Enhanced use of information and communication technology by professional nurses in distance education

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At times in our lives we reach a point where you personally feel that you have reach the end of a point, but that is your decision and not that of our Heavenly Father, as He has laid out our paths in live, he has put certain of his true Apostles there to pick up people like us and take us on the journey that He has planned for us.

Herewith my sincere gratitude and appreciation to all those “Apostles” that He had send on my journey.

- My Heavenly Father for the courage and bravery that you bestowed on me throughout this journey to make my dream a reality.

- My dearest and loving children Ivy, Roystin and Roschnee for time and patience that you had with me if I could not be available for you and during the time I felt it was all over your words of encouragement did not fell on deaf ears. You are mine and I will always appreciate and love you all.

- To my grandchildren Ifran, Leogan, Mandisa, Zidane and Leandre love you and hope and pray that you will follow in my footsteps that you are never too old to study and reach your goals in live.

- My dearest mom thank you for all your encouragement during this time I pray that our Almighty Father will keep you with me to witness the final chapter and day when I graduate.

- My dear students at the Welkom study centre for your encouragement and for being part of my sample size and data collection it was highly appreciated and I care for you equally.

“I will never leave nor forsake you”

Hebrews 13:5
DECLARATION

I hereby declare that this work is my own and has not been submitted to any institution before. I declare that this work has not been plagiarized, nor did I violate copyright restrictions. I declare that I gave due reference to all sources used in this document and that these sources are completely and accurately referenced in the list of references.

Caroline Geiler                                Date
RESEARCH OUTLINE

The research in this study is presented in an article format and includes the following:

Chapter 1: Introduction and overview of the study, including all the content of a typical first chapter in a dissertation, as well as a description of the context of the study in addition to a literature review.

Chapter 2: Article, as follows:

**Article title:**

*Debunking the ICT myths: integrating information communication technology in post-basic nursing in South Africa*

*For submission to the following journal:*

The Journal of Nursing Education

Chapter 3: Evaluation of the research and recommendations to enhance the use of ICT by professional nurses in distance education.

Note that the dissertation is submitted in article format and that the following apply to the list of references in the dissertation:

For Chapter 1, 3: The reference list compiled according to the Harvard style as prescribed by the Postgraduate guidelines of the North-West University.

Chapter 2: Reference list compiled in the format set forth in the Uniform Requirements for Manuscripts Submitted to the Journal of Nursing Education as prepared by the International Committee of Medical Journals Editors as preferred style according to IT South Africa Journal.
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CHAPTER 1: OVERVIEW TO RESEARCH AND LITERATURE REVIEW

1.1 INTRODUCTION

This research argues that information communication technology (ICT) is inevitable in the delivery of post-basic nursing programmes presented through distance learning. The experiences of professional nurses enrolled as students in post-basic nursing programmes presented through distance learning related to ICT was explored in an attempt to have a better understanding of these nurses’ adoption of ICT. Chapter 1 consists of two parts, namely an overview to this research followed by a literature review. In the research overview, the rationale for and significance of this research are described according to the steps of the research process. Thereafter follows a critical and analytical synthesis of information communication technology (ICT) positioned within higher education (HE) and distance learning within the context of health sciences.

The research report is presented in an article format. Chapters 1 and 3 are formatted according to the requirements stipulated in the North-West University’s (Potchefstroom Campus) Manual for Post-graduate Studies, approved by the Senate of the North-West University for use by post-graduate students at all NWU campuses. The manuscript presented in Chapter 2 is entitled Enhanced use of information and communication technology by professional nurses in distance education, prepared according to the requirements for The Journal of Nursing Education.
PART 1: OVERVIEW

1.2 BACKGROUND AND PROBLEM STATEMENT

The information age has caused a shift from a global- to a knowledge-based economy. A knowledge-based economy refers to services and products (Powell & Snellman, 2004:199-220), requiring knowledge, high skill levels (Organisation for Economic Cooperation and Development [OECD], 2005:71) and know-how as critical economic resources. A knowledge-based economy relies more strongly on intellectual ability than natural resources and material input (Powell & Snellman, 2004:199-220). This shift was led by innovation and accelerated by information and communication technology (ICT) (Collins & Rhoads, 2008:177-221). ICT is an umbrella term defined as all the software and services related to information processing, communication and handling, as well as all business activities that depend substantially on the above (Aduda & Ohaga, 2004).

South Africa is not isolated from the competitive nature of a global knowledge-based economy. By 2004 UNESCO (2004:28) acknowledged that Africa was falling behind the knowledge-based economy due to, among other things, a lack of ICT. The difference between countries well-equipped with ICT and those who are not has come to be referred to as a digital divide. Despite national and international awareness for ICT in education in general, Tiene (2002:211-213) concludes that by 2002 millions of people has already fallen victim to the increasing digital divide, which impacts negatively on educational access. The high costs for Internet access is listed as a critical factor in the digital divide (Tiene, 2002:214-215), followed by infrastructure, poverty, bureaucracy, protectionism, language, culture and corruption. The digital divide is ever-increasing due to the expensive Internet costs in African countries compared to non-African countries (UNESCO, 2004:28).

South Africa’s effort to join in the competitive knowledge-based economy is challenged by the inequities from Apartheid. After the dawn of the South African Democracy in 1994, the African National Congress (ANC) presented the National Higher Education Plan White

ICT in this research refers to all the technologies used for the manipulation and communication of information in education, with specific reference to equipment (hardware such as laptops and personal computers, smart phones and digital cameras); computer programs (software such as word processing, databases, multi-media, Internet, e-mails, social media, online learning management systems) and networks allowing one to access, retrieve, store, organise, manipulate and present information by electronic means (Department of Education, 2003:17-18).
Paper. It provided an education framework set out to be fair, acceptable, assessable and sustainable for all South Africans (ANC, 1997:1-12). It furthermore provided a framework to ensure the fitness of the HE system to contribute to the challenges faced by South Africa in the 21st century (ANC, 1994:38). In addition to the White Paper, the ANC advocated for the use of ICT training in all schools, further education training (FET) colleges, universities, clinics, hospitals and other facilities, as this is demanded from students in this digital age (ANC, 1994:38). Efficient ICT is not only a need in higher education (HE) (Shaikh & Khoja, 2011:149-161), but is also one of the pillars for the 21st century learner. Learners should exhibit critical skills such as ICT literacy, information literacy and media literacy (21st Partnership, 2011:2).

Although South Africa as a developing country is still progressing towards ICT (Kalua et al., 2009:2), there are still students in HE that do not have access to ICT (Kalua et al., 2009:2). South Africa had the lowest telephone density and internet connectivity in the world by 2003 (Okpaku, 2003:1). By 2009 most areas in South Africa didn’t have telephone connections and thus fixed line internet services could not be installed (Kalua et al., 2009:3). Due to the above-mentioned gaps, steps were taken to get South Africa up to standard. The United Nations instituted the Technological Task Force to support all Africa’s efforts to harness ICTs for poverty eradication, human development, the elimination of gender disparities, in addition to the combating of disease (United Nations, 2004:368) and ignited the evolution of e-health (Eysenbach, 2001:20). E-health comprises the components of telemedicine, continuing medical education, health care data for public health and preventative medicine programmes (South Africa, 2013:6-9).

Amidst the developments and benefits of e-health, nursing education has had limited exposure to technology (Kalua et al., 2009:1-213). The research by Nkosi et al. (2011:876-882) regarding post-basic student nurses’ attitude towards ICT in practice, concluded amongst other findings that nurses lack computer literacy skills, have limited access to ICT and nurses voiced the view that computer literacy should be integrated into the curriculum. Phaneuf (2009) argues that nursing education in particular presents with conservatism in education practices and a high workload, inhibiting the mastering of ICT in pedagogy. The provision of ICT infrastructure and lack of in-service training are examples of barriers (Gulbahar & Guven, 2008:37-51) for ICT in nursing education. Punie et al. (2006) emphasised the importance of equipping professional nurse educators for the 21st century learner, as the future of learning in nursing is within a knowledge-based society. Furthermore, the Nursing Strategy for South Africa (Department of Health, 2008:196-914)
fortified nurses’ adoption to ICT, stating that due to the challenges the nursing profession faces, the acquisition of ICT as a skill should be a priority.

Besides the need to cater for ICT in nursing education, there is an ever-increasing demand for nursing education delivered through distance education, according to the American Association for Colleges of Nursing (2007) and Abbott and Coenen (2008:241). Distance education is defined as education for learners that are geographically living at a distance from an education provider (International Association for Distance Learning, 2014). Distance education is therefore the model of delivery and different modes can be used, such as online learning. Gazza and Hunker (2014:1128) conclude that there is a continuous growth in nurses’ enrolment for online nursing education. In 2010 eHealth, an online publication focusing on cutting-edge ICTs and medical technologies in healthcare, declared that distance education is utilised in India to address the demand for nursing education within a reality of severe nursing shortages and insufficient educational infrastructure. The International Council for Nurses (ICN) (2006:1-2) urged in 2006 that nurses in Africa require distance education for further training. By 2009 Legg et al. (2009:64) explained that the Internet ensured nurses’ access to distance education as a dynamic reality.

Phillips et al. (2010:132) claimed that ICT, with specific reference to the Internet, changed the flat and unilateral nature of distance education in nursing, although Mancuso-Murphy (2007:264) requested that technologies in distance education in nursing needed extensive exploration (Mancuso-Murphy, 2007:264). Advanced nurses in Northern America reported anxiety in their exposure to online assessments in distance education (Caudle et al., 2011:328). Watts and Waraker (2008:105) urge the acknowledgement of challenges that professional nurses experience when enrolled in open distance learning programmes within the United Kingdom. Already in 2007 Billings (2007:247-248) claimed that distance education in nursing be presented in a learning environment that equip nurses for real life and that the use of online curriculum should be based on application, analysis and synthesis as required within nursing practice within the international arena.

Nursing programmes are also presented through distance education in South Africa. A summary of these programmes with the deployed ICT used is presented in Table 1 below. This information was extracted from the programme detail provided by each training institution.

Table 0-1 indicates that nursing education through distance learning and the use of ICT are realities within the South African HE context. Yet the gap identified is that international literature reports on ICT use by nurses in distance learning, while insufficient South African
literature is available on ICT use by professional nurses in distance learning. An extensive search on national and international databases (EbscoHost, Sabinet, Emerald, Scopus, and Science Direct) implied insufficient reports of the actual use of ICT by professional nurses in distance learning in Africa and South Africa, although research reports the important role ICT plays in nursing education through distance learning.

This leads the researcher to ask the following research question: *How can ICT use by professional nurses enrolled in a post-basic programme be integrated into distance learning?* The following sub-questions are formulated: *What are the experiences of professional nurses enrolled in post-basic programmes that are delivered through distance learning regarding ICT?* And *what recommendations can be formulated to facilitate the integration of ICT by professional nurses enrolled in post-basic programmes presented through distance learning?*

### 1.3 AIM AND OBJECTIVES

The aim of this study is to formulate recommendations to enhance the integration of ICT use in post-basic programmes in nursing presented through distance learning. The objectives are to explore and describe the experiences of professional nurses enrolled as students in post-basic programmes presented through distance learning related to ICT use.

### 1.4 CENTRAL THEORETICAL STATEMENT

The central theoretical statement can be formulated as follows:

Insight into how professional nurses enrolled as students in post-basic nursing programmes delivered through distance learning, experience ICT in distance learning, can assist the researcher to formulate recommendations to integrate ICT in the curriculum and mode of delivery in distance learning and therefore enhance the use of ICT in distance learning.
### Table 0-1: Summary of nursing programmes presented through distance education at South African universities with ICT indicated in italics

<table>
<thead>
<tr>
<th>University</th>
<th>Programmes presented</th>
<th>Nature of teaching mode and uses of ICT</th>
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| North-West University (NWU) (Potchefstroom Campus) | • Advanced University Diploma in Health Science (Community Nursing; Health Science Education; Health Services Management; Clinical Nursing Science Health Assessment, Treatment and Care).  
• Baccalaureus Curationis (Educationis et Administrationis).                                                                 | Contact with distance education, adult-learning and *interactive white board broadcasts* with Saturday contact sessions at decentralised study centres, *social media*, call centre, *web-based captured lectures* (NWU, 2014). |
| University of Johannesburg (UJ)                | • Baccalaureus Curationis (Educationis et Administrationis).                                                                                 | Multi-modal approach with weekday lectures, Saturday lectures, block system and the Internet (UJ, 2014). |
| University of KwaZulu-Natal (UKZN)             | • Bridging course from staff nurse to general registered nurse.  
• Certificate in Mental Health Nursing.  
• Certificate in Nursing Management.  
• Certificate in Primary Care.                                                                  | Decentralised programmes, certificate courses with contact classes at study centres (UKZN, s.a.).      |
| University of South Africa (UNISA)             | • Bachelor of Arts in Nursing Science Health Services Management and Education.  
• Honours Bachelor of Arts in Health Studies General.  
• Master’s and Doctoral qualifications.                                                            | Distance education to post-registration nurses (no reference to ICT) (UNISA, 2013).                   |
1.5 RESEARCHER’S ASSUMPTIONS

The researcher’s assumptions, also referred to as a paradigmatic perspective, are discussed as the meta-theoretical, theoretical and methodological assumptions.

1.5.1 Meta-theoretical assumptions

From a Christian perspective, the researcher views man as a holistic, unique creation with own rights and responsibilities. In this research, man refers to the professional nurses completing their post-basic education through distance learning at a South African university.

Society is an organised group of persons associated together for religious, benevolent, cultural, scientific, political, patriotic or other purposes. In this study it refers to a group of persons sharing the same association as post-basic nursing students who are part of the nursing society (Merriam-Webster Unabridged Dictionary, 2014).

Health is a “... state of complete physical, mental and social well-being and not merely the absence of disease or infirmity” (WHO, 1948). For the purpose of this research, “health”
applies to the professional nurses as enrolled students, and their experiences of ICT in distance learning as well as their utilisation thereof in the aim to obtain their learning outcomes so that a balance is reached between the physical, psycho-social and spiritual levels of each student.

**Nursing** encompasses autonomous and collaborative care of individuals of all ages, families, groups and communities, sick or well, and in all settings. Nursing includes the promotion of health, prevention of illness, and the care of the ill, disabled and dying people. Advocacy, promotion of a safe environment, research, participation in shaping health policy and in patient and health systems management, and education are also key nursing roles (International Council of Nursing [ICN], 2010). Nursing is the protection, promotion and optimisation of health and abilities, prevention of illness and injury, alleviation of suffering through the diagnosis and treatment of human response, and advocacy in the care of individuals, families, communities, and populations. In this research nursing refers to professional nurses enrolled in post-basic education through distance learning at a South African university and the activities conducted towards the optimal achievement of learning outcomes.

The **environment** is important to maintain a life that is healthy, pleasant and safe in order to live the life in the way the person wants to live. The environment in this research refers to the realities faced in the HE world where professional nurses are enrolled in post-basic programmes presented through distance learning. This environment entails working while studying, trying to balance a work-life, having access to various forms of ICT as well as printed media, having contact sessions on Saturdays attended at decentralised study centres, and being responsibility for one's own lifelong learning.

### 1.5.2 Theoretical assumptions

The researcher chose the Transformational Learning Theory by Mezirow as a theoretical framework in this study (Mezirow, 1995:39-70).

Transformative learning has emerged within the field of adult education as a powerful model for understanding how adults learn. It has attracted researchers and practitioners from a wide range of theoretical persuasions and practice settings. It is complicated and it offers a considerable theoretical, practical and ethical challenge, and this all depends on how well these perspectives are fostered. Dirkxs (1998:1) considered to understand the major theoretical perspectives or strands of transformative learning evident in this field, e.g. to
identify, as a whole, this literature suggests about adult learning as transformational and to explore the implications for the role of the educators in this process.

Transformative learning involves experiencing a deep, structural shift in the basic premises of thoughts, feelings and actions. It is a shift of consciousness that dramatically and irreversibly alters our way of being in the world. Such a shift involves an understanding of oneself and self-locations; relationships with other humans and with the natural world; understanding relations of power in interlocking structures of class, race and gender; body awareness; visions of alternative approaches to living; and sensing possibilities for social justice, peace and personal joy (Mezirow, 1994b:222-232). Furthermore, transformative learning is the expansion of consciousness through the transformation of basic worldview and specific capacities of the self; transformative learning is facilitated through consciously directed processes such as appreciatively accessing and receiving the symbolic contents of the unconscious and critically analysing underlying premises (Mezirow, 1995:39-70).

The professional context of transformative learning starts off with two individuals, namely the student and the educator. They both have certain expectations in mind and must start at some point and work through a process. The following derives from that process (Barnes & Hooper, 2011:1-7):

- What each of the two individuals are expecting from the learning experience will lead to transformation during the learning experience.
- The transformation can occur with respect to their purpose and values in life, what they believe in and the assumptions that they perceive.
- What knowledge, skills and experience they have of the learning process.
- At the end of the learning experience all the above should be reached after the learner had gone through the learning situation or dilemma to ensure that transformative learning has taken place.

The following context was used as a point of departure:

- **The idea of transformation**: This encompasses how adults learn and depart from what they have learnt and what they held in traditional learning.
- **Transformation as critical reflection**: A distinct understanding of what transformation means within the actions of adult learning in cognitive and developmental psychology (Mezirow, 1991:199-200).
• **Transformation as development:** The need to find and construct meaning within life as a key factor that motivates adults to participate in formal learning experiences, and also to one’s ability to make sense of experiences as related to the developmental movement in one’s life. Many adults participating in formal learning experiences find themselves “in between” phases of development, where the meaning structures of the old phase seem frayed or no longer relevant to their life experiences. Thus, there is a movement into new developmental phases that require the adult learner to construct new meaning structures that help such a learner to perceive and make sense of the changing world (Dirkxs, 1998:5).

