

A	≤ 25 years	
B	26 – 30 years	
C	31 – 35 years	
D	36 – 40 years	
E	≥ 41 years	

Gender:

A	Male	
B	Female	

Race:

A	African	
B	White	
C	Asian	
D	Coloured	

Highest Nursing Education Qualification:

A	Nursing Education Doctoral	
B	Nursing Education Masters	
C	Nursing Education Degree	
D	Nursing Education Diploma	

Nursing Education Experience:

A	≤ 5 years	
B	6 - 10 years	
C	11 - 15 years	
D	≥ 16 years	

SECTION B: DIMENSIONS

Please evaluate each item regarding the degree the item measures a characteristic of yourself.

ITEM	1 Strongly Disagree	2 Disagree	3 Unsure	4 Agree	5 Strongly Agree
New technologies contribute to a better quality of life					
Technology gives me more freedom of mobility					
Technology gives people more control over their daily lives					
Technology makes me more productive in my personal life					
Other people come to me for advice on new technologies					
In general, I am among the first in the circle of friends to acquire new technology when it appears					
I can usually figure out new high-tech products and services without help from others					
I keep up with the latest technological developments in my area of interest					
When I get technical support from a provider of a high-tech product or service, I sometimes feel as if I am taken advantage of by someone who knows more than I do					
Technical support lines are not helpful because they don't explain things in terms, I understand					
Sometimes, I think that technology systems are not designed for use by ordinary people					
There is no such thing as a manual for a high-tech product or service that's written in plain language					
People are too dependent on technology to do things for them					
Too much technology destructs people to a harmful point					
Technology lowers the quality of relationships by reducing personal interaction					
I do not feel confident doing business with a place that can only be reached online					

“These questions comprise the Technology Readiness Index 2.0 which is copyrighted by A. Parasuraman and Rockbridge Associates, Inc., 2014. This scale may be duplicated only with written permission from the authors.”

ANNEXURE D: INVITATION FOR DATA COLLECTION SESSIONS

RESTRICTED



sa military health service

Department:
Defence
REPUBLIC OF SOUTH AFRICA

NURS COL/R/103/2

Telephone: 082 [REDACTED]
Enquiries: Lt Col (Ret) A. Dean

SAMHS Nursing College
Private Bag X1022
Thaba Tshwane
0143
25 October 2021

Lt Col M.A. Mapukata
Acting Officer Commanding SAMHS Nursing College

INVITATION TO NURSING EDUCATIONAL PERSONNEL FOR DATA COLLECTION SESSIONS

1. The abovementioned refers.
2. I, [REDACTED] Lt Col (Ret) A. Dean am currently registered for the Masters Degree in Advance Nursing Education at the University of Pretoria.
3. The study titled "Determination of Nurse Educators' Readiness regarding the Use of Technology for a new Nursing Programme" will aim to determine the level of readiness to use technology as well as to describe possible barriers and enablers that influence the use of technology. The results of this study could be used by the management of the nursing college to assist in planning regarding technology integration by nurse educators in the new nursing programme when a clearer picture or statistical information and graphs are available regarding readiness. The inclusion of effective use of technology may contribute to increased academic excellence and improved quality in nursing education.
4. Herewith the invitation to all the nursing educational personnel to participate in **one** data collection session as follows:
 - a. Wednesday 27 October 2021 at 07:45 – 08:45 **or** 13:30-14:30,
 - b. Tuesday 2 November 2021 at 07:45 – 08:45 **or** 13:30-14:30
 - c. Wednesday 3 November 2021 at 07:45 – 08:30 **or** 13:30-14:30
5. Your participation will be highly appreciated.

