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# LIST OF ABBREVIATIONS

| | |
|---|---|
| E-learning | Electronic learning |
| ICATT | IMCI Computerised Adaptation and Training Tool |
| IMCI | Integrated Management of Childhood Illness |
| WHO | World Health Organization |

# CHAPTER 1

# ORIENTATION TO THE STUDY

## 1.1 INTRODUCTION

In the year 2015, an estimated 5,9 million children under the age of five died due to preventable or curable diseases (World Health Organization: Towards a Grand Convergence for Child Survival and Health 2016:1). The children succumbed to diseases such as respiratory infections, diarrhoea, malaria, measles and malnutrition which are preventable or treatable with interventions that are cost-effective (World Health Organization: Towards a Grand Convergence for Child Survival and Health 2016:1; Gombe, Mabaera, Tshimanga, Shambira, Chadambuka & Nkomo 2010:7). This is a global problem with many of these deaths occurring in countries in Sub-Saharan Africa (Inter-agency Group for Child Mortality Estimation 2012:1; Gombe et al 2010:7). Although the annual rate of reduction in under-5 mortality has declined in Sub-Saharan Africa during the period 2000-2011, it still has the highest global rate of child mortality, as 1 in 9 children die before age five years in the same (Inter-agency Group for Child Mortality Estimation 2012:1). The number of live births and population of children under the age of five years are set to grow rapidly in Sub-Saharan Africa (Inter-agency Group for Child Mortality Estimation 2012:1). There is a disparity between Sub-Saharan Africa and other developing regions, such as Eastern Asia and Latin America and the Caribbean, which have shown a sharp decline in under-five mortality rates. It was therefore indicated that at the present trajectory, Sub-Saharan Africa would fall short of achieving the fourth Millennium Development Goal (MDG 3) (Inter-agency Group for Child Mortality Estimation 2012:9-11). This was a concern that required attention, and hence, the introduction of the Integrated Management of Childhood Illness (IMCI) strategy in Sub-Saharan Africa.

The IMCI strategy was developed by the World Health Organization and the United Nations Children's Fund (UNICEF) in the 1990s. The aim was to rapidly and effectively reduce mortality rates of children under the age of five years in resource-limited settings (Goga & Muhe 2011:[1]). This aim has since been identified globally as a key factor to meeting the fourth Millennium Development Goal (MDG 4) (Goga & Muhe 2011[1]).

According to Woods (2010:28), the IMCI strategy is advocated in developing countries as a survival strategy to improve the health of children and reduce under-five mortalities of preventable causes, like respiratory infections, diarrhoea, measles, malaria and malnutrition. To date, over 100 countries, including South Africa, have adopted the IMCI strategy. South Africa adopted the IMCI strategy in 1997, and it has since been the gold standard for the management of sick children at primary health care level in this country (Horwood, Voce, Vermaak, Rollins & Qazi 2009 b:[2]; Horwood, Butler, Vermaak, Rollins, Haskins, Nkosi, Neilands & Qazi 2011:42).

Currently, the implementation of the IMCI strategy in South Africa has been extended to many of its regions, and many health care workers working in primary health care facilities have received training in the application of this strategy (Horwood, Vermaak, Rollins, Haskins, Nkosi & Qazi 2009a:[8]). Feedback on the IMCI training from the provinces noted in the Strategic Plan for Maternal, Newborn, Child and Women's Health and Nutrition in South Africa (2012-2016:22), indicated that 60% of its health care providers in 66% of its primary health care facilities had received training in IMCI. Whilst this is a commendable training uptake, ensuring that the IMCI strategy is included in the pre-service curricula of medical and nursing students, and that health workers trained in IMCI implement IMCI consistently and comprehensively, remain key challenges to the implementation of the same (Woods 2010:28; Goga & Muhe 2011:[2]). Such challenges are not unique to South Africa.

Goga, Muhe, Forsyth, Chopra, Aboubaker, Martines and Mason (2009:3) agreed with this and stressed that this is a global problem, as a wide range of countries have experienced difficulties not only in training their health care workers in IMCI and its implementation, but also in the adaptation of its generic guidelines. This is a growing concern, hence, an electronic learning (e-learning) tool for IMCI was developed by the Novartis Foundation for Sustainable Development and the World Health Organization to address the above concerns by facilitating IMCI adaptation and IMCI training (ICATT-Novartis [s.a.]). The new tool is called IMCI Computerised Adaptation and Training Tool (ICATT). It is an innovative, computerised software application that allows for the adaptation of the generic guidelines of the IMCI strategy (ICATT-Novartis [s.a.]). This suggests that ICATT can be translated into a wide range of languages, such as French, and Indonesian. Arguably, ICATT can be modified to meet the needs of specific countries and thus it can be used in varied environments using different training media namely, computer, internet and

satellite-based facilitation. ICATT can be used for in-service, pre-service and distance learning programmes, and it has the potential to offer cost-effective training in IMCI to a large number of health workers (ICATT-Novartis [s.a.]). It has been adopted for training in Tanzania, Peru and Indonesia, and the outcomes of the training in these countries show that it is effective in scaling up IMCI training and reducing training time and cost (ICATT-Novartis [s.a.]).

South Africa is one of the twelve countries in the world that has completed the adaptation of the IMCI guidelines, through ICATT (ICATT-Novartis [s.a.]). Anecdotally, although the computerised IMCI case management training guidelines have been adapted, they are not being fully utilised at nursing campuses in South Africa. Two training institutions in KwaZulu-Natal have conducted a pilot study using ICATT for IMCI case management training for nurses. However, no findings were published. Similarly, there are no published empirical studies on the readiness of nursing campuses to use ICATT in KwaZulu-Natal, South Africa. Hence, this study investigated the "readiness" of the nursing campuses in KwaZulu-Natal to use ICATT. Although a detailed explanation of "readiness" is provided in this thesis under the definition of concepts section, it is important to offer a brief explanation of what "readiness" is at this stage. The Free Dictionary by Farlex (2017) defines the term readiness as "the state of preparedness of an object for action."

## 1.2 THE RESEARCH PROBLEM

The existence of a problem is the starting point for research (Brink, Van der Walt & Van Rensburg 2012:3). A research problem is identified as an area of concern or, a phenomenon that currently exists which researchers find troubling and in need of a solution (Polit & Beck 2010:146; Brink et al 2012:61; Grove, Burns & Gray 2013:73). It is the axis around which the research studies revolve, and in this case, it includes reasons for undertaking the research study (Polit & Beck 2012:73). This, in essence, relates to the factors that motivate the researcher to engage in this research study.

### 1.2.1 Source of the research problem

Research problems in this subject area originate and develop from numerous sources, most commonly from clinical practice, nursing literature, observed health and illness patterns and research priorities of a country (Polit & Beck 2010:148; Brink et al 2012:62).

Researchers may have an interest in a broad topic area, which can be narrowed down to a specific researchable and feasible research subject area (Polit & Beck 2010:149). The researcher was motivated to conduct this study because of her interest in exploring the perceptions of campus principals, nurse educators and learners to computer-based learning, specifically ICATT. Additionally, the intention to conduct the study originated from the researcher's knowledge of the numerous challenges faced by nurse educators trained in IMCI at nursing campuses, when these institutions incorporated IMCI case management training into their core curricula. Challenges at the nursing campuses include a shortage of nurse educators trained in IMCI, frequent attrition of nurse educators trained in IMCI, high cost of printing training module materials and chart booklets each time they are updated, and the duration of the IMCI case management training course.

It is clear in the empirical literature that the infant and child mortality rates in South Africa are high and remain on the increase (Strategic Plan ... South Africa 2012-2016:19; Rispel & Moorman 2013:239). There was therefore a need to develop a strategy to reduce these rates in line with the requirements of the fourth Millennium Development Goal (Rispel & Moorman 2013:239). It was stated that the implementation of the IMCI strategy may help to achieve this goal: the reduction of infant and child mortality rates (Strategic Plan … South Africa 2012-2016:7,22). The period for the attainment of the Millennium Development Goals has since ended in the year 2015. The IMCI strategy must now be "repositioned to accelerate progress" towards the Sustainable Development Goals which were adopted by the United Nations in 2016 (World Health Organization: Towards a Grand Convergence for Child Survival and Health 2016:1,4). The implementation of the IMCI strategy is considered by the government of South Africa as a pre-service and in-service training priority for all health care professionals (Strategic Plan … South Africa 2012-2016:23). It is therefore critical to increase the capacity of health care workers trained in IMCI as well as their knowledge of ICATT and how to effectively implement the same.

The question now arises, who is responsible for offering training in the use of ICATT? Because IMCI is mainly the domain of nurses, it makes sense for nurse educators to offer training in this area using ICATT. The South African Nursing Council (SANC) has stipulated in its nursing and education standards of 2005 and the Nursing Act 33 that nurse educators should integrate new technology in teaching and learning strategies (South African Nursing Council Nursing Education and Training Standards [s.a]:81). It is

therefore necessary to explore nursing campuses' readiness to use ICATT. The outcome of such a study may offer evidence to enhance the use of ICATT in nursing campuses, which in turn may improve IMCI case management training. An improvement in case management training will subsequently result in the reduction of infant and child mortality rates (Rakha, Abdelmoneim, Farhoud, Pièche, Cousens, Daelmans & Bahl 2013:[7]).

### 1.2.2 Background to the research problem

The IMCI strategy can contribute to the attaining of the third Sustainable Development Goal in particular Target 3.2 that focus on Under-five mortality rate and Neonatal mortality rate (World Health Organization: Towards a Grand Convergence for Child Survival and Health 2016:4; Krüger, Heinzel-Gutenbrunner & Ali 2017:[2]). This strategy aims to lower childhood morbidity and mortality rates in resource limited settings by teaching health care workers how to assess and treat sick children up to the age of five years (Krüger et al 2017:[2]). According to Horwood et al (2009a:[2]), IMCI seeks to improve the quality of care health care workers provide to sick children attending primary health care facilities. It aims to achieve this through improving case management skills of health care workers, strengthening the health system, and promoting household and community behaviours that will impact positively on the health of children.

The IMCI strategy has at its core integrated guidelines for the comprehensive care of children suffering from common childhood illnesses, like diarrhoea, pneumonia, measles, malaria and malnutrition (Rowe, Rowe, Holloway, Ivanovska, Muhe & Lambrechts 2011:2). The health worker trained in IMCI assesses the sick child by checking for, and asking questions about cough or problems with breathing, diarrhoea, fever and ear problems, and then classifies the child based on defined signs and symptoms using a series of algorithms (Horwood et al 2009b:[2]). The classification allows for the identification of specific and appropriate treatments for the child (Horwood et al 2009b:[2]). Counselling the caregiver about aspects of homecare, and the provision of follow-up care for the sick child are also part of the algorithm or treatment options.

Data have shown that IMCI has been effective in improving the quality of care and counselling that sick children and their caregivers receive (Goga & Muhe 2011:[2]. In a qualitative study undertaken in the provinces of KwaZulu-Natal and Limpopo, the experiences of health care workers were explored during focus group interviews to

ascertain their opinions in relation to IMCI training and implementation (Horwood et al 2009b:[3]). Almost all of the health care workers in the study expressed positive opinions of the use of the IMCI strategy when assessing and caring for sick children. Negative sentiments were directed to the length of time that health care workers were expected to be away (over eleven consecutive days) from the clinical areas for training. This duration for training was considered too long by the participants. One of the innovative solutions to this particular problem identified in the study was the adoption of interactive computer-based learning methods, as longer training periods (i.e. over eleven days) were not a viable option (Horwood et al 2009b:[5]).

However, the WHO, in its guidelines for IMCI case management training, stipulates that the duration of the training for health workers should be eleven days. The guidelines also state that the IMCI case management training should include a follow-up visit to the health care workers' facilities one month after the initial training. The rationale for this approach is not only to identify good practices (such as the use of job aids like chart booklets, wall charts of the IMCI algorithm, and age-specific recording forms), but it is also to identify challenges and suggestions for addressing the same (WHO IMCI information: IMCI training course for first level-health workers: Linking integrated care and prevention 1999:5; Horwood et al 2009b:[1]). The WHO further stipulates an ideal participant to facilitator ratio. It stresses that the ratio should not be more than four participants to a facilitator, and highlights that a minimum of 30% of participants' time is to be spent in the clinical areas (WHO IMCI information: IMCI training course for first-level health workers: Linking integrated care and prevention 1999:3; Rowe et al 2011:2). Numerous multi-country studies have identified challenges related to in-service training and the implementation of the IMCI strategy (Horwood et al 2009a:[8]). Examples of these challenges include low training coverage, health care workers not following or adhering to IMCI guidelines, incomplete IMCI assessments, and limited or non-existent follow-up and supervision (Horwood et al 2009a:[8]; Woods 2010:28; Goga & Muhe 2011:[2]). Training coverage refers to the number of health care workers who have received IMCI training (Implementing IMCI 2008:[2]).

The IMCI pre-service training for medical and nursing students was identified as one of the solutions for increasing the coverage of IMCI trained health care workers (Prosper, Macha & Borghi 2009:66). The IMCI pre-service training initiative is the process of integrating the IMCI strategy with medical and paramedical education before graduates

can be allowed in clinical practice or health services (Haileamlak, Hailu, Nida, Desta & Tesema 2010:[1]). According to Haileamlak et al (2010:[1]), cost-effectiveness, feasibility and sustainability have been identified as some of the benefits of IMCI pre-service training, and thus more needs to be done to strengthen its implementation and effectiveness. An evaluation of 19 medical related training institutions in five countries revealed that IMCI pre-service training was well established and accepted by teaching staff and students (Haileamlak et al 2010:[1]). However, findings from other studies revealed that challenges with IMCI pre-service training prevented the large-scale coverage required to address millions of preventable under-five deaths (Woods 2010:28). A policy brief that reported on IMCI implementation in Kenya mentioned the inadequacy of pre-service training, and attributed this to the limited time for training and exposure to the clinical areas, and lack of learning materials, such as job aids and training modules (Mullei, Wafula & Goodman 2008:[2]). Similarly, Woods (2010:28) reported obstacles that have impacted on IMCI pre-service training, and examples of these include costs related to the use of a model dependent on a centralised tutor-based training scheme, frequent attrition of trained staff, and inadequate supply of training materials.

Goga and Muhe (2011:[1]) in their multi-country study, using quantitative and qualitative methods, reviewed training approaches and methods for IMCI case management training. They documented the challenges to rapid scale-up of IMCI case management training and examined country-specific experiences and capabilities in addressing barriers to IMCI case management training and follow-up. The results of the qualitative element of the study corroborated or supported the data obtained from the quantitative study. Examples of these results include a range of barriers to rapid acceleration of IMCI case management training, uncertainty of IMCI's role in relation to child health, lack of political support, lack of human and material resources, and mismatch between training needs and available training (Goga & Muhe 2011:[6]).

Taking into account the discussions thus far, it is important to briefly examine some recommendations for improvement of IMCI pre-service training. In Haileamlak et al's (2010:4]) views, the re-examination of the current nursing curricula, facilitation of staff training, and provision of adequate training materials could improve the effectiveness of IMCI pre-service training. This highlighted the need to explore alternative approaches to support and strengthen pre-service training. It is probably because of this that the Strategic Plan for Maternal, Newborn, Child and Women's Health and Nutrition in South

Africa stipulated for IMCI pre-service training to be included in the curricula of all health professionals (Strategic Plan … South Africa 2012-2016:22). To date, more than 70% of nurse training institutions had incorporated IMCI into their pre-service curricula (Strategic Plan … South Africa 2012-2016:38). Although this is the case, the effectiveness of this in relation to IMCI implementation needs to be explored. Acknowledging this, there is a need to explore alternative and innovative approaches for sustaining IMCI pre-service training, a view echoed also by Haileamlak et al (2010:4).

The electronic learning (e-learning) tool that has been developed by the Novartis Foundation for Sustainable Development and the WHO has since been identified as one of the approaches for sustaining and strengthening IMCI in-service and pre-service training (ICATT-Novartis [s.a.]; Goga & Muhe 2011:[9]). The approach that is frequently talked about in relation to this is ICATT (Goga & Muhe 2011:[9]).

### 1.2.3 Statement of the research problem

Currently, all nursing campuses that are affiliated with the KwaZulu-Natal College of Nursing and offer the R425 nurse training programme facilitate IMCI pre-service training. Added to this, the nurse educators trained in IMCI assume the role of a facilitator. According to the WHO (WHO IMCI information: IMCI training course for first- level health workers: Linking integrated care and prevention 1999:4), there is a range of conventional or traditional approaches for facilitating IMCI case management training. Examples of these include group discussion, demonstration and role-play using IMCI chart booklets, modules, exercise booklets, photographs, DVDs and recording forms. However, numerous barriers are often noted that impact negatively on IMCI pre-service training at the nursing campuses when using these conventional approaches. Examples of the barriers identified by the researcher at the nursing campus where she works include shortage of nurse educators trained in IMCI, lack of support from the district office regarding training and the provision of updated printed materials, cost of re-printing training materials, the large number of learners, and limited time for training. Although there are no current studies that reflect the challenges and experiences of IMCI trained facilitators at other nursing campuses in KwaZulu-Natal, anecdotal evidence suggests that the same barriers to IMCI pre-service training do exist. However, with the present state of knowledge, it is impossible to know how pervasive these conditions or barriers are.

ICATT has been identified as an innovative technology that has the potential to strengthen pre-service training and increase training coverage (ICATT-Novartis [s.a.]). The researcher is of the opinion that implementing ICATT at nursing campuses can reduce both the financial and human resource burden of training. ICATT has never been implemented at nursing campuses in South Africa, and KwaZulu-Natal in particular. The researcher is also of the opinion that in order for ICATT to be implemented successfully at nursing campuses, it is necessary to investigate whether nursing campuses, nurse educators and learners are ready to use this technology. This study therefore sought to explore the understanding of campus principals, nurse educators and learners with regards to the use of ICATT at nursing campuses in KwaZulu-Natal.

## 1.3 RATIONALE

One of the approaches for sustaining and strengthening IMCI in-service and pre-service training is the IMCI computerised adaptation and training tool (ICATT), which is an electronic learning tool. The South African Nursing Council, in its nursing education and training standards, has stated that nurse educators should integrate new technology for teaching and learning. However, nurse educators trained in IMCI have encountered numerous challenges at their nursing campuses, particularly during IMCI case management training with their second-year learners. To date, the nursing campuses of the KwaZulu-Natal College of Nursing have not adopted computer-based learning.

This predicament therefore provided impetus to explore whether nursing campuses, nurse educators and learners are ready to use and implement a computerised adaptation and training tool. An investigation into the use of the computerised adaptation and training tool as a means of strengthening teaching and learning, and addressing the challenges encountered during IMCI pre-service training is necessary. The research study should therefore provide valuable insight on the use of the computerised adaptation and training tool by nurse educators and learners at nursing campuses. It is thus the researcher's intention to use the emerging findings for the formulation of guidelines and the development of a model specific to nursing campuses. In addition, principals, nurse educators and learners may become more confident and knowledgeable about the use of innovative technologies for teaching and learning in nursing education. A study of this nature has not been conducted in South Africa, and literature around this subject is lacking which further highlights the need for the researcher to conduct this study.

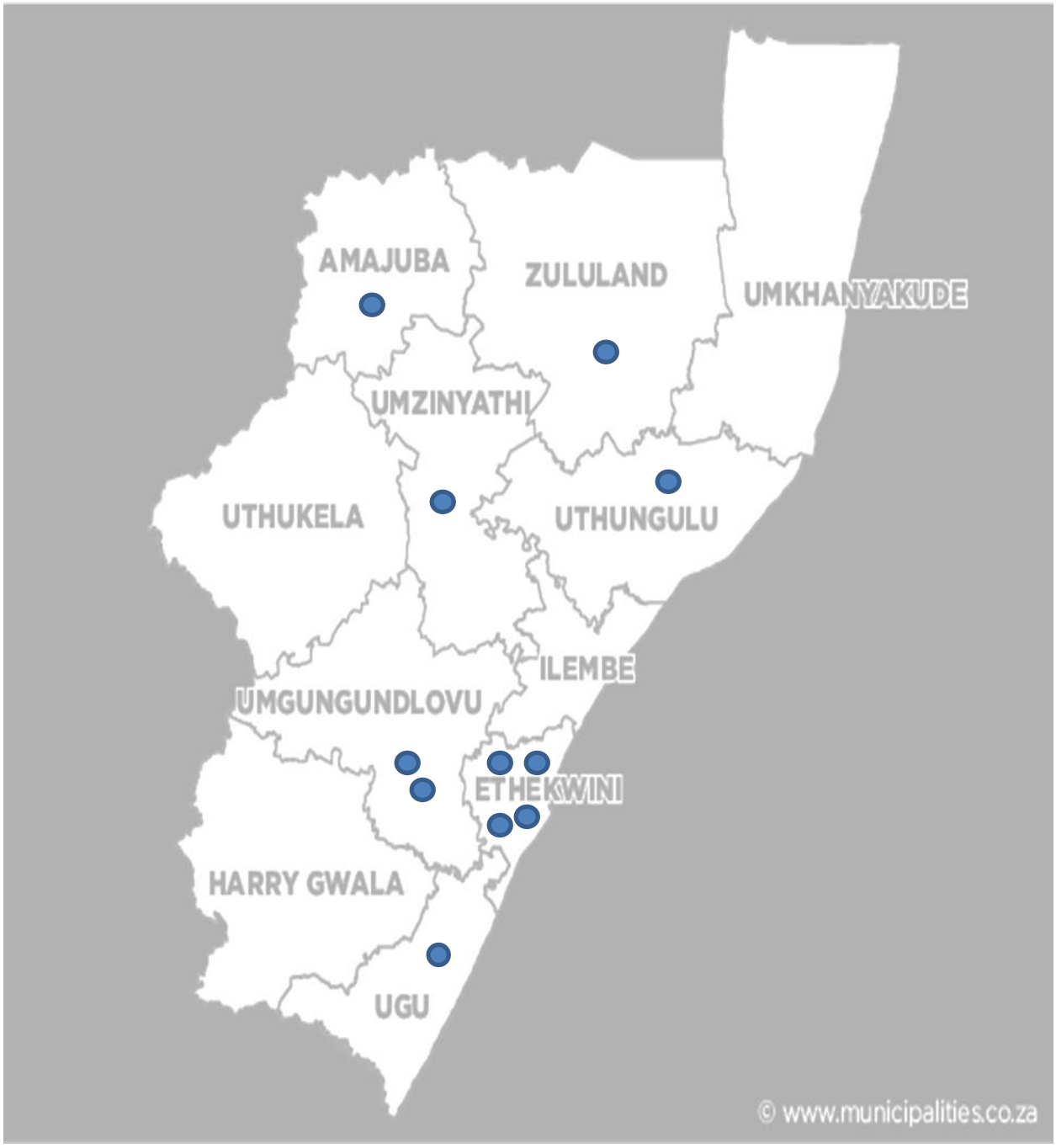


**Figure 1.1 Map of KwaZulu-Natal indicating the sites of the nursing campuses of the KwaZulu-Natal College of Nursing**

(Adapted from www.municipalities.co.za)

## 1.4 AIM AND OBJECTIVES OF THE STUDY

### 1.4.1 Aim of the study

The aim of this research study was to investigate the nursing campuses' readiness regarding the use of ICATT and ultimately develop guidelines and a model for improving the use of ICATT for IMCI case management training at nursing campuses in KwaZulu-Natal.

### 1.4.2 Objectives of the study

The qualitative component objectives of the study were to:

- explore the campus principals, nurse educators and learners understanding of ICATT and its use
- explore the campus principals, nurse educators and learners understanding of ICATT with regards to the enablers and barriers to ICATT use in the nursing campuses in KwaZulu-Natal
- explore the campus principals, nurse educators and learners understanding of ICATT with regards to the readiness of the nursing campuses in KwaZulu-Natal for ICATT use

The quantitative component objectives of the study were to:

- identify the enablers and barriers to ICATT use in the nursing campuses in KwaZulu-Natal
- investigate the readiness of the campus principals, nurse educators and learners for the use of ICATT

The mixed method method objectives of the study were to:

- develop guidelines and a model for improving the use of ICATT at nursing campuses in KwaZulu-Natal

### 1.4.3 Research questions

The qualitative component research questions are:

- What are the views of campus principals, nurse educators and learners regarding ICATT and its use in nursing campuses in KwaZulu-Natal?
- What are the views of campus principals, nurse educators and learners regarding the enablers and barriers to ICATT use in nursing campuses in KwaZulu-Natal?
- What are the views of the campus principals, nurse educators and learners regarding the “readiness” to use ICATT in the nursing campuses in KwaZulu-Natal?

The quantitative component research questions are:

- What are the enablers to ICATT use in the nursing campuses in KwaZulu-Natal?
- What are the barriers to ICATT use in the nursing campuses in KwaZulu-Natal?
- What is the “readiness” of the campus principals, nurse educators and learners for the use of ICATT in the nursing campuses in KwaZulu-Natal?

The mixed method research questions are:

- In what ways do the qualitative interviews with the campus principals, nurse educators and learners contribute to a better understanding of the quantitative data of the enablers and barriers to ICATT use?
- In what ways do the qualitative interviews with the campus principals, nurse educators and learners contribute to a better understanding of the quantitative data of the nursing campuses’ readiness to use ICATT?
- What are the best practices for using ICATT at nursing campuses?

## 1.5 CONTRIBUTION OF THE STUDY

Research studies must make a relevant contribution to either theory or clinical practice (Polit & Beck 2012:708). The findings of this study will make a significant contribution to literature surrounding the use of a computerised adapted training tool for IMCI case

management training for learners at nursing campuses. It will enable nurse educators and learners to explore computer assisted learning in order to strengthen teaching and learning at nursing campuses. In addition, nursing campuses in KwaZulu-Natal will be able to use the findings of the study to enhance their contextual knowledge of ICATT use, and this will be useful in understanding the state of readiness of nursing campuses to use ICATT for IMCI case management training. The findings of the study have led to the development of guidelines and a model for improving the use of ICATT in nursing campuses in KwaZulu-Natal. Given the similarities of nursing campuses in South Africa, the guidelines and the model that have been developed, will serve as a useful tool for facilitating the implementation and use of ICATT in other nursing campuses in various provinces of the country. These guidelines and model will provide specific guidance and be of practical utility to all stakeholders for the implementation and use of ICATT.

To be more specific the findings of this study will: 1) contribute to the development of literature in the field of ICATT use in nursing campuses for IMCI case management training and 2) provide a novel insight into South Africa's state of readiness to implement ICATT for pre-service training for nurses. It must be noted that to date no other study has provided guidelines or a model for ICATT use at nursing campuses in South Africa.

## 1.6 DEFINITION OF THE KEY CONCEPTS

### Educators

According to the *Oxford Dictionary and Thesaurus* (2009, sv "educator"), an educator is a person who trains or instructs someone to improve their mind or character. *The Free Dictionary by Farlex* (2017) defines an educator as a person trained in teaching. The term educators, in the context of nursing education, refers specifically to nurse educators or core academic lecturers, who are registered professional nurses and midwives with an additional qualification in nursing education (South African Nursing Council, Nursing Education and Training Standards [s.a.]:76). In this study, nurse educators trained in IMCI are nurse educators who have attended an 11-day course in IMCI case management training, and a 5-day IMCI facilitator's course.

### Integrated Management of Childhood Illness (IMCI)

The Integrated Management of Childhood Illness (IMCI) is a strategy that aims to lower the under-five mortality rates by addressing the health and development needs of children, strengthening the skills of health care workers and improving the care practices of the community (Fick 2017:208). The focus of the strategy is on managing common childhood diseases in a holistic way instead of treating individual diseases in children under the age of five years (Mulaudzi 2015:89; Woods 2010:28). In this study, IMCI refers to the comprehensive approach used by nurses for assessing, classifying and treating sick children and young infants in health care care facilities.

**IMCI case management training**

In IMCI case management, clinical guidelines and algorithms are used when assessing and treating sick children under five years of age (Horwood et al 2009b: [2]). Case management is the co-ordinated manner in which health care workers observe and treat patients with specific diagnoses (*The Free Dictionary by Farlex* 2017). The WHO developed the 11-day IMCI case management training course to teach health care workers how to use the IMCI clinical guidelines (Horwood et al 2009b: [2]). Facilitators trained in IMCI conduct the training that involves classroom work and clinical practice supported by approved learning materials for example the IMCI chart booklet (Horwood et al 2009b:[2]). In this study, nurse educators trained in IMCI case management conduct IMCI case management training for learners at the nursing campuses in KwaZulu-Natal.

**ICATT**

The ICATT is an electronic learning tool with a computerised software application, which allows for the adaptation of the generic guidelines of the IMCI strategy (ICATT-Novartis [s.a.]). In this study, ICATT refers to the use of the computerised software application for IMCI case management training at selected nursing campuses in KwaZulu-Natal.

**Learners**

A learner is a person who is “learning a subject or skill” *(The Oxford Dictionary and Thesaurus* 2009, sv “learner”). According to the *Harper Collins English Dictionary* (2016, sv “learner”), a learner is a person who acquires knowledge through a programme of study. The term learners or learner nurses, in the context of nursing education, refers to

persons who are following a programme of study in nursing at a nursing training institution (Nursing Act 33 of 2005:27). In this study, the learners are all learner nurses who have completed the IMCI case management training in their second year of training.

**Nursing colleges**

According to the Nursing Act 33 of 2005, nursing colleges or nursing education institutions are institutions that offer nursing education and training programmes to nurses in order to ensure that they are fit for practice, award and purpose. The training offered by these colleges is accredited by the South African Nursing Council (Nursing Act 33 of 2005:30). Nursing colleges are recognised educational institutions that offer basic nurse training and some specialised clinical courses (Mellish, Oosthuizen & Paton 2010:79). In this study, nursing college means, the KwaZulu-Natal College of Nursing. This is a public nursing education institution that is under the supervision of the KwaZulu-Natal Department of Health. It has eleven campuses and twelve sub-campuses that offer nurse training. Only ten of these nursing campuses are involved in this study as they offer IMCI case management training.