• **Transformation of consciousness-raising:** Work presented by Paulo Frère’s in 1970 emphasizes the poor in Brazil and the efforts in Latin America and Africa. Frère’s work and the effort for liberation did have quite a significant influence on the development of a critical perspective for adult education. Other influences include Collins (1991) and Welton (1995). Adult education aims to foster critical consciousness among individuals and groups, while also teaching them how to read (Spring, 1994:44). It can thus be believed that critical consciousness refers to a process in which learners develop the ability to analyse, pose questions, and take action within the social, political, cultural and economic contexts that influence and shape their lives (Dirkxs, 1998:4).

• **Transformation as individuation:** Robert Boyd (1991) sees this strand that has received less attention from adult educators, and his idea of transformative learning are embedded within what is called transformative education. This is shared by others e.g. Daloz, Mezirow and Boyd, as a developmental perspective and commitment to understanding and facilitating personal transformation (Dirkxs, 1998:5).

**A way towards a transformative pedagogy**

Central to one’s understanding of transformative learning is the emphasis on actualisation of the person and society through liberation and freedom. This is constrained by the presence of coercive forces or factors within our personal and socio-cultural contexts, and thus shapes the way in which we come to understand who we are as persons and communities and what might be our best interests. Transformative learning aims at identifying these forces and freeing us from their coercive influences through reflection, dialogue, critique, discernment, imagination, and action (Dirkxs, 1998:9). To think about adult learning as potentially transformative is to ground the content and processes of learning concretely within the lives
of those within an educative capacity, as well as within the sociocultural context in which their lives are embedded. However, it would be naive to think that one can always foster transformation. It is thus best to view an educator’s role as one in which one enters, for a time, a journey that is and has been on-going within the individual and collective lives of the students.

Thus transformative learning has neither a distinct beginning nor an ending. Rather, it represents a potential that is eternally present within us and our learners, and it is rather regarded as a way of being and relationships towards learners, rather than a strategy.

![Diagram of action and reflection cycles](image)

**Figure 0-1:** Mezirow’s critical reflection within transformation learning (Mezirow, 1990:14)

In this study professional nurses are also adult learners with a cadre of habits, experiences, values and perspectives that influence their use of ICT. Through transformational learning, these enrolled students can reflect on their own learning.
1.5.3 Methodological assumption

The model of Botes (1991:38-42) provides a holistic perspective, and different methodologies (quantitative and qualitative) can be used. It is functional and it introduces health care activities in three orders, namely practice (first order), health science (second order) and paradigmatic perspective (third order). The practice of health care forms part of the empirical world (reality) and problems are derived from the empirical world. The aim of this order is to improve health care practice for the benefit of the community. The second order is the health science, which is developed through research and theory generation. The third order is the paradigmatic perspective of the researcher, which is the line of thoughts where the assumptions of the researcher are made. These assumptions are made in terms of the researcher’s view of man, society, health, nursing and environment.

The researcher selected the research process as stipulated by Burns and Grove (2009:54) as the framework according to which the research design and methods in this study were conducted. The research process is described as different steps that are not necessarily linked in definite sequence, but that guides the researcher through the process of inquiry and research problem identification, data collection, data analysis, discussion of results, and publication of results and identification of new research problems. The research process can be viewed as a cyclic process and is depicted graphically below as follows:

**Figure 0-2:** Graphic depiction of the cyclic nature of the research process, divided into steps (adapted from Burns & Grove, 2009)
The following concepts are central to this research and are defined briefly:

- **Information communication technology (ICT)**

  *In this research ICT refers to the use of the Internet, social media, electronic mail, web-based learning management systems, a virtual learning environment, interactive whiteboard technologies and technology devices such as computers, laptops, tablets, cellular – and smart phones.*

- **Professional nurses**

  A professional nurse is a person who is qualified and competent to function independently and practise comprehensive nursing in the manner and to the level prescribed and who is capable of assuming responsibility and accountability for such practice (SANC, 2005:25). *In this research professional nurses are enrolled as students in post-basic programmes delivered through distance learning.*

- **Experiences**

  Experiences refer to something that a person encountered personally, something a person has lived through or undergone (Merriam-Webster, 2014). Experiences therefore refer to a deeper and more personal level. *In this research the experiences of professional nurses that are enrolled in post-basic education regarding ICT will be explored and described.*

- **Distance learning (learning can also refer to education)**

  Distance education refers to technology and teaching methods focused to deliver teaching to students that are not physically present in a classroom (Esterhuizen, 2013:xxiii). *Distance learning refers in this research to the mode of delivery through which post-basic nursing programmes are presented.*

### 1.6 RESEARCH METHODOLOGY

In the following paragraphs the research methodology will be discussed as different steps.
1.6.1 Research design

A qualitative, explorative, interpretive descriptive and contextual design (Burns & Grove, 2009:270) was followed. This type of design was conducted to enhance the researcher’s understanding of human experiences. Its qualitative nature offered the opportunity to explore the natural world of professional nurses’ enrolled as students, experiences of ICT in post-basic nursing programmes presented through distance education. A qualitative design was also appropriate because of the following motivations:

- The basis of knowing was to discover and gain a deeper meaning over a relatively unknown phenomenon (Keele, 2010:36) because there is a limited amount of literature available regarding the experiences of ICT use by professional nurses in neither distance education nor on how to enhance ICT uses.
- There are complex interrelations (Boutellier, 2013:3) associated with the exploration into how ICT use can be enhanced by professional nurses as Bates et al. (2007) and Petit Dariel et al. (2014) concluded that the adoption to technology, ICT and innovations are in general very complex and entails various individual aspects.

An interpretive descriptive approach (Thorne et al., 1997:169) was used as the researcher entered data collection and analysis from a nursing perspective. A detailed description of each participant’s response and the research process was documented. The research was contextual in nature (Burns & Grove, 2009:271) as data was collected within a specific environment.

1.6.2 Research method

The research method entailed data collection, data analysis and the role of the researcher. The research methods were conducted within a specific research setting.

Data collection

The population refers to the entire group of people who meet the criteria for inclusion in a study (Burns & Grove, 2009:209). The population in this research was all the professional nurses enrolled in post-basic nursing programmes presented through distance education (N=1 800) at a South African university, referred to as “the University”. Within this population, participants were selected through non-probable convenient sampling (Brink et
al., 2012:135) according to specific inclusion criteria. This type of sampling was appropriate because:

- It was impossible to get all the students together as the professional nurses enrolled in distance education are geographically distributed throughout South Africa.
- Geographical distance challenges effective communication with students that are situated nationwide.
- Professional nurses in distance education study while working and visit decentralised study centres according to a predetermined study schedule, presenting with specific opportunities to have contact with students at study centres.
- To enhance the probability of participation at a decentralised study center to where the researcher had to travel, a study center was used that was accessible for both the participants and the researcher and that had a sufficient amount of students visiting the center.

Before the convenience sampling was conducted, a decentralised study center was selected. The study center identified was situated in Welkom, the Lejweleputswa district in the Free State Province. There were approximately 40 professional nurses allocated at the Welkom decentralised study center. The reasons why this study center is appropriate are as follows:

- The study center coordinator declared her support to this research. The center coordinator is a person employed part-time to oversee all the administrative-logistic services presented at the study center.
- The study center has been utilized for distance education for almost twenty years and is viewed as a center with a stable influx of enrolled students.
- This study center is equipped with three (3) SMART Boards interactive whiteboard technologies to ensure that all the enrolled students are exposed to interactive whiteboard broadcasting.
- Enrolled student nurses have access to the Internet through an asymmetric digital subscriber line (ADSL) at this study center.
- The study center presented with sufficient amounts of class rooms to ensure private and comfortable meetings with participants without disrupting contact sessions as decentralised study centres are a buzz of activities on Saturdays.
- The researcher was familiar with the Lejweleputswa district and able to drive to the study center for numerous events for data collection.
The researcher planned to identify a mediator to assist with the recruitment of participants. This mediator had to be a facilitator at the decentralised study center in Welkom. Facilitators refer to a person appointed to assist student nurses during contact sessions at the study centres and are therefore familiar with the students that attend contact sessions. Prospective participants allocated to visit the decentralised study center in Welkom are selected according to the following inclusion criteria:

- participants should be enrolled in a post-basic nursing programme presented through distance learning; and
- participate voluntary and grant informed consent;
- be proficient in business English.

The sample size refers to the number of participants who are selected from the population (Brink et al., 2012:135) and is determined by the richness of information and data saturation, that is when sampling provides repeating information and no new themes are observed (Burns & Grove, 2009:188).

Focus groups were used as the method for data collection. A focus group interview involves verbal communication during which the participants provide information to the researcher (Burns & Grove, 2009:67). The focus group was designed to obtain the participants’ feedback that is permissive and non-threatening and that could enhance group dynamics to express and clarify different views in ways that are less likely to occur in a one-on-one interview. The group may give a sense of safety to those wary of researchers or those who are anxious (Burns & Grove, 2009:82). Focus groups were also appropriate for data collection in this research because it was functional as a standalone method when research relates to group processes and meanings (Gill et al., 2008:293). As all the participants were professional nurses enrolled in post-basic nursing programmes through distance learning, the group mix (Gill et al., 2008:293) was limited, which is advisable for a good focus group composition to enhance quality contributions from participants. An interview schedule was prepared in advanced in order to provide a moderate structure yet stimulating open, two-way conversations. The interview schedule was prepared after taking the following principles into consideration (Gill et al., 2008:293-294):

- questions should move from general to specific; and
The order of questions should be relative to the importance of the issues addressed in the research.

The following questions will planned to be asked during the focus groups:

- **Introductory question:** You are a professional nurse enrolled in a post basic nursing programme presented through distance education. In this distance education students are motivated to use ICT for example by submitting your assignments in typed format via e-mail, to surf the web, to view new communication on facebook and to view captured lectures on the internet. Can you tell me how do you experience these types of ICT especially in distance education?

- **Sub-questions:**
  - What is your understanding of the meaning of ICT?
  - What types of ICT do you use in your studies?
  - What types of ICT do you want to use but don’t yet use and why?
  - What do you need in place to use ICT in your studies?
  - What factors facilitate the use of ICT in your studies?
  - What factors hinders the use of ICT in your studies?

Focus groups were digitally voice recorded and transcribed for the purpose of data analysis.

**Data analysis**

Data analysis refers to imposing some order on a large body of information so as to reach a general conclusion (Polit & Beck, 2010:88). In this research, the transcriptions of the focus groups were analysed according to content analysis (Creswell, 2013:254). The eight coding steps of Tesch (1990) were followed and are listed as follows:

- A sense of the whole sampling will be obtained, all transcripts will be read carefully and ideas that come to mind will be jotted down.

- A transcript of a focus group that is the most interesting, shorter or on the top of the pile will be taken, after reading it through questions will be asked like, what is this all about? A look will be taken from the underlying meaning and not about the substance and will be jotted down.
• Several of the participants’ data will be read through to develop a general sense of the information and will be listed that comes to mind, these topics will be put into columns in order as maybe the major topics, unique topics, and left over’s.

• The list of topics will be taken and reverted back to the data at hand and be abbreviated. Next to the appropriate segments of the text and see if any new category emerges.

• The most descriptive wording will be found for the topics and be turned into categories, than a way will be found to reduce the list of categories by grouping them together as they relate to each other and interrelationships will be highlighted.

• Decision will then be taken on the abbreviations for each category and alphabetize of the codes will be done.

• Assembling of the data material will be assembled from each category and a preliminary analysis will be done.

• If necessary decoding of the existing data can be done, coding can be done in several ways, such as colour coding schemes by cutting and pasting text segments into note cards, or using computer software.

A consensus discussion was held between the researcher and an independent co-coder and a decision was reached on the main themes and the sub-themes that will emerge from the written text (Polit & Beck, 2010:302). The reporting of the research results was concluded with literature integration. Personal, theoretical and methodological field notes were kept by the researcher (Botma et al., 2010:88).

1.6.3 Role of the researcher

The role of the researcher in this study was as follows:

• Participant recruitment and selection: approaching the study center coordinator and intermediorator to discuss the process of sampling and data collection; preparing an information sheet and obtain informed voluntary consent; inviting prospective participants to participate according to an appointment schedule and any follow-up reminders sent to participants.

• Prepared for focus groups: which entailed the preparation of the interview schedule and the preparation of the class room to ensure a conducive environment for focus groups.
• Interviewing and transcribing: conducted the interviews according to specific steps and interview skills; ensured accurate digital voice recording of the interviews and transcribed the completed interviews.

• Analysed the transcribed interviews according to a specific data analysis technique and conducting consensus discussions with an independent co-coder after providing the research proposal, the interview schedule, transcriptions and field notes to the co-coder.

• Reporting of the research process and research results.

• Proper documentation of data to ensure that all the steps followed in the research process was accurately documented.

• Adherence to ethical considerations whereby all ethical procedures were explained to the participants for better understanding and assurance of confidentiality.

1.7 REALISATION OF DATA COLLECTION AND ANALYSIS

Three focus groups were conducted on separate Saturday afternoons after participants concluded their contact sessions. The scheduling of the focus groups and the recruitment of participants happened concurrently and the researcher was supported by a facilitator familiar with all the enrolled students. Although it was discussed that the facilitator should also conduct the interviews as the researcher also renders facilitation services at the study centre, both the researcher and participants felt comfortable to continue with the focus groups. The centre coordinator assisted to provide a class room with sufficient seating and a comfortable environmental temperature and a notice was indicated on the door to limit disturbances. Although a fourth focus group was done, this focus group’s voice recording was unsuccessful and viewed as a pilot study and training opportunity for the researcher and discarded.

Participants that were willing to participate voluntary, signed the informed consent form. Sufficient time was given to participants to discuss their participation and to think about the benefit-risk ratio thereof. The researcher utilised the question schedule (see 1.6.1.1) to conduct the focus groups and kept field notes. The digital voice recordings in MP3 format, of the three focus group discussions with six participants each (n=18) were transcribed. Field notes were analysed and comparisons made between the groups (Burns & Grove, 2009:543). Data was analysed according to the techniques for analysis described by Tesch (Creswell, 1994:153-157) as already stated in 1.6.2.2.
1.8 RIGOUR

Rigour is a deliberate attempt to enhance the reliability and validity of research, otherwise it can be argued that the research is worthless, represents fiction and has no use (Morse et al., 2002:2). In qualitative research rigour refers to trustworthiness which is defined by Creswell (2013:151) as part of qualitative validity, criticality and integrity. Error! Reference source not found.2 explains in detail how rigour was secured in the study.

Table 0-2: Strategies to enhance trustworthiness

<table>
<thead>
<tr>
<th>Epistemological standards</th>
<th>Strategies/principles of trustworthiness</th>
<th>Researcher’s application in the study</th>
</tr>
</thead>
</table>
| **Truth value** to conduct the investigation in such a manner that it will increase the credibility of the findings | Credibility, referring to whether the fullness and essence of the phenomenon captured were captured and do the study reflects what it set out to do? | • Used an interview schedule for the focus groups.  
• Adhered to ethical consideration indicated in point 1.9.  
• Gave a detailed description of the context and the research setting.  
• Did a literature review and literature integration. |
| **Applicability**, which tests of the information gathered as applicable to the information needed in the study. | Transferability, indicating if the results could be contextualised. | • Sample consisted of knowledgeable representatives of the population.  
• Conducted focus groups until no new themes emerge.  
• Thick, rich description of the themes for information to relate with similar professional nurses in distance education. |
| Consistency, as the stability of the data in due course and condition. | Dependability, that referred to methodological rigour and coherence and if the reader accepts the results with confidence. It also implies if the study can be replicated and the same results | • Had clear identifiable research sources.  
• Thick and dense description of the methodology followed.  
• An audit of the realisation of the research process |
Epistemological standards | Strategies/principles of trustworthiness | Researcher’s application in the study
--- | --- | ---

concluded? | | conducted.  
• Used a co-coder to verify emerging themes.

Neutrality, as the extent to which the results were entrenched by the data and not the subjectivity of the researcher | Conformability, which refers to the concerns about the researcher’s influence and bias on the study. | • Full disclosure of the research process, including the limitations of the study and ethical consideration.  
• Did self-reflection to rule out bias and keep detailed field notes.