Dean

(A. DEAN)
RESEARCHER: LT COL (RET)



Lefapha la Boiphemefo, Umnyango wezokuVikela, Kgoro ya Tshireletso iSebe lezoKhuselo, Department of Defence, Muhasho wa Tsiriledzo
UmNyango WezokuVikela, Ndzawulo ya swa Vusirheleri, Lehapha la Tshireletso, Departement van Verdediging, UTiko leTekuvikela

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INVITATION TO NURSING EDUCATIONAL PERSONNEL FOR DATA COLLECTION SESSIONS

Remarks: Member is allowed to conduct research in line with the
research protocol and access to collect data is granted



**(M.A. MAPUKATA)
ACTING OFFICER COMMANDING SAMHS NURSING COLLEGE: LT COL**

ANNEXURE E: LETTER TO REQUEST PERMISSION FOR THE RESEARCH PROJECT

RESTRICTED



sa military health service

Department:
Defence
REPUBLIC OF SOUTH AFRICA

NURS COL/R/103/2

Telephone: +27 12 6746117
Facsimile: +27 12 6746046
SSN: 811 6117
Enquiries: Lt Col A. Dean

SAMHS Nursing College
Private Bag X1022
Thaba Tshwane
0143
28 August 2020

Lt Col M.A. Mapukata
Acting Officer Commanding SAMHS Nursing College

REQUEST FOR PERMISSION TO CONDUCT RESEARCH AT THE SAMHS NURSING COLLEGE

1. The abovementioned refers.
2. I, [REDACTED] Lt Col A. Dean am currently registered for the Masters Degree in Advance Nursing Education at the University of Pretoria.
3. Herewith the request for permission to conduct research among the nursing educators of the SAMHS Nursing College.
4. The study will be conducted under the supervision of Prof C.M. Maree.
5. The study titled "Determination of Nurse Educators' Readiness regarding the Use of Technology for a new Nursing Programme" will aim to determine the level of readiness to use technology as well as to describe possible barriers and enablers that influence the use of technology to assist management in planning to enhance excellence in the new nursing programme.
6. A quantitative, non-experimental, descriptive survey will be used to collect the necessary data. An existing structured data collection instrument with close ended questions will be used to collect the quantitative data for the study. It is available for use with the permission of the developers. Two open ended questions were added.
7. Upon completion of the study, a full research report will be made available to all interested stakeholders and role players.
8. A copy of the proposal is enclosed for your perusal and consideration.

Sincerely

Dean

(A. DEAN)
VICE PRINCIPAL SAMHS NURSING COLLEGE: LT COL



Lefapha la Boiphemelo - Umnyango wezokuVikela - Igoro ya Tshireletso - iSebe lezoKhusele - Department of Defence - Mhasho wa Tsiriledzo
UmNyango WezokuVikela - Ndawulo ya swa Vusirheleri - Lehapha la Tshireletso - Departement van Verdediging - LiTiko leTekuvikela

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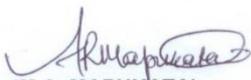
RESTRICTED

REQUEST FOR PERMISSION TO CONDUCT RESEARCH AT THE SAMHS NURSING COLLEGE

Enclosure 1: Research Proposal

Approved / Not Approved

Remarks: The topic of ^{Research} research will
be usefull to the Nursing College



(M.A. MAPUKATA)

ACTING OFFICER COMMANDING SAMHS NURSING COLLEGE: LT COL

AD/AD

DISTR

For Info

DMHN
Act GOC MHTF

Internal

File: NURSCOL/R/79740643PE

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ANNEXURE F: LETTER OF PERMISSION SAMHS