**Principals**

A principal is the head of a school or college (Harper Collins 2016, sv “principal”). In the South African context, principals are also referred to as heads of nursing education institutions or nursing colleges (Mulaudzi, Daniels, Direko & Uys 2012:4). In the context of this study, campus principals are the heads of nursing campuses. Campus principals are responsible for the management of the nursing campuses, which offer the R425 programme and the 11-day course in IMCI case management training for learners.

**Readiness**

According to the *Oxford Dictionary and Thesaurus* (2009, sv “readiness”), readiness is defined as “a state of preparedness.” Readiness is also defined as “the degree to which those involved are individually and collectively primed, motivated and technically capable of executing the change” (Holt & Vardaman 2013:9). In this study, the term readiness concerns the nursing campuses. It is about whether the nursing campuses have the necessary resources, and whether they are adequately prepared to implement computer-

based training. In addition to the infrastructure, resources here refer to the principals, nurse educators and learners of the nursing campuses. The readiness of principals, nurse educators and learners refers to whether this population has the requisite confidence, knowledge, attitude and skills of the use of ICATT for teaching and learning purposes.

**Use and ICATT use**

*The Harper Collins English Dictionary* (2016, sv "use") defines use as "put into service or action." In the context of this study, the computerised training tool use (ICATT use) relates to the use of ICATT for IMCI case management training at nursing campuses for pre-service training.

## 1.7 FOUNDATIONS OF THE STUDY

The foundations of this study are guided by both a theoretical framework and a set of assumptions. The set of assumptions, in essence, relates to the research paradigm of the study. The theoretical framework which was used to contextualise and guide this study is presented below.

### 1.7.1 Theoretical framework

A theoretical framework is the "conceptual underpinnings" of a study (Polit & Beck 2010:198). A framework allows researchers to apply useful concepts to their study and frame their arguments (Brink et al 2012:26). The researcher used the integrated model of evaluation research as a theoretical framework to offer guidance throughout the research process (De Vos, Strydom, Fouché & Delport 2011:469).

The integrated model of evaluation is concerned with establishing whether programmes are needed, including the possibility of their use (Terre Blanche, Durrheim & Painter 2006:410). ICATT is a new tool for developing skills and knowledge of health care workers in IMCI case management training (Kudlova & Lejnev 2011:1). It was not used at nursing campuses in KwaZulu-Natal before the commencement of this study. The researcher used some elements of the integrated model of evaluation in supporting the use of ICATT at the nursing campuses in KwaZulu-Natal. Terre Blanche et al (2006:411) state that there is no correct approach to conduct a programme evaluation. Hence, only the aspects of

the integrated model of evaluation relevant to this study were adopted to guide the entire research process. The integrated model of evaluation is presented in Figure 1.2 below.

| **Evaluation approach** | **Philosophical and value orientations** | | |
|---|---|---|---|
| **Purpose of Evaluation** | **Formative** (Information for forming or improving) | **Process** (Information for describing and delivery) | **Summative** (Information for measuring outcomes) |
| **Type of evaluation** | Needs assessments | Monitoring | Impact/outcomes assessments |
| | Evaluability assessment | | Efficiency assessments |
| | | | Utilisation assessments |
| **Evaluation designs** | Ways in which ingredients are put together in an attempt to answer the evaluation questions | | |
| **Evaluation methods** | Techniques used in practice to conduct an evaluation | | |
| **Life cycle** | **Beginning → Middle → End** | | |

**Figure 1.2 The integrated model of evaluation**

(Adapted from De Vos et al 2011 :469)

This integrated model of evaluation (De Vos et al 2011:469) has the following evaluation processes which are presented according to a lifecycle (beginning, middle and end):

1) *Formative evaluation:* It is suggested that a needs assessment and evaluability assessment are conducted at the outset.
2) *Process evaluation:* This relates to assessment of problems during or in the middle of programme implementation. This component also incorporates programme monitoring.
3) *Summative evaluation:* This component measures outcomes by conducting impact assessments, efficiency assessments, and utilisation assessments at the end.

The researcher did not follow the life cycle, as suggested in the model. In other words, not all of the components of the integrated model of evaluation were used in this study. Only the formative and summative components of the integrated model were employed in this study, with the process evaluation being excluded (De Vos et al 2011:469). In other words, the needs assessment, evaluability assessment, efficiency assessments and

utilisation assessments elements of the integrated model were used in this study. Such utilisation is a function of the view that the cyclical approach to programme evaluation is not always adopted, as the linear approach is preferred in cases where programme evaluation activities are undertaken independently (Lobo, Petrich & Burns 2014:[2]). Taking this into account, it was the researcher's intention to conduct programme evaluation activities independently, without rigidly adhering to the evaluation cycle. Thus, the researcher's focus was on identifying resources that were available for ICATT use, including aspects of the current IMCI case management training programme. Lobo et al (2014: [2]) state that data collected solely to be compliant with the programme evaluation cycle may not be acknowledged as useful data. This indicates that if data were collected using the life cycle approach, some of the data might not be relevant to the aims and objectives of this study. The discussions that ensue relate to the key elements of the integrated model of evaluation.

#### *1.7.1.1 Needs assessment*

A needs assessment refers to the collection of data that points to the number of people in a particular community that need a particular service, including an assessment of the level of services and resources needed (De Vos et al 2011:455). The purpose of the needs assessment is therefore to ascertain whether the programme that is being considered is needed, and whether it can be implemented to meet the needs and wants of the communities. It is worth noting that the type of needs assessment of this study is normative given that experts had identified gaps in the existing services and approaches for addressing the same (De Vos et al 2011:456). Needs assessments can be used in establishing priority areas when resources are limited (Polit & Beck 2012:267). A needs assessment was conducted by means of a situational analysis in this study (Terre Blanche et al 2006:411). A survey was used to collect specific data related to the needs assessment (Polit & Beck 2012:267). Conducting the needs assessment enabled the researcher to offer recommendations and develop guidelines for improving ICATT use at the nursing campuses (Polit & Beck 2012:267).

#### *1.7.1.2 Evaluability assessment*

An evaluability assessment is also known as a feasibility study (D'Ostie-Racine, Dagenais & Ridde 2013:72). It is defined as a systematic process for describing the structure and

objectives of a programme, and for analysing the feasibility of achieving the objectives (D'Ostie-Racine et al 2013:72). This category of assessment consists of three activities viz: (1) focusing on the goals and objectives of a programme, (2) assessing the clarity and evaluability of the programme and (3) identifying stakeholder interest and plans for use of findings (Hare & Guetterman 2014:9) The researcher used the evaluability assessment to identify challenges that could limit the use of ICATT at nursing campuses, and for exploring the perceptions of the stakeholders regarding ICATT use. The findings of this category of evaluation contributed to the development of guidelines for the use of ICATT.

#### *1.7.1.3 Efficiency assessment*

Efficiency assessment, commonly known as economic evaluation, is defined as "the comparative analysis of alternative courses of action in terms of both their costs and their consequences" (Cunningham 2014:246). This indicates that an efficiency assessment examines costs and resource allocation in respect of programme implementation and use (De Vos et al 2011:460; Cunningham 2014:247). This type of assessment is commonly used as a tool in health care appraisal. Cunningham (2014:247) cites Drummond et al (1987) in supporting this claim by stating that economic evaluation involves identifying, measuring, valuing and comparing the costs and benefits of health care services and care provision. In this study, an efficiency assessment relates to the assessment of the cost of using the conventional IMCI approach. The efficiency assessment in this study also involves a comparative assessment of the conventional IMCI approach and ICATT use, with the aim of identifying the most suitable approach for IMCI case management training.

#### *1.7.1.4 Utilisation assessment*

According to De Vos et al (2011:462), utilisation assessment allows for the gathering of detailed, descriptive information about a programme being implemented. Utilisation assessments further informs decision makers about what is going on in a programme, and how and why programmes deviate from initial plans and expectations (De Vos et al 2011:463). De Vos et al (2011:463) also cite Rossi (2004) who states that utilisation assessments question the cost efficiency and effectiveness of programmes. Qualitative data collection methods are required for utilisation assessments as they offer the perspectives of people, who in essence serve as the sources of the data (De Vos et al

2011:463). This study utilised this category of assessment and specific questions were used to gather data. The focus of the questions was on the perceptions and experiences of the research participants in relation to ICATT implementation and use.

### 1.7.2 The integrated model of evaluation: Relevance to this study

The integrated model of evaluation used in this study succinctly outlines the prerequisites for investigating the readiness of nursing campuses for ICATT use. An example of these prerequisites includes needs assessment, cost efficiency assessment and stakeholder meaningful involvement. The provision of the prerequisites for ICATT use was found to be useful in this study, as it guided the researcher in selecting the research methodology and research design. Added to this, the integrated model of evaluation underpins the entire research process of this study as it helps the researcher in developing the study's aims and objectives and reviewing relevant extant literature. The development of the tools for data collection emerged from the formative and summative evaluation components of the model. The model enables the researcher through its core elements (needs assessments, evaluability assessments) to identify barriers to ICATT use, and provide possible strategies for addressing this. An example of these strategies includes the development of guidelines and a model that are grounded in the data of this study. The guidelines and model that were developed could shape policy regarding ICATT use for IMCI case management training at both local and national levels of policy formulation.

A detailed discussion of this model is provided in chapter 2. The rationale for this is to enhance comprehension of the guidance that the theoretical framework offered the researcher throughout the study.

## 1.8 RESEARCH METHODOLOGY AND RESEARCH DESIGN

A research methodology is a strategy that enables researchers to identify appropriate research designs for research studies (Grove et al 2013:707). A mixed methods methodology or approach was used in this study to investigate the use of the IMCI computerised adaptation and training tool, and to develop guidelines and a model for improving the use of ICATT for IMCI case management training at nursing campuses**.** According to Tashakkori and Creswell cited in Polit and Beck (2012:630), mixed methods research uses quantitative and qualitative strands to collect and analyse data, integrate

findings and draw inferences in a single study. The research design is a strategic plan which guides the research process to ensure valid conclusions are reached (Terre Blanche et al 2012: 563). The research design which is a “blueprint” or framework for the entire study guided the researcher during the research process (Creswell 2009:5). This study utilised a two-phase sequential exploratory mixed methods design which allowed the researcher to explore and understand a phenomenon of interest (Venkatesh, Brown & Bala 2013:24; Creswell 2009: 212). The qualitative component provided information on the understanding of the campus principals, nurse educators and learners with regards to the implementation of ICATT at the nursing campuses, whilst the quantitative component added a statistical, measurable element to the findings. The sequential exploratory mixed methods design allowed the researcher to analyse the qualitative and quantitative data separately and then merge the results to develop guidelines and a model (Venkatesh et al 2013:39). The sequential exploratory mixed methods design is used in two phases of this study, and this together with the research methods is presented in chapter 3.

## 1.9 ETHICAL CONSIDERATIONS

Research ethics refers to the rules which govern the conduct of researchers when people are participants in research (De Vos et al 2011:114). Researchers are therefore required to consider a number of ethical issues for safe guarding participants’ rights and wellbeing when conducting a study. Examples of these ethical issues include autonomy, privacy, confidentiality, fairness and scientific honesty (De Vos et al 2011:115). The first step in conducting a research study is to obtain ethical clearance and permission from the relevant authorities. Prior to undertaking the research study, the researcher therefore ensured that:

- An ethical clearance certificate (Certificate number HSHDC/259/2013) was obtained from the Higher Degrees Committee at the Department of Health Studies of the University of South Africa which granted the researcher permission to conduct the study (Annexure A).
- Permission to conduct the study was obtained from the KwaZulu-Natal Health Research Committee, the gatekeepers of the KwaZulu-Natal Department of Health (see request letter Annexure B and Approval Letter Annexure C).

- Permission to conduct the research study at the campuses of the KwaZulu-Natal College of Nursing (nursing education institutions) was obtained from the Acting Head of the KwaZulu-Natal College of Nursing, and all the principals of the campuses (see request letter Annexure D and Approval Letter Annexure E).
- Permission to use the ICATT software was obtained from the National Department of Health, Child and Youth Health directorate (see request letter Annexure F and Approval Letter Annexure G).
- Permission to use a survey tool was obtained from the researcher (Annexure K).

Prior to data collection the researcher ensured that:

- All research participants were made aware of the research process, which included the procedure for data collection, and the inclusion and exclusion criteria (see example of letter Annexure I, Annexure T).
- All the research participants voluntarily consented to participate in the research study by completing the consent form (see example of letter Annexure H, Annexure S).

During the data collection phases of this study the researcher ensured that:

- The privacy and confidentiality of all research participants by ensuring that all data was to be stored securely and not shared with anyone, other than the researcher's supervisor. This was elaborated on in the informed consent form.
- The anonymity of all research participants was maintained by not recording the names of the participants or the institutions on the questionnaires. This was further ensured by not disclosing the names of the participants or the institutions during the dissemination of the research findings.

During the write-up of the thesis plagiarism was avoided by using the University of South Africa's recommended referencing system.

Additional information pertaining to ethical considerations is further discussed in chapter 3.

## 1.10 LIMITATIONS OF THE STUDY

This study was limited to the ten nursing campuses in the province of KwaZulu-Natal. The study was further limited to the principals and nurse educators at the nursing campuses where IMCI case management training was conducted in the R425 nurse training programme, and learners who had received IMCI case management training in their second year of training. Colleges of nursing in other provinces in South Africa were not included in this study. This may have some implications on the generalisability of the study findings.

A sequential exploratory mixed methods design was adopted in this study. The use of this design is time consuming as data is collected in phases and in a specific sequence from the campus principals, nurse educators and learners. Challenges were therefore encountered with accessing the prospective participants at the specified times. In addition, the researcher is based centrally in eThekwini district, and had to travel long distances to access some of the nursing campuses in the Northern and Southern regions of the province of KwaZulu-Natal. These challenges were addressed by corresponding in advance with the principals and the nurse educators about suitable appointment dates and times for data collection. In addition, the researcher employed the services of a research assistant to assist with data collection. However, work commitments impacted on the availability of campus principals for the individual interviews. This meant that some information pertaining to campus readiness may have been excluded from the qualitative study findings. In stating this, there was a good response rate from the campus principals in the completion of the questionnaires. The demands of the teaching and clinical environments impacted on the availability of a few nurse educators to complete the questionnaires in this study. This also meant that some information pertaining to the nurse educator readiness could have been excluded from the quantitative study findings. This limitation was addressed because the researcher conducted eight focus group interviews with the nurse educators until data saturation was reached.

The ICATT software was adapted by the National Department of Health (NDOH) and is therefore “owned” by them. Difficulties were experienced in identifying and obtaining permission from the relevant person to use the ICATT software. These difficulties delayed data collection process. The lack of previous studies on ICATT and the limited literature available on the implementation of ICATT was also a limitation of this study. This is

because ICATT and its use for IMCI case management training has only recently been developed by the Novartis Foundation for Sustainable Development and the World Health Organization. The researcher addressed this limitation by conducting a systematic and comprehensive literature review on the use of computer-based learning in education and nursing which is pertinent to this study.

## 1.11 LAYOUT OF THE THESIS

To enhance readers' understanding of this study, the thesis is divided into chapters that are further sub-divided into a number of subsections.

Chapter 1 of the thesis deals with the orientation to the study, including discussions relating to the research problem and background to the study. It also includes the aims, objectives, research questions and foundations of the study. Included in this chapter are also brief discussions of the research design, methodology and ethical considerations that were adhered to. The researcher presents arguments for the rationale, contribution and the limitations for this study.

Chapter 2 presents the theoretical framework that underpins the study. A comprehensive review of the extant literature on the IMCI strategy, the use of ICATT for IMCI case management training, electronic learning and the readiness for electronic learning is also discussed in this chapter.

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Chapter 3 is a discussion of the methodology used in the study. This includes a description of the study design and methods of data collection and analysis used in the three phases of this study. The researcher also reports on the ethical principles that were adhered during data collection and analysis.

Chapter 4 presents the findings of the study. Based on the mixed methods approach, qualitative and quantitative findings of phases one and two of the study are presented visually and through the words of the respondents.

Chapter 5 presents a section on the development of and discussion of the guidelines and model.

Chapter 6 is the final chapter and includes an integrated discussion of the results from the both the qualitative and quantitative elements of the study using the extant literature discussed in chapter 2. The scope and limitations of the study and the scientific rigour adhered to in this study are presented. The chapter ends with a summary, which serves as a conclusion of the study.

## 1.12 SUMMARY

The use of ICATT for IMCI case management training is a National Department of Health initiative to increase the coverage and strengthen the training of health care workers in an in-service and pre-service setting. The focus of this research study is therefore to assess the readiness of nursing campuses in KwaZulu-Natal for a computerised adaptation and training tool such as ICATT. Chapter 1 outlined the study by presenting the research problem, the aims and objectives, the rationale for and contribution of the study, definition of key terms, and the conceptual framework that underpins the study. The chapter also provided an overview of the research design and methods used in this study. The ethical considerations and limitations of this research study were also presented. In summary, this chapter has provided a brief overview of the discussions presented in subsequent sections of chapter three of this thesis. The next chapter is a review of the literature on IMCI computerised adaptation and training tool, and related issues.

# CHAPTER 2

# LITERATURE REVIEW

## 2.1 INTRODUCTION

The most prominent causes of death in children under the age of five years are pneumonia, diarrhoea, malaria, measles and malnutrition (Kiplagat, Musto, Mwizamholya & Morona 2014: [2]). In Africa, HIV/AIDS adds to the burden of disease in this age group (Rhode & Mash 2015:1). With regards to South Africa, HIV, together with diarrhoea, respiratory infections and malnutrition contribute to over 50% of deaths in children (Horwood et al 2011:42). Thus, the WHO and UNICEF have devised an integrated approach, the IMCI, for the assessment and treatment of these diseases in children under the age of five years, in an effort to reduce the morbidity and mortality of this population (Nguyen, Leung, McIntyre, Ghali & Sauve 2013: [1]). The IMCI is considered cost effective in the assessment, treatment and prevention of diseases and death of children under the age of five years (DeRenzi, Parikh, Mitchell, Chemba, Schellenberg, Lesh, Sims, Maokola, Hamisi & Borriello 2008:753; Magge, Anatole, Cyamatare, Mezzacappa, Nkikabahizi, Niyonzima, Drobac, Ngabo & Hirschhorn 2015:565). The cost effectiveness of this strategy can be achieved if health care workers are trained in the same (Magge et al 2015:565). It is for this reason that health worker training is considered a key component of the IMCI strategy (Magge et al 2015:565; Steinhardt, Onikpo, Kouamé, Piercefield, Lama, Deming & Rowe 2015:[2]). Despite this, training coverage remains low in many countries, including South Africa (Horwood et al 2009b:[2]).

In an effort to sustain the implementation of the IMCI strategy and increase training coverage in South Africa, the government made pre-service and in-service training a priority for all health care professionals (Strategic Plan … South Africa 2012-2016:16). Such prioritisation led to the inclusion of IMCI training in the undergraduate programmes for medical and nursing students at universities. IMCI training was also included in the second-year module of the four-year diploma programme at public nursing colleges. Even though this is the case, the pre-service training stage of the implementation of IMCI faces a range of challenges. Examples of these challenges include poor planning, lack of managerial support, and a lack of resources, such as material, human and financial

(Woods 2010:28). This is a global problem, as evidenced in the outcomes of a range of multi-country studies (Goga, Muhe, Forsyth, Chopra, Aboubaker, Martines & Jason 2009:3; Goga & Muhe 2011:[6]). However, these challenges can be alleviated or at least minimised by the use of the IMCI Computerised Adaptation and Training Tool (ICATT) (Goga & Muhe 2011:[9]). The first English version of ICATT was released in May 2008 by the WHO and Novartis Foundation for Sustainable Development (NFSD) (ICATT-Novartis [s.a.]). Since 2009, ICATT, an innovative software technology that supports IMCI has been tested in several countries, including Tanzania, Peru and Indonesia (ICATT-Novartis [s.a.]). South Africa has adopted ICATT, including its training resources as an additional training tool to scale up IMCI coverage (ICATT-Novartis [s.a.]).

The South African National Department of Health, in their 2013/2014 Workplan for Integrated Management of Childhood Illness on Self Learning Methods, states that it is important to build capacity of health professionals through ICATT learning. Although ICATT has been piloted as a tool at a private hospital and at a university in KwaZulu-Natal, little is known or published about its implementation process, including pre-service training (South African … 2013/2014:2). The pre-service training stage of the implementation of IMCI is often exposed to a number of challenges (Woods 2010:28). It is hypothesised that introducing ICATT can alleviate these challenges at institutions, such as the campuses of the public nursing college in KwaZulu-Natal. Acknowledging this hypothesis, stakeholders need evidence to make informed decisions about the implementation of ICATT in these settings: the campuses of the public nursing college in KwaZulu-Natal.

The researcher conducted the literature review to explore and summarize current empirical and theoretical literature related to this study (Grove et al 2013:99). The literature review helped to contextualise the research problem and thus provided the basis for a logical argument on why this study is needed (Grove et al 2013:99). A comprehensive and systematic literature review further provides the basis on which to build new knowledge. The literature review provided the researcher with an opportunity to explore the existing literature available on the IMCI strategy, IMCI pre-service training, ICATT implementation and programme evaluation. This chapter thus presents a review of the extant literature relevant to the aims and objectives of this study.

All the papers or literature sources identified and selected were critically analysed and synthesised. The analysis and synthesis of data resulted in the development of the following themes. They are discussed here in the order presented: 1) a comprehensive overview of the integrated model of evaluation which is the theoretical framework of this study, 2) a background and overview of the IMCI strategy, 3) the implementation of the IMCI strategy globally and locally, 4) a global and local perspective of IMCI training, 5) electronic learning and health care worker training, 6) ICATT and its role in IMCI case management training and lastly 7) the readiness for electronic learning.

## 2.2 THE THEORETICAL FRAMEWORK OF THE STUDY: A DETAILED DISCUSSION

### 2.2.1 The integrated model of evaluation

The theoretical framework of this study is the 'integrated model of evaluation research' used in programme evaluation and adapted from De Vos et al (2011:469) (see figure 1.3). The following elements are included in the model which is presented as a life cycle of programme evaluation: the needs assessment, evaluability assessment, efficiency assessment and utilisation assessment. These elements are viewed as the foundation of the programme evaluation model and guide the activities related to programme evaluation (De Vos et al 2011:454). As stated previously the 'integrated model of evaluation research' thus provided the theoretical underpinning for the literature review, research methodology and the presentation of the results.

### 2.2.2 Programme evaluation

Evaluation is defined as the process of gathering information about the value of a programme in order to make decisions on its effectiveness or to make improvements (Owston 2008:606). Thus, programme evaluation examines programmes in relation to stated objectives and is concerned with identifying and evaluating the structure, efficiency, effectiveness, relevance and impact of a programme (Ferris, Naylor, Basinski, Williams, Llewellyn-Thomas & Cohen 1992:1301). Ferris et al (1992:1301) discussed programme evaluation in the context of health care programmes that are required within a health care system. A health care programme provides a planned service to address the specific needs of patients. Common examples of health care programmes include an

educational programme to assist patients cope with cardiac surgery and a lifestyle modification programme for newly diagnosed diabetic patients (Ferris et al 1992:1301). According to Ferris et al (1992:1301) the data emanating from a programme evaluation should provide information regarding whether a programme should be "maintained, changed or eliminated." In their article, they argued for a comprehensive evaluation model that incorporates varied phases of programme, and varied types of evaluation. Additionally, Ferris et al (1992:1301) reported that there is no "fit-for-all" evaluation approach for programmes. The authors went on to state that specific types of evaluation are appropriate for specific phases of programmes. For example, it is appropriate to undertake needs assessment in the planning phase of programmes. Failure to do so can lead to a mismatch of programme design and target population, and such a mismatch may hinder the effectiveness of a programme. Evaluability assessments provide information on the readiness of a programme for evaluation. An evaluability assessment further determines the nature of the programme (what is being offered), the programme activities (what strategies are being used) and programme delivery mechanisms (whether programmes are on schedule) (Ferris et al 1992:1302). A process evaluation (formative evaluation) monitors programmes to ascertain whether they adhere to their intended designs. Outcome evaluation (summative evaluation) aids decision-making with the view to ensuring programme continuation. An outcome evaluation also helps to determine the acceptability or appropriateness of cost accrued, and whether programme implementation leads to positive outcomes. Ferris et al (1992:1304) claimed that such an approach to programme evaluation has practical utility, as it ensures the provision of "accurate, objective and timely information" on all the stages of a programme, from commencement or initiation through implementation to termination (Ferris et al 1992:1304).

Victora, Black, Boerma and Bryce (2010:[1]) proposed radical changes for conducting evaluations of large-scale programmes and initiatives that aimed at improving health care. The authors stated that traditional designs, which compared districts from low and middle-income countries with and without a health programme are no longer applicable, as health programmes are been implemented in almost all districts worldwide. Victora et al (2010:[2]) described typical designs of programme evaluation before proposing a new design. The first design was a before and after assessment of programme areas. Although this evaluation design is simple, and necessitates recording changes over time in the intervention area, it is limited because it is difficult to ascertain whether the changes

are a function of the implementation of the programme (Victora et al 2010:[2]). This is because of the absence of a comparison group, a view which Victora et al (2010:[2]) echoed in the outcomes of their study. The second design was a comparison of programme and non-programme areas. This design is frequently used for rigorous programme evaluations (Victora et al 2010:[2-3]). Even though this is the case, it is hardly used in low income countries because of its limitations (Victora et al 2010:[2-3]). The limitations include the presence of multiple programmes being implemented at the same time which makes it difficult to assess the impact of a singular programme. Secondly, socioeconomic progress in low income countries is usually linked to declining mortality rates rather than health programmes that have been implemented. Acknowledging these limitations, the evaluation platform design is considered the most suitable design for programme evaluation (Victora et al 2010:[3]). To be precise, the evaluation platform design is suitable for low and middle-income countries, and this is particularly the case for those that often simultaneously implement numerous public health programmes (Victora et al 2010:[10]). The platform design considers indicators of coverage, impact and cost, and thus enables governments to make decisions regarding allocation of scarce resources. It is also cost-effective as it makes use of pre-exiting and current data bases, which allows for comparison between the two data sets when answering evaluation questions. The platform design promotes evaluation as a continuous process, which recognises that changes could occur in the implementation of programmes. Finally, the platform design allows for objectivity in the evaluation process, as this is undertaken by individuals or agencies not directly related to the programme and its implementation (Victora et al 2010:[10]). Although this is the case, this evaluation design is more suited for large-scale multi-country evaluations that focus on the simultaneous implementation of more than one public health programme, and the promotion of donor coordination. Taking this into account, it may not be suitable for a small-scale programme evaluation, like this research study, which is focused on a single programme, with no intervention or support from external donors.

According to Owston (2008:606), many new technologies are being developed and used to enhance teaching and learning. Examples of these technologies include blogs, interactive devices and whiteboards (Owston 2008:606). Anecdotal evidence regarding the effectiveness of these technologies is contradictory and unclear. The lack of clarity raises a key and a sensible question on the inclusion of technologies, for example, in health-related curricula. Can technology enhance teaching and learning? This question

triggers the need for the evaluation of health-related programmes or curricula that use technology. Owston (2008:606) further adopted the position that technology-based programme evaluation is an aspect of general programme evaluation. Thus, the methods and tools of evaluation are applicable to the two categories of evaluation, formative and summative (Scriven 1972 cited in Owston 2008:606). Formative evaluation assesses the strengths of a programme while it is still under development, and offers suggestions for improvement. Summative evaluation, on the other hand, measures the outcomes of an already completed programme.

In addition to the formative and summative categories of evaluation, other models of evaluation are reported consistently in the empirical literature. Examples of these are those noted by Owston (2008:606) namely Stufflebeam's (1973) context, input, process and product (CIPP) model and Scanlon, Jones, Barnard, Thompson and Calder's (2002) context, interactions, attitudes and outcomes (CIAO) model. The context, input, process and product model is an evaluation model developed for general educational programmes, whilst the context, interactions, attitudes and outcomes framework is a technology evaluation approach (Owston 2008:608). The Stufflebeam's model (see Figure 2.1) describes four evaluation activities, namely context, input, process and product. This model requires evaluators to ask the following questions related to programmes: What needs to be done? How should it be done? Is it being done? Did it succeed? In addition, the context, input, process and product model is aligned with Scriven's (1972) formative and summative evaluation category of programme evaluation (Owston 2008:607).

| Context | Input | Process | Product |
|---|---|---|---|
| Assesses the problems, needs and opportunities present | Assesses competing strategies and the work plans and budgets | Monitors, documents and assesses programme activities | Examines programme impact, the quality and significance of outcomes and the extent to which the programme is sustainable and transferable |

**Figure 2.1 Stufflebeam's context, input, process and product model**

(Adapted from Owston 2008:607)

Scanlon et al's (2002) model of evaluation (context, interactions, attitudes and outcomes) is considered comprehensive in nature, and it was developed to assess technology-based learning (Owston 2008:609). The authors of this model offered clear advice to evaluators. They noted that evaluators should not be "prescriptive" or rigid when using this model of evaluation (Owston 2008:609). However, this model may be perceived as inflexible as it specifies not only the type of data that are to be collected for each dimension, but it also specifies the methods of data collection (Owston 2008:609). It is implicit from this assertion that data that are not consistent with the prescribed dimensions of this model are more likely to be overlooked. Adopting such a stance could hamper programme evaluation, and negatively impact on the implementation of a technology driven programme as pertinent information might be left out or omitted.

| Context | Interactions | Attitudes and Outcomes |
|---|---|---|
| Concerns how the technology fits within the course, and where and how it is used | Refers to how students interact with the technology and each other | Deals with how students change as a result of using the technology |

**Figure 2.2 Scanlon et al's context, interactions, attitudes and outcomes framework**

(Adapted from Owston 2008:609)

The Centre for Disease Control (CDC) in the United States of America developed a study guide that focused on programme evaluation for public health programmes (US Department of Health 2011:1). It provided a broad definition of programme evaluation, which can be applied to any setting where a public health action is implemented. It defined evaluation as an examination of the worth, merit, or significance of an object, and programme as a set of organised activities with a corresponding set of resources to achieve a specific and intended result (US Department of Health 2011:3). The Centre for Disease Control acknowledged that programme evaluation does not occur in isolation, and is influenced by every day challenges that are often associated with resources, time and politics (US Department of Health 2011:3). It is for this reason that the Centre for Disease Control stressed for questions on evaluation to focus on implementation, effectiveness, efficiency, attribution and cost effectiveness of the programme. Such a stance allows for the monitoring of the progress of programmes, promotes accountability, and enables evaluators to identify ways of strengthening programmes (US Department

of Health 2011:4). The Department of Health, in its efforts to strengthen programme evaluation, proposed for programme evaluation to be conducted according to a set of guidelines. Bearing this in mind, guidelines for conducting programme evaluations for public health programmes were developed. The guidelines include six steps that should be adhered to viz.: (1) engage stakeholders, (2) describe the programme, (3) focus the evaluation design, (4) gather credible evidence, (5) justify conclusions, and (6) ensure use and share lessons learned (US Department of Health 2011:9). According to the Centre for Disease Control, adherence to these guidelines will ensure meaningful use of the result or outcome of a programme evaluation (US Department of Health 2011:9).