1.9 ETHICAL CONSIDERATIONS

Rule and John (2011) concur and encourage researches to conduct research in an ethical sound manner, thus enhancing the quality of the research and add to its trustworthiness. Ethical considerations (Botma et al., 2010) refer to the adherence to ethical principles when conducting research involving human beings. Adherence of the ethical principles are summarised in Table 1-3. Before starting with data collection, the following written permission was obtained:

• Ethics Committee of the North-West University (Certificate no NWU-00050-12-A1), approved under the research program titled “Leadership and governance as mechanisms towards excellence in South Africa health systems”.
• Director of the School of Nursing Science at the university.
• The participants, after giving them adequate information concerning the research to ensure that they comprehend the required information, enabling them to consent voluntarily to participate in the research (Burns & Grove, 2009:375).
<table>
<thead>
<tr>
<th>Ethical principle applied to this research</th>
<th>Ethical principles (Rule &amp; John, 2011; Burns &amp; Grove, 2009:375-380)</th>
</tr>
</thead>
</table>
| Autonomy which refers to the participants’ right of self-determination. | • Acknowledge participants as persons with a freedom of choice according to human rights.  
• Provide an accurate and user-friendly information sheet and consent form that can assist participants to make an informed decision based on all the necessary information.  
• Treat participants who decline to participate in the study (or who may withdrew from the study after agreeing to participate) in a non-prejudice manner.  
• Acknowledge that because the participants are also enrolled student nurses, that these participants should never feel coerced directly or indirectly to participate in this research. |
| Justice entails the protection of the identities and interests of those involved. | • Selecting participants based on inclusion criteria.  
• Keep identifying information in safe in a password protected computer of locked away in a cupboard in a lockable office for at least seven (7) years.  
• Substitute identification numbers for participants’ names on study files and computer files to prevent any breach of confidentiality.  
• Clarify the roles of the center coordinator, mediator, researcher and participants to enhance confidentiality. |
| Beneficence is the appropriate protection of the rights and welfare of the participants by ensuring that the degree of risks taken by those participating in the research will not exceed the benefits of the knowledge to be gained. | • Ensure that the focus groups are conducted in a facility that is comfortable.  
• Enhance the researcher’s competence to conduct focus groups by means of a pilot study. The researcher will first be trained to do a focus group, then conduct a pilot and receive feedback from the study supervisors.  
• Inform participants that there are no anticipated |
risks or negative aspects associated by participating to this research.  
- Confirm to participants the availability of a counsellor should participation cause emotional discomfort.  
- Maintain sensitivity to the participants that should overrule the scientific importance of the research.  
- Approach the research with integrity by being honest and fair to all participants.

Ethical issues could manifest in any study and the researcher will be sensitive to this and will deliberately assess what is right and what is wrong in any given situation (Babbie, 2007:65).

1.10 OUTLINE OF RESEARCH

This research was conducted in an article format and the layout is as follows:

- **Part 1:** Overview to this research, including all the content of a typical first chapter in a dissertation, as well as a description of the context of the study in addition to a literature review.

- **Part 2:** Article, the manuscript entails a rich description of the research results.

- **Part 3:** Evaluation of the research and recommendations.
PART 2: LITERATURE REVIEW

INFORMATION AND COMMUNICATION TECHNOLOGY UTILISATION BY PROFESSIONAL NURSES IN DISTANCE LEARNING, A NATIONAL AND INTERNATIONAL PERSPECTIVE

1.11 INTRODUCTION

In Part 1 an overview of the research was formulated. Part 2 is a literature review of information communication technology (ICT) utilisation by professional nurses enrolled in post-basic nursing programmes in higher education (HE) through distance education from a national and international perspective. The researcher further investigates the infrastructure for and the adoption of ICT by professional nurses in their daily practice.

1.12 SEARCH STRATEGY

A search strategy was used to search various types of literature. The main search engines accessed were EbscoHost, Science Direct and Sabinet (Sabinet specifically used for government publications) and Google Scholar. Literature relating to post-basic nursing programmes is ill-defined within the South African context, specifically scholarly literature, or is not available and information is mostly derived from government publications. However, copious amounts of literature are available on technology and ICT and students’ involvement in skills development. In Table 1-4 below the researcher declares the search strategy followed as the first step in this literature review.

Table 0-3: Layout of search strategy

<table>
<thead>
<tr>
<th>Key words used</th>
<th>Search engines used</th>
<th>Data bases accessed</th>
<th>Types of literature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Influencing</td>
<td>Google Scholar.</td>
<td>Computer Science</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Emerald.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
1.13 ICT AND HE IN DEVELOPED COUNTRIES

Developed countries are countries with a healthy and well growing economy of high standard, allowing citizens to enjoy a free and healthy life in a safe environment in countries such as Japan, Asia, Canada, New Zealand, the United States of America and Austria (Annan, 2008:19-21). Developed countries are more technological developed and economically stable and are able to implement technology in any situation. In this study especially the use of technology in HE will be discussed.

ICT is a mainstream issue in HE. In the Western context it is an accepted practice to integrate ICT in major logistical organisational and educational processes of HE. This is illustrated in the case of Ghent University, which introduced ICT in 2003 at campuses around their jurisdictions to students in HE for students to be more involved in ICT. It is at their disposal and there are ample electronic learning environments (ELE) (Kop et al., 2004:8-9; Mayer, 2002:5). In 2003 an in-depth study of ICT and institutional policies and management was executed in HE institutes in the Netherlands (Kop et al., 2004). The study included 2592 teaching staff members, 364 management representatives and 6973 students. The approach adopted in this contribution aimed at detecting for relevant indicators of the uncomfortable zone for institutions and their policies in the context of ICT and educational innovation in the Western European context. Strategies and initiatives were presented to develop more favourable conditions for HE institutes to cope with the new demands of ICT.
and educational innovation. But, more important are developments at the institutional level in general and the middle management actors in particular. The development of their personnel in management change skills was presented as a key to empower HE to move forward in this field and to develop a more comfortable zone for HE in its teaching facilities (Kop et al., 2004).

Efficient ICT utilisation is not only a needed in HE, but is also one of the pillars for the 21st century learner. Learners should exhibit critical skills such as ICT literacy, information literacy and media literacy (21st Partnership, 2011:2). Efficient ICT is necessary for HE improvement (Shaikh & Khoja, 2011:49). The utilisation of ICT towards asynchronous learning networks as a teaching-learning mode of delivery (Morse, 2003:37) has gained in popularity, although not separate from critique. Furthermore, a study was done by Michael Hammond in Warwick of HE institutions in America and it presents a review of a recent study that was done to further enhance the use of technology in HE. The study made use of asynchronous online discussions in HE to analyse the terms of curriculum design, assumptions about teaching and learning and the claims for online discussions, in particular the opportunities for interaction between learners. Permanent access to these interactions is found to be frequently based on social constructivist principles, and it is also offers additional value by providing learners with experience regarding computer communication tools and opportunities for taking part in group work, the nature of curriculum design, software design, tutor support and learners’ attitudes and previous experiences. Email lists or conferencing programmes like First Class and Web Board have been used to support learners who are registered with a higher education and Asynchronous is used as a catchall to include things like computer-mediated communication and threaded discussions between tutors and students. Researchers express broad agreement in reports on learners’ perception and benefits that the argument for using Asynchronous online rests in the commitment to interaction between learners and an adherence to a social constructivist approach in teaching and learning (Hammond, 2002-2004:1-15).

1.14 ICT AND HE IN DEVELOPING- AND BRICS COUNTRIES

BRICS is the acronym for the five major emerging developing economies, namely Brazil, Russia, India, China and South Africa. This grouping was originally known as “BRIC” before the inclusion of South Africa in 2010. In 2010 South Africa began efforts to join the BRIC grouping and the process for its formal admission began in August 2010 and the country officially became a member nation on 24 December 2010 after formally being invited by the
BRIC countries to join the group. The group was consequently renamed as BRICS (Mortished, 2008:5-16). With the possible exception of Russia, the BRICS members are all developing or newly industrialised countries, distinguished by their large, fast-growing economies and significant influence on regional and global affairs (Halpin, 2009:6-17). Five countries are G-20 members. G-20 members are all members and partners of a group of twenty finance ministers and central bank governors from 20 major economies and is represented by the president of the European Council and the Central European Bank, and they represent collectively approximately 80% of the gross world product, also 80% of world trades and 2 thirds of the world population (Daws, 2013). As of 2013, the five BRICS countries represent almost 3 billion people and have an influence on regional and global affairs. Presently, South Africa holds the Chair of the BRICS group (Goldman Sachs, 2007).

The BRICS have received both praise and criticism from numerous quarters, as there were numerous indications that the “Big four” countries have been seeking to form a political club or alliance to cover up their growing economic power into greater geopolitical clout, but after the June 2009 summit a declaration was issued that called for the establishment of an equitable democratic and multipolar world order. One of the countries in the BRICS consortium is India, which showed much progress after becoming part of the group.

According to Mahajan (2002:272) ICT in India has become a buzzword in the computer industry. ICT in India affects all industries in one way or another. Its current developments and advancements reinvented home-offices and decision-making is in general more scientific (Mahajan, 2002:272). Fast technological changes accelerated development in all directions, such as electronic mail, telex, facsimile transmissions, bulletin-board services, teletext, video, voice systems, video-conferencing, fax machines, data networks; optical disc storage and retrieval systems (Mahajan, 2002:272). All the above technologies are available at present in India and have been used for educational purposes since 1975 as the first experimental satellite instructional experiment (SITE) (Mahajan, 2002:272). Through SITE, educational content was broadcasted to rural schools in India (Mahajan, 2002:272). Also, in the current and coming two decades the majority of Indian universities will be structured as virtual universities that differentiates between full-time and part-time studies and the reference to local and distance students may vanish in India (Mahajan, 2002:272). Mahajan (2002:275) warns that this restructuring won’t be easy, or simple, or uniform and will necessitate some distinct local customisation.

ICT in India is useful to optimise resources, but very difficult to operate in the Indian context (Mahajan, 2002:275). Networking is a major challenge in India and therefore impacts on distance education. Networking can be extended between two to three open universities.
The term open university or open universities usually refers to a university with an open-door academic policy, i.e. no entry requirements (Errett, 2013). The term may specifically refer to universities and distant learning institutions located geographically nearby networking needs, well thought-out planning, collaboration and sharing of resources and facilities (Errett, 2013).

In conjunction with the abovementioned literature, new technology is constantly dominated by policy makers of distant education systems and is not in the interest of the students, as students struggle to get hold of information from books and teachers (Mahajan, 2002:275). At present, the university and distant education institutes are emphasising the provision of costly technology equipment at a huge cost without examining its utility to distant learners. Use should be made to adopt technology that is feasible, practical, cost effective, and meets the needs of the students, much of the future will undoubtedly be decided by own responses to the new communication technology. If students and teachers pretend it does not exist, or run away in fear, it will unquestionably destroy the value and growth of the profession, thus technology should be embraced and its capacity to the fully exploited (Mahajan, 2002:275-276).

Factors that mostly enable and constrain ICT applications are essentially the same in both developed and developing countries, although they obviously differ in terms of importance, depending on which side of the digital divide they are viewed from (Farrel & Shafika, 2007:17-18). What differentiates the rate of adoption and diffusion of ICT in education is not the factors at play, but rather the degree to which they have been developed or are present in a given country. Most of the countries have developed or are in the process of developing a road map for the incorporation of ICT in their education systems. Some countries have detailed implementation plans with priorities and timetables and measurable indicators in place. Mostly the focus is more on the development of ICT operational skills than on the integration of ICT in a pedagogical practice of advocacy, leadership, gender equity, infrastructure and access. Yet the major constraints are inconsistency or unavailable supply of electricity, lack of ICT equipment, overcrowding of computer labs, and lack of affordable access to connectivity (Farrel & Shafika, 2007:17-18).
Table 0-4: Survey of ICT and Education in Africa: A Summary Report Based on 53 Country Surveys

<table>
<thead>
<tr>
<th>Skill</th>
<th>Target</th>
<th>Practical Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typing</td>
<td>Mastering a variety of keyboard functions.</td>
<td>Saving, deleting, copy-pasting, highlighting, tabulating, spacing, justifying, inserting punctuation marks, cancelling, texting, etc.</td>
</tr>
<tr>
<td>Word processing</td>
<td>Preparing documents in accordance with basic grammar and formatting rules.</td>
<td>Typing assignments and note-taking. Using an automatic corrector, etc.</td>
</tr>
</tbody>
</table>

The above survey included Australia and there are several reports suggesting that Australian nurses have a deficit of skills in ICT and this compromises the use of the technology and the benefits that are offered (Webster et al., 2003; Edirippulige, 2005:1375-1382). The abovementioned study was undertaken in 2005 by an independent research group commissioned by the Australian Nursing Federation (ANF) with funding from the Australian Government’s Department of Health and Ageing. It was the first to capture a national picture of ICT in the nursing profession in Australia. Access to computers, knowledge and use of ICT, barriers to ICT use, training and education and ICT support were all determined. The results are intended to support the development of national strategies to meet the needs of nurses. The paper reports on past training and education, and future training requirements (Rober et al., 2008:2758-2759).

1.14.1 ICT and HE policy and ethical legal perspectives

South Africa is not isolated from the competitive nature captured within a global knowledge-based economy. This competitiveness is presented in a country’s efficient assimilation of available knowledge and the building of comparative advantages in high growing prospect areas and the utilisation of technology to relieve environmental challenges (Altbach, 2011:2). The World Bank linked the contributions by Higher Education (HE) in Sub-Saharan Africa to an accelerated economic growth (Altbach, 2011:2). Yet, by 2004 UNESCO (2004:28)
acknowledged that Africa was falling behind the global knowledge-based economy due to a lack of ICT, among other reasons, referred to as the digital divide. While the global HE enrolments increased with 1200% from 1950 to 1997 (referred to as “class to the mass”), Sub-Saharan African had less than 3% HE enrolments (UNESCO, 2004:34). Yet the global supply of HE graduates are insufficient for the global needs, and even more so in Sub-Saharan Africa.

South Africa’s effort to join in the global competitive knowledge-based economy is presented with an additional challenge, namely to redress inequities from Apartheid. In 2001 the National Plan for Higher Education (NPHE) was released (UNESCO, 2004:28) and it listed planning, quality control and funding as the three main mechanisms. In March 2001, the Minister of Education released the most recent initiative, the National Plan for Higher Education (NPHE), which identified five strategic objectives to achieve “the overall goal of the transformation of the higher education system” through three main steering mechanisms: funding, planning and quality. The NPHE reconsidered the delivering of knowledge faster, but did not focus on the utilisation of ICT for distance education (UNESCO, 2004:38). In addition, the African National Congress (ANC) presented the National Higher Education Plan White Paper, providing an education framework set out to be fair, acceptable, assessable and sustainable for all South Africans (ANC, 2001) and provided a framework to ensuring fitness of the HE system to contribute to the challenges faced by South Africa in the 21st century (ANC Policy Framework for Education, 1994:38). HE should be knowledge-driven with a three-fold motivation, namely as human resource development; high-level skills training; and production, acquisition and application of new knowledge (ANC, 1997:1-12). In addition to the White Paper, the ANC advocated the use of ICT training in all schools, further education training (FET) colleges, universities, clinics, hospitals and other facilities, as this is demanded of students in this digital age (ANC, 1994:3). The South African government also published a policy framework on education and training in the document known as the “Yellow Book” (ANC, 1994:5). One of the important policy positions of the “Yellow Book” is that education and training had to be integrated with the focus to build and sustain a single coherent post-school education and training system.

The efficient ICT utilisation is not only a need in HE, but also one of the pillars for the 21st century learner, stating that learners should exhibit critical skills such as ICT literacy, information literacy and media literacy (21st Partnership, 2011:2). Efficient ICT is necessary for HE improvement (Shaikh & Khoja, 2011:49). The utilisation of ICT towards asynchronous learning networks as a teaching-learning mode of delivery (Morse, 2003:37) has gained in popularity, although not without criticism.
The global changes of the past 20-30 years transformed the higher education (HE) landscape (Collins & Rhoads, 2010:108) on an international and national basis. In knowledge-based economies HE institutions are instrumental for people to transform information into skills, socially beneficial knowledge, and improved standards of living and to produce and prepare skilled workforce (Shaikh & Khoja, 2011:49) congruent with the work environment needs. In Africa, the New Partnership for African Development (NEPAD) (UNESCO, 2004:43) acknowledged the role link between accelerated economic growth and ICT. In 2005 the Minister of Science and Technology appointed a review committee to advise on the matter of what the objective is to stimulate Africa's development by bridging existing gaps in infrastructure (NEPAD, 2005:iii). The actions include the creation of the African Ministerial Council on Science and Technology (AMCOST) and its subsidiary bodies -- the NEPAD Office of Science and Technology, and the AU Commission for Human Development, Science and Technology. These institutions have collectively developed Africa's Science and Technology Consolidated Plan of Action at the second African Ministerial Conference on Science and Technology in Dakar, in September 2005. The main goals of Africa's Science and Technology Consolidated Plan of Action (CPA) are to strengthen Africa's capacities to develop, harness and apply science, technology, and innovation to achieve Millennium Development Goals (MDGs), and to mobilise Africa's expertise and institutions to contribute to the global pool of science and technological innovations (NEPAD, 2009: iii).

International and Africa-specific changes in ICT and education impacted also on the HE in South Africa. The South African Qualifications Authority's (SAQA) guidelines for computer science and information technology were formulated and are the key for implementation of the abovementioned guidelines (Government Gazette, 2001). SAQA is charged with developing the National Qualifications Framework (NQF) on a consultative basis for the Minister of Higher Education's approval (Higher Education Laws, 2010). The Department of Education is basing its forward thinking on a provisional structure of the NQF, comprising ten (10) qualification levels and credits (Higher Education Laws, 2010). In most health institutions technology are available and in place, the only need is for nursing professionals to be able to make use of the technology and gain the necessary skills of these programmes to be able to become skilful in how to use the necessary technology. Thus the Unit Standard Titles in Data Communications and Networking at level 4 will be most suitable for them to gain these skills to be able to make use of technology in health systems (Government Gazette, 2001:35).
Yet, in South Africa as a developing country that is still progressing towards ICT, there are still students in HE that do not have the means for ICT (NEPAD, 2009:2). According to Okpaku (2003:1), South Africa has the lowest telephone density and internet connectivity in the world. These technological gaps hinder the integration of developing nations into the new global economy (Kearney, 2001:4). Most areas in South Africa still do not have telephone connections and thus fixed line internet services cannot be installed, hampering services that technology can provide to facilities (NEPAD, 2009:3). Due to the above-mentioned gaps, steps were taken to get South Africa up to standard. Thus the United Nations instituted the Technological Task Force to support all Africa's efforts to harness ICTs for poverty eradication, human development, the elimination of gender disparities in addition to the combating of disease (United Nations, 2004:123-129). This ignited the evolution of the e-health concept, which is characterised not only as technical development, but also to improve health care locally, regionally and worldwide by using ITC (Eysenbach, 2001:7). E-health (E-health Strategy South Africa, 2012-2016:6-9) comprises of the following components: telemedicine, continuing medical education, health care data for public health and preventative medicine programmes. The influence of ICT in health care are reiterated in South Africa as the National Health Plan for South Africa (1994:31) stipulated how technology should be implemented and sustained in South African health systems.