RESTRICTED



defence intelligence
Department:
Defence
REPUBLIC OF SOUTH AFRICA

Telephone: (012) 3[REDACTED]
Fax: (012) 3[REDACTED]
Enquiries: Col J. van Wyk

DI/DDS/R/202/3/7

Defence Intelligence
Private Bag X337
Pretoria
0001
4 December 2020

AUTHORITY TO CONDUCT RESEARCH IN THE DEPARTMENT OF DEFENCE (DOD): LT COL A. DEAN

1. Receipt of a request letter NURS COL/R/103/2 dd August 2020 to conduct research in the DOD with a Research Proposal attached as per requirements is acknowledged.
2. Permission is hereby granted from a security perspective to Lt Col A. Dean to conduct research in the DOD on the topic entitled "**Determination of Nurse Educators Readiness Regarding the Use of Technology for a new Nursing Programme**" that will aim to Determine the level of readiness to use Technology as well as to describe possible barriers and enablers that influence the use of Technology to assist Management in planning to enhance excellence in the new Nursing Programme. The study is for a Master's Degree in Advance Nursing Education under the auspices of the University of Pretoria as requested.
3. After the completion of the research, the final research product must be forwarded to Defence Intelligence (DI), Sub-Division Counter Intelligence (SDCI) for a final authorisation before it may be published or distributed to any entity outside the DOD.
4. Access to DOD information is however granted on condition that there is adherence to inter alia DODI 2/99 "Disclosure of Defence Information" and Section 104 of the Defence Act (Act 42 of 2002) pertaining to protection of DOD Classified Information and the consequences of noncompliance.

5. For your attention.

(M.D. SAMBO)
CHIEF DIRECTOR COUNTER INTELLIGENCE: MAJ GEN
KS/KS (Lt Col A. Dean)

DSTR

For Action

SAMHS Nursing College

(Attention: LT Col A. Dean)

Internal

RESTRICTED

ANNEXURE G: APPROVAL FROM THE ETHICAL COMMITTEE

RESTRICTED

1MH/302/6/01.01.2021



sa military health service
Department:
Defence
REPUBLIC OF SOUTH AFRICA

Telephone: 012 314 0013
Facsimile: 012 314 0013
Enquiries: Prof / Lt Col M.K. Baker

1 Military Hospital
Private Bag x 1023
Thaba Tshwane
0143
26 February 2021

CLINICAL TRIAL APPROVAL: STUDY NUMBER: 01.01.2021: "DETERMINATION OF NURSE EDUCATORS' READINESS REGARDING THE USE OF TECHNOLOGY FOR A NEW NURSING PROGRAMME"

1. The 1 Military Hospital Research Ethics Committee (1MHREC) registered in South Africa with the National Health Research Ethics Council (NHREC) (REC-111208-019-RA) adhering to GCP/ICH and SA Clinical Trial guidelines, evaluated the above-mentioned protocol and additional documents.

2. The following documents were evaluated:
- Personalised Covering Letter from Investigator
 - Research Proposal
 - Questionnaire for Readiness Regarding the Use of Technology
 - Participant Information & Informed Consent Document
 - Permission Letter from Unit Officer Commanding to Conduct Research
 - Letter of Support from The Supervisor
 - Permission Letter from Counter Intelligence to Conduct Research
 - Updated Curricula Vitae:
 - PI Name: Lt Col. A. Dean
 - Supervisor Name: Prof. C.M. Maree
 - Co Supervisor Name: Dr. M. Yazbek

3. The recommendations are: The study was ethically approved on 26 February 2021. The approved principal investigator is Lt Col. A. Dean.

4. The study is granted research ethics approval for a period of 12 months. At the end of this period the Principal Investigator must apply for re-approval of the study. Failure to re-apply will result in approval expiring and data generated after the 12-month period, not being able to be included as part of the research project. Report backs are to be made to the 1MHREC annually, in the event of any serious adverse events and on completion or termination of the study. Research ethics approval is granted subject to concurrent ongoing approval from Military Counter Intelligence and the relevant study supervisors and overseers. Should publications result from the study the relevant manuscripts will also need to be approved by Military Counter Intelligence. All funds generated through this research study must be paid into an approved Regimental Fund account.