Dudley (2014:[1]) states that programme evaluations are action oriented and inform judgements on whether a proposed programme is to be started. Put simply, programme evaluations inform judgements on how well a programme is functioning, and provide information on the effectiveness of a programme (Dudley 2014:[1]). It is critical to note that health related activities can be evaluated, and examples of these include training, service interventions, community mobilisation and policy processes, to name but a few. Evaluation need not only be conducted at the end of a programme, but it can be undertaken at all phases of a programme: planning, implementation and termination phases. The types of evaluation that can be conducted at the phases of a programme are referred to as developmental evaluation (planning phase), process evaluation (developmental phase) and outcome or impact evaluation (termination phase). In Dudley's (2014:[2]) view, an evaluation that takes into account all the phases of a programme is referred to as comprehensive evaluation. Such an evaluation, Dudley (2014:[2], adds, can enhance the likelihood of positive outcomes of programmes. The likelihood of positive outcomes can be further enhanced if evaluators adhere to Dudley's (2014:[3]) advice. When conducting a programme evaluation, it is important to clarify the need for the programme, describe the context of the programme (social and economic conditions), state the expected effects of the programmes (goals or objectives to be achieved), ensure the availability of resources, and clarify the programme's capacity to bring about change (Dudley 2014:[3]). This advice is reflected in the logic model (see Figure 2.3) that places emphasis on the 'why' and the 'how' an intervention or programme works.

| Inputs | Activities | Outputs | Outcomes/impacts |
|---|---|---|---|
| *What resources go into a programme* | *What activities the programme undertakes* | *What is produced through those activities* | *The changes or benefits that result from the programme* |
| e.g. money, staff, equipment | e.g. development of materials, training programmes | e.g. number of booklets produced, workshops held, people trained | e.g. increased skills/ knowledge/ confidence, leading in longer-term to promotion, new job, etc |

**Figure 2.3 The programme logic model**

(Adapted from Dudley 2014:3)

Owston (2008:610) asserted that the "surfeit" of evaluation approaches allows for evaluators to select aspects from different models that are suitable for a specific programme and implement them. Acknowledging this, it is safe to state that no one model is adequate to conduct a programme evaluation. Thus, mixing or combining relevant aspects of a range of models for a specific programme evaluation is considered a better approach to evaluate programmes. Taking this into account, the researcher of this study utilises the integrated model of evaluation research. This model combines aspects of the context, input, process and product (CIPP) model, context, interactions, attitudes and outcomes (CIAO) framework and the Logic model (see Figure 2.4). Such an integration of models allows for a comprehensive evaluation of programmes, like that of the readiness of nursing campuses for ICATT use.

| **Evaluation approach** | **Philosophical and value orientations** | | | |
|---|---|---|---|---|
| **Purpose of Evaluation** | **Formative** (Information for forming or improving) | | **Process** (Information for describing and delivery) | **Summative** (Information for measuring outcomes) |
| | **Context** | **Activities** | **Monitoring** | **Impacts/Outcomes** |
| **Type of evaluation** | Assesses problems, needs and opportunities present Situational analysis | | | Effects of the programme and its impact on stakeholders |
| | Evaluability assessment- aims and purposes of programme | | | Efficiency assessments- costs and resource allocation |
| | | | | Utilisation assessments- evidence of effectiveness and efficiency |
| | Assesses where the technology fits | Use of training materials, and how students interact with the technology | | Deals with how students change as a result of technology- new knowledge, increased skills |
| **Evaluation designs** | Ways in which ingredients are put together in an attempt to answer the evaluation questions | | | |
| **Evaluation methods** | Techniques used in practice to conduct an evaluation | | | |
| **Life cycle** | **Beginning** → **Middle** → **End** | | | |

**Figure 2.4 The integrated model of evaluation research incorporating aspects of context, input, process and product model, context, interactions, attitudes and outcomes framework and logic model**

A review of the extant empirical literature that are relevant to evaluation studies was conducted by Adam, Hsu, De Savigny, Lavis, Røttingen and Bennett (2012: iv9). The objective was to explore whether health systems strengthening interventions were being comprehensively evaluated, and whether relevant questions related to policy-making were being asked. For example, does the intervention work as intended? Does it address

the target group, and under what circumstances was it implemented? (Adam et al 2012: iv10). Comprehensive and holistic evaluation relate to that which examines the context, outcomes and activities of a programme (Adam et al 2012: iv11). A wide range of studies on evaluations was reviewed by Adam et al (2012: iv15). The findings of the review revealed that less than half of the evaluations conducted were comprehensive. However, only half of the evaluations adhered to a conceptual framework to guide their impact assessments. It was noted that only 24% and 9% of studies conducted process and context evaluations respectively. This indicates that vital questions relating to whether the interventions worked as intended, and whether they reached their intended target groups are largely unanswered by most of the evaluations (Adam et al 2012: iv9). These limitations to comprehensive evaluations are a function of limited capacity, lack of funding, inadequate time frames or difficulties in undertaking evaluation (Adam et al 2012: iv10). The integrated model addresses these limitations (Figure 2.4). Thus, the researcher anticipates that adherence to the integrated model will enable educators to make informed decisions of whether to use computer-based programmes in the educational environments for enhancing teaching and learning. Bearing this in mind, this model will have practical utility not only for educators but for other stakeholders that are engaged in programme evaluation.

## 2.3 IMCI – A CHILD SURVIVAL STRATEGY

### 2.3.1 Background

Wardlaw, You, Hug, Amouzou & Newby (2014:[1]) reported that in the year 1990, 12.7 million children died before they reached the age of five. This figure was significantly reduced to 6.3 million in 2013, indicating a decline of almost 50% of the under-five mortality rate (Wardlaw et al 2014:[1]). Although this decline is considered an achievement, there is still more to be done to stop or, at least, further curb the preventable child deaths globally (Wardlaw et al 2014:[1]). Despite this call, the progress to date to reduce the global preventable child deaths or mortalities is apparently sluggish (Wardlaw et al 2014:[2]). It was further reported that only a few countries with high under-five mortality rates were on track to achieve Millennium Development Goal 4: to reduce mortality rates of children under the age of five years (You, Hug, Ejdemyr, Idele, Hogan, Mathers, Gerland, New & Alkema 2015:2284). The sub-Saharan Africa countries, including South Africa are currently not on track to meet the target of improving neonate

and child health, as children continue to die from preventable and treatable illnesses (Mabaso, Ndaba & Mkhize-Kwitshana 2014:183). Of the 5.9 million children who died in their first five years of life in 2015, the leading causes of death were pneumonia, diarrhoea and meningitis (Black, Levin, Walker, Chou, Liu, Temmerman & Group 2016:[6]). The disease profile of the under-five year population of South Africa is similar to other developing countries, like India and China (Liu, Oza, Hogan, Perin, Rudan, Lawn, Cousens, Mathers & Black 2015:433). Although HIV contributes to 50% of the deaths in children under the age of five years, other contributors include diarrhoeal disease, meningitis, lower respiratory infections and malnutrition (Horwood et al 2011:42; Mabaso et al 2014:184). Thus, given the multitude of diseases that contribute to the high mortality rates of children under the age of five years, it is critical to explore solutions for improving child survival rates.

According to authors such as Liu et al (2015:43), scaling up proven interventions to prevent and treat childhood diseases is the key to achieving this goal of improving child survival. One of these interventions which is relevant to this study, the IMCI strategy, is advocated globally, especially in developing countries, is said to improve the health of children and reduce under-five mortality (Woods 2010:28). It is probably for this reason that the global agenda indicate that the leading causes of under-five deaths could be alleviated by ensuring high coverage of cost effective interventions (Liu et al 2015:430). A systematic analysis on causes of child mortality conducted by Liu et al (2015:436) revealed the need for additional implementation research on scaling up coverage and quality of cost effective interventions. Liu et al (2015:436) further reported on the causes of under-five deaths. They noted that preterm birth complication is the global leading cause of death, with pneumonia being second and intrapartum-related complications in third place replacing diarrhoea. This change in causal pattern of under-five deaths has not only led to the case management of pneumonia and diarrhoea receiving little attention, but it has also led to the unfortunate removal of IMCI from the global agenda (Liu et al 2015:436). Despite this, IMCI has been adopted as the gold standard in South Africa for the management of sick children at primary health care level (Horwood et al 2011:42).

In line with this, Mabaso et al (2014:183) conducted a synthesis and review of data of the current status of maternal, neonatal and child deaths in South Africa. Their rationale was to identify trends and prevalence of child deaths, and suitable approaches for reducing

maternal, neonatal and child deaths. The results of their study revealed unacceptably high maternal, neonatal and child deaths (a maternal mortality ratio estimate of 310 deaths per 100 000 live births, neonatal mortality rate of 14 deaths per 1000 live births and children under the age of five year mortality rate of 56 deaths per 100 000 live births). Clearly, child mortality is a concern in South Africa. Given these high mortality rates, the Committee on Morbidity and Mortality in Children under five years (CoMMiC) recommended the National Department of Health of South Africa to strengthen its existing child survival programmes (which includes IMCI), and strengthen training, mentoring and supervisory systems (Mabaso et al 2014:186). The child survival programmes should focus on alleviating the causes of childhood deaths, namely poor quality of care, poor communication, inadequate clinical care, and lack of adherence to nutrition and immunisation programmes.

### 2.3.2 An overview of the IMCI strategy

In order to understand the importance of the IMCI strategy, it is imperative to explain its roots and functions. IMCI is a WHO/UNICEF strategy that was launched globally in the mid-1990s. It aims to improve the health status of children under the age of five years, as well as reduce their morbidity and mortality in low- and middle-income countries (Mushi, Mullei, Macha, Wafula, Borghi, Goodman & Gilson 2010:[2]).

The IMCI strategy consists of four elements: integrated, management, childhood and illnesses. “Integrated” refers to the characteristics of the IMCI strategy which, in essence, takes into account the need to offer comprehensive and holistic care to children under the age of five years. Thus, IMCI includes curative, preventive and development aspects of child care (WHO What is IMCI… 2015:[1]). The rationale for the blend of aspects of child care is that most child deaths occur as a result of a mixture of risk factors rather than a single risk factor (Kiplagat et al 2014:[2]). This points to the need to adopt the integrated or combined guidelines for the management of childhood illnesses (Kiplagat et al 2014:[2]). “Management” refers to the case management guidelines that use algorithms, which identify specific symptoms and clinical signs (Mulaudzi 2015:89). The health care worker thus uses a syndromic approach when managing sick children. A classification rather than a diagnosis is made which enables the health care worker to select a management plan (WHO What is IMCI … 2015:[1]). “Childhood” focuses on children below five years of age (WHO What is IMCI … 2015:[2]). UNICEF stated that in 2010,

about 7.6 million children died before their fifth birthdays from preventable illnesses (Kiplagat et al 2014:[2]). Initially, the IMCI strategy did not include infants in their first week of life when first developed in 1995. Since then, several countries including South Africa, have adapted the IMCI guidelines to include infancy (WHO What is IMCI … 2015:[2]). This is because newborn babies die quickly when ill, with one in three child deaths in South Africa being due to neonatal causes (Nsibande, Doherty, Ijumba, Tomlinson, Jackson, Sanders & Lawn 2013:[2]). "Illness" refers to those diseases which may vary in severity and may cause disability or death amongst children under the age of five years. Examples of these include acute respiratory infections, meningitis, malaria, HIV/AIDS, measles, ear infections, malnutrition and anaemia (WHO What is IMCI … 2015:[2]). The death toll of children under the age of five years from treatable conditions, including diarrhoea, pneumonia and malaria is very high (an estimated 6.9 million children). This is especially evident in In low and middle-income countries (Nguyen et al 2013:[1]). A similar scenario is noted in South Africa, with the major causes of deaths of children under the age of five years reported as diarrhoea, meningitis, pneumonia, HIV/AIDS and malnutrition. These conditions or illnesses account for 80% of deaths in children under the age of five years (Mabaso et al 2014:184; Strategic Plan … South Africa 2012-2016:19).

The IMCI as viewed by Woods (2010:28) is the "principal strategy for improving child health." This is due to the fact that the IMCI strategy promotes the accurate identification of childhood illnesses in outpatient settings and ensures that appropriate treatment is prescribed and administered to children with both major and minor illnesses (Woods 2010:28). The strategy further strengthens the counselling of caregivers and speeds up referral procedures for severely ill children (Titaley, Jusril, Ariawan, Soeharno, Setiawan & Weber 2014:162). In addition, it encompasses other aspects that are vital for managing children in under-resourced settings. Examples of these aspects include assessing feeding practices and immunisation.

The three components of the IMCI strategy are focused on improving health systems, improving the skills of health care workers during case management and improving the health practices of families and communities. However, strengthening the case management skills of health care workers is viewed as the "cornerstone" to its success (Steinhardt et al 2015:[2]). This is achieved by conducting an 11-day integrated case management training programme for health care workers which was developed by the

WHO and UNICEF. This programme incorporates classroom work with clinical practice. The reason for this is to teach health care workers effective management of sick children under the age of five years (WHO IMCI information: IMCI training course for first-level health workers: Linking integrated care and prevention 1999:1). The success of this strategy lies in evidence from multi-country studies that IMCI has improved the case management skills of health care workers and quality of child care services (Titaley et al 2014:161; Integrated Management of Childhood Illness (IMCI) 2015:[1]). Despite this success, there is evidence in the empirical literature to support that health care workers do not always adhere to the case management guidelines of IMCI (Mulaudzi 2015:89; Nkosi, Botshabelo, Jorosi, Makole, Nkomo & Ruele 2012:92). For example, the results of an observational study conducted at 16 primary health care (PHC) facilities in Johannesburg showed that the quality of child care services was poor, and "less than a third of IMCI-trained nurses" adhered to the IMCI case management guidelines during the time of the study (Thandrayen & Saloojee 2010:76). It is probably for this reason that the WHO requires all IMCI-trained health care workers to be offered follow-up visits from an IMCI facilitator within four weeks of completing their training ((WHO IMCI information: IMCI training course for first-level health workers: Linking integrated care and prevention 1999:5). The reasons for the follow-up visits are to improve health workers' skills related to the implementation and use of IMCI in clinical settings, identify problems related to the management of sick children, and gather information on the performance of health care workers in order to improve IMCI implementation (Follow-up after … 1999:1). In response to reports of non-adherence to IMCI case management guidelines in Tanzania, Kiplagat et al (2014:[2]) conducted a cross-sectional study to understand the reasons for this. The findings revealed that health care workers did not receive the routine follow-up after IMCI training. In addition, the IMCI facilitators were unable to offer onsite mentoring and supportive supervision due to budgetary constraints (Kiplagat et al 2014:[5]). These factors, together, contributed to health care workers not adhering to the IMCI guidelines and not implementing and utilising the IMCI strategy. Considering these findings, strengthening these areas can have positive outcomes for improving case management skills of health care workers and IMCI implementation (Kiplagat et al 2014:[7]).

In order to ensure the successful implementation and effective use of IMCI, the following principles are to be adhered to and include: 1) the use of chart booklets, 2) assessing children for general danger signs, 3) use of an assess, classify and treat algorithm, 4) use of a colour coded triage system, 5) a routine assessment for specific conditions for

example TB and HIV, 6) the use of essential drugs and 7) the role of the caregivers in the management of sick infants and children (Woods 2010:28; Mulaudzi 2015:90).

## 2.4 IMPLEMENTING THE IMCI STRATEGY

### 2.4.1 Global implementation

As a global strategy, its implementation internationally as well as within each country must be understood. As established, the IMCI is a child survival strategy, focused on reducing childhood morbidity and mortality in under resourced settings. To date, IMCI has been implemented in over 100 countries (Goga & Muhe 2011:[1]). The focus of IMCI is on improving the case management skills of health care workers, together with strengthening health system supports and community health practices. To improve case management skills, IMCI advocates the use of an algorithmic framework for the assessment, classification and treatment of sick children (Steinhardt et al 2015:[2]). In this way, all children are assessed according to the same standards, after which treatment is given and follow-ups are carried out.

Since implementation of the IMCI strategy on a global scale, multi-country evaluations have been conducted with seemingly mixed results. Some studies have indicated an improvement in the disease classification, treatment and counselling of caregivers, whereas others report shortcomings in the areas of IMCI implementation, health systems support and community practices (Steinhardt et al 2015:2). The shortcomings that were of concern to the researchers regarding health worker performance after IMCI training are as follows: one-third of sick children are not treated correctly for severe diseases, and the lack of infrastructure does not support IMCI implementation (Steinhardt et al 2015:2). Available evidence suggests that the strategy can improve the quality of care accessed at health care facilities and reduce fatalities from illnesses (Rakha et al 2013:[6]). However, other studies, as cited by Steinhardt et al (2015:2) have reported challenges with the implementation of the strategy and gaps in health workers' performance.

These challenges are not surprising. In fact, they were identified much earlier by the Benin Ministry of Public Health who expressed their concerns in 1999, during the planning stages of IMCI implementation. This was related to the view that training would not lead

to an improvement in health workers' practices, and that performance might deteriorate further within a year following training. In an attempt to address this problem, a study that used two complementary methods namely, record review and cross-sectional surveys was conducted to determine whether the performance of health care workers deteriorated over three years (Rowe, Osterholt, Kouamé, Piercefield, Herman, Onikpo, Lama & Deming 2012:439). There was no evidence to suggest that performance declined over three years after IMCI training. However, weaknesses in performance, such as identifying treatment for anaemia, and difficulty in mastering specific clinical skills such as identifying chest in drawing were noted. Both of these weaknesses might have practical implications for IMCI implementation. Rowe et al (2012:439) therefore recommended an investigation into factors that influence health workers' practices to improve and maintain health workers' performance. Further, Steinhardt et al (2015:2), undertook a cohort study to gain a better understanding of the factors influencing health worker performance after IMCI training in Benin, from 2001-2002. The findings of Steinhardt et al (2015:8) are similar to those of other studies. These authors noted that a range of factors are associated with the quality of case management. Patient-level factors (infants received better care than older children), and health worker age (younger health care workers outperformed older health care workers) are considered the most important predictors of the quality of case management. The frequency of supervision and in-service training are often reported to impact less on the quality of care (Steinhardt et al 2015:8).

Focusing on South-East Asia and India, similar available data and trends on neonatal and child health from the South-East Asia Region (SEAR) have indicated a slow decline in neonatal mortality rates that increased the risk of this region not achieving the Sustainable Development Goal 3 (Nair, Arya, Vidnapathirana, Tripathi, Talukder & Srivastava 2012:223). In an attempt to improve neonatal health, India implemented the Integrated Management of Neonatal and Childhood Illnesses (IMNCI). India further initiated a project to strengthen health worker performance by providing supportive supervision to health workers trained in the Integrated Management of Neonatal and Childhood Illnesses (Nair et al 2012:224). Outcomes of this intervention revealed an improvement in assessment, treatment and counselling. However, the inadequacy of IMCI implementation has continued to be a concern for some countries that have adopted IMCI (Nguyen et al 2013:[2]). Recent findings report that IMCI is plagued by issues of low coverage, fragmented health systems and inadequate community practices (Nguyen et al 2013:[2]). This has necessitated further exploration on health worker performance. A systematic

review and meta-analysis of whether IMCI training strengthens health worker performance in five selected areas (classifying illnesses, prescribing appropriate medications, providing vaccinations, counselling caregivers on nutrition, and instructing them on the administration of medication) was conducted (Nguyen et al 2013:[2]). The findings revealed that a greater number of health workers trained in IMCI are correctly classifying illnesses and prescribing the right medications (Nguyen et al 2013:[7]). Nair et al (2012:225) suggested in their study that supportive supervision can improve the efficacy of the Integrated Management of Neonatal and Childhood Illnesses and reduce infant mortality rates in India. Similarly, the analysis conducted by Nguyen et al (2013:[8]) further lends support to the view that health worker performance can be enhanced by improved supervision, case management observation and the availability of resources.

In other countries, such as Indonesia and Tanzania, which are considered low to middle income countries with resource limited settings, IMCI was implemented (Titaley et al 2014:162; Kiplagat et al 2014:[1]). Both countries adopted IMCI with the aim of reducing morbidity and mortality amongst infants and children aged 5 years and below. Cross-sectional studies were conducted in Indonesia and Tanzania to broadly examine the implementation and use of IMCI at health centres. The findings from both countries were similar as they revealed barriers to the implementation and use of IMCI. In addition, the findings revealed that a high percentage of health care workers acknowledged the importance of IMCI, with 77% of the health care workers from Tanzania stating that it was a more suitable approach to manage sick children in resource limited settings (Titaley et al 2014:165; Kiplagat et al 2014:[9]). Based on these findings, recommendations by the researchers to strengthen or improve IMCI implementation in both countries include the following: increase in the provision of support for health care workers through on-site mentoring, supportive supervision, enhancing training programmes, and improving the health care system (by increasing health care financing and ensuring a constant supply of essential drugs). Implementing these recommendations can improve IMCI implementation and effectiveness in resource-limited settings (Titaley et al 2014:168; Kiplagat et al 2014:[9]).

Unearthing similar sentiments, a research study carried out in Rwanda in 2010 revealed that although IMCI had been implemented on a national scale, the skills of the nurses trained in IMCI were suboptimal, and their under-five and infant mortality rates remained high (Magge et al 2015:565). One of the factors found to be contributing to the poor quality

of IMCI-related services was limited on-site supervision (Magge et al 2015:565). The results of a study conducted in Uganda, demonstrated that IMCI trained health workers who received one supervisory visit performed significantly better than those without supervision (Magge et al 2015:565). These results or findings motivated the Rwanda Ministry of Health to adopt an intervention called the Mentoring and Enhanced Supervision at Health centres. The aim of the Mentoring and Enhanced Supervision at Health centres is to provide support for the standard IMCI training programme to improve health worker performance (Magge et al 2015:566). Data were collected from research participants after IMCI training both before the Mentoring and Enhanced Supervision at Health centres intervention, and after 12 months of the Mentoring and Enhanced Supervision at Health centres intervention. The results of the study indicated that IMCI trained nurses who received the Mentoring and Enhanced Supervision at Health centres intervention, performed significantly better in IMCI assessments (Magge et al 2015:568). The Mentoring and Enhanced Supervision at Health centres intervention therefore has a role to play in strengthening IMCI implementation and increasing child survival rates. However, a review of surveys from Namibia, Kenya, Tanzania and Uganda provided a more realistic picture of the state of health worker adherence to the IMCI guidelines (Krüger et al 2017:10). The assessments for danger signs was performed best in Uganda, whilst in Namibia health workers were better in assessing fever and pneumonia (Krüger et al 2017:5). Overall, a consistent finding from all the countries was that health workers who received re-training in the past 12 months performed better than health workers who received no re-training (Krüger et al 2017:4). It is evident that both studies present two separate arguments for strengthening health worker performance. The study by Magge et al (2015:568) highlights the need for supervision whilst the recommendation from Krüger et al (2017:[10]) is that there is a need for periodic re-training of health workers who have been trained in IMCI case management.

Through investigating these challenges of IMCI, numerous studies have documented that poor adherence with IMCI guidelines is common, but information on the reasons for non-compliance is limited. Lange, Mwisongo and Mæstad (2014:56) conducted a mixed-methods study in Tanzania to measure adherence to IMCI case assessment guidelines and then identify reasons for poor adherence. The quantitative phase revealed a poor adherence to clinical guidelines, whilst the follow-up study (qualitative phase) in which in-depth interviews were conducted revealed numerous reasons for poor adherence (Lange et al 2014:61). Firstly, it noted that the failure of health care workers to follow IMCI

guidelines was partly due to a lack of motivation to do so, and the belief that the guidelines were not important. Secondly, the experience of the health care workers and faith in their diagnostic skills interfere with their adherence to IMCI guidelines (Lange et al 2014:59-60). Although there is no conclusive evidence to support that higher salaries would influence health care workers to adherence to IMCI guidelines, the findings of Lange et al (2014:62) indicate an association between remuneration and patients' treatment.

In considering these results, it must be borne in mind that the timeous and correct management of sick children will contribute to the achievement of Millenium Development Goal 4. Revised policies and treatment protocols should therefore be integrated into the IMCI clinical guidelines. Another study in Ghana conducted by Febir, Baiden, Agula, Delimini, Akpalu, Tivura, Amanfo, Chandramohan, Owusu-Agyei and Webster (2015:[1]) explored the perceptions of health workers regarding the implementation and use of the WHO revised IMCI guidelines for malaria. The findings that emerged were related to non-adherence to the IMCI guidelines and health systems challenges. Along similar lines, Stephen, Murila and Wamalwa (2017:8) conducted a study to determine the proportion of sick children who were correctly assessed and managed for acute diarrhoea using the IMCI guidelines. Hereto the findings indicated that the health workers failed to adequately assess, manage and document the cases of children with signs and symptoms of dehydration and health systems challenges (Stephen et al 2017:10). Both studies provide evidence of sub-optimal health worker skills in the assessment and treatment of sick children and health systems challenges which impact on the quality of care. Stephen et al (2017 :10) reported that the health systems challenges were lack of supplies to manage acute watery diarrhoea whilst Febir et al (2015:[3]) stated that the health systems challenges were policy changes, financial shortcomings, and the supply and quality of malaria rapid diagnostic test kits. Both studies identified the need to strengthen training of the health care workers and address health systems challenges (Stephen et al 2017:10; Febir et al 2015:[8]).

As one of its' key elements, the IMCI strategy recognises the role of the caregivers in administering home remedies, giving treatment at home, identifying the degree of illness of children and when to return to health facilities. A literature review on caregivers and IMCI was conducted between 1998 and 2008 by Paranhos, Pina and De Mello (2011:205), and identified the role of caregivers in relation to IMCI. The countries included in the review were Brazil, Kenya, Pakistan, Benin, Mexico, Nigeria, South Africa, Sudan

and Ecuador. Their findings revealed that communication between health care workers and caregivers is vital for the recovery of a sick child. Essentially, effective use of communication skills can strengthen the “therapeutic relationship” between the health care worker and patients, a view echoed in the IMCI strategy (Paranhos et al 2011:210).

In relation to newborn children and infants, the IMCI strategy has been expanded to include care of the new born and young infants, from birth up to two months (Woods 2010:28). Neonatal (0-28 days) deaths of preventable illnesses or conditions in resource-limited countries are still noted in the empirical literature to be high (Simen-Kapeu, Seale, Wall, Nyange, Qazi, Moxon, Young, Liu, Darmstadt, Dickson & Lawn 2015:[1]). As authors note, appropriate case management of this vulnerable group could result in a decline in neonatal deaths (Simen-Kapeu et al 2015:[1]). A multi-country analysis conducted by Simen-Kapeu et al (2015:[2]), was the first in-depth analysis that focused on exploring health system challenges across twelve countries, identifying solutions to overcome the challenges and strengthening case management of neonatal illnesses or infections, such as sepsis and pneumonia. The participating countries were Afghanistan, Cameroon, Democratic Republic of Congo, Kenya, Malawi, Nigeria, Uganda, Bangladesh, India, Nepal, Pakistan and Vietnam. The following were identified as major challenges in more than three quarters of the countries namely: health workforce, community ownership and partnership, health financing and health management information systems. The health workforce and community ownership were ascertained as being the priority areas to improve the treatment of neonatal illnesses or infections. A participatory approach was used to engage with technical experts from twelve high burden countries in an effort to identify solutions for these challenges (Simen-Kapeu et al 2015:[8]). Examples of these solutions, provided by Simen-Kapeu et al (2015:[12-13]), include increasing community capacity by empowering women to recognise signs of possible serious bacterial infection, prompt and timely seeking of medical care, and strengthening the health workforce through in-service and pre-service training and on-going supervision. Operationalising these examples, Simen-Kapeu et al (2015:[12-13]) emphasised, could decrease child and neonate mortality and morbidity rates. In stating this, it has been noted following a meta-analysis based on studies form Tanzania, India and Bangladesh that the implementation of IMCI has not had the expected 50% reduction in under-five mortality rates (Krüger et al 2017:10). It has been further noted that the marked reduction in under-five mortality following IMCI implementation has only been identified in one study in Egypt (Krüger et al 2017:10).