The importance of nursing professionals in the South African health systems is highlighted. In 2008 there were 196 914 workers eligible to practice nursing. The prominence of nurses in the health care delivery system warrants a specific focus on the strategy for nursing professionals as a requirement by the professional governing body (SANC, 2006). Nursing professionals are responsible for bringing health service to all communities through the spectrum of health care delivery mechanisms from PHC to tertiary levels of health care. The Nursing Strategy for South Africa (2008:9) fortified nurses' adoption to ICT. The contributing factors for ICT utilisation by professional nurses were indicated as internal (such as age, gender, generation, qualifications) and external (such as available infrastructure) factors (Nursing Strategy for South Africa, 2008:10). In addressing the challenges the nursing profession face, the accomplishment of ICT as a skill should be a priority (Nursing Strategy for South Africa, 2008:11). This confirms the importance of professional nurse educators being equipped for the 21st century learner since the future of learning in nursing is within a knowledge-based society (Punie Cabrera & Bogdanowicsm, 2006:10).

In South Africa, nursing education has limited exposure to technology despite national policy (Public Health in Africa, 2009:123-146). The utilisation of ICT in HE is a challenge, not only to nursing education, but education in general. Phaneuf (2009:3) argues that nursing
education in particular presents with conservatism in education practices and a high workload inhibiting mastery of ICT in pedagogy. The provision of ICT infrastructure and lack of in-service training are examples of barriers (Gulbahar & Guven, 2008:37). On the other hand, ICT in education in general is also associated with adoption, acceptance and diffusion thereof (Usluel et al., 2008:262). This is applicable in both contact and distance education. Specific benefits of ICT in HE in South Africa is an increased access to HE, wider networks and extended communication, increased interactivity, innovation and a shift towards an efficiency paradigm (Czerniewicz et al., 2006:36-40). Yet the mere provision of ICT in distance education doesn't guarantee optimal adoption thereof by either lecturers or students (Kirkup & Kirkwood, 2005:1, 10), as both lecturers and students are agents in the innovation adoption lifecycle.

South African studies have also been done on the use of ICT and how to enhance it in the educational fields. According to Mdlongwa of the Sustainable Development Programme, at the Africa Institute of South Africa (AISA), in a policy process that the education authorities of the national departments of Basic Education (DBE) and HE and Training (DHET) in South Africa adopted, measures are included that will see the use of Information and Communications Technology (ICT) as a means of enhancing education in South Africa. The South African education system has for a number of years faced immense challenges, which range from mud schools to low pass rates at matric level, high dropout rates, high levels of absenteeism by teachers in schools and, mainly, the poor efficiency and productivity of both teaching and learning in schools. One way in which we could overcome the challenge of low efficiency and productivity of both teaching and learning would be through the use or introduction of ICT in South African schools. In accordance with previous research carried out in the abovementioned field within South Africa and Africa at large, this policy brief looks at some of the challenges, benefits and recommendations relating to the use of ICT as a means of enhancing education in schools in South Africa (Africa Institute of South Africa [AISA], 2012:1). In accordance with the above literature the advent of the twenty first century has seen a number of technological developments that affect almost every aspect of our lives. At the core of this is the ever-growing use of ICT in all realms of live. From the workplace to the sports field, in schools and on personal or social level ICT is defined as a global network of ideas. AISA policy brief number 80 (AISA, 2012), and The Electronic and Communications Transaction Act, No. 25 of 2002, was established by the Department of Communications (DoC) in a bid to lead all ICT initiatives in South Africa and to develop a five-year national e-strategy which would empower all citizens, especially the education sector. A number of various initiatives, both legislative and to do with policy, have been undertaken by various government departments to support the integration of ICT with
teaching and learning. The South African government, through the DoC, hosted a National ICT Policy Colloquium on 19–20 April 2012, at Gallagher Estate. The aim of the colloquium was to start a process of reviewing all the government ICT policies that have been in existence since 1994. The DoC also hosted an ICT Indaba in Cape Town in June 2012, which brought together various stakeholders in business, labour, academia and civil society across Africa and the world (Asmal, 2008:22-25).

1.14.2 ICT and HE infrastructure and trends

It was hoped that from the numerous measures outlined above and others, South Africa would be able to develop and enhance its ICT capability in the near future. Currently ICT profiles are as follows in South Africa: The use of computers was introduced into schools in South Africa during the 1980s, primarily in private schools and a few well-resourced government schools. Initially computers were used mainly for administrative purposes, such as keeping student records, recording examination marks, producing school reports and creating timetables, but with the continuous advances in ICT, this later changed (DoE, 2008:22-25).

There are 2,311 schools in South Africa with one or more computers, and it is estimated that 10% of South Africa’s 28,000 schools have access to one or more computers. The implementation of ICT in South African schools is being led by School Net, which also provides staff development and ICT support to schools. One of the biggest challenges to the implementation of ICT across all South African schools is that the Government of South Africa does not have enough funds to purchase computers and build infrastructure with regard to ICT in the various provincial educational departments. The government also does not prioritise the issue of ICT implementation, as compared to the productivity of both the teaching and learning, and any particular subject in ICT has become a core part of this process (DoE, 2008:22-25). South African schools have used traditional teaching methods that have stayed the same for the last few decades, thus schools and HE that do not use ICT and do not get support from the government as a means of enhancing teaching and learning has led to South Africa failing to close the digital divide (International Telecommunication Union, 2001).

In the United States of America 72.7% learners are already using the Internet in comparison with South Africa at only 6.45%; which is an indication that South Africa is still lagging behind in ICT development. The government has responded to this, and are trying to bridge the digital divide as was seen when the 2001 Presidential National Commission on Information
Society and Development was established. In conclusion the use of ICT in South Africa will in the long run give South Africa a competitive advantage in coping with and competing in an ever-demanding twenty first century labour market and finding solutions to some of Africa’s developmental challenges (DoE, White Paper on e-Education, 2008:22-25).

In the next section some of the developments and enabling factors are discussed that faces education in South Africa.

### 1.14.3 ICT, HE and health systems

During the 70's, two major events occurred: the Declaration of Health for All (HFA) by the World Health Organisation Health Assembly (WHOHS) in 1977 and the adoption in Alma-Ata in 1978 of the Primary Health Care (PHC) approach as the strategy by which the ultimate objective of HFA would be attained. Health for All became a popular slogan for many years to follow and it was recognised that stronger health systems must be based on PHC principles, which today is still regarded as the best approach to sustainable access to prevention, treatment and care. As part of the global movement, African countries developed health-for-all strategies and incorporated them within their national health development plans with a view to addressing some urgent needs such as the development of human resources for health; promotion of environmental health; control of communicable diseases and strengthening of health systems. As a result, health system infrastructures were strengthened, in line with the primary health care approach and various attempts were made to integrate clinical medicine into public health, and, at the same time, health within other sectors, as technology to make the scope and information retrieval much easier for health professionals to ascertain, and makes the sustainability of technology for professional nurses even more of an important skill to accomplish and develop, to ensure easy accessibility for state of the art care. As can be seen in the abovementioned information, technology came from the times when the PHC and HFA were instituted to strengthen and integrate clinical data into technology to ensure easy accessibility for continuation of patient care and treatment (Gawanas & Bience, 2006:40-56).

Weeks and Richard (2012:173-185) offer a technology perspective of health care services and the main problem that was investigated was the South African process of implementing of a multi-billion rand National Healthcare Insurance (NHI) initiative that will entail and extensive review and revitalization of health care services and its supporting infrastructure. Although technology plays a very fundamental and critical role in healthcare service management, it would appear that the concept is not all clearly articulated, both within
literature and in practice. The literature indicates that although planning was done in the 1977 and 1978, it was still not well-articulated in practice and in found literature (Weeks & Richard, 2012:173).

The abovementioned study concluded that diverse interpretations exist as to the concept technology and its utilisation as a support system within a health service management context. Seen in the context of the development and roll-out of the NHI initiative, this could be problematic. The people or human component of the technology concept in particular would appear to act as a constraint in the utilisation of technology to support healthcare service delivery (Weeks & Richard, 2012:173-185). Thus the value of the abovementioned study highlighted that health professionals are increasingly confronted with limited resources and an increasing demand for efficient, cost-effective, sustainable and patient-centred services. The use of appropriate healthcare technology support systems could serve as a means for addressing some of these issues. The findings associated with this research study could serve as a source of information and reference for both researchers and practitioners involved in the strategic alignment of healthcare services and technology, particularly if seen within the context of the roll-out of the NIH initiative (Weeks & Richard, 2012:173-185).

In the next section the researcher look at health technology for equitable access to quality health services as a research study was done by Bhagwandin and Niresh (2011:91-98). Health technology (HT) is an important part of health systems, the acquisition, assessment and costs of which have brought about increasing challenges in delivery of healthcare services. In order to address the high levels and wasteful use of HT, the national Department of Health published a framework for Health Technology Policies in 2001, following this with a draft National Health Technology Strategy document in 2005. The key outcomes envisaged in these documents are discussed against the backdrop of South Africa's high burden of disease and resource constraints in the public healthcare sector. The imminent piloting and implementation of the National Health Insurance and Government's renewed drive for improved access to quality health care for all have placed HT firmly in the spotlight. So professional nurses will deal with clients that will be part of this development they need to understand it and be skilful in how to use the technology that will be used in this programme. The ensuing paragraph looks into the challenges and how improvements can be made to ensure that professional nurses gain these skills and to be able to use it in their daily care with clients (Bhagwandin & Niresh, 2011:91-98). It some of the HT challenges and what improvements can be made in the key areas of prioritisation of public HT needs, HT management, HT regulation, HT innovation and public-private partnerships. It is notable that
the long-awaited national audit of assets in public health facilities has commenced and was scheduled for completion in 2012. The inventory arising from this audit will provide the basis for effective asset management, including facilitating scheduling of preventative maintenance and providing financial information to support budget proposals and procurement requests. A further development has been the establishment of a Medical Devices Innovation Platform to harness and integrate skills and expertise from a number of universities and research institutions in the country. Promotion and pursuit of HT innovations present South Africa with an opportunity to build capacity to solve health challenges, and thus to have a positive impact on health and development (Bhagwandin & Niresh, 2011:91-98).

However, the overarching goal of the adoption of ICT within healthcare is to improve patient care in a cost-effective manner, so that in the end, both old and new technologies are being adapted. For example, bar codes, invented in 1952 and used in retail since 1974 (Bellis, 2007:18), have been introduced during dispensing of medicines (Bendigo Health, 2006). Use of this half-century-old technology has been shown to be effective (Anderson & Wittwer, 2004:24) and will go a long way to reduce medication errors which, were estimated in 1999 to account for 40% of the avoidable 80 000 medication-related hospitalisations in Australia each year at a cost of at least $350 million per year (Roughead, 1999:36). And for nurses working in the PHC facilities this will be of a great help as they do dispense to clients after consultation in the facility.

A new strategy was introduced by Dr. Aaron Motsoaledi, the Minister of Health, in July 2012. It called for an e-Health Strategy for South Africa for its implementation between the years 2012 to 2016 for completion (DoH, 2012:5). As was described in previous literature, ICT was characterised by fragmentation and lack of coordination, prevalence of manual systems and lack of automation, and where automation existed there was a lack of interoperability between different systems. Considerable resources were also invested in these systems that, in the final analysis, did not generate the expected return on investment (DoH, 2012:5).

e-Health is defined by the World Health Organization as “the use of information and communication technologies (ICTs) for health to, for example, treat patients, pursue research, educate students, track disease and monitor public health” (DoH, 2012:5).

The layout of this strategy for the public health sector will provide a roadmap for achieving a well-functioning national health information system with the patient located at the center. This strategy implementation will be monitored by the Minister of Health and The National Health Council, who will closely monitor the implementation of this strategy to ensure that previous errors do not revisit us and that the strategy indeed supports patient care and
healthcare management, and this is where the professional nurse will play an important part as health care giver and part of management (DoH, 2012:5). The aim of the strategy as set out by the Director General for Health, is to support the strategic objectives of the Department of Health in a way that is comprehensive, pragmatic and innovative. It defines e-Health as a broad domain which includes mHealth, telemedicine and all information communication technologies (ICTs) used to promote, support and strengthen healthcare (DoH, 2012:6). The following priorities have identified and coupled with dates for completion “between” 2012 to 2016, the ten priorities that must be acted on as is a product of a concerted effort team of officials from the National DoH and the Medical Research Council (MRC) in constant consultation with the National Health Information Systems committee of South Africa (NHIS/SA) are strategy and leadership; stakeholder engagement; standards and interoperability; governance and regulation; investment, affordability and sustainability; benefit realisation; capacity and workforce; eHealth foundations; applications and tools to support healthcare delivery; monitoring and evaluation of the e-Health Strategy.

1.14.4 ICT in HE

There are also other technologies and applications that are much newer and have tremendous potential. The internet has been the vehicle for the delivery of information such as the knowledge-based information systems that have been rolled out to support evidence-based practice tele-health and this is blossoming thanks to the use of mobile devices such as personal digital assistants (PDA’s) that provide quick access to information, are flexible and offer convenient point of entry for patient data (Davenport, Jackson & Dewar, 2004:134). A study was undertaken of the current knowledge and future training requirements of nurses in information and computer technology to inform policy to meet national goals for health (Rober et al., 2008:2758-2759). The role of the modern clinical nurse is intertwined with information and computer technology and the adoption of such technology forms an important component of national strategies in health. The majority of nurses are expected to use information and computer technology during their work, however, the full extent of their knowledge and experience unclear (Rober et al., 2008:2758-2759).

The above study had the following results and rates that computers were used by 86.3% of respondents as part of their work-related activities. Between 4-17% of nurses had received training in each of 11 generic computer skills and software applications during the preregistration/pre-enrolment and between 12-30% as continuing professional education. Nurses who had received training believed that it was adequate to meet the needs of their
job and was given at an appropriate time. Almost half of the respondents indicated that they required more training to better meet the information and computer technology requirements of their jobs, and a quarter believed that their level of computer literacy was restricting their career development (Rober et al., 2008:2758-2759). Nurses felt that the vast majority of employers did not encourage information and computer technology training and, for those for whom training was available, workload was the major barrier to uptake. Nurses favoured the introduction of a national competency standard in information and computer technology (Rober et al., 2008:2758-2759).

The study concluded that for the considerable benefits of information and computer technology to be incorporated fully into the health system, employers must pay more attention to the training and education of nurses, who are the largest users of that technology in the health sector (Rober et al., 2008:2758-2759). Thus the clinical relevance of the study is that knowledge of the training and education needs of clinical nurses with respect to information and computer technology will provide a platform for the development of appropriate policies by government and by employers.

Noteworthy, the following information was also gathered for the enhancement of technology in healthcare as an information-intensive industry in which quality and timely information are critical resources. Computer-driven technologies are providing the means to acquire that information. Potential benefits of information and computer technology (ICT) used in the healthcare industry include those associated within any other industry or business such as improved efficiency and communication. Adoption of appropriate technologies to support health delivery in Australia is driven in part by national strategies for electronic health records (National Health Information Advisory Council, 2001:10).

Over-all nurses, as the largest sector of the workforce in health facilities, are the greatest users of ICT in the health industry. To use the available technology to its potential, provision of access alone is not sufficient; skill or ability must be adequate. As has been concluded by many researchers, skills must be built into undergraduate nursing curricula so that graduates possess the necessary basic computer skills and specific knowledge of available resources (Griffiths & Riddington, 2001; McCannon & O’Neal, 2003:55-59). Furthermore, once employed, employers of nurses need to provide accessible and relevant education and training to maintain and build upon these skills and knowledge (Staggers et al, 2002, Curran, 2003:36). Another study that was done by Stropel and Ottani (2006:197–204) was the use of a Shift Report, which is a multifaceted process that serves to provide nurses with vital patient information to facilitate clinical decisions and patient care planning. It also provides
nurses with a forum for functions, such as patient problem solving and collaboration (Strople & Ottani, 2006:197-204).

Noteworthy is that the abovementioned study also indicates that the Shift report provides nurses with a forum for functions such as patient problem solving and collaboration in the literature review. There was an indication that current methodologies used to collect and convey patient information are ineffective and may contribute to negative patient outcomes, data incongruence, legal implications, time constraints augmented by the nursing shortage, and the financial impact of the shift report is also addressed. It was revealed that significant rationale for pioneering a new innovative method of shift-to-shift communication to build a safe health system to prevent the occurrence of medical and communication errors (Institute of Medicine, 1999:197).

As a result, government policy makers and health care agencies have focused their attention on determining the root cause of errors to identify preventative measures, including the use of information technology (Institute of Medicine, 2002:197). In this endeavour to keep patients safe has led to transformation in the work environment of nurses. Thus the use of computer technology and wireless modes of communication is explored as a means of improving the shift report process and, subsequently, health care outcomes (Strople & Ottani, 2004:197). This information in nursing can be of great help as handing and taking over between shifts are crucial it can be assured that all that is said and done for each patient can be easily accessible through this report, and omissions of care or instructions can be prevented to ensure best health practices.