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1MH/302/6/01.01.2021

5. The 1 MHREC wishes you success with the study.



(M.K BAKER)
CHAIRMAN 1 MILITARY HOSPITAL RESEARCH ETHICS COMMITTEE:
LT COL / PROF

DIST

For Action

Lt Col. A. Dean

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1MH/302/6/01.01.2021



sa military health service

Department:

Defence

REPUBLIC OF SOUTH AFRICA

Telephone: 012 314 0013
Facsimile: 012 314 0013
Enquiries: Dr /Maj. M.L. Kekana

1 Military Hospital
Private Bag x 1023
Thaba Tshwane
0143
29 November 2022

CLINICAL TRIAL APPROVAL: STUDY NUMBER: 01.01.2021: "DETERMINATION OF NURSE EDUCATORS' READINESS REGARDING THE USE OF TECHNOLOGY FOR A NEW NURSING PROGRAMME"

1. The 1 Military Hospital Research Ethics Committee (1MHREC) registered in South Africa with the National Health Research Ethics Council (NHREC) (REC-111208-019-RA) adhering to GCP/ICH and SA Clinical Trial guidelines, evaluated the above-mentioned protocol and additional documents.

2. The following documents were evaluated:
- a. Personalised Covering Letter from Investigator
 - b. Research Proposal
 - c. Questionnaire for Readiness Regarding the Use of Technology
 - d. Participant Information & Informed Consent Document
 - e. Permission Letter from Unit Officer Commanding to Conduct Research
 - f. Letter of Support from The Supervisor
 - g. Permission Letter from Counter Intelligence to Conduct Research
 - h. Updated Curricula Vitae:
 - i. PI Name: Lt Col. A. Dean
 - ii. Supervisor Name: Prof. C.M. Maree
 - iii. Co Supervisor Name: Dr. M. Yazbek

3. The recommendations are: The study was ethically approved on 26 February 2021. The approved principal investigator is Lt Col. A. Dean.

4. The study is granted research ethics approval for a period of 12 months. At the end of this period the Principal Investigator must apply for re-approval of the study. Failure to re-apply will result in approval expiring and data generated after the 12-month period, not being able to be included as part of the research project. Report backs are to be made to the 1MHREC annually, in the event of any serious adverse events and on completion or termination of the study. Research ethics approval is granted subject to concurrent ongoing approval from Military Counter Intelligence and the relevant study supervisors and overseers. Should publications result from the study the relevant manuscripts will also need to be approved by Military Counter Intelligence. All funds generated through this research study must be paid into an approved Regimental Fund account.

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1MH/302/6/01.01.2021

5. The 1 MHREC wishes you success with the study.

Post Script 1: On 29 November 2022 the following documents were reviewed and approved:

- I. Application for Annual Re-Approval of Research Study.
- II. Permission is hereby granted for the study to be re-approved until 29 November 2023. No new data will be collected.
- III. The PI needs to submit a research summary to the 1MHREC upon completion of the study. The PI needs to ensure that all permission letters are obtained before publishing and presenting any research data.



(M.L. KEKANA)

**CHAIRPERSON 1 MILITARY HOSPITAL RESEARCH ETHICS COMMITTEE:
MAJ**

DIST

For Action

Lt Col. A. Dean

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APPROVAL FROM THE ETHICAL COMMITTEE



Faculty of Health Sciences

Institution: The Research Ethics Committee, Faculty Health Sciences, University of Pretoria complies with ICH-GCP guidelines and has US Federal wide Assurance.

- FWA 00002567, Approved dd 22 May 2002 and Expires 03/20/2022.
- IORG #: IORG0001762 OMB No. 0990-0279 Approved for use through February 28, 2022 and Expires: 03/04/2023.

Faculty of Health Sciences Research Ethics Committee

13 October 2021

Approval Certificate New Application

Dear Mrs A Dean

Ethics Reference No.: 490/2021

Title: Determination of nurse educators' readiness regarding the use of technology in a new nursing programme

The **New Application** as supported by documents received between 2021-08-18 and 2021-10-13 for your research, was approved by the Faculty of Health Sciences Research Ethics Committee on 2021-10-13 as resolved by its quorate meeting.