Regarding the Western Pacific region of the globe, the area has reported a decline in child mortality and is on track to achieve the Sustainable Development Goal 3. Some poorer countries within this region such as the Solomon Islands and Fiji have not made progress towards achieving the Sustainable Development Goal 3. Jayawardena, Subhi and Duke (2012:210-211) aimed to "explore the experiences of these poorer countries in the implementation of child survival strategies. The rationale was to identify factors that might promote and impede their achievement of the Sustainable Development Goal 3. The challenges to IMCI strategy implementation in the Western Pacific region are not dissimilar to other low-income countries. Examples of such challenges include budgetary and training constraints, and inadequate guidelines for strengthening community-based IMCI. The findings on the quality of IMCI case management revealed an improvement in Mongolia and Vietnam, and a decline in Cambodia. Perhaps many can look to China where pre-and-post facility-based studies were conducted, the identification of general danger signs in sick children increased from 15% to 90%, and the prescribing of appropriate treatment increased from 20% to 80% (Jayawardena et al 2012:215). The outcomes from the study in China led to the development of frameworks for countries with high child mortality. The rationale for this is to strengthen their child survival programmes (Jayawardena, et al 2012:217).

In Botswana, IMCI was implemented in 1997. The Botswana Health Facility Report of 2004 noted that health care workers failed to follow IMCI guidelines when managing sick children under the age of five years (Nkosi et al 2012:93). Taking this into account, the Botswana annual IMCI report of 2009 highlighted the importance of adhering to IMCI guidelines to the National Health Service system (Nkosi et al 2012:92). The same authors explored the challenges experienced by the primary health care nurses in the use of the IMCI guidelines. Their findings revealed that only 45% of the primary the health care nurses followed the IMCI guidelines in its entirety when attending to sick children under the age of five years. This concurred with the findings of the health facility report of 2004 (Nkosi et al 2012:91,100). The challenges that the primary health care nurses faced when implementing the IMCI strategy were lack of resources, shortage of staff, lack of time, untrained staff and lack of supervision (Nkosi et al 2012:91). The primary health care nurses stressed that effective implementation of the IMCI strategy could be achieved if and only if the aforementioned challenges are alleviated (Nkosi et al 2012:100).

Staying on the African continent, Rakha et al (2013:[1]) conducted a comparative study in Egypt on the impact of IMCI implementation on under-five mortality. Specifically, the annual under-five mortality rates before IMCI implementation was compared to the mortality rates after IMCI implementation. To achieve this, Rakha et al (2013:[1]) focused on four key areas of IMCI implementation: IMCI training, health facility supports, appropriate treatment, and caregiver knowledge and caregiver satisfaction with the services. Data analysis revealed an improvement in all four areas, which resulted in a decline in under- five mortality rates (Rakha et al 2013:[6]). This finding revealed that systematic and effective implementation of the IMCI strategy could improve the quality of care. Thus, it is clear that an improvement in the quality of care could result in a reduction in child mortality.

Previous studies have also documented the effectiveness of IMCI in the context of reduction in child mortality (Goga & Muhe 2011:[2]). Despite this, the global coverage of IMCI remained low, a function of the challenges often experienced during the implementation of this strategy. A multi-country survey conducted by Goga and Muhe (2011:[9]) presented a unique perspective on the challenges of IMCI implementation. Five emergent themes were identified as challenges or barriers to IMCI implementation: “lack of political support, lack of human and material resources and time for IMCI implementation, poor reading ability of health care workers and a mismatch between training needs and resources available” (Goga & Muhe 2011:[4]). The urgency to overcome these barriers to IMCI implementation cannot be ignored, as IMCI is still viewed as a key strategy for lowering under- five mortality rates (Goga & Muhe 2011:[10]).

### 2.4.2 Implementation of the IMCI strategy in South Africa

The Department of Health of South Africa adopted the IMCI strategy in 1996 and adapted it to suit the South African context. It is the aim of the Department of Health to prevent or at least reduce the childhood morbidity and mortality rates. South Africa conducted the first case management training for IMCI implementation in 1998 in Mpumalanga province, and by July 2002, all the nine provinces in this country had initiated IMCI implementation (Report of IMCI ... 2002:6). It must be emphasised that such a success was a function of the strong commitment of the government of South Africa to ensure IMCI implementation. An important recommendation stemming from the report of a Health Facility Survey conducted in the Free State, Gauteng and the Western Cape was for the IMCI strategy

to be recognised as a national priority. Added to this, the report of the Health Facility Survey also noted that in addition to training, health care workers are to be provided with regular and consistent support in the form of supervision and visits for following training (Report of IMCI … 2002:27).

In order to measure the success of the IMCI, the WHO conducted health facility surveys in the continent of Africa from 1998-2004. The six countries that were included in the survey were Botswana, Malawi, South Africa, Tanzania, Uganda and Zambia. The report of the survey was positive regarding IMCI implementation in South Africa. In June 2004, approximately 93% of the districts in South Africa were implementing IMCI with a marked improvement in the quality of care for sick children (World Health Organization [s.a.]:3). Comprehensive assessments were carried out, and growth patterns and immunisation status were closely monitored. There was also an overall improvement in health workers' prescription practices and caregivers' counselling (World Health Organization [s.a.]:3).

The KwaZulu-Natal Department of Health Annual Report of 2005/2006 indicated that about 75% of the clinics in this province have one professional nurse trained in IMCI (KwaZulu-Natal … 2005/2006:40). It is further indicated that at least 60% of their professional nurses have been trained in IMCI case management in more than a third of its clinics. Despite the earlier progress made, in its annual report of 2012/2013 it is stated that only 50% of professional nurses at public health facilities have been trained in IMCI (KwaZulu-Natal … 2012/2013:40). Training in South Africa is ongoing, and it is reported that 10 000 health care workers have been trained (Fick 2017:209). However there remains an inadequate number of nurses trained in IMCI which is consistent with the global concern of the limited capacity of nurses trained in this strategy (Fick 2017:209).

It is evident that skills training is the key to IMCI success. The IMCI case management training can equip health care workers with specific skills to manage sick children who may present with more than one illness. The skills include assessment, classification, treatment, counselling and urgent referral. Despite this, the WHO recommends for health care workers trained in IMCI to be supported with follow-up visits after training (Horwood et al 2009a:[2]). The rationale for this is to strengthen their skills in the clinical environment (Horwood et al 2009a:[2]). The study by Horwood et al (2009a:[2]) investigated the assessment skills of health care workers trained in IMCI in the provinces of Limpopo and KwaZulu-Natal. The focus was on the quality of the health care workers' assessment

skills of sick children. The findings revealed that IMCI assessments were frequently incomplete, and those children who were severely ill and required urgent referral were often overlooked. Most health care workers (65%) received a follow up visit after training. However, the study did not reveal any relationship between health worker performance and follow up visits (Horwood et al 2009a:[3]). Although IMCI can improve the quality of care for sick children in under-resourced settings, incomplete assessment can have a negative impact on child survival (Horwood et al 2009a:[5]). Given that supervision can improve performance, strengthening IMCI supervision can positively impact IMCI implementation and use (Horwood et al 2009a:[5]).

As mentioned, the IMCI strategy is the accepted standard for the management of sick children at primary health care level in South Africa (Horwood, Butler, Vermaak, Rollins, Haskins, Nkosi, Neilands & Qazi 2011:42). The IMCI strategy offers guidance to health care workers in the form of guidelines, when managing sick children (Horwood et al 2011:42). The IMCI guidelines have been adapted by the South African government to suit the South African context. Acknowledging this, the IMCI guidelines used in South Africa can be correctly referred to as revised guidelines. The revised IMCI guidelines focus on respiratory infections, diarrhoeal disease, meningitis, malaria, malnutrition, ear infections and HIV, as these are the critical conditions that affect children in South Africa. The lack of published data on the profile of diseases of children attending primary health care facilities led Horwood et al (2011:43) to conduct a study in South Africa, with particular attention on the prevalence of HIV among children. The findings revealed that pneumonia, and undiagnosed HIV related infections were common among children at the primary health care level. Improved management of these children could lead to better health outcomes and ultimately lower childhood morbidity and mortality rates (Horwood et al 2011:49). There are sub-optimal levels of IMCI implementation and use in South Africa, as sick children receive substandard care at the primary level (Horwood et al 2011:49). This can be remedied by improving the implementation and use of IMCI and strengthening the skills of health care workers at the primary health care level (Horwood et al 2011:50).

Focusing on this, primary health care nurses in Limpopo Province are trained in IMCI case management, and they are very familiar with this strategy in the management of sick children (Vhuromu & Davhana-Maselesele 2009:61). Given this, Vhuromu and Davhana-Maselesele (2009:61) explored and described the experiences of primary

health care nurses in implementing the IMCI strategy at selected clinics in the Vhembe District, Limpopo Province. The central theme that emerged was that primary health care nurses experienced difficulties in rendering IMCI services. These difficulties were because of lack of resources (both human and material), and poor working conditions (Vhuromu & Davhana-Maselesele 2009:63). Arguably, the use of the use of the IMCI can be enhanced if these difficulties or challenges are alleviated.

South Africa and other countries like Brazil and Tanzania have expressed concern regarding the poor performance of nurses following IMCI training (Woods 2010:28). It is reported in the empirical literature that some nurses trained in IMCI often demonstrate a lack of ability to assess and manage sick children (Woods 2010:28). Inadequate health system support and limited or lack of supervision is cited as reasons for such inability, which Woods' (2010:28) described as poor performance. However, previous studies conducted outside of South Africa noted that successful implementation of the IMCI strategy is positively correlated or associated with health worker performance or ability (Rakha et al 2013:[6]; Titaley et al 2014:161). Thus, the South African Department of Health acknowledged the IMCI strategy as a national priority, and thus directed resources to ensure its successful implementation (Thandrayen & Saloojee 2010:73). What should therefore be evident, following the successful implementation of the IMCI strategy, is improved child health care delivery and a decline in under- five morbidity and mortality rates (Thandrayen & Saloojee 2010:73).

Thandrayen and Saloojee (2010:73) further evaluated the quality of care offered to children attending primary health care clinics in Johannesburg. The findings revealed that twelve clinics (75%) had a health care worker trained in IMCI, and professional nurses (50%) trained in IMCI. However, only three clinics actually had a nurse who was implementing the IMCI strategy. Less than a third of nurses trained in IMCI were using the IMCI algorithm when screening sick children (Thandrayen & Saloojee 2010:75). Danger signs were poorly assessed, as was checking respiratory rates, and the presence of stiff neck and bulging fontanelle. These findings are not dissimilar to other local settings (Thandrayen & Saloojee 2010:76). In addition, the poor quality of health care meted out to sick children, can be attributed to poor quality control mechanisms, and the limited abilities and commitment of health professionals, rather than to training or infrastructure limitations (Thandrayen & Saloojee 2010:77).

The lack of a formal system of triage in South Africa led researchers to question the effectiveness of the IMCI strategy in triaging sick children. Cheema, Stephen and Westwood (2013:43), in their article on paediatric triage in South Africa, described the IMCI algorithm as “rudimentary” in relation to a triage system. They further noted that whilst IMCI strategy is a valuable clinical tool for the assessment of sick children in under-resourced primary health care settings, it fails to identify immediate life-threatening illnesses (Cheema et al 2013:43). The IMCI strategy allows for a rapid appraisal of all sick children, including those in need of an assessment for general danger signs (Cheema et al 2013:43). However, even though this is like a form of triage, it lacks the speed and acuity that is required for treating sick children (Cheema et al 2013:43). Cheema et al (2013:43) cited the findings from a study evaluating the quality of IMCI assessments in South Africa. Evidence shows that very few health care workers accurately assessed and classified sick children using the IMCI strategy. Only about 12% of health care workers checked every child for general danger signs. However, 46.4% of children are accurately classified as having a general danger sign and severe classification. It was conceded that although IMCI assessments were sub-standard, it played a valuable and life-saving role in triaging within the primary health care systems. It is therefore worth recommending for all health workers trained in IMCI to continuously check all sick children for general danger signs in order to assist with early identification of children with critical health needs (Cheema et al 2013:45). Adhering to this recommendation would strengthen the paediatric triage system, and IMCI implementation and use. McKerrow and Mulaudzi (2010:70) stated in their report on child mortality in South Africa that the strengthening of priority programmes could improve the well-being of children, which in turn would reduce the mortality of this population. One of the priority programmes that were highlighted in this regard was IMCI. However, the success of this programme does not depend solely on the existing health system, but it also depends on community and home care services (McKerrow & Mulaudzi 2010:70).

It is also key to focus on the preventative illnesses that IMCI hopes to reduce and investigate how these may be avoided. A leading cause of morbidity and mortality in children in developing countries is diarrhoea (Cooke, Nel & Cotton 2013:84). Thus, engaging in optimal management of diarrhoea in the respective homes of children can save the lives of the same. Optimal management includes counselling caregivers on best feeding practices, fluid replacement and identification of danger signs (Cooke et al 2013:84). The paucity of data on the implementation of IMCI and the use of oral

rehydration therapy (ORT) in the Western Cape Province of South Africa necessitated a prospective, descriptive study by Cooke et al (2013:85). The focus of their study was on pre-hospital home and primary care management of diarrhoeal disease, including the mixing and use of oral rehydration therapy, fluid intake at home, and advice from health care providers in the context of the IMCI strategy. The findings of Cooke et al's (2013:85-86) study revealed the following:

- Oral rehydration therapy was initiated by 80% of caregivers in their respective homes.
- The number of caregivers giving oral rehydration therapy in their homes has increased. This can be attributed to the success of the IMCI programme. Previous studies conducted in 2003 and 2009 reported fewer caregivers giving oral rehydration therapy in the home (60% and 42% respectively).
- The incorrect mixing of oral rehydration therapy is a concern, as does a poor understanding of fluid replacement and feeding practices.
- The advice given by health care workers on giving extra fluids, the recipe for sugar salt solution, continuing feeds and the danger signs of dehydration remains substandard.

Given these findings, Cooke et al (2013:87) concluded that IMCI requires further promotion in the community, and at the primary care level. Thus, commitment from the community is a key factor in the success of IMCI and the survival of many children.

Unfortunately, despite these investigations into the implementation of the IMCI strategy in South Africa, it has failed to significantly reduce the under-five mortality rates. Statistics from 2010 showed that 47 417 children under the age of five years died of mainly neonatal conditions, pneumonia, diarrhoea, HIV and malnutrition (Mulaudzi, 2015:89). Research findings from studies conducted in South Africa showed that training health care workers in the IMCI case management guidelines could improve the quality of care offered to sick children (Mulaudzi 2015:89). However, there is no recent data on the numbers and the coverage of health care workers trained in IMCI in South Africa (Mulaudzi 2015:89). In addition, the implementation and use of the IMCI guidelines are often inadequate, a view echoed in outcomes of studies by Chopra (2005) and the Child Health care Problem Identification Programme as cited in Mulaudzi (2015:89). It is therefore not surprising to note that whilst there has been a decline in the under-five mortality rate in South Africa

from 48.1 per 1000 in 2007 to 23.6 per 1000 in 2013, it has not been sufficiently robust to meet the 2015 Millennium Development Goal 4 (Millennium Development Goals 4: Reduce child mortality/Statistics South Africa 2015:1). Considering this and the varied coverage of health care workers trained in IMCI, Mulaudzi (2015:89) conducted a cross-sectional study in Kalafong Hospital, Pretoria, to assess health care workers' adherence to IMCI case management guidelines. The findings are suggestive of non-compliance to IMCI case management guidelines, incorrect and incomplete classifications of conditions and failure to administer pre-referral treatment (Mulaudzi 2015:91). This finding concurs with an earlier study conducted by Horwood et al (2009a:[4]). However, the limitations of this study are to be taken into account when considering these outcomes. This is because it was not known whether all the primary health care workers were trained in IMCI, and whether the absence of records of pre-referral treatments on referral notes was an indication that the pre-referral treatments were not administered. Acknowledging this, the study recommends for health care workers to be trained and supported in using the IMCI guidelines, including record keeping or documentation (Mulaudzi 2015:92).

Admittedly, there are still gaps in the implementation of the IMCI case management guidelines in South Africa even though they were adopted almost 20 years ago to assist in the realisation of the Millennium Development Goals (Mulaudzi 2015:89). The National Department of Health highlighted its commitment to IMCI implementation through IMCI capacity building in its 2013/2014 work plan. The rationale is to develop practitioners who are competent in the use of IMCI in the context of being fit for purpose and practice (South African … 2013/2014:3). This confirms that IMCI is a critical aspect of clinical care for children under the age of five years to lower under-five mortality rates. In stating this, the review of research conducted in South Africa has shown that there needs to be a collective input from health care workers and the community.

## 2.5 IMCI CASE MANAGEMENT TRAINING

When implementing a strategy which aims to enhance healthcare and quality of life, it is important that those in contact with patients are fully trained and supportive of that strategy. Low and middle-income countries like South Africa, Tanzania and Brazil initiated IMCI training to provide health care workers with the skills required to treat sick children using the IMCI strategy (Report of IMCI … 2002:6; IMCI training…1999:5). An audit of the mortality of children conducted in public hospitals in South Africa indicated that many

of the deaths were avoidable (McKerrow 2014:1). According to McKerrow (2014:1), any failure to adequately train nurses in the use of the IMCI case management algorithms, can impact negatively on the mortality of children. The need to strengthen the skills of health care workers through pre-service, post-graduate and in-service training in child health programmes, not excluding the IMCI strategy, is therefore vital (McKerrow 2014:1). This view was shared by Coetzee (2014:1) who convened a colloquium, and utilised a participative World Café approach to understand the current situation of paediatric nurse training in South Africa. One of the outcomes from the colloquium was to strengthen nurse training in the area of national child health priorities which could be achieved through improved teaching and learning strategies (Coetzee 2014:4).

When considering training, the WHO and UNICEF acknowledge that in-service training in IMCI would not in itself contribute to a greater number of health care workers trained in the IMCI strategy. In-service training requires increased organisational effort, and greater investment in resources to expand the coverage of health care workers trained in IMCI. As this was not practical, health authorities in different countries explored the feasibility of pre-service training, in addition to in-service training, as a means of expanding coverage (WHO IMCI Information: Introducing IMCI … 1999:1). According to Johnson, Fogarty, Fullerton, Bluestone and Drake (2013:[2]), pre-service education refers to "the curriculum of studies that prepares a health provider for entry into practice of a health profession." The WHO and UNICEF defines pre-service training for IMCI as "including IMCI in the teaching agendas of medical, nursing and other health professionals' institutions" (WHO IMCI Information: Introducing IMCI …1999:1).

Applying this to the South African context, the universities and public nursing colleges in South Africa have included IMCI pre-service training in their nursing curricula (Van Dyk & Bezuidenhout 2013:128). However, there remains a paucity of data on the state of IMCI pre-service in training institutions, like nursing colleges in South Africa. This prompted the study conducted at the University of Free State that examined the quality of IMCI nurse training (Van Dyk & Bezuidenhout 2013:129). A qualitative, descriptive research design was used, and the target population was second year nursing students. The findings of the study revealed that IMCI training helped the student nurses to "feel competent and knowledgeable" when using the chart booklet and examining and treating sick children, and counselling caregivers. The study also revealed a lack of understanding of what is required during tests, a lack of consistency when using assessment tools, and a lack of

practical exposure for completing documents (Van Dyk & Bezuidenhout 2013:134-135). However, the study did not offer clarity on whether good quality IMCI nurse training was taking place at this institution (Van Dyk & Bezuidenhout 2013:136).

Despite this being the case, other countries, like Ethiopia, have adopted pre-service training. Ethiopia implemented IMCI pre-service training to address the challenges experienced in achieving the desired coverage of health workers trained in IMCI. Pre-service training is considered to be both economical and sustainable, although there have been concerns regarding the training (Haileamlak et al 2010:[1]). Research was conducted using a cross-sectional survey to assess the status of pre-service training in Ethiopia. Findings revealed that most health professional training institutions had incorporated IMCI into their training programmes (Haileamlak et al 2010:[2]). The commonly used methods for classroom teaching were group discussion, demonstration and facilitation. The most commonly used methods in clinical practice were demonstration and supervised individual and group practice. Most of the training institutions assess students in IMCI training using the format of written essays and clinical examinations (Haileamlak et al 2010:[3]). The main challenges to IMCI pre-service training that were identified were a shortage of health workers trained in IMCI and teaching materials, staff attrition, difficulty in integrating IMCI into the existing curriculum and the large number of students. Other findings include the good attitudes of teaching staff and students toward IMCI training, and above average performance of students in managing sick children as per the IMCI guidelines. The recommendations included strengthening the IMCI pre-service training by facilitating staff training, ensuring that there are adequate teaching materials and aids, allocating adequate time to clinical practice and exploring alternative, and innovative approaches to IMCI pre-service training (Haileamlak et al 2010:[4]). With the advent of the Sustainable Development Goals and other WHO and UNICEF programmes, Duke (2017:3) presents an argument for a more efficient and sustainable way to conduct IMCI training in Papua New Guinea. It is suggested that training should be user-friendly to facilitate in-service training or as self-learning method. In addition, the integration of information technology should be explored to improve efficiency and allow for learning materials to be easily accessed and updated (Duke 2017:3). Evidence from two studies suggests that the integration of technology for IMCI case management whether in the classroom or clinical area can have positive outcomes. In a quantitative study conducted by Mitchell, Hedt-Gauthier, Msellemu, Nkaka and Lesh (2013:[1]) to investigate the impact of technology on adherence to the IMCI guidelines, findings

indicated that the health workers preferred using the Personal Digital Assistant Device (PDA). Health workers indicated that it improved the accuracy and completeness of their assessments of sick children. This requires the health workers' interaction with an electronic device. A qualitative study undertaken by Shao, Rambaud-Althaus, Swai, Kahama-Maro, Genton, D'Acremont and Pfeiffer (2015:[1]) explored the perceptions of health workers with regards to the use of a new electronic algorithm. The majority of the health workers had positive attitudes regarding the electronic algorithm, with only a few health workers experiencing problems with typing (Shao et al 2015:[7]).

Further afield, the implementation of IMCI pre-service training in medical schools in Brazil yielded the following results: medical students accepted the integration of IMCI into their paediatric module and displayed an improvement in their knowledge base in the field of child health (Fujimori, Higuchi, Cursino, Verissimo, Borges, De Mello, Nascimento, Behn & Wilson 2013:656). However, there was a dearth of information regarding how the IMCI strategy was taught to nursing students. A study was conducted by Fujimori et al (2013:656), to describe and analyse the teaching of the IMCI strategy in undergraduate nursing programmes. Its findings added to the body of knowledge in this subject area.

Although the research area was the same, the methodology as well as the findings, differed from that of studies undertaken in South Africa and Ethiopia, which utilised a cross-sectional online survey to collect data. Only 64% of the training institutions in Brazil had incorporated IMCI into their curricula. For those that did, the use of traditional teaching methods predominated, with case studies used less often and videos were infrequently used. Less than 50% of the training institutions included practical activities during IMCI case management training and the treatment module had "rarely or never" been used. Only one third of lecturers had received IMCI training and there were even fewer IMCI trained clinical instructors to assist with clinical training. There was also a lack of appropriate teaching material for example the IMCI instructional manuals (Fujimori et al 2013:659-661). This study reflected the "weakening" of the quality of IMCI training in both public and private nursing institutions in Brazil, as is evidenced in the findings (Fujimori et al 2013:661). Perhaps what is most concerning is that the IMCI case management training has not been included in all undergraduate nursing programmes. Only a few lecturers are trained in IMCI, and access to IMCI teaching materials remains a challenge.

According to Wilson (2014) cited in Jackson and Ashworth (2015: S50) the global challenges to in-service training include shortage of experienced trainers, inadequate supply of training materials, poor follow-up, limited supportive supervision, frequent attrition of trained staff, cost of releasing staff for training, travel and accommodation costs, and reluctance of trained staff to use their IMCI knowledge and skills in the clinical areas. In addition, Wilson (2014) as cited in Jackson and Ashworth (2015: S50) further stated that pre-service training presented with its own challenges which included: difficulties with integrating IMCI into a pre-existing curriculum, accessing suitable clinical facilities for practical learning, ensuring a constant supply of teaching materials and acceptance by fellow academics for the inclusion of IMCI into different academic programmes. The lessons learned were that both in-service and pre-service training were equally important and could be adapted for use in different settings, such as shortening IMCI service training and the use of interactive e-learning programmes for pre-service training (Jackson & Ashworth 2015: S51).

### 2.5.1 The IMCI course organisation, training aids and facilitation methods

The aim of the case management component of IMCI is to improve the clinical skills of health care workers who treat sick children. This can be achieved with the help of a robust training process of case management that includes distinct steps or stages: course organisation, IMCI training aids and facilitation methods. The course organisation stage is discussed here in two contexts: the international context and South African context.

#### *2.5.1.1 IMCI course organisation*

##### *2.5.1.1.1 International context*

In order to standardise guidelines globally and ensure strict adherence to them, the 1999 IMCI information pack lists specific guidelines pertaining to IMCI training and course organisation. The specific guidelines that will ensure standardised quality IMCI training include: an eleven-day training course, which would include a minimum of 30% clinical contact time. The size of participants groups should be limited to 24 participants for each training course. The ideal facilitator: participant ratio should not exceed 1:4. This ratio of facilitators to participants allows for the promotion and monitoring of participants' learning (Horwood et al 2009b:[4]). IMCI facilitators are carefully selected to ensure good quality

IMCI training (Horwood et al 2009b:[4]). The course facilitators oversee case management training in the classroom, whilst the clinical instructors guide learning in the clinical venues (IMCI training 1999:3-4).

In order to test the adherence and success of these guidelines, an exploratory survey of 27 purposively selected countries was conducted to document the experiences of different countries regarding IMCI case-management training, and to determine the acceptability of shortening the duration of training (Goga et al 2009:[1]). Sudan, Ghana and Madagascar were included as they were located within six WHO regions and had high under-five mortality rates (Goga et al 2009:[2-3]). Results of the study showed that many countries were forced to make adaptations to the course duration, course content and clinical practice, based on country specific needs (Goga et al 2009:[5]). All the countries studied offered shorter IMCI case management training courses ranging from three to ten days as the eleven-day course was too costly. No mention was made of whether the shortened courses impacted on the quality of care. However, health care workers who attended the shorter course rated themselves to be less skilled than those health care workers who attended the full eleven-day course (Goga et al 2009:[4]). This can be attributed to the fact that the shorter course did not make allowances for individual feedback or provide opportunities for skills reinforcement or mentoring (Goga et al 2009:[5]). The study concluded that although there is a place for a shortened IMCI case management training, it must be supplemented with follow-up and mentoring post-training (Goga et al 2009:[6]).

The training of health care workers is an integral part of the integrated management of childhood illness and is therefore emphasised in the IMCI strategy. Despite several years of implementation of the IMCI strategy, many countries, including Kenya and Tanzania have low coverage of IMCI trained health workers (Mushi et al 2010:2). A document review and in-depth interviews with stakeholders revealed factors facilitating and constraining the roll-out of IMCI training in Kenya and Tanzania. Variations in coverage did exist between districts in Kenya and Tanzania. High costs and limited funding, and the low priority given to IMCI in both countries were identified as constraining factors (Mushi et al 2010:5). Higher levels of training noted in two districts were attributed to strong district leadership and personal commitment to IMCI (Mushi et al 2010:6). Recommendations from this study include lower cost methods of IMCI training namely on the job training and pre-service training, and greater advocacy for IMCI locally and

globally (Mushi et al 2010:8). Similarly, Fick (2017:208) reported on the decline of IMCI training due to the loss of donor-partner funding in South Africa. In an attempt to scale up IMCI training, numerous countries are exploring the possibilities of a shortened IMCI course to less than eleven days and different modes of training for example the use of ICATT. This would also overcome additional problems of the cost of training and releasing of essential staff for off-site training (Fick 2017:208).

A systematic review of 29 studies was carried out to compare IMCI's effectiveness, with the standard eleven-day course versus the shortened course of five to ten days (Rowe et al 2011:2). There were four broad conclusions that emerged from the systematic review. Firstly, the standard training, which has a duration of 11 days, was noted to be more effective than the shortened training of 5 to 10 days. Secondly, it is not conclusive that shortening the duration of the IMCI training can reduce its effectiveness. Thirdly, nurses trained in IMCI require post-training support to enhance the effectiveness of the IMCI strategy. Lastly, shortening IMCI training reduces costs (Rowe et al 2011:12). It is, however, suggested that additional research be conducted to identify effective and affordable interventions to support health care workers' performance in low resource settings (after IMCI training) (Rowe et al 2011:12).

Underscoring the importance of effective training, the example of Bangladesh is apt. In 2011, under-five mortality in Bangladesh was 53 per 1000 live births (Hoque, Arifeen, Rahman, Chowdury, Haque, Begum, Hossain, Akter, Haque, Anwar, Billah, Rahman, Haque, Christou, Baqui, Bryce & Black 2014:754). The quality of paediatric care following IMCI implementation had shown some improvement. However, whether this can be maintained in the long term remains an area of concern. The results from previous studies had shown that training, together with a follow-up visit, is sometimes inadequate (Hoque et al 2014:754). An intervention study was conducted to explore whether high quality in-service training in IMCI, together with monthly supervision, could impact on the quality of care over a two year follow-up period in first level health facilities (Hoque et al 2014:755). This was compared to similar facilities, where health care workers were supervised according to the standards of the Government of Bangladesh. The supervision included observation of health worker's performance and individual feedback. The findings suggested that good quality training and supportive supervision could play an important role in improving and sustaining the quality of care in the long term (Hoque et al 2014:761).