Another use of technology in the nursing field is presented in a study that was done by Larrabee and Brown (2003:345). The benefits of the barcode point-of-care (BPOC) technology are plentiful and are increasingly recognised by health-related organisations. It addresses the finding that the majority of non-intercepted medication errors originate at the bedside. The application of bar-code technology to medication administration is growing, and its benefits are increasingly recognised. This article describes a hospital’s experience with bar-code point-of-care (BPOC) and discusses the benefits of BPOC, considers the essential role of the pharmacist when implementing BPOC in a hospital setting, and provides a financial model for cost avoidance using a BPOC system. A BPOC system revolves around the small vertical lines and spaces of the bar code. These tiny lines and spaces represent data that, when read by a light source, can be interpreted by computer software. Bar-code labels on unit-of-use medications ideally contain the drug name, strength, national drug code (NDC) established by the United States of America Food and Drug Administration (FDA), expiration date, lot number, and manufacturer. If used in a primary health care facility, this
can be of great help for the quick dispensing of medication in overcrowded facilities, with one professional nurse that must consult and dispense medication to patients at the same time and will result in less time consuming efforts when dispensing.

A BPOC system is one solution to track, reduce, and prevent medication errors. Successful implementation revolves around maximizing end-user involvement, critically examining the hospital’s entire medication process, updating the formulary and mapping drugs to it accurately, and identifying a process to maximise bar-code label attachment to medications. Benefits that are realised through BPOC systems include increased visibility of near misses and increased opportunity to demonstrate an institutional commitment to safety to patient’s family members, and the community (Larrabee & Brown, 2003:345-353).

Another means for professional nurses of reaching out to patients can be seen in a trial that was done by Egede et al. (2011:2). It is assumed that the use of telephone contacts, video-conferences, personal digital assistance and web-based systems offer new opportunities to bridge the gap in support for patients with diabetes, between face-to-face visits with their health care providers. However, systematic reviews evaluating the efficacy of telemedicine interventions on patient outcomes have yielded equivocal results. A consistent finding across all these reviews is that there is a shortage of controlled randomised trials that implement clinical outcome measures, using sample sizes with sufficient power. However, the nature of the interventions compared (telemonitoring, physical decision-making support, increased patient access to provide electronics reminders, educational, educational materials, or some combination of the above). The baseline features of the populations studied have varied considerably, making specific conclusions difficult to draw. While the optimal formula for technology-enhanced patient support is far from determined, there is a growing body of evidence to suggest that telemonitoring strategies, overall, are an effective intervention for improving metabolic control. The abovementioned trail study can be of help in PHC facilities as some of the patients have to travel far distances to get to the facilities. The use of technology can be of help so that if patients got problems they can gain from being part of such a project (Egede et al., 2011:2).

Furthermore, sustainability can be attained in many schools with ICT equipment and connectivity to the internet for developing services for the wider community on a cost-plus basis to generate revenue, but to meet the on-going cost of maintaining equipment, staff training, connectivity, content materials acquisition, and development and consumables is a major challenge. Some governments are allowing an ICT attainment to sustain it in teaching and education facilities (Czerniewicz et al., 2006:36-40).
In the abovementioned survey the progress that was demonstrated that was made in the adoption and diffusion of ICT in the education throughout Africa, particularly in the early years of the 21st century, is remarkable, but with regard to the broader impacts on learners the process is just beginning. Some suggestions and comments towards future options in key areas of ICT in education will be important to attend to as the adoption process continues. Suggestions for a strategy to maintain and enhance the currency of the data that has been gathered are included in the following text to move forward on implementation of ICT in education. In the paragraphs below some strategies to improve implementation of ICT in education (Czerniewicz et al., 2006:36-40) are listed.

- **ICT as the 'silver bullet'**

  There are a few countries that continue to have a rather singular emphasis on the development of ICT infrastructure as the “silver bullet” for achieving socio-economic development. However, as noted in a recent study cited in the *Electronic Journal on Information Systems in Developing Countries*, investment in ICT by itself does not foster human development, but must be accompanied by investment in education and health as well (Czerniewicz et al., 2006:36-40).

- **ICT in education versus education in ICT**

  While the practice of equipping schools with computers and using them to teach computer literacy and use packaged content to augment teaching is useful, the goal of fully integrating ICT in educational administrative and pedagogical processes will continue to be constrained by the lack of access to ICT infrastructure, affordable connectivity with sufficient bandwidth, and a reliable supply of electricity (Czerniewicz et al., 2006:36-40).

- **Teacher professional development**

  Teacher training should involve much more than the development of computer literacy skills. Teachers need to be able to design and adapt content materials to suit student needs, to search and manage information, and to be aware of the ethics and dangers inherent in the use of ICT technologies. These are some of the ways in which enhancement and sustainability can be maintained in ICT in education and distant learning in South Africa.
• **Keeping information current**

Developments in ICT applications in education in Africa are happening on a daily basis, with the result that the data of the sort collected in this Survey will become out dated very quickly.

• **Evaluation**

The literature pertaining to ICT in education is mostly descriptive of projects and initiatives, and while this is very useful, there is a paucity of data from well-designed evaluation and research studies, particularly in Africa. A study about ICT sustainability (Global Benchmark, 2012), measured the prevalence and maturity of information and communications technology ICT sustainability initiatives being undertaken by organisations around the globe. These initiatives included procurement, disposable, power management, virtualization, consolidation, mobility, data centre efficiency, networking, software design and others. In this report it was found that efforts to improve ICT sustainability in organisations reached a plateau. The global ICT sustainability index (ITSx) declined in 2013, showed a falling to 53.1 as from 54.3 in 2012 and a high of 56.4 in 2010 (Global Benchmark, 2012). There are clear opportunities for enhancing the use ICT to improve efficiency and significantly reduce costs, although not all companies are taking such steps Further the organizations could be actively tracking the energy use of their ICT resources and see ICT related energy consumption as a strategic measure and one that can be managed in real time, and not just as a static number produced on a quarterly or annual basis (Global Benchmark, 2012). According to the study the ICT sustainability of the health/education/welfare sectors, statistics declined to 47.9 in 2012, from 52.5 in 2011 and this puts the performance below the global IT sustainability index of 53.1. Factors that can be contributing to this decline are that the Health/Education/Welfare sector typically comprises smaller ICT departments, which generally underperform larger enterprises in sustainability. The top performing countries in terms of Health/Education/Welfare sector ICT sustainability were the USA (ITSx 56.4) followed by New Zealand (54.5), and Australia (48.9). The largest increase in these sectors was China by rising 6.3 to 43.4. With the above literature in hand this gives the researcher an indication that ICT Sustainability is well on its way and around the globe measuring of progress is done to take ICT and its Sustainability into the future as a commodity that is here to stay, and be exploited and embraced (Global Benchmark, 2012).
1.15 CONCLUSION STATEMENTS

As seen in literature that was read, technology plays an important role in the health system if all recourses are available. The necessary skills are accomplished by all end users in the health systems and have its good and bad effects on human beings. For it to be positively accepted by the uses and health practitioners it needs intervention, control, governance and to have inputs and guidance for its development to be patented. The e-Health strategy should be well-documented and much information about it should be available to all stakeholders and end users. It should be well accepted by other practitioners of Africa. Misconceptions are overruling the use and the inclusion of (IT) in the health systems. Health practices and the use of some of the knowledge that will be gained will put health practitioners in a better position if it is included in the primary health care system and in nursing curricular in the future. Thus, the study will be of good use for practice and for inclusion in future working health systems. This literature will also help to enhance the enabling factors in ICT that hampers its full usage in the health sector and ensure that it can be sustained for future generations.
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CHAPTER 2: ARTICLE

Debunking the ICT myths: integrating information communication technology in post-basic nursing in South Africa

For submission to the following journal: The Journal of Nursing Education
**Author guidelines**

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The Journal of Nursing Education publishes research and other scholarly works involving and influencing nursing education. Regular features include Major Articles, Research Briefs, Educational Innovations, and Syllabus Selections. The Journal focuses on aspects of nursing education related to undergraduate and graduate nursing programs. Staff development, continuing nursing education, client teaching, and clinical topics not related to teaching-learning in academic programs are more appropriate for other journals. The Journal adheres to the Uniform Requirements for Manuscripts submitted to Biomedical Journals (2008) of the International Committee of Medical Journal Editors.

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*Major Articles* are:

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Integrative reviews of literature, which contribute to the advancement of knowledge about nursing education, including state-of-the-science reviews, or to new applications of existing knowledge to the teaching-learning enterprise.

Philosophical analyses of nursing education.

Analyses of political, social, economic, professional, pedagogical, or technological trends and issues influencing nursing education.

Reports of qualitative studies (i.e., grounded theory, interpretative, phenomenological, descriptive) that provide new theory about and/or insights into nursing education practices.

Major articles are generally limited to 15 narrative pages, exclusive of references, tables, and figures. Tables and figures should be limited to those that are necessary to clarify or amplify the narrative.

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Title page

Debunking the ICT myths: integrating information communication technology in post-basic nursing in South Africa

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ABSTRACT (word count: 350)

Background: South Africa's higher education has come a long way since 1994, providing an ideal framework to ensure education according to the needs of the 21st century learner. This is placed within the realities of a knowledge-based economy. Yet, the digital divide in South Africa remains a challenge as information communication technology (ICT) is not accessible enough to overcome inequities. In addition, there is an increased demand for distance learning to equip full-time employed adults to further their education while remaining active in duty, this is also applicable to nursing. Despite different types of ICT infrastructure available at various universities, insufficient literature on students’ optimal use of such infrastructure remains. The question arose as to how can ICT use be enhanced through optimal ICT integration into the current curricula of post-basic nursing qualifications presented through distance learning within the challenges presented by a developing country.

Methods: A qualitative, explorative, interpretive descriptive and contextual design was followed. Purposive sampling was done of professional nurses enrolled as students in post-basic nursing programmes. Three focus groups (n=18) were conducted. The context was a decentralised study centre in the Free State, South Africa. Transcribed interviews underwent thematic analysis.

Results: Three main and eleven sub-themes were formulated. Participants provided a one-dimensional definition of ICT. Both hindering- and facilitating factors for ICT use were identified. Hindering factors included lack of access and limited opportunities; being fearful and unskilled; a fight against time and cannot master new ICT skills; “old school” and unable master ICT; ICT use as individual choice versus gender and age. Facilitating factors were students’ needs for ICT; to move seamlessly between rural and urban areas; nurses taking their own initiative and ownership in ICT; positive outcomes of ICT and technology is known and used by nurses in practice.

Conclusions: Literature integration confirmed that several of the hindering factors are debunked myths and can be overcome, such as rising silver surfers as an antipode to age-related fears and mobile technology is the preferred ICT in rural areas. By strengthening the facilitating factors, ICT integration into the curricula might empower both students and lecturers.

Keywords: Professional nurse, distance learning, integration, information communication technology, higher education, facilitating and hindering factors, experiences
BACKGROUND

South Africa’s effort to join the competitive knowledge-based global economy remains challenged by the inequities brought about by Apartheid. Various positive initiatives have been taken after the dawn of democracy in 1994. The African National Congress (ANC) presented the National Higher Education (HE) Plan White Paper as an education framework with the aim of being fair, acceptable, accessible and sustainable for all South Africans (ANC, 1997:1-12). The HE White Paper established a framework ensuring a functional HE system fit for the challenges faced by South Africa in the 21st century (ANC, 1994:38). Furthermore, information communication technology (ICT) training on basic education level, and at further education training colleges, universities, clinics, hospitals and other facilities were advocated by the ANC as ICT is demanded by students in this digital age (ANC, 1994:38). Almost two decades later the strategic positioning by the White Paper was fortified, considering that efficient ICT is not only a need in HE (Shaikh & Khoja, 2011:149-161), but one of the critical indicators for the 21st century learner.

Catering for the 21st century learner is broader than curriculum considerations only as it provides essential skills within the knowledge-based economy. This fast-paced, information-driven economy views knowledge as a commodity and competitiveness dependent on the speed of information. ICT entails the software and services related to information processing, communication and business activities (Aduda & Ohaga, 2004). From an education perspective ICT includes all the technologies used for the manipulation and communication of information, with specific reference to equipment, software and networks that enable access, retrieval, storage, organising, manipulation, control and presentation of information through electronic means (South African Department of Education, 2003:17-18).

Despite the ANC’s vision, South Africa as a developing country has already fallen victim to the digital divide as students in HE have limited access to ICT (Kalua et al., 2009:2). Although ICT infrastructure enjoyed more focus and policy recognition, South Africa had the lowest telephone density and internet connectivity in the world in 2003 (Okpaku, 2003:1) and by 2009 most areas in South Africa still lacked telephone connections and fixed line internet services (Kalua et al., 2009:3). One initiative to counter this was the Technological Task Force of the United Nations (2004:368), which aimed to support Africa’s efforts to utilise ICTs for human development, poverty eradication and the elimination of gender disparities. ICT progressed also in the health sector in that combating of disease served as an impetus for an e-health evolution (Eysenbach, 2001:20). E-health refers to telemedicine, preventative medicine programmes, public health care data and continuous medical education (South Africa, 2013:6-9).
The progress in e-health is not representative of the health sciences in general. Nkosi et al. (2011:876-882) concluded that nurses lack computer skills, have limited access to ICT and that ICT is fragmented in nursing education. A conservatism remains in nursing education practices where high workloads inhibit ICT mastering in pedagogy (Phaneuf, 2009). The Nursing Strategy for South Africa (Department of Health, 2008:196-914) acknowledge nurses’ adoption of ICT and that ICT as a skill should be a priority. Nurse educators need to be equipped for the 21st century learner as the future of learning in nursing is within a knowledge-based society (Punie et al., 2006).

Besides the need for ICT in nursing education, there is an ever increasing demand for nursing education delivered through distance learning (American Association for Colleges of Nursing, 2007; Abbott & Coenen, 2008:241). Distance learning is defined as education for learners geographically divided by distance from an education provider (International Association for Distance Learning, 2014). Distance learning is a model of delivery and different modes of teaching-learning can be used, such as online learning. In fact, Gazza and Hunker (2014:1128) concluded that there is a continuous growth in nurses’ enrolment in online nursing education. The International Council for Nurses (ICN, 2006:1-2) urged already in 2006 that nurses in Africa required distance learning for further training. In South Africa, various nursing programmes are presented through distance learning.

Nursing education through distance learning with the use of ICT is a reality within the South African HE context. Yet there is insufficient literature on the actual use of ICT by professional nurses in distance learning in Africa and South Africa to assist nurse educators to integrate ICT in curricula. This fact has led to the formulation of the question ‘how can ICT use by professional nurses enrolled in a post-basic programme be integrated into distance learning curricula?’

The aim of the study was to formulate recommendations for the integration of ICT use in post-basic nursing programmes presented through distance learning. This aim was pursued by exploring and describing the ICT experiences of professional nurses who are enrolled as students in post-basic programmes that are presented through distance learning. The significance of this research is to provide direction to lecturers and policy and decision-makers in higher education regarding the realities of integrating ICT in distance learning in nursing. This is especially challenging because South Africa presents a digital divide, yet post-basic students are professionally qualified and adult learners, which counters the socio-economic views of the digital-age-gender divide.
This article reports on the ICT experiences of professional nurses who are enrolled as students in post-basic qualifications presented through distance learning at a South African university. The focus is specifically on the use of ICT in their studies. These views were explored by means of focus groups and thematic analysis. It maps the realities experienced by professional nurses and presents a rich understanding of the complexity of ICT adoption, which extends beyond ICT infrastructure into areas of gender equality, intra- and interpersonal dynamics and culture. Facilitative and hindering factors are identified for consideration by nurse educators when integrating ICT into current curricula. The discussion also debunks ICT myths ascribed to developing countries and in specific, rural South Africa by arguing that professional nurses' adoption of ICT in distance learning is underestimated.

Methodology
A qualitative, interpretive, descriptive and contextual design was followed. The population comprised professional nurses enrolled for various post-basic nursing qualifications (four types of advanced university diplomas in health sciences presented over one year and a bachelor’s degree over three years) delivered by means of distance learning at a South African university (N=1 800). These nurses attended contact sessions on Saturdays at a study centre in the Lejweliputswa district in the Free State Province (approximately 40 students attend contact sessions at this study centre). This study centre is a model C primary school contractually used on Saturdays as a study centre for university students and is one of 55 study centres throughout South Africa. It was selected because it provided sufficient student numbers, was easily accessible for the researcher and students, has been operational for over 15 years, and the centre manager provided practical support for an extra class room and ad hoc appointments to conduct data collection. The study centre is equipped with two SMART® interactive whiteboards to broadcast live sessions, supported by an experienced technical support officer, and provides internet access to students. Students attending contact sessions were exposed to SMART® boards; Sakai 10.0 (web-based learning management system), Facebook, text messages and a call centre.

An experienced facilitator acted as mediator and conducted the first informative session to recruit prospective participants. Thereafter followed a non-probable, purposive sampling according inclusive criteria where participants i) were registered with the South African Nursing Council (SANC) as professional nurses; ii) were enrolled as students for a post-basic nursing qualification presented through distance learning; iii) participated voluntary; and iv) were able to participate in English, Sotho or Afrikaans. The mentor assisted the
researcher to schedule focus group sessions. The researcher received mentoring on efficient focus group interview skills and after each focus group, declared the interview to the study supervisor for feedback. Participants signed voluntary informed consent. Three focus groups of six participants per group (n=18) were conducted on Saturdays after contact sessions in an unoccupied class room prepared for the focus groups. The participants were professional nurses, aged predominantly 50-59 years, female, African and enrolled for a one year advanced university diploma.