Please note the following about your ethics approval:

- Ethics Approval is valid for 1 year and needs to be renewed annually by 2022-10-13.
- Please remember to use your protocol number (490/2021) on any documents or correspondence with the Research Ethics Committee regarding your research.
- Please note that the Research Ethics Committee may ask further questions, seek additional information, require further modification, monitor the conduct of your research, or suspend or withdraw ethics approval.

Ethics approval is subject to the following:

- The ethics approval is conditional on the research being conducted as stipulated by the details of all documents submitted to the Committee. In the event that a further need arises to change who the investigators are, the methods or any other aspect, such changes must be submitted as an Amendment for approval by the Committee.

We wish you the best with your research.

Yours sincerely



On behalf of the FHS REC, Professor Werdie (CW) Van Staden
MBChB, MMed(Psych), MD, FCPsych(SA), FTCL, UPLM
Chairperson: Faculty of Health Sciences Research Ethics Committee

¹The Faculty of Health Sciences Research Ethics Committee complies with the SA National Act 61 of 2003 as it pertains to health research and the United States Code of Federal Regulations Title 45 and 46. This committee abides by the ethical norms and principles for research, established by the Declaration of Helsinki, the South African Medical Research Council Guidelines as well as the Guidelines for Ethical Research: Principles Structures and Processes, Second Edition 2015 (Department of Health)

Research Ethics Committee
Room 4-80, Level 4, Tswelopele Building
University of Pretoria, Private Bag x323
Gezina 0031, South Africa
Tel +27 (0)12 356 3084
Email: depeka.behani@up.ac.za
www.up.ac.za

Fakulteit Gesondheidswetenskappe
Lefapha la Disaense tsa Maphelo

ANNEXURE H: DECLARATION OF PLAGARISM

DECLARATION OF ORIGINALITY UNIVERSITY OF PRETORIA

The Department of Nursing Science places great emphasis upon integrity and ethical conduct in the preparation of all written work submitted for academic evaluation.

While academic staff teach you about referencing techniques and how to avoid plagiarism, you too have a responsibility in this regard. If you are at any stage uncertain as to what is required, you should speak to your lecturer before any written work is submitted.

You are guilty of plagiarism if you copy something from another author's work (eg a book, an article or a website) without acknowledging the source and pass it off as your own. In effect you are stealing something that belongs to someone else. This is not only the case when you copy work word-for-word (verbatim), but also when you submit someone else's work in a slightly altered form (paraphrase) or use a line of argument without acknowledging it. You are not allowed to use work previously produced by another student. You are also not allowed to let anybody copy your work with the intention of passing it off as his/her work.

Students who commit plagiarism will not be given any credit for plagiarised work. The matter may also be referred to the Disciplinary Committee (Students) for a ruling. Plagiarism is regarded as a serious contravention of the University's rules and can lead to expulsion from the University.

The declaration which follows must accompany all written work submitted while you are a student of the Department of Nursing Science No written work will be accepted unless the declaration has been completed and attached.

Full names of student: Anita Dean

Student number: u19363584

Topic of work: Determination of Nurse Educators' Readiness Regarding the Use of Technology.. for a New Nursing Programme

Declaration

1. I understand what plagiarism is and am aware of the University's policy in this regard.
2. I declare that this Proposal (eg essay, report, project, assignment, dissertation, thesis, etc) is my own original work. Where other people's work has been used (either from a printed source, Internet or any other source), this has been properly acknowledged and referenced in accordance with departmental requirements.
3. I have not used work previously produced by another student or any other person to hand in as my own.
4. I have not allowed, and will not allow, anyone to copy my work with the intention of passing it off as his or her own work.

SIGNATURE

Dean

ANNEXURE I: CERTIFICATE FROM EDITOR



27 October 2022
Pretoria, South Africa

To whom it may concern,

I hereby confirm that I undertook the language editing for the thesis:

**DETERMINATION OF NURSE EDUCATORS' READINESS REGARDING THE USE OF
TECHNOLOGY FOR A NEW NURSING PROGRAMME**

by Anita Dean

The work was well written overall.

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