On the African continent, high training costs and time away from clinical areas during training were obstacles to IMCI implementation, specifically in Rwanda (Harerimana, Nyirazinyoye, Ahoranayezu, Bikorimana, Hedt-Gauthier, Muldoon, Mills & Ntanganira 2014:100). Shortening the training time from 11 days to 6 days was a strategy adopted by Rwanda, to address the aforementioned problems. However, there was a lack of evidence on the effect of shortened training on nurses' performance. This study was undertaken to evaluate the effect of shortened training versus standard training on appropriate IMCI classification and treatment of sick children (Harerimana et al 2014:100). Similarly, a cross-sectional cohort comparison of post-course knowledge and performance, for long and short IMCI training courses was conducted in Afghanistan (Mayhew, Ickx, Newbrander, Stanekzai & Alawi 2015:145). A key challenge to adopting shorter courses for IMCI training in Afghanistan was the concern that the quality of care provided by those trained would be compromised. Additionally, these concerns were similar to that of Rwanda namely high training costs, and length of time health care workers remained away from health facilities (Mayhew et al 2015:144). The findings from this study complement the findings of the study conducted in Rwanda. There were no major differences in the classification and treatment of common childhood illness between the nurses who completed the long versus the short IMCI training. The Afghan Ministry of Public Health has since 2011 adopted the short IMCI training course for in-service and pre-service training (Mayhew et al 2015:151). Based on these studies, it is apparent that context is influential on training and its' effectiveness.

*2.5.1.1.2 South African context*

In comparison to the regions mentioned above, South Africa conducts the 11-day IMCI in-service training for nurses and other health care professionals. Although this duration of training is consistent with that stipulated by the WHO, Horwood et al (2009b:2) conducted a study that examined nurses and other health care professionals' perceptions of their satisfaction of the IMCI training. Horwood et al (2009b:4) reported that respondents were of the opinion that the 11-day training was too short and that IMCI training should be increased to more than 11 days (Horwood et al 2009b:6). The reason for this is that South Africa is one of the countries with generalised HIV epidemics with an added HIV component to the IMCI training, that failed to take into account the duration of the training (Horwood et al 2009b:7). The failure to take into account the duration of the training is probably because of the stipulation of the South African National Department

of Health. In its 2013/2014 Work plan, the South African National Department of Health highlighted that one of the methodologies for IMCI training should be the 11 days traditional course (South African … 2013-2014:8). Despite this, Van Dyk and Bezuidenhout (2013:128) noted that the South African Department of Health often conduct IMCI training for professional registered nurses for two weeks. The School of Nursing at the University of the Free State differs as it includes IMCI training as clinical experiential learning in the second-year module in a primary health care setting (Van Dyk & Bezuidenhout 2013:128).

#### *2.5.1.2 IMCI training aids*

For the IMCI strategy to be effective, stipulated guidelines must be supplemented with practical training aids to aid the learning process and produce standardised outcomes. The WHO, together with experts from the scientific and public health community, are responsible for the development of the IMCI training aids (WHO What is IMCI … 2015:[2]). Countries who adopt the IMCI strategy are required to collaborate with the WHO in adapting the IMCI training aids to ensure they are country specific (WHO IMCI training … 1999:4). This means that the training aids address the health needs and adhere to the epidemiological and health policies of that country (WHO What is IMCI … 2015:[4]; WHO IMCI training … 1999:4). According to the WHO the following training aids must be adapted and used to support IMCI case management training: - a set of four wall charts, a set of seven training modules, a photo exercise booklet, two videos, IMCI case recording forms for use in the clinical areas and three facilitator guides (WHO IMCI training … 1999:4). In South Africa, one generic IMCI training version is currently in use for IMCI case management training. Studies conducted by Haileamlak et al (2010:[3]) and Horwood et al (2009b:[3]) reported that respondents found the chart booklet to be a useful training aid which was frequently used in the classroom and in the clinical areas. Respondents also reported that the training materials were well designed, and this facilitated the acquisition of knowledge and an improved understanding of the content that was taught (Horwood et al 2009b:[3]).

#### *2.5.1.3 Facilitation methods*

The teaching strategy adopted for IMCI training is facilitation as opposed to a lecture method. The facilitators trained in IMCI offer guidance to participants as they complete prescribed learning activities (WHO IMCI training … 1999:4). The learning activities include reading through seven training modules which are complemented by written exercises, providing individual feedback, group discussions, drills, presentations, demonstrations, short answer exercises and role-plays. Many exercises focus on the identification of clinical signs using a photograph booklet and a video. This demonstrates the assessment of sick children to the participants using a variety of case studies. The findings of a study conducted by Horwood et al (2009b:3) on teaching methods revealed that the use of multiple teaching methods does not only have the potential of improving participants' understanding of the content taught, but it also has the potential of facilitating theory-practice integration. Every participant is required to attend ten clinical sessions that often involve compulsory assessment of about 30 to 50 sick children in a children's outpatient department or a paediatric ward. This allows the participants under the guidance of the clinical instructors to use their chart booklets to practice assessment, classification, treatment and counselling skills (WHO IMCI training … 1999:3). Although this strengthened their learning the participants found the time spent in the clinical area was limited and "rushed" (Horwood et al 2009b:3).

## 2.6 ELECTRONIC LEARNING

Implementing the IMCI strategy in pre-service and in-service training has not been without its challenges (Woods 2010:28). The obstacles, which are many, include the costs of supporting a model reliant on centralised tutor-based training, a shortage of experienced trainers, an inadequate supply of training materials, poor follow-up support and attrition of trained staff. The use of Internet learning or interactive programmes, such as ICATT has been identified as a solution to resolving the aforementioned obstacles (Woods 2010:28). According to Fick (2017:211) IMCI pre-service training needs to be prioritised in South Africa. The use of ICATT can support training and address some of the challenges currently being experienced (Fick 2017:211). However, limited literature exists on the use of ICATT globally, including South Africa.

One of the key role players, nurses, play a vital part in the delivery of health services to sick children (Coetzee 2014:2). Nurses assess and provide care to sick children at primary care facilities and, refer them to hospitals should they require further management (Coetzee 2014:2). It is therefore necessary to strengthen paediatric nurse training in South Africa, especially through the skilled use of guidelines, such as IMCI (Coetzee 2014:2). At a recent colloquium convened in Cape Town, one of the sub-themes to have emerged as educators explored the alignment of practice, teaching and student experience with current National Department of Health and Provincial policy, was 'innovative teaching methods' (Coetzee 2014:4). This theme relates to teaching methods that enable facilitators to engage students more actively in their learning. Costello, Corcoran, Barnett, Birkmeier and Cohn (2014:3) agree on the need to integrate information and communication technologies as a teaching method in nurse training programmes. However, they suggest that the nurses need to attend workshops and be trained on the use of information and communication technologies if it is to be used for learning (Costello et al 2014:3).

In terms of student learning, Computer Aided Learning (CAL) has been in use in undergraduate medical schools for over a decade (Senga, Ndiritu, Osundwa, Irimu & English 2010:[1]). However, it is a relatively new phenomenon in sub-Saharan Africa. It has been used mainly to help students learn new concepts or reinforce previously learned concepts. Senga et al (2010:[1]) cited findings from a study conducted in Uganda, where health care workers were introduced to IMCI guidelines, using computer-aided learning. The findings revealed that computer-aided learning approaches are more cost-effective than traditional approaches. Added to this, the findings noted that the majority of students were interested in the computer-aided learning approach. However, it should be stated that any attempt to interpret these findings should take into account the context in which the study was conducted (Senga et al 2010:[4]).

Electronic learning also has implications for the labour force. Bollinger, Chang, Jafari, O'Callaghan, Ngatia, Settle, McKenzi-White, Patel, Dossal and Al Shorbaji (2013:890) presented their perspective on the use of e-learning to address health workforce gaps. This was based on world-wide estimates that reflected the need for more health care workers to be trained to meet the health care needs of global populations. Electronic learning should be explored as a means to scale up health worker training and improve its quality as it can lead to cost-savings, enhanced productivity and better health

outcomes. Electronic learning tools, such as open online courses, webcasts and simulation training can support curriculum development, and these are particularly suitable when using blended learning approaches. It can be used successfully in overcoming challenges facing current educational strategies as it allows for content to be presented in an innovative manner (Bollinger et al 2013:890). Be that as it may, the question that should be asked is what are the skills of undergraduate nurses in respect of the use of information and communication technologies? Edwards and O'Connor (2011:3) developed seven learning modules which focused on classroom and clinical work correlated with computer literacy to assess the skills and knowledge of beginner nursing students in an undergraduate nursing programme. The findings indicated that student nurses expressed positive attitudes about the use of computers for learning but lacked the technology skills required to use basic computer software, complete on-line courses or send emails. Similarly, Bollinger et al (2013:891) reported that the lack of knowledge in computer use and electronic learning tools can be a barrier to e-learning use and implementation by health care workers. Recommendations from this research paper include training, supporting and empowering health workers in resource-limited settings on electronic learning as a way forward in transforming education and health care (Bollinger et al 2013:891). Edwards and O'Connor (2011:15) suggested refresher courses on computer literacy for students before the start of the nursing programmes.

Further, a review of literature on electronic learning in medical education was conducted against the background of severe faculty shortages in resource constrained low-and middle-income countries (Frehywot, Vovides, Talib, Mikhail, Ross, Wohltjen, Bedada, Korhumel, Koumare & Scott 2013 [2]). In this paper, electronic learning was defined as "all forms of electronically-mediated teaching" and was further clarified as "teaching and learning that is facilitated via information and communications technology (ICT), both inside and outside the classroom." One of the results of the review reported that electronic learning was used predominantly in physician training and less so in nursing, pharmacy and dentistry training (Frehywot et al 2013 [5]). Considering this, Moazami, Bahrampour, Azar, Jahedi and Moattari (2014:[2]) conducted a post-test only design study to compare a virtual learning method with a conventional learning method for dental students. A control group of 20 students attended a traditional lecture and an experimental group of 15 students participated in virtual learning. The coursework was the same for both groups. On completion of the coursework a post-test was completed by both groups of students (Moazami 2014:[3]). The test results indicated that the students who completed their

coursework using virtual learning performed better than the students who attended a traditional lecture (Moazami 2014:[4]).

Personal experiences and attitudes towards electronic learning is also an influential factor on the use of communications technology in a profession. Nursing is dynamic and is continuously exposed to change especially in the arena of information and communications technology. The purpose of a study conducted in Nairobi, Kenya was to determine the attitudes of nurses toward the use of computers and the factors that influence these attitudes (Kipturgo, Kivuti-Bitok, Karani & Muiva 2014:[1]). The factors influencing nurses' attitudes toward computerisation include age, educational level, years of nursing experience and experience with computers (Kipturgo et al 2014:[3]). The findings from this cross-sectional descriptive study were that generally nurses exhibited a positive attitude towards computerisation. They were aware of the benefits of computers to their professional practice. Younger nurses were more positively inclined to computers than their older counterparts. This indicates that nurses need to be motivated to use technology and be provided with adequate training. In this line, Kipturgo et al (2014:[7]) recommended that computer training be incorporated in both in-service and pre-service nursing curricula.

A core issue here relates to access and the nursing institutions' willingness to embrace change. According to Clarke (2008) as cited in Maboe and De Villiers (2011:95), computer-assisted instruction is a form of electronic learning, which is supported and delivered through the use of information and communication technologies, whilst computer-based learning is the learning that occurs when students engage with material that is delivered and supported by means of a computer. However, it has been noted that both these terms tend to be used interchangeably. The direction of nursing education is not clearly defined in the context of its response to the impact of technological innovations, new knowledge and the social change that accompanies the new generation of students (Maboe & De Villiers 2011:95). The use of of information technologies by student nurses can strengthen learning (Barker, Omoni, Wakasiaka, Watiti, Mathai & Lavender 2013:[1]). Nurse educators are therefore compelled to change direction from the traditional methods of instruction to computer-assisted instruction and computer-based learning. A quantitative, descriptive study was undertaken in a nursing college in Gauteng province, South Africa. This study investigated the nature of the student nurses' exposure to computer-assisted instruction and computer-based learning, the perceived

benefits of the exposure and the challenges encountered (Maboe & De Villiers 2011:95-96). The findings highlighted that because information and communication technologies "was in its infancy" at this college, access was inadequate. Be that as it were, students' preferred computer-assisted instruction to the traditional methods of instruction as it was found to enhance the learning of the students. Other challenges were the lack of technical assistance for students who experienced difficulties with equipment and software, and an unavailable and untrained facilitator. A qualitative study undertaken at the University of Nairobi to explore student nurses views of e-learning presented similar findings (Barker et al 2013:[1]). The students were eager to incorporate e-learning into their studies and access online learning activities via the internet (Barker et al 2013:[3]). However, the challenges were the lack of computers and internet access. The study also highlighted the inequity between the poorer and wealthier students from diverse backgrounds and areas with regards to access to internet and computer access (Barker et al 2013:[4]). Recommendations from these studies included the strengthening of resources and activities which support computer-assisted instruction and computer-based learning (Barker et al 2013:[5]); Maboe & De Villiers 2011:102).

It is the opinion of the researcher that there is a dearth of information regarding the use of information and communication technologies and computer-based learning at public nursing colleges in South Africa. In stating this, the researcher has identified during the literature review the following themes that are relevant to this study namely the attitudes and skills of educators and learners, and the availability of resources to support electronic learning

## 2.7 IMCI COMPUTERISED ADAPTATION AND TRAINING TOOL

Based on the previous discussions on electronic learning, the researcher will now focus on the computerised training tool specifically ICATT. In a multi-country survey conducted by Goga and Muhe (2011:[9]) which served to benchmark the status of IMCI implementation and the challenges to scale-up globally, ICATT was identified as one approach to overcome barriers to IMCI implementation. Similarly, Fick (2017:208) conducted a literature review on IMCI implementation in the South African context. One of the interventions that was suggested to address the pre-service training deficiencies in resource-limited settings was the implementation of ICATT (Fick 2017:211).

### 2.7.1 What is IMCI Computerised Adaptation and Training Tool?

IMCI Computerised Adaptation and Training Tool (ICATT) is an “innovative software technology to support the adaptation of generic IMCI guidelines” (Goga & Muhe 2011:[9]). The Novartis Foundation supported the WHO Department for Maternal, Newborn, Child and Adolescent Health, in the development of this electronic learning tool, in response to the challenges facing IMCI in-service and pre-service training globally (ICATT-Novartis [s.a.]).

By definition, ICATT is an open, flexible software package that can be adapted and updated in the case of technical updates, language changes and country specific circumstances. Videos, pictures, sound and relevant documents have been integrated into ICATT. Once a country has adapted ICATT to suit its requirements, the software can be “closed” and distributed to IMCI training institutions for both pre-service and in-service training, for any category of health care worker namely nurses and doctors (ICATT-Novartis [s.a.]).

The software package can either be installed on a computer or run directly from a CD-ROM or memory stick. Most recently, the newer versions of ICATT allowed it to be run on intranet and internet sites, as well as the World Wide Web, allowing for global access to training. Trainees only require access to a computer, but no specific computer skills are required (ICATT-Novartis [s.a.]).

### 2.7.2 Implementation of the IMCI Computerised Adaptation and Training Tool

In order to implement such an innovation in the medical field, ICATT was piloted and tested in Tanzania, Peru and Indonesia in 2008 (Kudlova & Lejnev 2011:5). The adaptation of the guidelines allowed for the creation of several different training packages that served different categories of trainees (Kudlova & Lejnev 2011:9). The three different training packages were:

- Classroom training with individual computers
- Classroom training with a data projector
- Distance learning

It was reported that the different packages had different strengths and weaknesses. Classroom training with individual computers allowed for learners to work at their own pace. The disadvantage was the need for a large number of computers (Kudlova & Lejnev 2011:14). Classroom training with projectors may obviate the need for many computers but was more demanding on facilitators and learners. It was also more difficult to track the progress of the learners (Kudlova & Lejnev 2011:14). Distance learning proved to be cost-effective as health care workers did not need to leave their clinical areas to attend IMCI training. However, other challenges like access to computers and lack of interaction with facilitators was problematic (Kudlova & Lejnev 2011:16). Overall, ICATT could be more beneficial than traditional IMCI training from a cost perspective, as the printing of learning materials was not necessary, and the length of training time can be decreased (Kudlova & Lejnev 2011:21). The feedback from the learners was positive with regards to the software being easy to use, time-saving, enjoyable and interesting. The challenges were technical in nature namely difficulty with typing on a computer keyboard (Kudlova & Lejnev 2011:12). Other challenges regarding the ICATT software are hardware and software viruses with may affect ICATT installation on computers (Kudlova & Lejnev 2011:19). The following are recommendations for the implementation of ICATT:1) facilitators trained in IMCI must receive training on the use of ICATT, 2) ICATT facilitators must have unrestricted access to a computer during the training period, 3) information technology technicians must be available to address hardware or software challenges and 4) clinical practice must be arranged to complement ICATT -based IMCI training (Kudlova & Lejnev 2011:23).

### 2.7.3 Global roll-out of IMCI Computerised Adaptation and Training Tool

The WHO has reported that a number of countries have adopted and adapted ICATT for training purposes. It is estimated that at least twelve countries, including South Africa, have completed their adaptation, and seven of them have started to implement training using ICATT (ICATT-Novartis [s.a.]). There is currently no published data available as to the state of ICATT training in these countries.

### 2.7.4 The implementation of IMCI Computerised Adaptation and Training Tool in South Africa

While the global roll-out has revealed some advantages and various challenges, it is relevant to this study to pay particular attention to how this has developed in South Africa. According to the South African National Department of Health, in their 2013/2014 work plan for IMCI on self-learning methods, ICATT was adopted as an additional training methodology to scale up IMCI saturation and ensure competent practitioners in IMCI implementation (South African … 2013/2014:2). ICATT was adapted by a non-governmental organisation for use in South Africa, and has since been piloted at a private hospital, although no published data was available pertaining to its implementation (South African … 2013/2014:2). According to the work plan the following areas were highlighted, that are pertinent to this study:

- Orientation training in ICATT for lecturers
- Piloting ICATT in one nursing college per province and six universities
- Four months training in ICATT for lecturers at piloting academic institutions
- Using ICATT training for medical and nursing students (South African … 2013/2014:4-5)

However, no published data exists on whether this work plan has been adhered to, and to what extent capacity building has taken place. There exists a dearth of information pertaining to ICATT implementation and use in South Africa. This reiterates the necessity of this study, as it will contribute to literature and assess the readiness of nursing campuses for ICATT use in KwaZulu-Natal.

## 2.8 THE READINESS FOR ELECTRONIC LEARNING

E-learning readiness involves assessing whether students, lecturers, technology and the environment are ready for the adoption and implementation of the e-learning approach (Mosa, Mahrin & Ibrrahim 2016:113). Higher education institutions that intend implementing an e-learning approach should ideally assess their readiness prior to implementation (Mosa et al 2016:113). Assessing readiness is a critical factor in ensuring the successful implementation of e-learning (Mosa et al 2016:113). Frehywot et al (2013:[2]) concur that assessing institutional readiness is necessary to ensure that e-

learning is aligned to the educational needs and economic context of an institution. Alshaher (2013) cited in Mosa et al (2016:114) highlighted the need to assess technological readiness prior to the implementation of an e-learning system to appreciate the benefits of e-learning and overcome the challenges during e-learning implementation.

Mosa et al (2016:113) conducted a literature review which focused on the various models developed to assess e-learning readiness. The researchers reviewed ten models and identified the most important aspects that should be considered when conducting an e-learning readiness assessment (Mosa et al 2016:123). The aspect that was most frequently mentioned in the models was the availability of technologies such as hardware and software to support e-learning. This was followed by the learner, the content of the e-learning package, social and cultural factors, the availability of equipment, the availability of other human resources for example teachers and information technology support staff and lastly a budget to support e-learning. In addition, researchers highlighted the technical skills of individuals and available infrastructure as significant factors when assessing e-learning readiness which were included in only three models (Mosa et al 2016:124). The researchers concluded that although many common factors have been identified in the e-learning readiness models, there is a gap in the knowledge with regards to the technological aspects of e-learning readiness (Mosa et al 2016:125). Similarly, Frehywot et al 2013:[2]) conducted a literature review on e-learning in an effort to propose a framework to guide e-learning implementation in under resourced countries, such as South Africa. Frehywot et al (2013:[11]) were of the opinion that prior to an institution adopting an e-learning strategy, institutions should assess their readiness to ensure that what is being considered is acceptable, affordable and sustainable.The five elements that were identified and included in the e-learning strategy were: institutional support, faculty engagement, infrastructure and support systems, information and communication technologies technical expertise, and student engagement (Frehywot et al 2013:[11]). In addition, financial models must be developed to further support e-learning implementation in the long term. Ruggeri, Farrington and Brayne (2013:[4]) explored key issues for developing a global model for the use of and evaluation of e-learning in health. The critical success factors for e-learning identified by research scholars includes institutional characteristics, instructor characteristics, learners characterisitics and e-learning programme characteristics. The researcher has identified that there are common aspects between the ten models discussed by Mosa et al (2016:123), the five elements identified by Frehywot et al (2013:[11]) and the critical success factors presented by Ruggeri et al

(2013:[4]). These are institutional support, information technology support, the technical skills of the teachers and the learners, and the content of the e-learning programme.

It is important to identify further factors that may influence readiness. The perceptions of teachers regarding the use of technology in the classroom, and their skills and experience with using technology can influence e-learning adoption. Hennessy, Harrison and Wamakote (2010:41) reviewed literature on the teacher-related factors which influence classroom use of information and communication technologies in Sub-Saharan Africa.The findings of the literature review indicate that although teachers' attitudes to information and communication technologies use is positive, their lack of knowledge and training can be a barrier to its use. They therefore present an argument for in-service training and support for the use of technology in the classroom that can improve teachers' readiness and confidence in using information and communication technologies (Hennessy et al 2010:49). Andoh (2012:136) conducted a more exhaustive literature review that included personal, institutional and technological factors that encourage teachers' use of computer technology in the classroom. The findings indicated that teachers' knowledge, attitudes and perceptions influence the use of information and communication technologies in the classroom. At the institutional level teacher training is a key factor to integrating computer use in the classroom. The technological factors are related to whether teachers believe that the use of computers can enhance their teaching function and be beneficial for learners and learning (Andoh 2012:147). A qualitative study undertaken by Chigona, Chigona and Davids (2014:[1]) investigated the motivation of educators to use information and communication technologies for teaching and learning in disadvantaged communities in the Western Cape Province of South Africa. It is stated that several factors can influence whether teachers use information and communication technologies in the classroom (Chigona et al 2014:[2]). The researchers identified that the following are motivating factors for educators in the classroom namely the availability of technical support when teaching with computers, the availability of computer laboratories and computers for use by the learners, and the learners' readiness to use computers for learning in the classroom.

According to Mahmud and Ismail (2010:6) the role of teachers has evolved with regards to the use technology in the classroom. There is therefore a need for them to know how to use technology effectively. The quantitative study that explored the impact of information and communication technology training and experience on teacher

knowledge, skills and attitude saw the emergence of important findings in this regard (Mahmud & Ismail 2010:7). Teachers displayed positive attitudes to the use of information and communication technologies in the classroom but were not prepared to use technology if they lacked the requisite knowledge, skills and information on information and communication technology use. Additionally, formal information and communication technology training and experience do influence the knowledge, skills and attitudes of teachers. There is therefore a need to provide information and communication technology training and workshops for teachers who require it (Mahmud & Ismail 2010:8). These findings are supported by a literature review on e-learning and the use of information and communication technology in nursing education conducted by Button, Harrington and Belan (2013:[1]). Two studies found that educators lacked the requisite skills in computer use, information literacy and nursing informatics required to implement e-learning, with three studies supporting the need for educators to increase their information and communication technology skills (Button et al 2013:10). Although nurse educators acknowledged the benefits of e-learning, they were of the view that staff development was paramount for the success of e-learning in nursing (Button et al 2013:11).

Broadly speaking, e-learning is becoming an integral part of many educational institutions in various fields. Bhuasiri, Xaymoungkhoun, Zo and Rho (2012:843) conducted a study to identify the critical success factors that influence the acceptance of e-learning systems in developing countries. The researchers first identified multiple factors that influence the success of e-learning from a literature review. The factors considered as being most important were strengthening technology knowledge and skills, improving learning content, computer training, motivating users to use technology and institutional support (Bhuasiri et al 2012:846). The Delphi method and Analytic Hierarchy Process (AHP) approach were used and two groups of participants namely information and communication technologies experts and faculty experts were asked to rate the factors they considered to be important for e-learning success (Bhuasiri et al 2012:848). The information and communication technologies experts identified learner characteristics as being most important which includes computer self-efficacy, internet self efficacy and attitude towards e-learning. The faculty experts indicated that infrastructure and system quality were more important for example internet access quality, reliability, ease of use and system functionality. It is therefore evident from the findings that learner readiness is considered a critical success factor ahead of infrastructure readiness. Lahti, Hätönen and Välimäki (2014:137), Liaw and Huang (2013:14) and Lin and Wang (2011:89) have

conducted studies with the focus on the learner and the e-learning environment. Lahti et al (2014:137) conducted a systematic review and meta-analysis to gain a better understanding of learners' needs with regards to e-learning. The findings suggest that whilst e-learning is not superior to traditional learning, individualised, tailored e-learning approaches have better outcomes for the learners (Lahti et al 2014:143). However, there is no evidence in support of whether e-learning strengthen clinical skills or whether e-learning positively affects learners' satisfaction with education (Lahti et al 2014:147). Liaw and Huang (2013:14) explored e-learning environments to understand learner attitudes towards e-learning. The findings indicate that the learner's competence and an interactive learning environment influence e-learning usage and satisfaction. The findings are also in support of the fact learners are more satisfied and perceive e-learning to be useful if the learning environment is viewed as more interactive (Liaw & Huang 2013:22). Liaw and Huang's findings support those of Lin and Wang (2011:88). The findings from a mixed method study conducted by Lin and Wang indicated that the information quality of an e-learning programme impacts on whether the learners finds it fit for use. This in essence means that perceived usefulness and system satisfaction impact on the continued use of an e-learning system (Lin & Wang 2011:96). It is evident from the aforementioned research findings that learners' attitudes and the learning environment are important factors that affect learners' readiness to adopt and use e- learning.

The literature on e-learning readiness highlights the many factors that need to be considered prior to the implementation of e-learning programmes. The evidence suggests that institutional readiness, educator readiness and learner readiness are at the forefront for the successful implementation of e-learning programmes.

## 2.9 SUMMARY

The focus of the literature review which is presented in this chapter is the theoretical framework used to guide the research study, the IMCI case management strategy, electronic learning and readiness for electronic learning. In line with this, the researcher has provided a broad overview on the different thoughts on programme evaluation and how it should be conducted. The elements of programme evaluation namely needs assessment, evaluability assessment, formative and summative evaluation has been highlighted.

In particular, the researcher has highlighted the relevant aspects of the IMCI strategy, the implementation of the IMCI strategy, IMCI training and electronic learning and the implementation of ICATT. Additionally, the researcher reviewed literature on the state of health of children under the age of five years, both globally and locally and further discussed the role that the IIMCI strategy played in addressing morbidity and mortality rates in this group of children. The chapter further looked at IMCI implementation and what was identified as best practices and obstacles to implementation following multi-country evaluations.

The IMCI case management strategy has been identified in numerous studies as the gold standard for assessing and treating sick children, and therefore training of health care workers in the use of this strategy is vital for scaling up coverage and implementation. The researcher also discussed IMCI case management training in terms of length of training, and training methods. The introduction of innovative teaching strategies for nursing education was highlighted. The concepts of electronic learning, computer-based learning and computer assisted learning were explored. The researcher further discussed e-learning readiness which could impact on ICATT implementation in nursing campuses. Although ICATT is introduced as an exciting and innovative method for IMCI case management training, some aspects of ICATT have not been fully explored in the literature. This has led to the following questions being asked which this study will investigate for example what are the enablers and barriers to ICATT use and what is the understanding of campus principals, nurse educators and learners to ICATT use?

In order to further explore ICATT use at the nursing campuses, a mixed method research approach was appropriate for this study and this will be detailed in the chapter 3. Chapter 3 also presents the scope of the study and an in-depth discussion on the research paradigm and the research methods that were used. The ethical considerations that were adhered to in this study are also discussed.

# CHAPTER 3

# METHODOLOGY

## 3.1 INTRODUCTION

This chapter presents the research methodology and design upon which this study is based. In a study of this nature, it is imperative that an appropriate research strategy is chosen to elicit rich and generalizable data. Thus, the chapter describes the scope of the study, research paradigm, research approach and design and the methods that were used to conduct this study. The chapter further describes the study populations, sampling and sampling techniques, and research instruments that were used in the three phases of this study. The ethical considerations adhered to during this research study are also discussed.

## 3.2 SCOPE OF THE STUDY

South Africa is divided into nine provinces. Nurse training is conducted in both public and private nursing education institutions in all nine provinces of the country. In the province of KwaZulu-Natal there is only one public nursing education institution, the KwaZulu-Natal College of Nursing. It is aligned to the KwaZulu-Natal Department of Health and two public higher education institutions of learning, the University of KwaZulu-Natal and the University of Zululand. This single nursing education institution addresses the needs of the province in respect of nurse training output and therefore has 11 campuses and 12 sub-campuses geographically dispersed in nine districts of KwaZulu-Natal. Each nursing campus has a campus principal, a deputy principal and nurse educators whose core function is nursing education and training. The KwaZulu-Natal College of Nursing is authorised by the Department of Health and accredited by the South African Nursing Council to conduct the R425 nurse training programme for learners at selected campuses. In addition, pre-service training for the IMCI case management strategy has been included in the R425 curriculum. The scope of this study is limited to the KwaZulu-Natal College of Nursing, and the ten nursing campuses that offer the R425 nurse training programme. The scope of this study is further limited to the campus principals, nurse

educators and learners based at the ten (10) nursing campuses which conduct IMCI case management training for learners in the R425 programme.