**RESULTS AND DISCUSSION**

The results indicated three categories with eleven themes. A pattern emerged in all three focus groups. Participants shared their comprehension of ICT. Thereafter participants moved through a phase of declaring the negative and hindering aspects they encounter with ICT in their studies. Then, participants spontaneously started to acknowledge the positive and facilitative aspects of ICT. Without a preconceived plan, participants followed a journey from limited perspective to a broader scope of ICT; from negativity and disinterest in ICT to the acknowledgment and appreciation of ICT and technology in general in their studies and within healthcare.

**Main theme: ICT = devices + communication**

Students’ comprehension of ICT revolved predominantly around computer usage. ICT is furthermore understood as the reciprocal communication between people by means of various devices. The first type of ICT device identified is mobile technology, such as smartphones used to send and receive messages and conducting mobile banking. The internet and Google, radios, DVDs and printed media such as internal guidelines and newspapers were also listed as types of ICT devices. Students were able to list interactive whiteboards
as devices within ICT, stating that these whiteboards facilitated a conducive learning environment and stimulated thinking among students. ICT was also viewed as a cognitive action where information is received, processed and responded to. It was interesting that students categorised lectures also as a type of ICT.

“What I understand about information, communication, technology. Maybe you use it on the computers, to communicate with others to get the information and then you can correspond with it.”

“I think it is the use of technology to communicate with other worlds, other people. It can radio, internal guides, cell phones, DVD’s or even the newspaper. Using it and reading it.”

Participants provided a one-dimensional and elementary definition of ICT, although the main concepts were represented as technology applied to enhance communication. Beal (2014) confirmed that ICT refers to using and developing technology to process information that is necessary to aid communication and that ICT includes all types of audio and video processing and transmission, as well as telephones and broadcasts (Anon, 2014). Therefore detailed aspects of ICT such as the attainment, analysis, control, distribution and storage of information, as well as the architecture and provision of the hardware and software to obtain these processes are also discussed in literature (de Watteville & Gilbert in Wombo, 2008).

Main theme: Hindering factors

Individual choice versus age and gender

Conflicting results emerged regarding individual choice versus age and gender. Some participants stated that the acceptance and use of technology depends on individual choice to conquer the unknown, and is not related to being too old. Yet, the majority of participants identified age and gender as two important factors hindering their acceptance of especially computer technology in their studies. Age refers to older students exposed to ICT later in their adult and professional lives as an unnatural imposter to their current set of skills. In addition, participants stated that especially within African cultures, gender is a factor to consider in ICT acceptance and adoption. Participants viewed it as the role of males to fiddle with unfamiliar technology without fear of damaging new technology. On the contrary, females don’t fiddle with unfamiliar technology as they fear that they will damage it. According to participants it is against African female’s nature to explore unfamiliar computer technology, it is rather handed over to males to explore. In addition to the female’s fear to work with technology, participants also stated that female adult learners who are employed and have families will first attend to their families while males take time to explore new technology. Once technology is more familiar to females and they understand how to operate it, they will start to adopt new technology.
“There are old people that are still learning and they say, no, I’ve reached my age I don’t want to know more and it is fine for them. So it all depends on the individual.”

“...I wasn’t brought up with technology so I am not really interested and it is difficult for me to understand when we practice only.”

“Because most of the females, we are, the nature of our, we are responsibly for different families, working as a mother and whatever. So we don’t have time for technology. Maybe we check our cell phones, and whatever, we learn that this is the easiest way to communicate. So then that, our job is to go to work and once that is finished, then we’ve got other things and we need more time with the technology.”

The digital gender divide in Africa is confirmed by Gillwald, Milek and Stork (2010:29). Yet, it is complex, considering various other inclusion and exclusion factors. Educated and employed women tend to have a smaller gender digital divide when they have a similar socio-economic status to their partners. Maleka (2011:2) reported that South African women are disadvantaged compared to men regarding broad ICT access and its use further than mobile voice communication. Yet, Gillwald, Milek and Stork (2010:2) confirmed the interesting phenomenon that qualitative explorations into the gender digital divide produce more pessimistic results versus quantitative depictions. The traditional social role of African women progress slowly from reproductive and agricultural and ICT is viewed as a critical catalyst to improve rural women’s general quality of life (Joseph, 2014:371). Attwood et al. (2013) confirmed the existence of the age norm that women aged 50 years and older presents with poor ICT adoption, yet their study also concluded that this norm was overcome through an intervention.

Old school, born before computers

Participants that grew up without computer technology or before the digital age named themselves as being old school and born before computers. These participants stated that they have a natural disinterest in technology and lack understanding of the practicality of especially computer technology. Participants have to be convinced that technology will simplify their established systems and processes.

“Ok, you would think that most other people don’t have access to the technology. It is one of those unknown areas or maybe I don’t know how to use it. I am old school.”

Neves and Amaro (2012) concluded in a Lisbon-based study that non-chronological age and ageing doesn’t serve as reason enough not to use ICT and identified active ageing discrimination pertaining to assumptions about technology. In the UK, Curtis (2014) debunked the age-based digital divide and stated that there is no difference between
consumers between the ages of 30-70 regarding web use. In South Africa, Czerniewicz and Brown (2010:859) concluded that the digital divide is not based on digital natives, nor age, but to elite and socio-economic status.

**A fight against time**

An adult student that is also employed fulltime doesn’t have time to master new technology while studying. It is a constant fight against time. As a student's priority is to complete his or her studies, a student will then prefer to complete activities manually with the intention to master the ICT skills at a later stage. Participants stated that professional nurses as students are constantly surviving at a very fast pace, and when in survival mode, hand written assignments just have to do as there is no time to upscale one’s typing skills.

“...because they are still learning and then it will take a lot of time other than doing the thing manually so as they are used to.”

Time management to complete distance learning successfully as a full-time employed adult learner remains one of the major challenges in distance education (O’Lawrence, 2007) as preparation even in distance learning is time consuming. Yet, the demanding challenges related to adult learners’ time are confirmed by Botha (2014:1). Adult learners as full-time employees in general have a conglomerate of daily demands on their time that are intensified when studying through distance learning. Yet, no confirmation was found in literature that links time demands as a reason for not mastering ICT.

**Unskilled and fearful**

Some participants were very frank, stating that they lack the basic skills to use ICT and if one doesn’t use ICT, and then one cannot expect to understand technology. Although nursing is a hands-on profession, nurses in general have limited opportunity for ICT skills development, and therefore nurses remain unfamiliar with the most recent ICT innovations. Being unskilled in ICT is a barrier to ICT adoption (Ruxwana, Herselman & Conradie, 2010: 23). Within the South African context, teachers in general expressed their fear of breaking computer devices and their fear of failure (Bingimlas, 2009). An interesting outcome according to Onu and Agbu (2013:68) was that Nigerian nurses did express their fear for technology as a fear that technology will replace humans, causing job losses. Fear of
technology in adults in general might be induced when some adapt faster to ICT than fellow colleagues (Mapi, Dalvit & Terzoni, 2009:78). In India, Singh and Muthuswamy (2013:1532) concluded that fear was a prominent factor influencing health professionals’ adoption of emergency medical record implementation in hospital.

**ICT is expensive**

For some students ICT remains an expensive luxury, rather than a necessity. Finances remain a reason why some professional nurses, although only a few don’t have smart phones. Some participants reiterated that air time is expensive for basic communication, especially for those living in rural and deep rural areas.

> “With the rural areas, they cannot afford to buy a cell phone, they cannot afford to buy, you need the money to access the internet and you don’t have airtime.”

The expenses of ICT, especially in rural areas, present interesting views. Gillwald, Moyo and Stork (2012:4) confirmed that Cell C and Telkom Mobile enabled a price decrease by Vodacom and NTM to stimulate new and innovative products and prices. Although South Africa improved on the Research ICT in Africa (RIA) Pricing Transparency Index: Prepaid Mobile (from 30 in 2012 to 22 in 2013 out of 46 indexed African countries), the cheapest prepaid mobile product in South Africa, remained approximately 7.5 times more expensive than the cheapest similar products on the African continent. South African News (SA news, 2014) reported that Eastern Cape traditional leaders expressed that the absence of ICT urged rural civilians to print out curriculum vitae for job applications and to travel via private transport to deliver these documents. It would be more affordable to have access to ICT. Barrett and Slavova (2012) confirmed that regulation infrastructure, appliances and services, as well as aspects such as over-regulation and taxation make mobile technology still expensive and less accessible in rural communities globally. Yet, Mpofu and Warikandwa (s.a) concluded that although mobile technology is expensive to deep rural inhabitants, it is more affordable than landline phones and it is an opportunity to bring the Internet to the poor, which is seen as part of improved quality of life and part of human rights.

**No access, no opportunity**

Some students reiterated the realities of not having access to ICT. The employer and the place of work are viewed as a critical aspect to enhance students’ access to ICT. Yet, the majority of participants agreed that despite having different types of ICT infrastructure at their place of work, they experienced not having the opportunity to access these ICTs (especially the Internet and e-mail) at work. The lack of access and opportunity for ICT was also described as a responsibility placed on the shoulders of the employer and the training
institution. In other words, participants were willing to explore and use ICT if the ICT infrastructure was made available for them. The responsibility to provide access to ICT is an action external to the participants.

“Ok, you would think that most other people don’t have access to the technology.”

“So what you want say is that they don’t give you the opportunity to develop skill on technology.”

Farrell and Isaacs (2007:2, 9) reported already in 2007 that access to ICT was a challenge that enjoyed major attention, as improved access to ICT became a policy focus in many African countries. The poor access and consequent deprivation of the opportunity to access to ICT in South Africa are confirmed by James, Esselaar and Miller (s.a) with specific reference to insufficient ICT infrastructure. They state that these factors are focal points in policy development. Yet, Young (2013:2) indicated that the penetration of mobile phones in South Africa is at 138% for total connections and 66% for individual subscribers and these figures might increase to 171% and 79%, respectively by 2017. This draws a picture of rapid growing access to mobile technology in South Africa.

**Main theme: Facilitating factors**

*Known and used*

Contradictory to participants’ fears and lack of skill in ICT, they also acknowledged that technology is part of their daily work environment. Participants agreed that technology is an integral part of the nursing practice. There are different types of biotechnology used in practice. Participants are positive about technology in practice, stating that it enables them to spend more time with patients. During the focus group interviews, participants initially started to voice their negativity about ICT, but changed their attitude when they considered the impact of technology in healthcare in general. Participants also acknowledged later in the focus groups that teleconferencing, e-mails and tablet technology were known to them.

“Yes, I’m about to say that it does help us in our work. The time it takes to take care of our patients.”

Hassmiller (2010:69) confirmed that nurses are frequent technology users and have to deploy biotechnology use, simulation technology in simulation laboratories and online learning technology as far as possible in the strive towards quality healthcare within healthcare reforms. The ability of nurses to see the bigger picture of the effect that technology can have on patient safety was indicated as a major conclusion in a study on ICT adoption by nurses in Northern America (Kirkley & Stein, 2004:218). Nurses aren’t only working with technology daily, but need to adapt regularly to new technology within a technology age in health care (Rivers, Blake & Lindgren, 2014:1).
Positive outcomes
ICT is more than devices; it is viewed as a mechanism to empower students by broadening their boundaries. The outcome of ICT is that students felt empowered as they could communicate with others in different worlds and over distance. Through ICT, students were able to communicate with each other about specific themes such as HIV/AIDS, although students were physically situated in different physical spaces. ICT makes communication between students effective and time efficient.

“The ICT now, especially the whiteboard, it improves my thoughts. My thinking…”

An outcome of ICT is a positive attitude towards learning in general (Mikre, 2011:2) as well as positive effects on learning outcomes (Aristovnik, 2012:1). Yet, Balanskat (2007:3) warned that although ICT do have a positive effect on learning outcomes, pedagogy should forgo ICT. The World Bank (2013) stipulated that ICT can be used to enhance inclusiveness through education, where inequity is a reality. In addition to the positive effects of ICT regarding students and learning outcomes, it is also empowering to educators (Intel Whitepaper, 2012:5).

Initiative and ownership
Participants noted that they were able to seek support and advice on the Internet via their smart phones when they struggled with technology. It became a story of adult learners making a decision at some time during the process of adapting to new technology, to search for the solution by themselves. Taking this initiative to seek support, especially through Google searches, gave participants a feeling of owning this new skill. These searches were done predominantly through participants’ smart phones, indicating an ability to search for self-help options.

“I Googled it. So it is not going to be a challenge. I borrowed the phone I just want to check this and then get back to her. I want to do stuff with that.”

The Intel White Paper (2012:3) confirmed that ICT led to improved self-esteem, more independence, ownership and that it transforms lives. Yet, this research result necessitates more exploration.

Rural versus urban
According to the participants, a rural context cannot serve as a reason for a lack of ICT anymore. Reasons granted were the mobility of people in general between rural and urban areas to get access to ICT. The second reason was that there are schools and other facilities found in rural and deep rural areas that do have ICT infrastructure and access. An
example was given of a participant living in a deep rural area that will travel to an urban area and then access the Internet through Wi-Fi or who will add data bundles to her smart phone. In general, there was sufficient Internet access in rural and urban areas through 3G/GPRS/Wi-Fi. Participants were able to upload their data bundles and air time through their mobile phones or via an electronic banking procedure.

"Again in rural areas presently, people got from the rural areas into the urban areas and then they can go back, they go back with the information and then they give those people information. So I don’t think that we are going back, we are going forward."

Baro (2011:1) conducted a study in Nigeria and confirmed the significant differences between urban and rural areas with reference to infrastructure, job opportunities, finances, etc. Yet, Baro didn’t confirm that the translation between urban and rural areas was effortless. Mpofu, Chimemga and Mafa (2013:3) indicated from a Zimbabwean perspective that there are similar challenges in ICT in both urban and rural areas. The researchers couldn’t get confirmation from literature that rural inhabitants can find solutions when transporting to urban areas.

Need ICT in your studies
Participants voiced their needs for ICT in their post-basic studies. The participants acknowledged that ICT is integral to their studies and listed that they need access to computer technology and printing facilities. Participants want to search information on the Internet, want to visit the university’s library’s online functions and want to e-mail documents to fellow students. Participants voiced that they need the social connectedness between students and with lecturers and to stay informed of communications related to their studies. Participants want to type their assignments and would prefer to submit a neatly typed document rather than a hand-written product. Furthermore, participants voiced their need for ICT training and ultimately, to have more control over their studies through ICT. This result was unique to this study.

"...to know how to look for the information because you need it and you don’t know how to look for the information."

CONCLUSIONS
Professional nurses related experiences that both facilitate and hinder ICT in post-basic education through distance learning. ICT experiences are presented on a scale where the hindering factors weigh heavier than the positive factors. Despite an elementary and one-dimensional comprehension of ICT, professional nurses identified the main concepts of technology, information and devices. The hindering factors, although more than the
facilitating factors, are referred to as debunked myths as literature, some older than a
decade, indicated that these hindering factors can be overcome. The risk exists that
hindering factors outweigh facilitating factors. The facilitating factors presented unique inter-
personal and personal dynamics that can be strengthened with the aim of integrating ICT
use in post-basic nursing programmes. Participants’ acknowledgement of their need for ICT
in their studies and the outcome of taking initiative and having ownership of ICT in their
studies are two results that can serve as impetus to enhance ICT integration.

**List of abbreviations**

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>HE</td>
<td>Higher education</td>
</tr>
<tr>
<td>ICT</td>
<td>Information communication technology</td>
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</tbody>
</table>

**Competing interests**
The author(s) declare that they have no competing interests.

**Authors’ contributions**
This article was a combined authoring effort by both C.G and PB. C.G focused on the
background and problem statement, PB and C.G wrote the methods, results and
discussions.
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The following is a declaration by the author and co-author of this article to confirm their contributions during the process of writing the article.

A declaration:
We hereby declare that we have written the article and that our contribution to this article is indeed stated above.

___________________  _____________________  _____________________
Mrs. Caroline Geiler  Dr. Petra Bester  Dr Martin Combrinck
Author               Co-author               Co-author
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http://www.lancaster.ac.uk/fss/organisations/netlc/past/nlc2010/abstracts/PDFs/Czerniewicz.pdf Date of access: 10 Nov. 2014.

Department of Education see South Africa.


ICN see International Council for Nurses


Shaikh, Z. & Khoja, S. 2011. Role of ICT in shaping the future of Pakistani higher education system. The Turkish online journal of educational technology, 10(1):149-161, Jan.


Table 1: Demographic detail of participants

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Gender</th>
<th>Culture</th>
<th>Qualification</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>African</td>
</tr>
<tr>
<td>25-29</td>
<td>16.66%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30-39</td>
<td>27.77%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>40-49</td>
<td>33.33%</td>
<td>94.44%</td>
<td>88.88%</td>
</tr>
<tr>
<td>50-59</td>
<td>38.88%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≥ 60</td>
<td>0.55%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Figure 1: Themes from focus groups (n=18)

**Facilitating factors**
- Need ICT in your studies
- Rural versus urban
- Initiative and ownership
- Positive outcomes
- Known and used

**Hindering factors**
- No access, no opportunity
- It’s expensive
- Unskilled and fearful
- A fight against time
- Old school, born before computers
- Individual choice vs. age, gender

**ICT = devices + communication**
CHAPTER 3: CONCLUSION, RECOMMENDATIONS AND LIMITATIONS OF THE STUDY

3.1 INTRODUCTION

Chapter Three serves as a retrospective evaluation of this research and motivates the significance of the research results. It includes a critical reflection on the selected research design and method. Limitations to this research are discussed, followed by recommendations to integrate ICT in distance learning for use by professional nurses and formulated for nursing education, nursing practice and nursing research.