## 3.3 RESEARCH PARADIGM

Researchers should be guided by a framework that incorporates and aligns philosophical worldview assumptions to the research methodology and research methods when commencing research (Creswell 2009:5). The term worldview and paradigm are interchangeable (Creswell 2009:6). The academic literature sources refer to the term worldview or paradigm as “a basic set of beliefs that guide action (Creswell 2009:6).” Morgan (2007) cited in Shannon-Baker (2015:[1]) argues that the original “Kuhnian perspective” of the term paradigm as “a way to summarise researchers’ beliefs about their efforts to create knowledge” has evolved. According to Biesta (2010) cited in Shannon-Baker (2015:[1]), paradigms should be viewed as “tools” that guide the research process

The components of a paradigm consist of the following assumptions: ontology, epistemology, methodology (including methods) and axiology (Scotland 2012:9; Mertens 2010:10). Ontological assumptions are concerned with the nature of reality (Crotty 1998:10). Ontological questions focus on the nature of reality, and researchers therefore often pose the question, “What is reality?” (Guba & Lincoln 1994:108). The epistemological assumptions are concerned with what can be known and epistemological questions ask, “How can I know reality?” (Guba & Lincoln 1994:108). Methodological assumptions are concerned about the process of achieving reality, and thus researchers frequently ask the question, “How do you go about finding out about reality?” (Guba & Lincoln 1994:108), and methods are the techniques used to collect and analyse data (Crotty 1998:3). Axiological assumptions are beliefs about the nature of ethical behaviour. The focus of the axiological question is on the ethical behaviour and the nature of ethics (Mertens 2010:10). In this context, researchers often pose the question: “What is the nature of ethics?” (Mertens 2010:10). Every paradigm is based on its own ontological, axioological and epistemological assumptions, which are ultimately reflected in the methodology (methods) of research studies (Scotland 2012:9).

The researcher adopted pragmatism as the research paradigm in this study. The pragmatic perspective of “what works” and the fact that the research question should direct the research study guided the researcher in accepting and using this paradigm in

this study (Riazi & Candlin 2014:142; Polit & Beck 2012:604). Additionally, the fact that pragmatism supports integrating perspectives and approaches, and provides justification and logical explanations for mixing approaches and methods, strengthened the argument for the researcher to accept this worldview (Johnson, Onwuegbuzie & Turner 2007:125). According to Polit and Beck (2012:604), pragmatism, as a paradigm, is associated with mixed methods research.

The ontological, epistemological, methodological and axiological assumptions are interrelated and therefore explained from a position of pragmatism.

### 3.3.1 Ontological assumptions

According to Terre Blanche et al (2006:6), ontologic assumptions are specific regarding the nature of reality that is to be studied. Pragmatists assert that although there is a single reality, all individuals view this reality differently and therefore have their own unique interpretation of reality (Mertens 2010:36). The researcher has adopted the pragmatic worldview of not committing to a singular reality in this study (Creswell 2009:10). The researcher's view of reality regarding IMCI case management training and ICATT use and implementation at nursing campuses is that it be examined from the perspectives of campus principals, nurse educators and learners, as different perceptions or realities will emerge. Pragmatists further view the measurable world or 'existential reality" as having different layers or elements, of which some layers or elements are subjective whilst others may be objective or may even be a mixture of the two (Feilzer 2009:3). The researcher is in agreement with the view that the perceptions of the research participants may differ that is be either objective or subjective, which is influenced by the way they view the world. Proponents of pragmatism also hold the view that research should not only aim to provide an accurate account of reality but should also aim to be useful (Feilzer 2009:3). The researcher acknowledges this and therefore aimed to not only provide data on the readiness of nursing campuses for ICATT use and implementation, but also to develop guidelines and a model for nursing campuses for ICATT use and implementation.

### 3.3.2 Epistemological assumptions

Crotty (1998:3) defines epistemology as "the theory of knowledge that is embedded in theoretical perspective." Epistemology is about "what it means to know" and is concerned

with how knowledge can be created, acquired and communicated (Scotland 2012:9). Guba and Lincoln (1994:108) further state that epistemology concerns whether there is a relationship between the enquirer (researcher) and the social world (research participants). The basic beliefs of pragmatists are that the formation of relationships in research are determined by what the researcher deems as appropriate to that particular study (Mertens 2010:11). Pragmatists further argue that the methods that are used are not as important as is the knowledge that is gained (Feilzer 2009:9). Bearing this in mind the researcher visited the research sites, established relationships with the research participants and collected data through individual and focus group interviews. The findings of this study are as a result of a meaningful interaction between the researcher and the research participants in this study. Pragmatism is characterised by an emphasis on communication and shared meaning-making (Shannon-Baker 2015:[4]). Thus, the researcher does not position herself as a casual observer, but as part of the research process, gathering information and making sense of the phenomenon of interest together with the research participants (Mertens 2010:38). In the data collection phases of this study, the researcher interacts with the campus principals, nurse educators and learners at the nursing campuses in KwaZulu-Natal to explore their understanding of ICATT use and implementation. It was the researcher's intention to determine the state of readiness of the principals, nurse educators and learners regarding ICATT use and implementation.

### 3.3.3 Methodological assumptions

According to Crotty (1998:3), methodological assumptions are concerned with the "how" of research. It provides guidelines for conducting research using methods that are scientifically acceptable. From a pragmatic perspective, methods should be aligned to the specific questions and purpose of the research study (Mertens 2010:11). Additionally, the use of mixed methods allows the researcher to move back and forth between the qualitative and quantitative components (Mertens 2010:11). The methodological assumptions related to the mixed methods research approach is when the researcher integrates: (1) qualitative and quantitative research questions, (2) qualitative and quantitative research methods, (3) techniques for collecting and analysing qualitative and quantitative data and (4) qualitative findings and quantitative results (Pluye & Hong 2014:30). Proponents of mixed methods research are cognisant of the value of both quantitative and qualitative worldviews to develop a deep understanding of the phenomenon of interest (Venkatesh et al 2013:24). Qualitative and quantitative research

methods were used sequentially to answer the research questions and to understand the phenomenon of interest i.e. ICATT implementation and use at nursing campuses. In this study the researcher used interviews and focus group interviews (qualitative data collection approaches) and surveys (quantitative data collection approach) to collect data about ICATT implementation and use at the nursing campuses. Individual interviews and focus group interviews were conducted to understand individuals' perceptions regarding ICATT implementation and use at the nursing campuses. An exploratory approach was necessary as there was no extant literature regarding ICATT implementation at nursing campuses in South Africa. Self-administered questionnaires were used to collect additional data on the readiness of campus principals, nurse educators and learners for ICATT implementation and use at nursing campuses. Both open- and closed- ended questions were included in the data gathering tools. Open-ended questions allowed research participants to communicate their experiences or opinions in their own words. Closed-ended questions yielded standardised "yes" or "no" responses or "agree" or "disagree" responses that allowed for comparative data analysis in quantitative studies. Quantitative data analysis was done using both descriptive and inferential statistics. In the qualitative components of this study, interviews were recorded and the participants' perceptions about ICATT implementation and use emerged during the transcription and the interpretative phenomenological analysis (IPA) step-by-step analytical process. The integration of the qualitative findings and the quantitative results facilitated the development of the guidelines and a model for ICATT use at nursing campuses.

### 3.3.4 Axiological assumptions

The philosophical concept of axiology relates to morals, values and right actions (Beatty, Leigh & Dean 2009:104). Proponents of the pragmatic paradigm emphasise the importance of the researchers' values and adherence to a code of ethics during the research process (Mertens 2010:36). The assumption within this paradigm is that the ethical goal of research is to gain knowledge (Mertens 2010:36). In the context of this study the aim of the researcher was to understand the perceptions of the research participants regarding ICATT use and implementation and, add to the body of knowledge without compromising ethical standards. The researcher thus adhered to the ethical principles of respect for the privacy, anonymity and confidentiality of the research participants in this study.

## 3.4 MIXED METHODS RESEARCH APPROACH: A RATIONALE

This study utilises a mixed methods approach. Mixed methods refer to an “emergent methodology” that uses quantitative and qualitative data in a single study so as to address a wide variety of research questions (Wisdom & Cresswell 2013:1). Tashakkorri and Creswell (2007) cited in Polit and Beck (2012:603) define mixed methods research as “research in which the investigator collects and analyses data, integrates the findings, and draws inferences using both qualitative and quantitative approaches in a single study or programme of inquiry.” According to Venkatesh et al (2013:21) mixed methods research combines qualitative and quantitative research methods in a single research enquiry so as to have a better understanding of a phenomenon of interest. Thus, the core characteristics of a mixed methods study as identified by Wisdom and Creswell (2013:1) include the following: 1) collecting and analysing both quantitative and qualitative data, 2) applying rigorous procedures when collecting and analysing the quantitative and qualitative data, 3) mixing the data during data collection, data analysis or during the discussion of the results and 4) combining both kinds of data either sequentially or concurrently.

Grove et al (2013:208) present a strong argument for adopting a mixed methods approach which is that neither the quantitative nor the qualitative data alone, is capable of capturing the essence or addressing the complexity of research problems. The researcher’s understanding that the study was complex, and the use of a single method would not adequately address the research question motivated the researcher to depart from using a single research approach to using the mixed methods approach. This allowed the researcher to obtain a full picture regarding IMCI case management training and ICATT implementation at the nursing campuses. Combining quantitative and qualitative methods allows researchers to utilise the strengths of both approaches in a single study (Grove et al 2013:208). In a mixed methods study, the strength of one approach alleviates or minimises the weaknesses of the other approach (Creswell 2009:14). Combining quantitative and qualitative methods also adds depth and breadth to the study during data collection and allows for accuracy when making inferences (Venkatesh et al 2013:25). It is for this reason that the researcher used both interviews and surveys for data collection, in this study. The interviews (qualitative) provided depth to the study from the rich narratives provided by the participants regarding ICATT implementation at the nursing campuses. The surveys (quantitative) added breadth to the

study by gathering data about different aspects related to ICATT implementation from many participants. In addition, the researcher mixed the quantitative data and the qualitative data during the analysis of the results and in the discussion of the results to strengthen and validate the findings of this study.

The advantages of the mixed methods approach highlighted by Polit & Beck (2012:604) and relevant to this study includes: complementarity, enhanced validity and practicality. Complementarity allows for the use of text and numbers in a study to avoid or reduce the limitations of a single approach. Practicality allows for a "what works" approach when addressing research questions whilst enhanced validity allows for the outcomes of a study to be supported by multiple and complementary types of data. Wisdom and Creswell (2013:3) further identify additional advantages of the mixed method approach which are: 1) researchers are better able to understand the incongruity between the quantitative results and the qualitative findings in a study, 2) the experiences and "voices" of the research participants are reflected in the research findings and 3) mixing of the qualitative and quantitative data allows for rich and comprehensive data to be presented in the findings.

In summary, proponents of mixed methods research have provided a rationale and advantages for mixing the approaches in a single study. The rationale and advantages were motivating factors for the researcher to adopt the mixed methods approach in this study. An important aspect which should not be overlooked is whether the mixed mixed methods approach addresses the research questions which are asked in a study (Polit & Beck 2012:613). The researcher's understanding that the use of a qualitative and quantitative approach would answer the research questions strengthened the argument for the researcher to adopt the mixed methods approach. Additionally, the researcher considered that the emerging findings from combining the quantitative and qualitative methods will provide a better understanding of the complexity and nuances of the phenomenon that is the implementation of ICATT at nursing campuses in KwaZulu-Natal.

## 3.5 RESEARCH DESIGN

In order to explore these dynamics, the research design of a study needs to be appropriate and ethical. The research design is a plan that guides data collection in a research study (Brink et al 2012:217). Similarly, Polit and Beck (2012:740) agree that a

research design is a plan for data collection that should effectively address the research question thus strengthening the study's integrity. Grove et al (2013:693) state that the research design provides researchers with a plan for conducting a study together with full control over factors which could negatively impact the validity of the study findings. Creswell (2009:5) is in agreement that a research design is a plan or proposal to conduct research. However, Creswell strongly argues that the research design or framework should clearly show the interconnectedness between philosophical worldviews, strategies of inquiry and specific methods of data collection and analysis (Creswell 2009:5). Creswell (2009:206) further identifies four main aspects that should influence researchers when selecting the design procedures for a mixed methods approach namely: timing, weighting, mixing and theorizing.Timing addresses how data collection will take place (sequentially or concurrently), weighting addresses the priority that is given to qualitative or quantitative research, mixing address the how and when of mixing data and theorizing addresses whether the research design will be underpinned by a theoretical framework (Creswell 2009:206). The researcher considered this, together with the research problem, the researcher's experiences and the target population (Creswell 2009:19) when choosing the research design which is further discussed below.

Creswell (2009:224) broadly identifies six designs which guide how data collection occurs when using the mixed methods approach namely: sequentially (explanatory and exploratory), concurrently (triangulation and nested) or transformatively (sequential or concurrent). Creswell and Clark (2007) cited in Venkatesh et al (2013:24) suggests four major types of mixed methods designs: triangulation, embedded, explanatory and exploratory. Grove et al (2013:208) narrows the focus to three main research designs which are associated with the mixed methods research approach. These include the sequential design, the concurrent design and the transformative design. In the sequential design, the researcher seeks to enhance the findings of one research methodology with another research methodology, so that the results can be generalised to a population (Grove et al 2013:208; Creswell 2009:14). An example of the sequential design is when the qualitative method is used first to explore a phenomenon, followed by a quantitative method using a large sample to generalise the findings of the study. Similarly, a quantitative method can be used first to test a theory followed by a qualitative method where the researcher conducts interviews which allows participants add to theory development (Grove et al 2013:208). In the concurrent design, the researcher collects both quantitative and qualitative data at the same time, allowing for the data to be

triangulated or merged to provide a comprehensive analysis of the research problem. This design also allows for the researcher to embed one form of data within another in order to analyse different types of questions (Grove et al 2013:208; Venkatesh et al 2013: 24; Creswell 2009:14). The transformative design makes use of a “theoretical lens” or perspective within a design that guides the study, contains both quantitative and qualitative data, and usually addresses issues pertaining to minority or marginalised groups (Grove et al 2013:209; Creswell 2009:15).

It was not the intention of the researcher to embed one form of data with another to analyse different types of questions or to collect both quantitative data and qualitative data at the same time. Similarly, the researcher was not using a theoretical framework that provides methods for data collection and anticipated outcomes from the study. It was however, the researcher’s intention to conduct a two-phase study where data will be collected in sequence in phases one and two. This means one set of data (either qualitative or quantitative data) will be collected first, followed by the collection of a second set of data (either qualitative or quantitative data). It therefore made sense for the researcher to use the “sequential design” to investigate the readiness of nursing campuses for implementation of ICATT in KwaZulu-Natal.

The two main approaches of the sequential design are: the sequential explanatory design and the sequential exploratory design (Grove et al 2013: 209; Venkatesh et al 2013:24). The difference between the sequential explanatory design and the sequential exploratory design lies in the sequence of data collection and data analysis. In a sequential explanatory design, the collection of and analysis of quantitative data occurs first, followed by the collection and analysis of qualitative data (Grove et al 2013:209). In a sequential exploratory design, the qualitative data collection and analysis occurs first, followed by the quantitative data collection and analysis (Grove et al 2013:209). In this study the sequential exploratory design was adopted because qualitative data collection and data analysis occurred first. This was followed by quantitative data collection and analysis. The sequence of data collection was the same in phases one and two of this study. In phase one the researcher used individual interviews to collect data from the campus principals which was analysed. This was followed by the use of the survey method to collect quantitative data from the campus principals which was analysed. In phase two of the study the researcher used focus group interviews to collect data from the nurse educators

and learners which was analysed. This was followed by using the survey method to collect quantitative data from the nurse educators and learners which was analysed.

A sequential exploratory design can be used if the focus is on exploring a phenomenon rather than explaining and interpreting relationships (Creswell 2009:211). Researchers can adopt the sequential exploratory design when the aim of the study is to use the quantitative data and results to assist with the interpretation of qualitative findings (Creswell 2009:211). According to Grove et al (2013:210) integration of the qualitative and quantitative data can occur in the interpretation phase. Morgan (1998) cited in Creswell (2009:211) states that the sequential exploratory design can also be used in a research study if it is the researcher's intention to generalise qualitative findings to different samples. The researcher adopted the sequential exploratory design as this study sought to explore a phenomenon rather than explain relationships between variables. The focus of this study is to explore the readiness of campus principals, nurse educators and learners for ICATT implementation at the nursing campuses. The focus of this study is to further explore the readiness of nurse educators and learners for ICATT use for IMCI case management training. In this study separate qualitative and quantitative data collection and analyses are carried out. The mixing of the data from the two methodologies was done in an attempt to integrate the information and develop guidelines and a model. In this study there is mixing in the research design and the results.

Creswell (2009:212) has identified that there are advantages to adopting the sequential exploratory design. Firstly, the sequence of data collection that is qualitative methods followed by quantitative methods is easy for researchers to implement (Creswell 2009:212). Secondly it is easy for the researcher to report on the phases in the write up stage of the research study. Lastly, the sequential exploratory design allows the researcher to explore a phenomenon and expand on the qualitative findings (Creswell 2009:212). The disadvantages of using the sequential exploratory design is that it can be time consuming as data must be collected in sequence that is qualitative data collection and analysis followed by quantitative data collection and analysis. Additionally, the researcher has to decide which aspects of the qualitative data will be used during the integration of the results Creswell 2009:212).

Figure 3.1 presents a diagrammatic representation of the sequential exploratory mixed methods design used in this study.

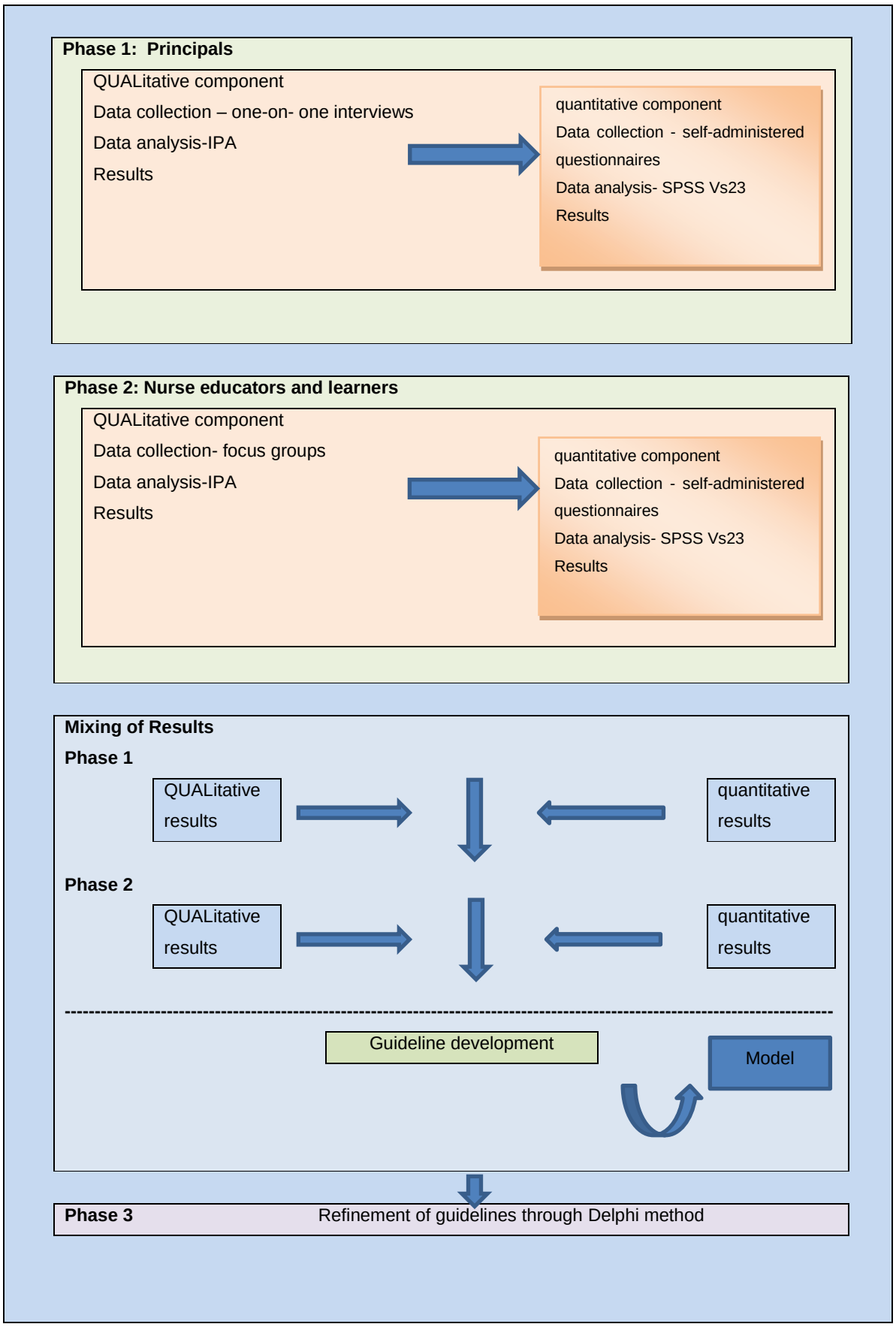


**Figure 3.1 The sequential exploratory mixed methods design**

(Adapted from Creswell 2009:209)

As already stated this study utilises the sequential exploratory mixed methods design which is shown in Figure 3.1. There are three phases in this design. Phases 1 and 2 have two components i.e. a qualitative component and a quantitative component. The qualitative component is usually the dominant component in the sequential exploratory design (Creswell 2009:211). The capitalisation in the QUAL/quan notation denotes that the qualitative data collection, analysis and results are dominant. The directional arrows in phase 1 and phase 2, with the arrowhead pointing to the right indicate that the qualitative component occurred first and was followed by the quantitative component. On completion of phase 1 and phase 2, mixing of the results occurred. The results from the qualitative and the quantitative component of phase 1 which have lain side by side are mixed together with the results from the qualitative and the quantitative component of phase 2. These results, as indicated by the two arrows pointing downwards, were used in the development of guidelines and model for ICATT implementation at nursing campuses. The broken line indicates that the development of guidelines did not occur immediately following the mixing of the results from phases 1 and 2. The guidelines and model were developed over a period of time following an in depth reading of the results and literature sources. Phase 3 followed the guideline development. Phase 3 was refinement of the guidelines through the use of the Delphi method. The model however was not tested or refined.

### 3.5.1 Qualitative component (phase 1 and phase 2)

The phases of this study's research design (1 and 2) have a qualitative component. Grove et al (2013:57) defines qualitative research as a "scholarly approach to describe life experiences from the perspective of the person involved." Polit and Beck (2012:739) define qualitative research as "the investigation of phenomena, typically in an in-depth and holistic fashion, through the collection of rich narrative materials using a flexible research interview schedule." Grove et al (2013:66) and Polit and Beck (2012:505) state that qualitative descriptive research designs have been used in nursing research to seek straightforward descriptions of phenomena and to design interventions that will be beneficial to a specific population group. It was therefore logical for the researcher to use qualitative data collection methods in this study. Qualitative data collection methods are used in this study for the following reasons:

- The researcher engaged with the research participants so as to gather rich descriptions about their experiences regarding IMCI case management training and ICATT implementation (Sandelowski 2000:336).
- The researcher stayed close to the “surface of the data and events” (Sandelowski 2000:336) so as to ensure that the experience was described from the viewpoint of the research participants.
- The researcher communicated the facts of the phenomenon using the everyday language of the research participants (Sandelowski 2000:336). Gathering the data and using the descriptions from those experiencing it themselves offered a valuable insider perspective of the phenomenon that is ICATT implementation.
- The researcher used the perspectives of the research participants to inform the knowledge, practice and policy regarding ICATT implementation at nursing campuses in KwaZulu-Natal (Grove et al 2013:66).

### 3.5.2 Quantitative component (phase 1 and phase 2)

The approach to the methodology of this study follows a specific 2-phase plan. The phases of this study’s research design (1 and 2) also have a quantitative component. Polit and Beck (2012:739) define quantitative research as “the investigation of phenomena that lend themselves to precise measurement and quantification, which sometimes involve a rigorous and controlled environment.” Grove et al (2013:25) state that quantitative research describes and examines relationships between variables so as to determine cause-and- effect relationships amongst the variables. It is further stated that quantitative research uses deductive reasoning to generalise findings (Grove et al 2013:25; Creswell 2009:4). Quantitative research can be used to test theories by examing the relationships between variables (Creswell 2009:4). In stating this, quantitative research designs are classed or described as being experimental, non-experimental or non-traditional (Brink et al 2012:103).

Brink et al (2012:112) state that in experimental designs the researcher controls or manipulates the variables in a study. It was not the intention of the researcher to manipulate the variables and establish relationships between the variables in this study hence, an experimental design was not adopted. However, in non-experimental designs there is no control, manipulation or alteration of independent variables and no intervention (Brink et al 2012:112). The main task in such a design is to observe phenomena as they

occur in their natural setting. Non-experimental designs are therefore useful for generating knowledge in a variety of settings. According to Maree and Pietersen (2007) cited in De Vos et al (2011:155), non-experimental designs are mainly used in descriptive studies in which the participants that have been selected to participate in the research are measured using relevant variables at a specific time. Non-experimental designs are therefore clearly distinguished by the fact that there is no manipulation of variables, and experimental or control groups are not used.

Bearing this in mind, in this study, the researcher carried out needs and cost analyses and evaluability assessments to determine the readiness of nursing campuses for ICATT implementation. The researcher allowed the nurse educators trained in IMCI and the learners trained in IMCI to use the ICATT software, in an attempt to investigate the usability of the computerised guidelines. In addition, the researcher identified the enablers and barriers to ICATT implementation at nursing campuses. There was no manipulation of the variables from the needs and cost analysis to establish whether this impacted on ICATT implementation.

Descriptive research is undertaken when little information is available about a phenomenon. It therefore provides the researcher with an opportunity to describe what exists, find new meaning, determine the frequency with which something exists and categorize the information (Grove et al 2013:215). Thus the aim of descriptive research is to provide insight into situations as they naturally occur (Grove et al 2013:215; Brink et al (2012:112). This serves as a starting point to develop theory, identify problems in clinical practice, justify the existence of current practices or make judgements (Grove et al 2013:215). In typical descriptive designs, variables are identified and described as part of a phenomenon of interest, with no attempt to introduce an intervention or establish causality (Grove et al 2013:216). Creswell (2009) cited in Grove et al (2013:217) states that it is common for researchers who use a descriptive design to combine quantitative methods and qualitative methods.

A quantitative descriptive design was adopted for this study as limited information was available regarding ICATT implementation at the nursing campuses. The purpose of adopting this design is to provide knowledge regarding the implementation of a computerised adapted training tool at nursing campuses which can be used for future research (Grove et al 2013:216). Within the context of this study, the researcher identified

enablers and barriers within nursing campuses, which could impact either positively or adversely on ICATT implementation. The researcher further described the conventional manner for IMCI case management training, and identified the requirements as per the needs, cost and evaluability assessments for ICATT implementation. Aspects that were also included were the findings from a situational analysis, and findings from a human, material and financial resources analysis. This study will provide evidence in establishing whether or not ICATT can be implemented at nursing campuses, not only as a new and innovative technology, but also as a means to improving IMCI case management training at nursing campuses amidst the challenges that have been experienced.

The examination of trends or patterns of change over time makes the dimension of time, an important factor in quantitative studies. As the study is both time-sensitive and unique to the context of South Africa, these elements must be prioritised in the methodology. A quantitative strand was included in this study as quantitative designs: 1) are streamlined to focus on a few concepts, 2) uses formal instruments and structured procedures for data collection, 3) emphasises objectivity during data collection and analysis, 4) uses statistical procedures to analyse data that has been collected, 5) the investigator is not a participant in the events under investigation, but collects data from afar and 6) use logical and deductive reasoning (Brink et al 2012:11). A quantitative component was used to focus on a few concepts namely ICATT implementation and the readiness of the campus principals, nurse educators and learners for ICATT use. The researcher used questionnaires to collect data from the campus principals, nurse educators and learners from ten nursing campuses in this study. The researcher together with a research assistant hand delivered the questionnaires to the participants. The questionnaires were self-administered to ensure the objectivity of the data that was collected. The researcher used logic and deductive reasoning when analysing the data to develop guidelines and a model for the implementation of ICATT at nursing colleges.

### 3.5.3 Phase 1

In phase one of this study the researcher collected data from the campus principals using individual interviews and self-administered questionnaires.

#### *3.5.3.1 Population*

A population is defined as “a term that sets boundaries on the study units”, and hence it refers to “individuals in the universe who possess certain characteristics” (De Vos et al 2011:223). Grove et al (2013:703) state that the population is sometimes referred to as the “target population.” The research participants should possess specific characteristics that allow them to be included in the target population termed inclusion sampling criteria whilst exclusion criteria refer to the characteristics that can exclude the participants from the target population (Grove et al 2013:353). The inclusion criteria for the campus principals are as follows: 1) campus principals from nursing campuses that offer the R425 nurse training programme. Exclusion criteria for the campus principals are as follows: 1) campus principals from sub-campuses and 2) campus principals from nursing campuses that do not offer the R425 nurse training programme. The accessible population is defined as the subset of the target population to which the researcher has reasonable access to (Grove et al 2013:686). The population of interest in phase 1 of this study were the principals of the nursing campuses where the R425 nurse training programme was offered. The accessible population were the ten principals from the ten nursing campuses where the R425 training programme was also offered.

#### *3.5.3.2 Sampling and sample size of campus principals*

There were two components to the sampling process. These include:

*a) Qualitative component*

In the qualitative component of phase 1 one of this study the campus principals were purposively sampled. In purposive sampling the researcher selects the sample based on the knowledge of the phenomena being studied (Brink et al 2012:141). Purposive sampling is also dependent on two participant related factors namely their availability and willingness to participate in the study, and that they are judged to be typical of the population under study (Grove et al 2013:365; Brink et al 2012:141). The study setting was the ten nursing campuses offering the R425 training programme and IMCI case management training for all second-year learners on this programme. The sampling of the campus principals was influenced by the study’s inclusion and exclusion criteria. Ten campus principals from ten nursing campuses that offered the R425 nurse training

programme and conducted IMCI case management training for second year learners were invited to participate in the study. The researcher used liaison persons from the selected nursing campuses to hand deliver a letter of information and an ICATT information sheet to the campus principals. The researcher made follow-up telephone calls and sent electronic mails inviting the campus principals to participate in the study. The inclusion criteria and other relevant information pertaining to the study for example, the purpose of the study and its contribution were discussed with the campus principals. The principals were referred to the ICATT information sheet for information on the use of the ICATT software. The prospective participants were asked to inform the researcher either directly or via the liaison persons of their intention to participate in the study. Although all ten campus principals met the inclusion criteria only seven campus principals informed the researcher of their intention to participate in the study. The final sample included six female campus principals and one male campus principal. The ages ranged between 41 to 60 years of age.

*b) Quantitative component*

The power analysis and sample size determination were conducted by a statistician using GPower (version 3.1.9.2). The total number of campus principals was ten. To observe a small to medium effect at a power of 80% a chi-square test gave a required sample of 10. The researcher therefore sampled all ten campus principals based on this. One campus principal declined to be a part of the study and therefore 9 campus principals were in the final sample. Table 3.1 shows the distribution of campus principals per nursing campus.

**Table 3.1 The distribution of campus principals (n=9) per nursing campus**

| Nursing campus | Distribution of campus principals | |
|---|---|---|
| | Sample | Total number in college |
| Campus A | 1 | 1 |
| Campus B | 1 | 1 |
| Campus C | 1 | 1 |
| Campus D | 1 | 1 |
| Campus E | 1 | 1 |
| Campus F | 1 | 1 |
| Campus G | 1 | 1 |
| Campus H | 1 | 1 |
| Campus I | 1 | 1 |

| | | |
|---|---|---|
| Campus J | - | 1 |
| **Total** | **9** | **10** |

#### *3.5.3.3 Data collection instruments*

Mirroring the sampling selection process, there were also two components to the instruments for data collection:

*a) Qualitative component*

In this component a semi-structured interview guide was used for data collection (Annexure O). The interview guide was designed with a broad introduction that is general and one open-ended question that was specific (Grove et al 2013:422). The interview guide was developed specifically for this study to explore the understanding and the attitudes of the campus principals about the possible use of ICATT for IMCI case management training at nursing campuses (Grove et al 2013:422). The open-ended question was used to engage the participants in a narrative and stimulate discussions regarding the use of ICATT versus the conventional method for IMCI case management training at the nursing campuses. The researcher also used probes to explore the perceptions of the campus principals regarding the readiness of the campuses, lecturers and learners for ICATT usage, the factors that could hamper ICATT implementation at the nursing campuses and the positive outcomes from ICATT implementation. The researcher used paraphrasing and neutral probes to explore other aspects considered relevant to ICATT implementation at nursing campuses.

The researcher piloted the interview guide prior to its use in the main study. Researchers advise that a pilot study be conducted to test methods to be used in data collection (Polit & Beck 2012:195). A deputy campus principal familiar with IMCI case management training and ICATT was conveniently sampled from a nursing campus. The deputy campus principal was not included in the main study sample. The feedback from the deputy campus principal following the pilot interview was that the questions were easy to understand. The types of questions asked by the researcher made it easy to respond appropriately.

*b) Quantitative component*

A questionnaire is a printed data collecting instrument that is designed to yield specific information which can be obtained from the participant's written responses (Grove et al 2013:425). A questionnaire is further described as a formal, written instrument which consists of a set of questions that the research participants complete either using paper and pencil format or on a computer (Polit and Beck 2012:297). A survey design using self-administered questionnaires was used to collect quantitative data from the principals. The rationale for using a self-administered questionnaire is that it is a quick way of obtaining data from a large group of people, and at the same time, it is cost-effective in terms of time and money. It is one of the easiest instruments to test for reliability and validity because the format of the questionnaire remains the same for all the research participants. Questionnaires also offer complete anonymity and therefore respondents tend to answer more honestly (Brink et al 2012:153).

The researcher developed the questionnaire to address the objectives of the study. The researcher conducted a systematic review of literature related to IMCI case management training and ICATT to further aid in the development of the questionnaire. According to Govender et al (2014: [4]) constructing a questionnaire that addresses the objectives and produces good quality data, increases the reliability of a study. Aspects of the questionnaire for this study were adapted from a survey tool which was developed by Maharaj (2015:129-150). The survey tool was then further adapted to fit in the context of this study. Permission to use the survey tool was sought (Annexure J) and granted (Annexure K). The questionnaires were developed in the medium of English and did not require translation as all the research subjects understood English. During the designing stage of the questionnaire the researcher kept in mind the importance of a well-designed layout that allowed for easy completion by participants who may not be in a position to ask for assistance or clarity. Thus, the researcher ensured that the questions related to a specific topic were grouped together. This also aids data analysis (Govender, Mabuza, Ogunbanjo & Mash 2014:[4]; Polit & Beck 2012:307;). In addition, the researcher ensured that the questions included were easily understandable, clearly worded and explicit (Polit & Beck 2012:307).

The structured questionnaire for campus principals (Annexure L) included closed-ended questions (dichotomous, rating, checklists) and questions based on the 5- point Likert scale (strongly disagree, disagree, neutral, agree and strongly agree). Dichotomous questions are useful for gathering factual information whilst checklists are easy to

understand (Polit & Beck 2012:299). The researcher was cognisant of the fact that closed-ended questions are easily administered and analysed and, are time-efficient allowing for research participants to complete the questionnaires in a specified period of time (Polit & Beck 2012:298). It further allows for the collection of descriptive information, especially if research participants lack the ability to express themselves adequately (Polit & Beck 2012:298). The researcher ensured that the first draft of the questionnaire was reviewed by the supervisor, co-supervisor and the statistician to identify errors and make suggestions for improvement of the questionnaire (Polit & Beck 2012:307).

It is advisable to conduct a pilot-test of an instrument to identify possible problems or flaws (Brink et al 2012:57). The self-administered questionnaire was pilot-tested on a deputy principal of a campus who was not included in the research study but was familiar with IMCI case management training. The deputy principal claimed that the questions were easy to understand and the questionnaire was easy to complete. The deputy principal indicated that the questionnaires took between 30-35 minutes to complete.

The self-administered questionnaire (Annexure L) had four sections (A-D).

**Section A** focused on the demographic variables. The purpose of including demographic information is that it provides data on the research participants which is called the sample characteristics (Grove et al 2013:154). This is necessary for the determination of whether the individuals in a particular study are a representative sample of the target population for generalisation purposes (Grove et al 2013:154). This section had three questions on personal information, such as age, gender and years of experience and one on facility information such as the type of nurse training offered at the nursing campus.

**Section B** focused on a needs assessment and an efficiency assessment. The purpose of including these aspects is to determine the readiness of the infrastructure at the nursing campuses through a situational analysis and a resource and cost analysis. This section had fifteen questions pertaining to the availability of human resources, teaching and learning using technology, a situational assessment, a technology assessment and the availability of financial resources. These were presented on a 5-point Likert scale and included some closed-ended questions.

**Section C** focused on an utilisation assessment, which would provide evidence on the whether ICATT implementation would be effective and efficient, and whether it would be problematic. This section had two questions presented as rating questions pertaining to the perceived challenges and perceived benefits to ICATT implementation at the nursing campus.

**Section D** focused on the evaluability assessment which explored whether the specific goals and objectives of IMCI pre-service training will be met through the implementation of ICATT. This section had one question on a 5-point Likert scale, based on the specific goals and objectives for ICATT implementation.

These sections were developed specifically to yield information pertaining to the readiness of the nursing campuses for ICATT implementation and, information about factors that could impact on ICATT implementation at the nursing campuses.

#### *3.5.3.4 Data collection*

Data collection simply means to gather specific information. Data collection is further defined as a methodical way of gathering specific data that is aligned to the objectives, questions or hypotheses of a research study (Burns & Grove 2009:695). The collection of data for the qualitative and quantitative components of this study extended from August 2014 to March 2015. The researcher provided secure storage for all the raw data that was collected during the qualitative and quantitative components of this study to protect the anonymity and confidentiality of the participants. The raw data will be kept for the prescribed period of five years as per the rules of the University of South Africa.

*a) Qualitative component*

The data collection took place at the campuses, which allowed the researcher to interact and observe the research participants in their natural setting. The researcher ensured that the setting was conducive for interviewing by turning off cellular phones and closing the door to prevent interruptions during the interview (Grove et al 2013: 272). The participants were allowed time to read the information letter, ICATT information sheet and consent form and ask questions pertaining to data collection. Consent was sought and obtained from each participant prior to data collection. One-on-one interviews were used

to collect data from the principals of the nursing campuses. The “up close” information gathering and “face to face interaction” are characteristic of qualitative research (Creswell 2009:175). The participants were informed that a recording device would be used to capture their responses during the interviews (Grove et al 2013:271-272). The researcher collected qualitative data from the campus principals using the semi-structured interview guide. The qualitative interview procedure allowed for both the researcher and the research participants to engage with one another, in order for the true meanings to emanate from the research participants. The questions were meant to explore how participants actually felt about the use of ICATT and elicit their opinions regarding the current IMCI case management training at nursing campuses. The research questions asked included: how do you feel about implementing ICATT at this nursing campus, for IMCI Case Management Training? Do you think nursing campuses are ready to adopt ICATT for IMCI case management training? Hence, qualitative data is based on the participant’s point of view, the meaning they attach to their experiences and the world (the use of ICATT for IMCI case management) as they see it without any scientific explanation (De Vos et al 2011:342). The duration of the interviews was between twenty minutes to 60 minutes.

*b) Quantitative component*

Data collection took place at the nursing campuses in this study. The researcher was therefore ethically bound to request for permission to collect data from the campus principals at each of the ten nursing campuses. The researcher sent copies of the ethical clearance certificate from the Department of Health Studies Higher Degree Committee at the University of South Africa (Annexure A), the permission letter from The Health Research and Knowledge Management sub-component in the province of KwaZulu-Natal (Annexure C), and the permission letter from the Acting Principal of the KwaZulu-Natal College of Nursing (Annexure E) to all the campus principals. In addition, copies of the letter of information, ICATT information sheet and data collecting instruments were sent to the campus principals. On receipt of a permission letter from the campus principals, the researcher suggested dates and times for data collection at the nursing campuses. On the planned dates and times, the researcher met with the campus principals. The researcher promised to respect the rights of the nursing campuses in respect of not disclosing the name of the campuses or that of the research participants employed at the said nursing campuses. The researcher ensured that information pertaining to the study

was given to all research participants in an information letter (Annexure I). The information letter (Annexure I) contained an outline of how the data will be collected, aspects of confidentiality that would be adhered to and the contact details of the researcher should the participants require further information or assistance regarding the completion of the questionnaire. The research participants were also given the ICATT information sheet which provided background information regarding the ICATT software. The participants had the opportunity to read the information letter, ICATT information sheet and consent form and ask questions pertaining to data collection. The researcher informed all the participants of their right to decide whether or not to participate in the research study, and thus participation was voluntary. Research participants were further informed that they could withdraw from the study without providing a reason, and without fear or prejudice. Once informed consent was obtained the questionnaires were given to the participants. The researcher chose to hand deliver the self-administered questionnaires to the participants. The delivery of the questionnaires to the research participants at the nursing campuses, allowed for contact between the researcher and the research participants. The advantage is that research participants have the opportunity to ask questions at this time. The researcher advised all the participants not to record their names on the questionnaires to guarantee their anonymity in this study. The researcher further ensured that the identities of the participants were protected by numerically coding the questionnaires which could not be linked to any individual participant. The researcher and the participants agreed on a timeframe for the completion of the questionnaires. The research participants were directed to place the completed questionnaire into a sealed envelope to ensure the confidentiality of the information.

A liaison person was identified at every campus, to ensure that the questionnaires were timeously collected from the participants. Hence, the liaison person at each campus was asked to give the research participants a reminder intermittently regarding the completion of the questionnaire. The researcher advised the liaison person on the secure storage of the completed questionnaires until they could be handed to the researcher. The liaison person was further responsible for the hand delivery of the completed questionnaires to the researcher. Table 3.2 shows the distribution of completed questionnaires for campus principals.

**Table 3.2 Distribution of completed questionnaires for Campus principals**

| Nursing campus | Distribution of campus principals |
|---|---|

| | Self-administered questionnaires | | |
|---|---|---|---|
| | **Number (n) sent out** | **Number (n) and percentage (%) of completed questionnaires returned** | |
| Campus A | 1 | 1 | 100% |
| Campus B | 1 | 1 | 100% |
| Campus C | 1 | 1 | 100% |
| Campus D | 1 | 1 | 100% |
| Campus E | 1 | 1 | 100% |
| Campus F | 1 | 1 | 100% |
| Campus G | 1 | 1 | 100% |
| Campus H | 1 | 1 | 100% |
| Campus I | 1 | 1 | 100% |
| **Total** | **9** | **9** | **100%** |

#### *3.5.3.5 Data analysis*

*a) Qualitative component*

The audio-recorded one-on-one interviews were transcribed verbatim, thereby ensuring a word-by-word account (Sandy & Shaw 2012:67). The transcripts were cleaned prior to data analysis to ensure accuracy against the recordings and that there were no errors in data recording (Grove et al 2013:688). Cleaning of the data was performed by another researcher that entailed checking for consistency by comparing the recordings to the transcribed data. In order to attribute meaning to the data or text it had to be analysed. Polit and Beck (2012:556) state that the purpose of analysing qualitative data is threefold: firstly, to organise the data, then to provide structure and lastly, to elicit meaning from the data. Qualitative data analysis can become more complicated and time consuming during the interpretation process as the researcher reads and rereads the transcripts (Grove et al 2013:280). In stating that, it is vital for researchers to become immersed in the data for the true and unspoken meanings to emerge (Grove et al 2013 280).

Qualitative researchers focus mainly on the experiences of research participants and the meanings they attribute to their experiences, rather than attempting to establish causal relationships (Pietkiewicz & Smith 2014:7). The interpretative phenomenological analysis (IPA) framework was adopted for data analysis in this study. This is an approach that focuses on how participants make sense of their personal and social world (Smith & Osborn 2008:53). IPA enables researchers to explore the personal experiences of the participants, and gain insights into their interpretations of the same (Smith & Osborn

2008:53). In addition, IPA values the dynamic role that the researcher assumes in the research process (Smith & Osborn 2008:53). This process which is peculiar to IPA is described as “double hermeneutic or dual interpretation process” (Pietkiewicz & Smith 2014:8). According to Pietkiewicz and Smith (2014:8), this means firstly that the participants attempt to attach meaning to their experiences, and secondly the researcher attempts to make sense of and interpret the meaning that participants attach to their experiences.

Pietkiewicz and Smith (2014:11) suggested a practical and flexible guide to conducting data analysis using the IPA framework. Sandy and Shaw (2012:67) suggested six stages based on Smith’s (2005) IPA framework. The researcher used the stages to analyse the data in a step-by-step process for each transcript. The researcher moved back and forth between conducting the interviews and the data analysis process. This meant that the data analysis was conducted in parallel with the interviews (Sandy & Shaw 2012:67). The researcher used this iterative process whilst conducting all the individual interviews (Sandy & Shaw 2012:67). The process stopped when category saturation was reached (Sandy & Shaw 2012:67). The researcher conducted the data analysis in this study using the stages suggested by Sandy and Shaw (2012:67) and the transcriptions of the audiotaped interviews for the campus principals which entailed the following:

- Two readings of the transcripts from the individual interviews were done to ensure that the researcher had a clear understanding of the participants’ narratives.
- Annotations were made in the margins of the transcripts about relevant points emerging from the the participants’ narratives.
- The annotations were used to identify specific themes that encapsulated the meanings of the participants’ narratives.
- The researcher looked for relationships between the emergent themes which were grouped together.
- A master table of themes with a superordinate theme, themes, sub-themes and quotes was developed for each individual transcript.
- The master table of themes from the individual transcripts were used to develop a single master table of themes (Sandy & Shaw 2012:67).

*b) Quantitative component*

The data that was collected was analysed and interpreted, for it to be meaningful to the researcher. A statistician assisted with capturing the data using the Microsoft Excel spreadsheet. A computer software package Statistical Package for Social Sciences (SPSS) version 23 was used for the analysis of the quantitative data (Annexure X). Data analysis entails categorising, ordering, manipulating and summarising the data. Narrative or statistical strategies are then applied to describe and make the findings meaningful (Brink et al 2012:177). Descriptive and inferential statistics were used to analyse the data. Descriptive statistics describe variables and provide information regarding the characteristics of a sample (Grove et al 2013:538). Inferential statistics allows researchers to make inferences or draw conclusions about an entire population, using data drawn from a sample (Grove et al 2013:538).

The questionnaire consisted of 70 items with a level measurement at a nominal, scale or ordinal level. The questionnaires in this study used open and closed-ended questions. The closed-ended questions which included 5-point Likert scale questions were analysed using descriptive and inferential statistics. The 5-point Likert scale questions were collapsed to show single categories (agree, neutral, disagree) for analysis and presentation purposes. A descriptive approach uses means, frequencies and modes which are expressed as numbers (De Vos et al 2011:260; Brink et al 2012: 185; Mash & Ogunbanjo 2014: [2]). The analysed data were therefore expressed as frequencies and summarised percentages which were rounded off to one decimal point. The researcher also used piegraphs, bar charts and frequency tables to illustrate numerical proportions and the distribution of numerical and categorical data for a better understanding of the results.

The open-ended questions were analysed by identifying common themes and the frequency with which they occurred. Frequency tables were used to present this data. A comparative analysis can be done using the findings from the open-ended and closed-ended questions.

The statistician conducted normality tests to determine whether parametric tests could be used. The results indicated that the distributions were not normal. Therefore, non-parametric tests were used such as chi-square. The chi-square tests were used to determine significant relationships and Spearman's rank correlation coefficient was used where applicable to determine strength relationships.

Due to the small number of research participants in this cohort, it is not possible to conduct reliability and factor analysis. It should not be viewed as a shortcoming and is common with small populations.

### 3.5.4 Phase 2

In phase 2 of the study data was collected from the nurse educators and the learners using focus group interviews and self-administered questionnaires.

#### *3.5.4.1 Population*

The population of interest in phase 2 of this study was the nurse educators trained in IMCI, and the learners that had completed the IMCI case management training in their second year of training on the R425 training programme. The inclusion criteria for the nurse educators were as follows: 1) nurse educators trained in IMCI case management at nursing campuses offering the R425 nurse training programme 2) nurse educators trained in IMCI case management and currently facilitating IMCI case management training for R425 learners in their second year of training. The exclusion criteria for nurse educators were as follows: 1) nurse educators who did not receive training in IMCI case management and IMCI case management facilitators course, 2) nurse educators who are IMCI trained but not currently teaching IMCI case management training at the nursing campuses and 3) nurse educators at the sub-campuses. The inclusion criteria for the learners were: second and third year learners of the R425 training programme that had completed the IMCI case management training course. The exclusion criteria were second year learners of the R425 training programme that had not yet received the IMCI case management training course. The accessible population was the nurse educators trained in IMCI and currently teaching IMCI case management at the nursing campuses. The accessible population also included second and third year learners on the R425 training programme that had completed IMCI case management training.

#### *3.5.4.2 Sampling and sample size for nurse educators and learners*

There were two components to the sampling process. These include:

a) *Qualitative component*

In the qualitative component of phase 2 of the study the nurse educators and learners were purposively sampled. As previously mentioned, purposive sampling allows the researcher to select the sample based on the knowledge of the phenomena being studied (Brink et al 2012:141). The sampling of the nurse educators and learners was also influenced by the study's inclusion and exclusion criteria.

- *Nurse educators*

The study setting was the ten nursing campuses offering the R425 training programme and the IMCI case management training for all the second year learners on this programme. The researcher approached the nurse educators trained in IMCI case management during planned meetings at the nursing campuses with an invite to participate in the study. The prospective participants were given a letter of information and an ICATT information sheet. The inclusion criteria and other relevant information related to the study for example the purpose of the study and its benefits were discussed with the prospective participants. The prospective participants were referred to the ICATT information sheet which contained background information on the ICATT software and its use. The prospective participants were asked to inform the researcher of their intention to participate in the study. Thirty-six nurse educators communicated their intention to participate in the study directly to the researcher. Only thirty nurse educators met the inclusion criteria and could thus participate in the study. Six nurse educators were not facilitating IMCI case management training at their nursing campuses. They were not included in the study. The sample included twenty-nine females and one male participant. The size of the focus groups varied between the nursing campuses with some groups having between three and five participants in a group. There were eight focus groups. Grove et al (2013:275) cite Marshall and Rossman (2011) who state that focus groups should have between four to twelve participants in order for discussions to be adequate. Polit and Beck (2012:521) present the argument that there are no fixed rules that guide sample size in qualitative research. Instead sample size should be determined by the need for adequate and in-depth information (Polit & Beck 2012:521). In this study, two focus groups had three participants each. The researcher conducted focus group interviews with these participants as she was confident that pertinent information would be shared.

- *Learners*

The researcher approached second- and third-year learners in groups during planned meetings at each of the nursing campuses. The prospective participants were given a letter of information and an ICATT information sheet. The inclusion criteria and other relevant information related to the study for example the purpose of the study and its contribution were discussed with the prospective participants. The prospective participants were referred to the ICATT information sheet for background information on the ICATT software and its use. The learners were advised to inform the researcher via the liaison persons of their intention to participate in the study. At one nursing campus the second-year learners indicated they would participate in the study. Those learners were excluded from the study as they had not done the IMCI case management training. Fifty-eight learners across the ten campuses contacted the researcher, via the liaison persons and indicated they would participate in the study. Fifty- eight learners could participate in the study because they met the inclusion criteria. There were both male and female participants in the focus groups. There were eight focus groups with between six and eight participants in each group. The researcher was guided by evidence when recruiting the participants for the focus groups. As stated above, focus groups should have between four and twelve participants to ensure adequate discussion (Grove et al 2013:275).

*b) Quantitative component*

In order for each person in the accessible population to have an opportunity to be selected for the sample, each person in that population must be identified (Grove et al 2013:356). This can be achieved by acquiring a list of the members of that population that is referred to as a sampling frame (Grove et al 2013:356). A sampling frame is “a comprehensive list of all the sampling elements in the target population from which a sample is to be chosen (Brink et al 2012:132; Polit & Beck 2010:567). The sampling frame used for phase 2 of this study was the records from the nursing campuses of all nurse educators that are IMCI trained and currently facilitating IMCI case management training at their campuses, and a list of all the second and third year learners who have completed IMCI case management training. All nursing campuses have a record of nurse educators and a list of learners which includes but is not limited to demographic data, educational qualifications and job experience. The researcher identified the total number of nurse educators and learners in the accessible population from the sample frame. This was submitted to the statistician to determine the required sample size for the two groups.

Conducting a power analysis is the ideal method for determining sample size (Grove et al 2013:367). Power is defined as “the capacity of the study to detect differences or relationships that actually exist in the population (Grove et al 2013:367). The power analysis and sample size determination for nurse educators and learners was conducted by a statistician using GPower (version 3.1.9.2). To observe a small to medium effect at a power of 80% a chi-square test gave a required sample of 44 nurse educators and 247 second and third year learners. The sampling approach that was used for nurse educators and learners was probability sampling. In probability sampling every member of the population has an equal chance of being selected for the sample, which tends to be more representative of the population (Grove et al 2013:357). The type of probability sampling used in this study was simple random sampling which is discussed in detail below.

- *Nurse educators*

Simple random sampling means that the research subjects are selected at random from the sample frame (Grove et al 2013:358). The researcher used the following steps for the simple random sampling: (1) the population was identified, (2) a sample frame was created, (3) the sample size was calculated, (4) each element in the sample frame was numbered consecutively and (5) a computerised random number generator was used (Brink et al 2012:135). The researcher identified that there were a total number of fifty nurse educators that received IMCI case management training and were currently facilitating IMCI case management training at the ten nursing campuses. The researcher compiled a list of names of all the nurse educators trained in IMCI and currently facilitating IMCI case management training at the nursing campuses. The preferred sample size was 44 nurse educators which were based on the power analysis and sample size determination. A consecutive number was then assigned to each name in the sampling frame (Brink et al 2012:135, Grove et al 2013:358). A computerised number generator was then used to generate an unordered list of random numbers within the range of one to fifty until the sample size of 44 was reached (Brink et al 2012:135, Grove et al 2013:358). This process ensured that each participant had an equal chance of being selected. Two nurse educators refused to be a part of the study. Attempts were made by the researcher to recruit two more research participants but due to the work demands of the potential participants, and unavailability due to leave, this was not possible. The final sample size for nurse educators was therefore 42. Table 3.3 shows the distribution of

nurse educators trained in IMCI and currently facilitating IMCI case management training at the nursing campuses.

- *Learners*

There was a total number of 689 second and third year learners that received IMCI case management training at the ten nursing campuses. The recommended sample size was two hundred and forty-seven learners (247 learners), and this was based on the power analysis and sample size determination. Simple random sampling was used to select the research participants. In simple random sampling, participants are selected from a sampling frame in a random manner (Brink et al 2012:135). Every participant therefore has an equal chance of being selected (Brink et al 2012:135). The researcher used the following steps when selecting the learners: (1) the population was identified, (2) a sample frame was created, (3) the sample size was calculated, (4) each element in the sample frame was numbered consecutively and (5) a computerised number generator was used (Brink et al 2012:135). The researcher identified the total number of second and third year learners that had received IMCI case management training at each of the ten nursing campuses. The researcher used a compiled list of names of all the second and third year learners from each of the ten nursing campuses to create a sample frame. The preferred sample size of all the learners was based on the power analysis and sample size determination. A consecutive number was assigned to each name in the sampling frame (Brink et al 2012:135, Grove et al 2013:358). A computerised number generator was used to generate an unordered list of random numbers within the determined range until the sample size was reached for each nursing campus. The researcher envisaged the possibility of a 5-10% drop out rate and therefore over sampled by eighteen learners (Grove et al 2013:367). Table 3.3 also shows the distribution of second- and third-year learners trained in IMCI at the nursing campuses.

**Table 3.3 Distribution of nurse educators trained in IMCI (n=42) and learners trained in IMCI (n=265) per nursing campus**

| Nursing campus | Nurse educators trained in IMCI | | 2nd and 3rd year learners trained in IMCI | |
|---|---|---|---|---|
| | Sample | Total number in campus | Sample | Total number in campus |
| Campus A | 5 | 6 | 25 | 65 |

| | | | | |
|---|---|---|---|---|
| Campus B | 4 | 5 | 30 | 62 |
| Campus C | 4 | 4 | 25 | 56 |
| Campus D | 3 | 5 | 25 | 59 |
| Campus E | 3 | 4 | 20 | 65 |
| Campus F | 3 | 3 | 25 | 70 |
| Campus G | 4 | 5 | 30 | 88 |
| Campus H | 7 | 8 | 35 | 76 |
| Campus I | 4 | 4 | 30 | 68 |
| Campus J | 5 | 6 | 20 | 80 |
| **Total** | **42** | **50** | **265** | **689** |

(Records at the nursing campuses of the KwaZulu-Natal College of Nursing 2014-2015).

#### *3.5.4.3 Data collection instruments*

The researcher developed three semi-structured interview guides for the qualitative component of phase 2 of this study. The interview guides were developed specifically for this study and was based on aspects related to IMCI case management training and ICATT implementation. The qualitative component of the instruments for data collection included the following:

- *The development of the semi-structured interview guide for nurse educators and learners (Annexure O)*

A semi-structured interview guide (Annexure O) was used to collect data from the nurse educators and learners prior to the use of the ICATT software. The interview guide was designed with a broad introduction that is general to guide the discussion and one open-ended question that was specific (Grove et al 2013:422). The open-ended question was meant to engage the participants in a narrative about ICATT implementation for IMCI case management training at nursing campuses. The interview guide was further designed to explore how the nurse educators and learners feel about computer-based learning at the nursing campuses (Grove et al 2013:425). The researcher included neutral probes and prompts to encourage participants to share their perspectives on the conventional way of IMCI case management training versus ICATT, without fear of biasing the participants' responses (Grove et al 2013:424).

- *The development of the semi-structured interview guide for nurse educators (Annexure P)*

A semi-structured interview guide (Annexure P) was used to collect data from nurse educators after the use of the ICATT software. The interview guide had a broad introduction which was general to guide the discussion (Grove et al 2013:422). This was followed by the open-ended questions which were meant to elicit the opinions and attitudes of the participants and asses their levels of knowledge regarding the ICATT software (Grove et al 2013:425). The open-ended questions were also to encourage participants to engage in a narrative about a situation that is familiar to them (Grove et al 2013:425). There were nine open-ended questions. The first two questions were meant to probe about the experience of using the ICATT software which had been downloaded on to computers, and which was new and had not been used prior to this. Additional questions were designed to gauge the usefulness and advantages of using ICATT for IMCI case management training. The interview guide used the probing questions and prompts to explore the role of computerised guidelines in teaching and learning, and what the nurse educators found preferable and advantageous for themselves and the nursing campus as a whole. The interview guide explored the possible challenges to ICATT implementation at nursing campuses. The interview guide further explored the views of the nurse educators regarding the way forward and recommendations that could assist with ICATT implementation at the nursing campuses.