3.2 CONCLUDING STATEMENTS

The following concluding statements are formulated from the research results and literature integration regarding how professional nurses enrolled as students in post-basic nursing programmes experience ICT in their studies:

- Although participants held a one-dimensional comprehension of ICT, all three main concepts of devices used with communication were identified. Yet, limited reference was made to the process pertaining to information.

- Although it seems that participants listed more hindering factors than facilitating factors, literature concluded that the majority of hindering factors are already debunked myths, namely gender and age versus individual choice; old school and born before computers; unskilled and fearful; ICT is expensive and no access and no opportunity.

- Gender: Although literature referred to gender inequality regarding ICT, it refers predominantly to unemployed females and the social role of rendering family care. Yet, all the participants were full-time employed professional nurses. Although gender inequality was identified as a hindering factor, the participants’ demographic profile opposed literature.

- Age: Some participants referred to age as a factor that hindered ICT use, but literature concluded that age was a factor in ICT adoption that could be overcome, referring to the silver surfers.

- Old school and born before computers: Participants stated that they had decreased interest in technology as they do not understand its significance. Yet, literature indicated
that nurses that can see the bigger picture enhanced the implementation of health information systems, even if they are older and unskilled in this regard.

- **Unskilled and fearful**: Although participants stated that they were unskilled and fearful in the use of ICT, literature indicated that nurses do use technology regularly and are rather fearful of breaking devices and fearful that other colleagues would improve their skills faster.

- **ICT is expensive**: Participants stated that ICT is expensive; although literature indicated that mobile technology is more affordable than landlines and that the absence of ICT is expensive.

- **No access, no opportunity**: Although participants stated that they had no access to ICT and no opportunities to use ICT, literature indicated that infrastructure to enhance access in rural areas has been a policy focus for over a decade.

- Adult learners that are employed full-time follow a rushed lifestyle and don’t have time to master ICT skills that are perceived as unnecessary.

- Unique facilitating factors surfaced, namely that learners identified the need for ICT in their studies; that learners took their own initiatives and ownership of ICT in their studies and that students didn’t perceive rural areas as an obstacle, but described the seamless movement from rural areas to urban areas as something that enabled them to update their ICT-status.

### 3.3 EVALUATION OF THE STUDY

The study is evaluated according to the following criteria (Table 3-1):
Table 3-1: Criteria that directed the evaluation of the study

<table>
<thead>
<tr>
<th>Criteria to consider in the evaluation of the study</th>
<th>Specific aspects of the study to evaluate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Was the research designed well?</td>
<td>Appropriateness of the research design.</td>
</tr>
<tr>
<td>Any reasons to doubt the research findings or other explanations possible for the conclusions?</td>
<td>Report back on the research methods and strategies to enhance the rigour.</td>
</tr>
<tr>
<td>How long did the research last?</td>
<td>Short description of the realisation of data collection and analysis.</td>
</tr>
<tr>
<td>Did the researcher get the full picture?</td>
<td>Description of the research context.</td>
</tr>
<tr>
<td>Where the findings checked by other experts?</td>
<td>The co-coder and supervisor’s role.</td>
</tr>
<tr>
<td>Do the conclusions of the research fit with any scientific evidence?</td>
<td>Literature integration of the research results.</td>
</tr>
<tr>
<td>The implications of, applications or potential problems with the research.</td>
<td>Discussion of the significance of the research and the formulation of recommendations.</td>
</tr>
</tbody>
</table>

The aim of this study was to formulate recommendations for the integration of ICT use into post-basic programmes in nursing presented through distance learning. The objectives were to explore and describe professional nurses enrolled as students in post-basic programmes presented through distance learning experiences of ICT use; and to formulate recommendations that can facilitate the integration of ICT use by professional nurses enrolled as students in post-basic programmes presented through distance learning. As the researcher wanted to gain in-depth knowledge of participants’ experiences and the meaning they attach to these experiences in their own words, a qualitative, explorative, descriptive and contextual design was appropriate. However, a follow-up investigation into the hindering and facilitating factors following a quantitative design might be valuable.

Three focus groups were conducted until data saturation was reached. Focus groups were both positive and negative. It was positive as it provided a non-threatening environment for participants to share their experiences. It was also negative as it might have caused some participants to remain silent, and a follow-up narrative would have been advised, especially when considering that equity, access, affordability and age were factors that were identified.
during the discussions. Thematic data analysis seemed efficient and led to the identification of three main and eleven sub-themes presented in a graphic manner.

The researcher identified a mediator (an appointed facilitator at the Welkom study centre) to help with the recruitment process of participants, and one dedicated classroom was used which was sufficient in size, private and ensure comfortable seating. Permission to gain entry to the area was obtained. The researcher obtained informed, written and voluntary consent from the participants. All ethical procedures were explained to the participants for better understanding and assurance of confidentiality. Field notes were taken to remind the researcher of events that might have occurred during the focus group.

A consensus discussion was held between the researcher and an independent co-coder and a decision reached on the main themes and the sub-themes that emerged from the written text. Within the ethical-legal framework of higher education, the researcher argues that literature confirmed that providing ICT to people in general, improves their quality of life. Participants also noted the positive influences of ICT on their learning outcomes and their personal growth.

As the researcher is herself viewed as a ‘silver surfer’, this researcher was meaningful, The researcher had to obtain ICT skills and is now ICT literate and always wondered how this can be translated to fellow ‘silver surfers’. The research is significant to the participating university as the research results can be presented to key role players to influence policy and enhance the integration of ICT into curricula. The manuscript has been formulated for the international audience and therefore the researcher argues that this research will contribute to the body of knowledge, as limited literature is available within the South African context.

3.4 LIMITATIONS OF THIS RESEARCH

The following limitations were identified:

- It was difficult to schedule focus group appointments with participants as participants were all employed full-time and attending classes on Saturdays.

- The researcher works in the higher education environment, which can add value, but can also cause bias in data analysis.
• Some of the students felt uncomfortable in a group to talk about their lack of ICT skills and it might have been beneficial to provide an opportunity to follow up after focus groups through narratives.

• The participants were all exposed to interactive whiteboard technology, face book and drop box, yet the researcher didn’t explored this exposure during the focus groups as this wasn’t the focus of the research. Yet, it would have brought interesting feedback.

3.5 RECOMMENDATIONS

Recommendations with the aim to integrate ICT in post-basic nursing programmes are formulated for nursing education; nursing practice and nursing research based on the conclusions, as indicated in the table below (refer to table 3.2).

3.6 SUMMARY

Chapter three concludes this research. After formulating the concluding statements, the research was evaluated and limitations listed. Recommendations to integrate ICT into the curricula included in post-basic nursing programmes were formulated with reference to recommendations for nursing practice and education.
Table 3-2: Recommendations for the integration of ICT into current post-basic nursing programmes curricula

<table>
<thead>
<tr>
<th>Conclusion</th>
<th>Recommendations: practice</th>
<th>Recommendations: education</th>
<th>Recommendations: research</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ICT definition</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participants held a one-dimensional view of ICT and limited reference was made to the processing of information.</td>
<td>The workplace fills a critical gap in the facilitation of ICT use as this is the area where nurses are exposed to technology and can have access to ICT infrastructure. It is therefore recommended that there should be and enhanced awareness of ICT in the workplace, with specific reference to technology, information processing and the different devices used in communication.</td>
<td>ICT should be defined within nursing education and management curricula, as ICT should forego pedagogy. ICT is used within the academic sphere, but more congruence should be established between lecturers regarding the meaning. It is argued that if students comprehend ICT, the student might have better understanding of its application in nursing education and management.</td>
<td>Research regarding the pedagogical approach to equip nurse educators regarding ICT use by professional nurses within a South African context.</td>
</tr>
</tbody>
</table>

<p>| <strong>Gender divide</strong> | | | |
| Participants were full-time employed professional nurses, challenging the traditional view of gender inequality as described in | Organise awareness days on which professional nurses, irrespective of gender, are introduced to different ICT devices and are granted the opportunity to work with these devices in a non-threatening environment. | Curricula should acknowledge cultural and gender diversity regarding ICT use, yet with the focus on skills enhancement and a solution approach. Students should address the ICT myths revealed by the | Explore gender inequality in ICT use in the event where professional qualified nurses are also full-time employed women, versus the traditional view of unskilled, unemployed and dependent |</p>
<table>
<thead>
<tr>
<th>Conclusion</th>
<th>Recommendations: practice</th>
<th>Recommendations: education</th>
<th>Recommendations: research</th>
</tr>
</thead>
<tbody>
<tr>
<td>literature.</td>
<td>Focus on exposure and skills enhancement and not on gender.</td>
<td>literature.</td>
<td>women.</td>
</tr>
</tbody>
</table>

**Silver surfers**

Literature concluded that age is a factor in ICT adoption that can be overcome, referring to the silver surfers. Identify older employees (aged between 50-65 years) that can be the champion ICT users at the place of work to role-model that ICT use can bridge the age divide. Adopt an approach that both students and lecturers within nursing education can master ICT skills by deliberately giving an assignment on the concept “silver surfers in nursing education”.

Literature is predominately from an international perspective. An exploration into the silver surfer phenomenon within the African context is a proposed research theme.

**Decreased interest**

Participants stated that they had decreased interest in technology as they lacked to understand its significance. Yet, literature indicated that nurses that can see the bigger picture enhanced the implementation of health information systems, although they were older. Acknowledge professional nurses’ interest and buy-in into technology, including ICT, in the nursing practice. This implies that nurses be informed of new ICT initiatives and invited to explore how ICT will improve patient quality.

Let students explore current challenges in their studies and discuss ICT options to let students obtain outcomes of high quality. Students should be informed of the characteristics of the knowledge-based economy, the 21st century learner and should list the characteristics needed of the 21st century nurse educator to address the needs of the learner.

Explore the characteristics needed from nurse educators to address the needs of the 21st century student nurse. Identify the needs for ICT skills development as indicated by nurse educators to be equipped for the 21st century student nurse.
<table>
<thead>
<tr>
<th>Conclusion</th>
<th>Recommendations: practice</th>
<th>Recommendations: education</th>
<th>Recommendations: research</th>
</tr>
</thead>
<tbody>
<tr>
<td>and unskilled.</td>
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</table>

### Unskilled, fearful

Although participants stated that they were unskilled and fearful in the use of ICT, literature indicated that nurses do use technology regularly and are rather fearful of breaking devices and fearful that other colleagues would improve their skills faster.

An annual programme for in-service training in practice regarding new technology. Establish a learning culture where different devices for ICT are introduced to employees by sales representatives. Have a ‘bring your technology to work’ opportunity whereby professional nurses can present to colleagues how they use ICT technology in the care of their patients.

Develop a culture of reciprocal ICT skills development as part of a practical learning unit within the nursing education practical module. This module should be focusing on the individual student. Let students present a professional plan at the beginning of a module and reflect at the end of the module on their personal, academic and also ICT related growth as the student as holistic person should be considered.

Research based on the Transformational Learning Theory by Mezirow as a mechanism to explore how professional nurses as adult learners can learn new ICT skills.

### Expensive

Participants stated that ICT was expensive; although literature indicated that mobile technology was more affordable than landlines and that the

A WiFi area is advisable for example to search the internet with practice-related applications such as pharmacological formularies or best practice guidelines available from the

Inform students of affordable ICT options such as What’s-App or e-mail, as well as free Wi-Fi areas. Wi-Fi within lecture rooms is advisable or designated areas with Wi-Fi hotspots.

A cost analysis of smart phone utilisation in post-basic nursing programmes.
<table>
<thead>
<tr>
<th><strong>Conclusion</strong></th>
<th><strong>Recommendations: practice</strong></th>
<th><strong>Recommendations: education</strong></th>
<th><strong>Recommendations: research</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>absence of ICT is expensive.</td>
<td>Cochrane Library.</td>
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</table>

### No access, no opportunity

Although participants stated that they had no access to ICT and no opportunities to use ICT, literature indicated that infrastructure to enhance access in rural areas has been a policy focus for over a decade.

Employers play a critical role to assist employees with ICT infrastructure. This is a mechanism for employers to advance their employees’ ICT skills, advance their internet searching skills and broaden their perspectives.

Plan educational activities with related infrastructure to support students to enhance exposure. Yet, this should be conducted with support and access.

An exploration into the realities of ICT access available in urban, rural and deep rural areas according to the perspective of professional nurses enrolled in post-basic programmes.

### Fight against time

Adult learners that are full-time follow a rushed lifestyle and don’t have time to master perceived unnecessary ICT skills.

Package new health information systems and ICT implementations at the workplace in such a manner that professional nurses, who are also adult learners, are acknowledge.

Introduce ICT from an elementary point of departure and then let students progress gradually to more complex ICT. Where possible, ensure that ICT use within pedagogy is self-directed and provide hands-on support to students, even through learner support mechanisms over

An exploration into user-friendly mobile technology such as What's-App, text messages and USSD within distance learning.
### Conclusion

**Recommendations: practice**

Where possible, nursing practice should play an active role in providing ICT infrastructure to professional nurses. This can for example be obtained through e-mails or an Intranet.

**Recommendations: education**

Develop and educational culture where students can teach the teachers regarding ICT and visa versa. Participate in policy development to introduce a baseline of mobile technology general to all nursing modules and maintain a functionalistic approach.

**Recommendations: research**

Develop a model to strengthen ICT adoption by professional nurses in post-basic nursing programmes presented through distance learning.

### Facilitating factors

Unique facilitating factors surfaced, namely that learners identified the need for ICT in their studies; that learners took their own initiatives and ownership of the ICT in their studies, and that students didn’t perceive rural areas as an obstacle, but described the seamless movement from rural areas to urban areas as something that enables students to update their ICT-status.
ANNEXURE A: ETHICS CONSENT FOR PROJECT

The North-West University Ethics Committee (NWU-EC) hereby approves your project as indicated below. This implies that the NWU-EC grants its permission that, provided the special conditions specified below are met and pending any other authorisation that may be necessary, the project may be initiated, using the ethics number below.

**Project Title:** Leadership and governance as mechanisms towards excellence in South African health systems

**Ethics number:** NWU-00960-12-A1

**Project Leader:** Dr P Bester

**Approval date:** 2012/08/13

**Expiry date:** 2017/08/12

Special conditions of the approval (if any): None

General conditions:
- While this ethics approval is subject to all declarations and agreements incorporated and signed in the application form, please note the following:
  - The project leader (principal investigator) must report to the prescribed format to the NWU-EC:
    - annually (or as otherwise requested) on the progress of the project;
    - without any delay in case of any adverse event (or any matter that interrupts sound ethical principles) during the course of the project.
  - The approval applies strictly to the protocol as submitted to the application form. Should any changes to the protocol be deemed necessary during the course of the project, the project leader must apply for approval of these changes at the NWU-EC. Would there be delays from the project protocol without the necessary approval of such changes, the ethics approval is immediately and automatically forfeited.
  - The date of approval indicates the first date that the project may be started. Would the project have to continue after this expiry date, a new application must be made to the NWU-EC and new approval received before or on the expiry date.
  - In the interest of ethical responsibility the NWU-EC reserves the right to:
    - request access to any information or data at any time during the course of or after completion of the project;
    - withdraw or postpone approval if:
      - any unethical principles or practices of the project are revealed or suspected;
      - becomes apparent that any relevant information was withheld from the NWU-EC or that information has been false or misrepresented;
      - the required annual report and reporting of adverse events was not done timely and accurately;
      - new institutional rules, national legislation and international conventions deem it necessary.

The Ethics Committee would like to remain at your service as scientist and researcher, and wishes you well with your project.

Please do not hesitate to contact the Ethics Committee for any further inquiries or requests for assistance.

Yours sincerely

Prof Amanda Lourens

(Chair NWU Ethics Committee)
ANNEXURE B: LETTER OF INFORMED PARTICIPANT CONSENT

Informed Consent Form for participants in the study Enhanced use of information and communication technology by professional nurses in distance education

Mrs. C. Geiler (M.Cur-candidate)

School of Nursing Science, North-West University (Potchefstroom Campus)

Supervisor: Dr. P Bester and Co-supervisor: Dr. M Combrinck

PART 1: INFORMATION SHEET

Purpose of the research

The aim of this study is to enhance professional nurses’ use of ICT in distance education. The objective is to explore and describe how ICT use can be enhanced by professional nurses enrolled in post-basic nursing programmes presented through distance education. By having a better understanding of students’ reluctance to use ICT might assist the researcher to formulate recommendations to enhance ICT use by these students.

Data collection

Data collection will be conducted by means of focus groups whereby participants will be invited to have a structured group discussion. The researcher will provide the structure.

Participant selection

The participants in this study are students enrolled at the University in the post-basic programmes (Advanced University Diploma in Health Science Education and Advanced University Diploma in Health Service Management) and the B.Cur (Ed et
Adm)-degree and who attend Saturday contact sessions at the Welkom Study Center.

**Voluntary participation**

Participation in the focus groups will be voluntary and participants can terminate their participation at any time without discrimination.

**Procedure**

Prior to data collection, all participants will complete voluntary informed consent. The focus group interviews will be done by the researcher. Each focus group will last 45-60 minutes per group. The focus groups will be digitally voice recorded in order to be transcribed for the purpose of data analysis.

**Risks and discomforts**

There is no direct risk or discomfort anticipated with participation in the focus group. Should any participant at any time experience discomfort the focus group can be terminated and the participant can be referred to a counsellor for support. The voice recorded focus groups and transcriptions will be kept in the office of the study supervisor, locked in a cupboard and password-protected and neither the identities of the participants nor that of the study center or university will be revealed.

**Benefits**

The benefits for participation are manifested in the contribution the participants make to the body of knowledge. This in return may increase an awareness of the participants’ own level of skills of ICT and an opportunity to assist in the development of a programme on ICT training for registered nurses enrolled in a post-basic distance learning programme.

**Confidentiality**

Participation in this study is confidential. To ensure anonymity, a number is allocated to participants by the interviewer. Participants’ identity will not be made public in the research report and the publication of the research results. The original focus group recordings will be kept in a safe place by the researcher.
Sharing the results

The feedback of the study results will be available in the dissertation, and an abstract will be available from the researcher for your interest. The researcher plans to publish a research article of the results.

Right to refuse or withdrawal

Participants in this study can withdraw at any time without any negative impact or discrimination.

Who to contact

Caroline Geiler (the researcher and interviewer) can be contacted at the following contact details: 083 590 4982, (office hours) 018 289 1302, geilercaroline9@gmail.com.

Please sign this part of the document to give consent to your participation in this study

I, __________________________(participant full name and surname), hereby give consent to take part in the above-mentioned study. I understand my participation is voluntary and that I may refuse to participate or withdraw my consent and stop taking part at any time. I have read the foregoing information and have had the opportunity to ask questions about it and any questions I have been asked have been answered to my satisfaction.

I hereby freely consent to take part in this research project.

_____________________________________                _____________________
Participant signature                                      Date

_____________________________________                _____________________
Witness signature                                      Date
ANNEXURE C: LETTER TO DIRECTOR OF THE SCHOOL OF NURSING

The Director

School of Nursing Science

REQUEST PERMISSION TO DO DATA COLLECTION FOR RESEARCH (MCUR) AT A STUDY CENTRE WITHIN THE POST BASIC NURSING PROGRAMMES DELIVERED THROUGH DISTANCE LEARNING: MRS C GEILER (11877235)

I am at present registered for my MCur-degree with the North-West University (Potchefstroom Campus) and ready to start with data collection. The study supervisor is Dr P Bester (Nursing) and Dr M Combrinck (Education) is my co-supervisor.

The aim of this study is to enhance the integration of ICT into the curriculum of post basic programmes presented through distance learning. By having a better understanding of students’ experiences of ICT, it might assist the researcher to formulate recommendations to enhance the integration of ICT.

The participants in this study are students enrolled at the University in the post basic programmes (Advanced University Diploma in Health Science Education and Advanced University Diploma in Health Service Management) and the B.Cur (Ed et Adm)-degree and who attend Saturday contact sessions at the Welkom Study Center (St Helena School). The method of data collection is focus groups which will be conducted at the Welkom Center. Participant recruitment and focus groups will be conducted by a facilitator and not the researcher.

Participants will be invited by a facilitator at the centre, Mrs ....... Focus groups will be conducted on the Saturdays when students have to be at the Center for class but will be done between classes not to disrupt students’ study schedules. Students will complete voluntary informed consent before the focus groups are conducted. Responses from students will be digitally voice recorded with their (participants) permission and the researcher will take field notes. Only open-ended questions will be asked. When data saturation seems to take place the researcher will end the focus groups.
The research proposal to this research is attached to this letter for your reference. The study is serving under the umbrella ethical clearance of the research programme that is titled *Leadership and governance as mechanisms towards excellence in South African health systems* (see attached ethics certificate). The research proposal has been approved through the PERC-committee of the School of Nursing Science. The process entails that I first request permission from the Director of the School of Nursing Science and from there will complete my data collection.

At present I am very motivated and excited to complete my studies and believe that the results will be useful and effective to help students be optimally equipped in future uses of technology and to make their studies much easier and enjoyable by making use of the technology pedagogically intended for them. Thus in this light I request permission to conduct data collection as stipulated.

I thank you in advance,

Caroline Geiler (M.Cur-student)

P Bester (PhD) Study supervisor
First Session

Focus group discussions with first group of students at the study centre in Welkom

Personal Notes

The researcher felt very nervous that the recording device would not work effectively and expresses this verbally to the students. The researcher also realized that participants were reluctant to participate as research in itself was a scary subject to them worse the name technology. They preferred to rather talk on how expensive and how they cannot afford computers or laptops. Some of the students were scared to answer as they did not want to sound as if they had no clue of all the technology and the different types that can be used by them.

Observational Notes

Participants were seated in a semi-circle appearing to be comfortable as the room was well light and ventilated.

Methodological notes

Most participants were giving circumstantial answers as they were not sure about their answers or they have were avoiding direct answers, they lacked spontaneity and had to be lead into answering at times when answering questions.

Questions:

What is your understanding of ICT?

Response:

Any type of machine or technology that can transfer communication or results to a next person eg Fax machines, telephones, CD and DVDs, Emails, computers, laptops, Radios, video machines

(1) What types of ICT do you use during your studies?
Response

Mostly use is made of computers, telephones, e-mails, DVDs and video clips

(1) What factors influence you to use ICT in your studies?

Response

It is much quicker and time consuming.

The message or result is directly transmitted to the person on the receiving end.

The result or explanation is given over as the sender intent it to be direct

Information can be stored

(1) What factors hamper you to use ICT in your studies?

Do not know how to use it no skills in ICT.

Accessibility of ICT as there are no places in our community where we can make use of it.

I can’t afford it too expensive for me to buy.

Second session

Focus group discussions with second group of students at the study centre in Welkom

Personal Notes

This group of students were generally at ease and settled in ready to talk about their experiences in the journey with ICT in their profession. They were spontaneous in their responses most of the time. Some of the participants were showing signs of anxiousness which later subsided as they answered more and more questions and
started to understand what the questions was all about, although there was on and off stammering at times, but at the end they all manage to express their views and needs.

**Observational notes**

The participants were sitting in a semi-circle with the researcher in the centre. Some of the professional nurses were anxious and showed signs of lack of spontaneity in their responses, they spoke in low voices.

**Methodological notes**

The researcher used simple English and at times had to translate into Sotho when it seemed that they do not understand parts of the question after which they responded well to the questions.
**Researcher**: Good morning everybody, welcome to this session. “As you know, you all filled out the questionnaire the last time that I ask you to be part of my data collection concerning technology. You have read through it, I am sure you have signed it. If you brought it with you, can I have the signed one back, or if you don’t have it, can I have it with the next class please? Ok, now what I want to hear from you people, what is your understanding of information, communication, and technology? ICT in short. What do you understand? What is that?”

**Participant 6**: “What I understand about information, communication, technology. Maybe you use it on the computers, to communicate with others to get the information and then you can correspond with it.”

**Researcher**: “Ok Anybody else? Anybody else? There is such a lot of technology that you are using every day. Ok, number?”

**Participant 2**: “Number two.”

**Researcher**: “Number two.”

**Participant 2**: “You can communicate through the means of telephone or getting the information through the whiteboard.”

**Participant 1**: ”The internet also empower people.”

**Researcher**: “Ok, anyone else? Number three.”

**Participant 3**: ”I think it is the use of technology to communicate with other worlds, other people. It can radio, internal guides, cell phones, DVD’s or even the newspaper. Using it and reading it.”

**Participant 4**: “It can also be a lecture through each and again you can vote or conquer a meeting through its people not coming to once off but indifference then you can give them what you want to say to about them. To get them to talk about, for example TB and HIV/Aids.”

**Participant 6**: “Also most of the work for example if you use technology, most of the work that supposed to be done manually, it helps when you use technology. It is quicker in time and can also be effective.”
Researcher: “Ok, I think you’ve got a good understanding of what ICT is. ICT is what it is, it is technology which we use to communicate, nê, in the much easier, sometimes in the much safer way, and a much quicker way as she has said. Ok, the next question.

What do you think, what is the problem why most people don’t want to use technology? Ok, number two.”

Participant 2: “Ok, you would think that most other people don’t have access to the technology. It is one of those unknown areas or maybe I don’t know how to use it. I am old school.”

Researcher: “Ok, that’s nice. Ok, meaning old school, can you elaborate?”

Participant 2: “Meaning old school mean, I wasn’t brought up with technology so I am not really interested and it is difficult for me to understand when we practice only.”

Researcher: “Ok, anybody else? Ok, number six.”

Participant 6: “I think we have the fear, the fear of starting to learn the technology.”

“You say its fear. Ok.”

Participant 1: “I think the fear to change.”

Researcher: “To change. Ok, that’s nice.”

Participant 4: “I can say the company other one who helps the assistants to give people the lectures about ICT especially people who were born before technology. That is where you get that fear, because you can’t use anything not knowing what is happening about it. You had to learn that then.”

Researcher: “So what you want to say is that they don’t give you the opportunity to develop skill on technology. Ok, that’s nice.”

Participant 6: “Just to add to what she’s said. The nature of the profession practices, for example here in nursing, usually, you know, we do practically do all the
work, labour. As a researcher, there is new evidence to help a researcher so we are afraid to use it because our nature of profession practices us never use the technology."

**Researcher:** “Ok, anybody else?”

**Participant 5:** “others are saying technology would be difficult for them because they are still learning and then it will take a lot of time other than doing the thing manually so as they are used to.”

**Researcher:** “Anybody else? Number four.”

**Participant 4:** “Others are saying they are open to change so, uh, it’s because mostly now, people are used to technology and a lot of the people are losing jobs. So at the end of the day it is the one with the experience.”

**Researcher:** “Anybody else wants to say something? What about, ok, I think somebody did mention it somewhere or half way about the age. Does your age influence it? Do you think at your age you still want to change from the old ways into the new ways? Do you think that is one of the hindering factors?”

**Participant 2:** “I think to some it does and to some it does not. There are old people that are still learning and they say, no, I’ve reached my age I don’t want to know more and it is fine for them. So it all depends on the individual.”

**Researcher:** “On the individual itself. And then also would you say that, uhm, males, you said males more than females, how do you feel about that one?”

**Participant 6:** “Because most of the females, we are, the nature of our, we are responsibly for different families, working as a mother and whatever. So we don’t have time for technology. Maybe we check our cell phones, and whatever, we learn that this is the easiest way to communicate. So then that, our job is to go to work and once that is finished, then we’ve got other things and we need more time with the technology.”

**Researcher:** “Anybody else? Number five.”
Participant 5: “I’ll say that males do use technology more than women because males are not afraid to practice because in their nature they are used to fixing things. So whether they are using a cell phone or a laptop nê, they are not afraid to use it without knowledge about what they are doing because they are not afraid of breaking it. With women it is a different story because we are always taking care the inserts. We don’t want anything that we don’t know. We won’t even try to explore because we are thinking that we are going to break that thing.”


Participant 2: “We are using the emails and the teleconference and the I-pad.”

Researcher “What about, what you say about things like, uhm, your blood pressure machine as a type of technology. Those new types of blood pressure machines, what about the sugar machine? Is it not technology?

Participant 2: The HB meter? The telephone and the stethoscope.

Researcher: You see now there you are now coming out with all the things that you are using in your facility, people that is technology. It is advanced. What about these cat-scan machines. What about the new digital x-ray machines. It is things that you are using in your field and that are new technology. Remember when those things were not there how it used to take time in getting a diagnosis. And now it’s much easier. Temperature machine. Do you remember how long it took? Now you just take it and ‘tjoop’, there it goes. So would you say technology makes things easier for you?”

All participants: “Yes it does.”

Researcher: “So it does. You are all going to say that? It does and that you will use it. Number three.”

Participant 3: “Yes, I’m about to say that it does help us in our work. The time it takes to care for our patients.”
Researcher: “You’ve got more time for your patients now.”

Participant 3: “yes, more time for more patients.”

Researcher: “Ok, so that means that when you are finished with one patient it stored, the information you stored, you know you can at a later time go and get that information and you write it up in the patients books, nê?”

Participant 3: “Even if you take an hour a day on one patient, now it can be done in forty minutes.”

Researcher: “Ok. Then another thing. In your studies itself, what type of ICT would you like or will you be using mostly now in your studies? Number six.”

Participant 6: “The computer when you print the research and getting the results or the feedback.”

Researcher: “And what do the other do when they did not bring their assignments with, how do they get it to me?”

All participants: “By email.”

Researcher: “Ok. Number six.”

Participant 6: “For me as a person, the most important thing with technology is my laptop is because I am a bad writer. So most of my things are in my laptop. So with the technology I bring my assignment, I bring everything.”

Researcher: “Is there anybody else? Are you all ok? So now, what you have told me about ICT, how to use ICT. How do you see ICT in the future? Ok, number five.”

Participant 5: “I think everything will be at our finger tips.

Researcher: “So everything is portable, it can move around. Anybody else?”

Participant 6: “I’m not sure if I am still on the right track with you. The ICT now, especially the whiteboard … it improves my thoughts. My thinking … even the setting … this is working but since we started doing it with Potch, life is much easier, with both the learning and also at work. Colleagues at work”
Researcher “Everybody you learn something new there on the computer every time you use it like, where is the button to switch on today, tomorrow where is the doc. Ok.”

Participant 5: “You can put everything on the computer and make sure that all the information that we’ve got are there and when you want the information you just switch on the computer or whatever and use it. And then the phones again. You can communicate with the emails or whatever or receive information on your banking account you can check out your money in the bank.

Participant 3: “I was going to say that in the future, you won’t have to come to class to study. You can study at home through the guide book, through the internet. In future you won’t even have to go to town to find something, you can find it online. You pay whatever online. So in future you can find everything without moving around.”

Researcher: “Number two.”

Participant 2: “I think it is a big challenge because it is not all the people who can afford to learn the computer. Even if you want to learn how to work it. It’s not all the people who can do it. It is a big challenge.”

Researcher: “So it is a challenge to accomplish the skill. Is that what you are saying? Ok. But if you get the opportunity.”

Participant 6: “I’ll appreciate it.”

Researcher: “You’ll appreciate it. Ok. Is there anybody with anything else?”

Participant 6: “Yes, I just want to say the challenge that number 6 was talking about, I beg to differ with her, because during the week when I am studying, the technical aspect, wordings on the assignment, but then I didn’t understand them, I just took my cell phone.”

Researcher: “And where did you go and look for that?”

Participant 6: “I Goggled it. So it is not going to be a challenge. I just borrowed the phone I just wanted to check and then get back to her. I want to do stuff with that.”
Researcher: “What you want to say it comes in there by where people are just too scared to change. Number two.”

Participant 2: “I agree with both of them. With her, I take the side of the rural areas. With the rural areas, they cannot afford to buy a cell phone, they cannot afford to buy, you need the money to access the internet and you don’t have airtime. So I agree with her. Then on the other side, it is … to know how to look for the information because you need it and you don’t know how to look for the information.”

Researcher: “Ok. Who first? Number four.”

Participant 4: “What I can say, I couldn’t say in the future. So when one actually say in the future, we are not talking about us anymore because we are talking about the universal teaching. So in rural areas, also they are developing. They’ve got a life, they’ve got a house. They don’t walk anymore to get those things. Again in rural areas presently, people got from the rural areas into the urban areas and then they can go back, they go back with the information and then they give those people information. So I don’t think that we are going back, we are going forward.”

Researcher: “So you are saying that definitively they are changing and that we will now be able to sustain this type of technology in the areas.”

Participant 4: “Exactly. And yesterday when I was listening to the radio, some of the rural areas were getting the computers at school. Did you hear? So why should we say we are going to be challenged? We are going forward.”

Participant 3: “I was about to say the challenges are minimal than the ability that would be … already there are computer or technology that way. You are using a microwave at home; you are using DVD’s at home. So I don’t think there are challenges. They are very minimal.”

Researcher: “Ok, that’s nice. So there you got it. The whole class feels it is not a challenge anymore. You can go out there and get the skills and once you’ve got the skills, everyday there is something new that you are learning. Definitely. Number two.”
Participant 2: “I don’t know if I don’t want to be practical but I need to get it clear, I need to assist in that it would be possible. Based on what is happening now, you’ve asked a question from each. But even now we are still having the challenge of technology. There are these things that are coming up and they are being implemented but it is indeed of a challenge. It is not like that we are safe and hope that in the future the rural will be more like urban where we will be able to assist ....... But I think there is room for challenges.”

Researcher: “There is room for challenges and there is room for improvement. Ok, number six.”

Participant 6: “I want to understand what you saying are that technology is that, it’s only one thing, example the laptop or what?” it is fast.

Researcher “No, it is fast. It is fast. It is everything that you touch.”

Participant 6: “I would just like to elaborate that there would not be a challenge in the rural areas ...... because somebody might have the phone, and use it.”

Researcher: “That is what she is trying to say, she is trying to say that, let me just get you on the road again, that the challenges are becoming minimal because things are moving more towards the place where it never was. And what I also could gather there from her is that the sustainability will be there and people will be able to sustain it as long as everybody buy’s into it and changes does happen.”

Researcher: “Ok, are we happy? Did you learn something?”

All participants: “Yes.”

Researcher: Did you learn about, how to collect data, what must ... that was on one of your question papers, what did the question paper say. Thank you very much for the information that I could gather from you people. And, uh, I hope we are still going to see each other although maybe not in research or wherever. I wish all of you to pass at the end of the year. So next week we’ve got the last class, if there is anything that I still need from you people I will let you know. But I think today I have achieved what I wanted to. I thank you very much for your co-operation.”