- *The development of the semi-structured interview guide for learners (Annexure Q)*

A semi-structured interview guide (Annexure Q) was used to collect data from the learners after they had the opportunity to use the ICATT software which had been downloaded on to the computers. The interview guide had a broad introduction which was general to guide the discussion (Grove et al 2013:422). This was followed by the open-ended questions which were specific and were meant to elicit the opinions and attitudes of the participants and assess their levels of knowledge regarding the ICATT software (Grove et al 2013:425). The open-ended questions were also meant to encourage participants to engage in a narrative about a situation that is familiar to them (Grove et al 2013:425). There were six open-ended questions that were meant to probe the experiences and opinions of learners regarding the use of the ICATT software. Probing questions were based on the usability of the ICATT software for IMCI case management training, for example was it easy to use, were directions clear, and were learners able to use the keyboard. There was also a question regarding the usefulness of the computerised

guidelines for learners at the nursing campuses. Additional questions highlighted any problem areas with the software, the advantages of ICATT for learners, and the way forward for IMCI case management training at nursing campuses. The interview guide further explored the views of the learners regarding recommendations that could assist with ICATT implementation at the nursing colleges.

The researcher pilot tested all the interview guides (Annexures O, P and Q) with two nurse educators and four learners in focus groups. Pilot testing of the interview guide is advisable to identify problems in the design of the question or procedure for recording responses (Grove et al 2013:424). On completion of the focus group interviews the research participants were asked about the relevance of the questions and whether they were understandable. The participants were in agreement that the questions were relevant, and easy to understand. The participants were of the opinion that the type of questions allowed them to engage with the researcher to provide relevant information.

The quantitative component of the instruments for data collection included:

A survey design using self-administered questionnaires was used to collect quantitative data from the nurse educators (Annexure M) and learners (Annexure N). Govender et al (2014:[1]) describe a questionnaire as a research instrument that allows researchers to collect information objectively about the knowledge, beliefs ,attitudes and behaviours of individuals. The rationale for the researcher using a self-administered questionnaire for the quantitative component of this study was firstly, it allowed for the collection of facts and opinions from individuals who were knowledgeable about the phenomenon of interest (De Vos et al 2011:186). It was also an efficient way of obtaining data from many research subjects at the lowest cost and lastly the structured methods would yield results that were easy to analyse statistically (Polit & Beck 2012:312).

The researcher developed the questionnaire to address the objectives of the study. A systematic review of literature related to IMCI case management training and ICATT also assisted with the development of the questionnaire. According to Govender et al (2014:[4]) constructing a questionnaire that addresses the objectives and produces good quality data, increases the reliability of the study. Aspects of the questionnaire for this study were also adapted from a survey tool which was developed by Maharaj (2015:129-150). The survey tool was then adapted to fit in the context of this study. Permission to

use the survey tool was sought (Annexure J) and granted (Annexure K). Questions pertaining to ICATT use were adapted from the ICATT software. The questionnaires were only developed in the English medium, as this is the medium for teaching and learning at the nursing campuses. The questionnaires were designed to be easily understandable and explicit with a layout that allowed for easy completion by research participants (Polit & Beck 2012:307). Thus, the researcher ensured that the questions related to a specific topic were grouped together. This also aids data analysis (Polit & Beck 2012:307; Govender et al 2014:[4]).

During the development of the structured questionnaires for nurse educators and learners (Annexures M and N) the researcher included closed-ended questions (dichotomous, rating, checklists) and questions based on the 5- point Likert scale (strongly disagree, disagree, neutral, agree and strongly agree). The dichotomous questions were included as the researcher was gathering factual information whilst checklists were included as they are easy to understand (Polit & Beck 2012:299). The researcher was cognisant of the fact that closed-ended questions are easily administered and analysed and, are time-efficient allowing for research participants to complete the questionnaires in a specified period of time (Polit & Beck 2012:298). A free text box was included in the questionnaires for the nurse educators and learners. Free text boxes can be inserted at the end of a section and adds "richness" to the quantitative data. Govender et al (2014:[5]) state that including open-ended questions or free text comments in a structured questionnaire, does not make the research qualitative in nature, but allows for greater clarity in a specific area. In addition, the responses can be quantified. The researcher ensured draft copies of the questionnaires were sent to the supervisor, co-supervisor and statistician to correct errors and make suggestions for change (Polit & Beck 2012:307).

- *The development of the self-administered questionnaire for nurse educators (Annexure M)*

The self-administered questionnaire (Annexure M) had four sections (A-D).

**Section A** focused on the demographic variables. The purpose of including the demographic variables is to determine whether the individuals in a particular study are representative of the target population if generalisations are to be made (Grove et al 2013:154). This section had three questions on personal information such as age, gender

and years of experience and one question which deals with the type of nurse training offered at the nursing college.

**Section B** focused on a needs and efficiency assessment from the perspective of the nurse educators trained in IMCI. The purpose was to assess the readiness of the nurse educators to implement ICATT for IMCI case management training. This section had eleven questions pertaining to IMCI case management training in the conventional manner at the nursing campuses, the adequacy of human resources, facilitating teaching and learning using technology and a technology assessment. The questions were closed-ended questions, rating questions and made use of a 5-point Likert scale.

**Section C** focused on an utilisation and evaluability assessment as per the theoretical framework. The purpose of this section was twofold: to ascertain what nurse educators viewed as challenges and benefits to ICATT implementation at nursing campuses, and to ascertain whether ICATT implementation would ultimately effect change by meeting the broad goals and objectives of the IMCI programme. This section had three questions pertaining to challenges, benefits, goals and objectives also on a 5-point Likert scale.

**Section D** focused on the ICATT software. The purpose of this section was to determine the usability of the ICATT software after nurse educators were given the opportunity to use the ICATT software for the first time. This section had two questions investigating the nurse educator's views on the different training components of ICATT (IMCI assess, classify, treat, counsel and follow-up modules and the ICATT read, see, practice and test sections) on a 5-point Likert scale, a rating question and a free text box (question 20).

These sections were developed to yield information pertaining to the readiness of the nurse educators for ICATT implementation and the readiness of the nurse educators for ICATT implementation at the nursing campuses.

- *The development of the self-administered questionnaire for learners (Annexure N)*

The self-administered questionnaire (Annexure N) had three sections (A-D).

**Section A** focused on the demographic variables. The purpose of including the demographic variables is to determine whether the learners in this study are

representative of the target population if generalisations are to be made (Grove et al 2013:154). This section had three questions about personal information such as age, gender and the training programme for which the participant is registered.

**Section B** focused on learners and computer-based learning at nursing campuses. The purpose of this section was to assess learners' exposure to computers at the nursing campus, the readiness of learners to integrate computers into their learning environment, and the readiness to change from the conventional way of learning to computer-based learning. This section included questions that need a "yes" or "no" answers, rating questions and 5-point Likert scale pertaining to accessibility to computers, technology assessment and the use of computers for teaching and learning at the nursing campus.

**Section C** focused on the ICATT software. The purpose of this section was to determine the usability of the ICATT software after learners were given the opportunity to use the ICATT software for the first time. This section had two questions investigating the learners' views on the different training components of ICATT (IMCI assess, classify, treat, counsel and follow-up modules and the ICATT read, see, practice and test sections) on a 4-point and a 5-point Likert scale, a rating question and a free text box.

These sections were developed to yield information pertaining to readiness of the learners for ICATT implementation.

- *Pilot testing of the data collection tools*

A pre-test or pilot test allows the researcher to identify possible problems with the newly developed instrument, prior to it being used in the study (Grove et al 2013:424). Sandy and Shaw (2012:66) advise that newly developed data collection tools should be pilot-tested before use. Lutwama, Roos and Dolamo (2012:[2]) suggest that pilot testing be done at two levels that is with a group of experts and with a group that share similar attributes to the target population. The value of the pilot study is that the researcher can determine the administration times for the questionnaire and check the clarity of the questions (Polit & Beck 2012:296). Problems with the layout of the questionnaire and sequencing of questions which may hamper completion of the questionnaire can be identified and addressed following a pilot study (Grove et al 2013:424; Govender et al (2014:[5]). Feedback from a pilot study allows the researcher to determine whether the

data collection instrument yields data that is reliable and valid (Grove et al 2013:424; Govender et al (2014:[6]).The researcher pilot tested the questionnaires (Annexure M and Annexure N) with a group of individuals who had knowledge on IMCI and ICATT and were considered to be experts in this field, and with nurse educators and learners.

*-Pilot-testing with the experts*

The researcher used content validity testing in this study to determine whether the elements relevant to the construct being measured were included in the questionnaires. Between three to five experts are recommended for content validity testing (Grove et al 2013:394). The researcher invited four “content experts” to determine whether all the variables that were being measured had been included in the questionnaires (Grove et al 2013:394). The experts were a paediatrician with expertise in IMCI and ICATT implementation and public health, two heads of department with experience in primary health care and IMCI case management training and, a nurse educator with experience in IMCI implementation at nursing campuses. The researcher developed a content validity index (CVI) tool (see Annexure R) to test the validity of the content included in the questionnaires used in this study. The experts were given the questionnaires for the campus principals, nurse educators and learners, and the content validity index tools. The experts were asked to rate the items on each of the questionnaires from “not relevant” (1) to “highly relevant” (4). All the experts indicated that the elements included in the data collecting instruments were relevant. In addition, the researcher sent the questionnaires to the supervisor and co-supervisor to critically review the questionnaire items. The supervisors made some suggestions for improvement of the questionnaires and the researcher ensured that the amendments and corrections were made.

*-Pilot testing with nurse educators and learners*

Permission was obtained from the campus principal to pilot test the questionnaires at a nursing campus that conducted the R425 nurse training programme and IMCI case management training. The researcher selected two nurse educators and three learners who were trained in IMCI case management. The researcher explained the reason for the pilot study and informed the participants that their participation was limited to the pilot study. An information sheet with the details of the study was given to each participant. When consent was obtained the questionnaires were distributed to the participants. The

researcher instructed the participants to critically review the questionnaires with regards to the phrasing of the questions and the order and relevance of the questions. The researcher further instructed the participants to keep a record of how long it took to complete the questionnaires. The research participants reported that they encountered no problems and hence completed the questionnaires in a time period of between 25-35 minutes. The questions were simply stated and unambiguous. The research participants had the opportunity to use the software and commented that the questions pertaining to the use of ICATT were relevant. They also indicated that the use of the checklists to gather data on the software was easy to complete. The completed questionnaires were submitted to a statistician for validity and reliability testing.

#### *3.5.4.4 Data collection*

Brink et al (2012:57) stated that data collection is the collection of actual information, according to a pre-established plan, and using the instrument that has been developed and pretested for that particular purpose. The collection of data for the qualitative and quantitative components of this study extended from August 2014 to March 2015. The researcher provided secure storage for all the raw data that was collected during the qualitative and quantitative components of this study to protect the anonymity and confidentiality of the participants. The raw data will be kept for the prescribed period of five years as per the rules of the University of South Africa.

*Qualitative component*

The data collection took place at the nursing campuses which was convenient for the participants to access and provided a private and non-threatening environment (Polit & Beck 2012:538). This allowed the researcher to interact and observe the research participants in their natural setting. The researcher ensured that the setting was suitable for interviewing by requesting that cellular phones be turned off and closing the door to prevent interrutions during the interviews. Chairs were arranged in a circular pattern to facilitate communication (Grove et al 2013:272). In the qualitative research component, focus group interviews were used to collect data from the nurse educators (eight focus groups) and the learners (eight focus groups) before and after the use of the ICATT software. The researcher chose to conduct focus groups as a means of obtaining the views of many people in the shortest time period (Polit & Beck 2012:538). The participants

were allowed time to read the information letter, ICATT information sheet and consent form and ask questions pertaining to data collection. The researcher informed the participants of ground rules to guide the interview process and protect the rights of the participants. Consent was sought and obtained from each participant prior to data collection. The research assistant was introduced to the focus groups. The role of the research assistant was explained to the participants to ensure that they did not experience any discomfort when communicating their points of view. The participants were informed that a recording device will be used to capture their responses during the focus group interviews (Grove et al 2013:271-272). In light of this the researcher reassured the research participants of their confidentiality and their anonymity (Brink et al 2012:158; Polit & Beck 2012:542).

Brink et al (2012:159) and Grove et al (2013:272) highlight the fact that a researcher must be skilled in administering interview schedules, to elicit high quality data. The researcher was the moderator of the focus groups and guided the discussions (Polit & Beck 2012:537). A semi-structured interview guide was used to guide data collection in the focus groups. The advantages of using a semi-structured interview guide in this study are: providing in-depth information when not much is known about that topic, allowing for probing to increase detailed exploration, increased rapport between the researcher and the research participants and allowing for clarification of the data (Brink et al 2012:158). The researcher collected data using open-ended questions. The researcher focused on learning the meaning that the research participants attached to the area of interest, not the meaning that the researcher brought to the research study (Creswell 2009:175). The researcher collected qualitative data from the nurse educators' and learners' focus groups using the semi-structured interview guide (Annexure O) prior to the use of the ICATT software. The questions were meant to explore the participants' perceptions and understanding of ICATT and the current IMCI case management training at nursing campuses. The research questions included: how do you feel about implementing ICATT at this nursing campus, for IMCI Case Management Training? Paraphrasing, probing and prompts were used by the researcher to explore the area of interest and obtain detailed and indepth information during the focus group interviews (Polit & Beck 2012:537). During the process of data collection, the research assistant wrote down notes regarding group interactions. The research assistant therefore served as an additional source of information (Polit & Beck 2012:538; Sandy & Shaw 2012:66).

The researcher also collected qualitative data from the nurse educators and learners focus groups using the semi-structured interview guides (Annexure P and Q) after the use of the ICATT software. The semi-structured interview guide included open-ended questions to allow participants to express their opinions regarding their first time use of the ICATT software. The researcher used probes to focus the group discussions on specific aspects regarding the ICATT software to emerge. The questions the nurse educator focus groups were asked included (Annexure P): how do you feel about using ICATT? What problems have you experienced using ICATT? Would the use of ICATT be useful in your setting? What have you identified as advantageous regarding ICATT implementation for you as an educator? What role can ICATT play in teaching and learning at the nursing campus? What would you prefer for future training? What do you foresee as challenges to ICATT implementation at your nursing college? The questions the learner focus groups were asked included (Annexure Q): how do you feel about using ICATT? What problems have you experienced using ICATT? Would the use of ICATT be useful in your setting? What have you identified as advantageous regarding ICATT for you as the learner? What would you prefer for future training? Are there any recommendations you would like to make pertaining to ICATT and ICATT implementation? The duration of the interviews was longer from 45 minutes to 60 minutes. The researcher recorded the interviews using a recording device. The research assistant wrote down notes about the group behaviour and interactions during the interviews (Polit & Beck 2012:538; Sandy & Shaw 2012:66).

*Quantitative component*

Data collection took place at the nursing campuses in this study. The researcher was therefore ethically bound to request for permission from the campus principals of the ten nursing campuses to collect data from the nurse educators and learners. The researcher sent copies of the ethical clearance certificate from the Department of Health Studies Higher Degree Committee at the University of South Africa (Annexure A), the permission letter from The Health Research and Knowledge Management sub-component (Annexure C) and the permission letter from the Acting Principal of the KwaZulu-Natal College of Nursing (Annexure E) to all the campus principals. In addition, copies of the letter of information, ICATT information sheet and data collecting instruments were also sent to the campus principals. On receipt of permission letters from the campus principals the researcher negotiated for dates and times for data collection.

On the planned dates and times, the researcher and research assistant met with the campus principals. The researcher promised to respect the rights of the nursing campuses in respect of not disclosing the name of the campuses or that of the research participants employed at the said nursing campuses. The researcher and the liaison person at each campus identified a suitable venue for data collection that would ensure the privacy of the participants and facilitate the use of the computer stations. The researcher met with the nurse educators first and then with the learners in groups. The researcher ensured that information pertaining to the study was given to all research participants in an information letter (Annexure I). The information letter (Annexure I) outlined how the data will be collected, aspects of confidentiality that would be adhered to and the contact details of the researcher should they require further information or assistance regarding the completion of the questionnaire. The research participants were also given the ICATT information sheet which provided background regarding the ICATT software. The participants were given time to read the information letter, ICATT information sheet and consent form and ask questions pertaining to data collection. Every research participant was informed of their right to decide whether or not to participate in the research study and thus participation was voluntary. Research participants were further informed that they could withdraw from the study without providing a reason, and without fear or prejudice. Once informed consent was obtained, the nurse educators and learners were directed to the computer stations to use the ICATT software. On completion of the ICATT exercises, the questionnaires were distributed to the research participants. The researcher and research assistant hand delivered the self-administered questionnaires to the nurse educators and learners. The delivery of the questionnaires to the research participants allowed for contact between the researcher and the research participants. The advantage is that research participants can ask questions at this time. The researcher advised all the participants not to record their names on the questionnaires to guarantee their anonymity in this study. The researcher further ensured that the identities of the participants were protected by numerically coding the questionnaires which could not be linked to any individual participant. The researcher and the participants agreed on a timeframe in which to complete the questionnaires. The research participants were directed to place the completed questionnaire in a sealed envelope to ensure the confidentiality of the information.

A liaison person was identified at every campus, to ensure that the questionnaires were timeously collected from all the research participants. Thus, the liaison person was asked

to give the research participants a reminder intermittently regarding the completion of the questionnaire. The researcher advised the liaison person on the secure storage of the completed questionnaires until they could be handed to the researcher. The liaison person was further responsible for the hand delivery of the completed questionnaires to the researcher. Table 3.4 shows the distribution of completed questionnaires for nurse educators and learners.

**Table 3.4 The distribution of questionnaires for nurse educators and learners**

| Nursing campuses | Distribution of nurse educators and learners | | | | | |
|---|---|---|---|---|---|---|
| | Nurse educators | | | Learners | | |
| | Self-administered questionnaires | | | Self-administered questionnaires | | |
| | Number (n) sent out | Number (n) and percentage (%) of completed questionnaires returned | | Number (n) sent out | Number (n) and percentage (%) of completed questionnaires returned | |
| Campus A | 5 | 3 | 7.1% | 25 | 24 | 9.0% |
| Campus B | 4 | 4 | 9.5% | 30 | 29 | 11.0% |
| Campus C | 4 | 3 | 7.1% | 25 | 20 | 7.5% |
| Campus D | 3 | 3 | 7.1% | 25 | 21 | 8.0% |
| Campus E | 3 | 3 | 7.1% | 20 | 17 | 6.4% |
| Campus F | 3 | 3 | 7.1% | 25 | 23 | 8.7% |
| Campus G | 4 | 3 | 7.1% | 30 | 26 | 9.8% |
| Campus H | 7 | 5 | 12.0% | 35 | 32 | 12.0% |
| Campus I | 4 | 4 | 9.5% | 30 | 26 | 9.8% |
| Campus J | 5 | 4 | 9.5% | 20 | 17 | 6.4% |
| **Total** | **42** | **35** | **83.0%** | **265** | **235** | **88.6%** |

*3.5.4.4.1 Recruitment and preparation of the research assistant for data collection*

The rationale for recruiting a research assistant for this study was: 1) the researcher adopted a two-phase approach which entailed collecting qualitative data and quantitative data sequentially in this study, 2) data was collected from three groups of participants and 3) computers and a software programme were used in phase two of data collection. The researcher therefore employed the services of a research assistant with experience in the field of information technology. The preparation of the research assistant entailed a one-day training session conducted by the researcher. The purpose of training the research assistant was to ensure that he understood his role during data collection (Polit & Beck 2012:535). The training of the research assistant included an orientation to the

ICATT software programme and troubleshooting for the ICATT software. The research assistant's role included setting up the laptops with the ICATT software and opening the programmes. In addition, the research assistant handed out the questionnaires after the participants used the ICATT software. The research assistant was familiar with the use of the recording device but received guidance from the researcher on note-taking during the focus group discussions. The research assistant was cautioned not to engage with the participants in the focus groups by prompting, contributing or offering assistance as this could compromise or bias data collection. The research assistant was told to be an observer of participants' body language and group interactions (Grove et al 2013:276). Prior to the focus group interviews, the research assistant assisted with the collection of the consent forms, once they were completed. During the focus group interviews the research assistant operated the recording device and made notes of the group dynamics which was discussed thereafter with the researcher.

#### *3.5.4.5 Data analysis*

*Qualitative component*

The audio-recorded focus group interviews for nurse educators and learners were transcribed verbatim, thereby ensuring a word-by-word account (Sandy & Shaw 2012:67). The transcripts were cleaned prior to data analysis to ensure accuracy of the audio recordings (Grove et al 2013:688). Cleaning of the data was performed by another researcher that entailed checking for consistency by comparing the recordings to the transcribed data. In order for meanings to emerge from the data or text it had to be analysed. Pietkiewicz and Smith (2014:11) suggested a practical and flexible guide to conducting data analysis using the IPA framework. Sandy and Shaw (2012:67) suggested six stages based on Smith's (2005) IPA framework. The researcher used the stages to analyse the data in a step-by-step process for each transcript. The researcher moved back and forth between conducting the interviews and the data analysis process. This meant that the data analysis was conducted in parallel with the interviews (Sandy & Shaw 2012:67). The researcher used this iterative process whilst conducting all the individual interviews (Sandy & Shaw 2012:67). The process stopped when category saturation was reached (Sandy & Shaw 2012:67). The researcher conducted the data analysis in this study using the stages suggested by Sandy and Shaw (2012:67) and the transcriptions

of the audiotaped interviews for the nurse educators and learners which entailed the following:

- Two readings of the transcripts from the individual interviews were done to ensure that the researcher had a clear understanding of the participants' narratives.
- Annotations were made in the margins of the transcripts about relevant points emerging from the the participants' narratives.
- The annotations were used to identify specific themes that encapsulated the meanings of the participants' narratives.
- The researcher looked for relationships between the emergent themes which were grouped together.
- A master table of themes with a superordinate theme, themes, sub-themes and quotes was developed for each individual transcript.
- The master table of themes from the individual transcripts were used to develop a single master table of themes (Sandy & Shaw 2012:67).

*Quantitative component*

The data that was collected from the nurse educators and learners was analysed and interpreted, in order for it to be meaningful to the researcher. A statistician assisted with capturing the data using the Microsft Excel spreadsheet. The computer software Statistical Package for Social Sciences (SPSS) version 23 was used for the analysis of the quantitative data (Annexure X). Data analysis entails categorising, ordering, manipulating and summarising the data, followed by using either narrative or statistical strategies to describe and make the findings meaningful (Brink et al 2012:177). Descriptive and inferential statistics were used in this study for data analysis. Descriptive statistics reveal characteristics of a sample and descriptions of study variables (Grove et al 2013:538). Inferential statistics are used in research studies when the intention is to compare groups and draw inferences about any statistically-significant differences (Mash and Ogunbanjo 2014:[3]).

The questionnaire for nurse educators consisted of 57 items and the questionnaire for learners consisted of 18 items with a level of measurement at a nominal or ordinal level. The questionnaires included open and closed-ended questions. The closed-ended

questions which included the 5-point Likert scale questions were analysed using descriptive and inferential statistics. The 5-point Likert scale questions were also analysed using factor analysis. A descriptive approach uses measures of means, median and modes which are expressed as numbers (De Vos et al 2011:260; Brink et al 2012:185; Mash & Ogunbanjo 2014:[2]). The data in this study was therefore expressed in the form of frequencies and summarised percentages, with all the percentages rounded off to one decimal point. The researcher also used pie-graphs, bar charts, and frequency tables to illustrate numerical proportions and the distribution of numerical and categorical data, for a better understanding and interpretation of the findings.

The open-ended questions were analysed by identifying common themes in the text by using frequency distributions. Frequency tables were used to present this data. A comparative analysis can be done using the findings from the open-ended and closed-ended questions.

The statistician conducted normality tests to determine whether parametric tests could be used. The results indicated that the distributions were not normal. Therefore, non-parametric tests were used such as chi-square.

Inferential techniques include the use of Spearman's rank correlation coefficient and chi-square test values, which are interpreted using the p-values, were presented where possible. The chi- square test was used to determine significant relationships. The Spearman's rank correlation coefficient was used were applicable to determine strength relationships.

The two most important aspects of precision are reliability and validity. Reliability is a measure of consistency (Grove et al 2013:707). Reliability is computed by using the same measurement scale on the same subjects at two different times. If the subjects' responses remain unchanged the measurement is considered reliable (Grove et al 2013:389). Cronbach's Alpha coefficient (α) is an index for testing internal consistency or homogeneity of the test items (Polit & Beck 2012:722). A reliability coefficient of 0.70 or higher is considered as "acceptable" (Polit & Beck 2012:722).
The table 3.5 below reflects the Cronbach's alpha score for all the items that constituted the questionnaire for the nurse educators.

**Table 3.5 Cronbach's Alpha Score for nurse educators**

| Section | Title | Number of Items | Cronbach's Alpha |
|---|---|---|---|
| B | Human Resources, Teaching and Learning Using Technology Assessment | 14 of 14 | 0.703 |
| C | Challenges and Benefits | 24 of 24 | 0.790 |
| D | Use of the ICATT Software | 26 of 26 | 0.960 |

The overall reliability score exceeds the recommended Cronbach's alpha value of 0.700. This indicates a degree of acceptable, consistent scoring for the various sections of the questionnaire.

Table 3.6 reflects the Cronbach's alpha score for all the items that constituted the questionnaire for learners.

**Table 3.6 Cronbach's Alpha Score for learners**

| Section | Number of Items | Cronbach's Alpha |
|---|---|---|
| B6 | 3 | .952 |
| B8 | 4 | .843 |
| B10 | 5 | .719 |
| B11 | 4 | .731 |
| B12 | 2 | .807 |
| C13 | 21 | .970 |
| C14 | 5 | .867 |

The reliability score for each section exceeds the recommended Cronbach's alpha value of 0.700. This indicates a high degree of acceptable, consistent scoring for the various sections of the research.

Factor analysis is a statistical technique whose main goal is data reduction (Grove et al 2013:566). A typical use of factor analysis is in survey research, where a researcher wishes to represent a number of questions with a small number of hypothetical factors (Grove et al 2013:566). Factor analysis is done only for the Likert scale items dividing certain components into finer components (Grove et al 2013:566). This is explained in the table as the rotated component matrix (Grove et al 2013:566). The matrix tables is preceded by a summarised table that reflects the results of Kaiser-Meyer-Olkin Measure and Bartlett's Test. The requirement is that Kaiser-Meyer-Olkin Measure of Sampling

Adequacy should be greater than 0.50 and Bartlett's Test of Sphericity less than 0.05. In all instances, the conditions are satisfied in this study which allows for the factor analysis procedure for data collected from the nurse educators and learners.

The summarised table reflects the results of the Kaiser-Meyer-Olkin and Bartlett's Test done for items on the questionnaire administered for learners.

**Table 3.7 Kaiser-Meyer-Olkin and Bartlett's test for learners**

| Section | Kaiser-Meyer-Olkin Measure of Sampling Adequacy | Bartlett's Test of Sphericity | | |
|---|---|---|---|---|
| | | Approx. Chi-Square | Df | Sig. |
| B6 | .766 | 711.377 | 3 | 0.000 |
| B8 | .768 | 458.752 | 6 | 0.000 |
| B10 | .670 | 347.153 | 10 | 0.000 |
| B11 | .749 | 181.744 | 6 | 0.000 |
| B12 | .500 | 143.286 | 1 | 0.000 |
| C13 | .929 | 4790.950 | 210 | 0.000 |
| C14 | .840 | 541.542 | 10 | 0.000 |

The principle component analysis was used as the extraction method, and the rotation method was Varimax with Kaiser Normalization. This is an orthogonal rotation method that minimises the number of variables that have high loadings on each factor. It simplifies the interpretation of the factors. The requirement is that Kaiser-Meyer-Olkin Measure of Sampling Adequacy should be greater than 0.50 and Bartlett's Test of Sphericity less than 0.05. In all instances, the conditions are satisfied which allows for the factor analysis procedure.

### 3.5.5 Phase 3: The Delphi method

The Delphi method is considered a suitable research instrument that can be used when there is limited knowledge about a problem or phenomenon (Skulmoski, Hartman & Krahn 2007: 2). It is a method for obtaining consensus by using a panel of experts, multiple feedback rounds and a series of questionnaires to collect data (Hsu & Sanford 2007:1,2). The questionnaires are developed to focus on problems, opportunities, solutions or forecasts (Skulmoski et al 2007:2). The panel of informed individuals offer opinion or judgement on a particular issue (Keeney, Hasson & McKenna 2006:206). The expert

opinion data is refined anonymously through an iterative process until consensus is obtained (Cramer, Klasser, Epstein & Sheps 2008:212). The Delphi method was developed by the Rand Corporation in the 1950s to obtain expert consensus regarding subjective data (Skulmoski et al 2007:2; Cramer et al 2008:212). It was first used in the defence sector but has since been used in many different settings for example health care and education (Skulmoski et al 2007: 2). The advantages of using the Delphi method are: anonymity of participants and their responses to obviate peer group pressure and group bias, the use of a panel of experts as participants to obtain knowledgeable opinion, the use of multiple rounds until a group opinion emerges and the opportunity for individual participants to change their own opinion in light of the group's opinion (Du Plessis & Human 2007:16; Hsu & Sandford 2007:2). The limitations of the method include: the possibility of low response rates during the Delphi rounds, conducting the Delphi rounds can be time-consuming, the researchers may unintentionally influence the feedback process and the levels of expertise of the panel members may be unequal thus compromising consensus (Hsu & Sandford 2007:5). Chilemba, van Wyk and Leech (2014: 1193) conducted a Delphi study to refine a set of guidelines. The researcher in this study developed a set of guidelines and required a group opinion from a panel of experts to refine the guidelines. It is for this reason that the researcher adopted the Delphi method for phase 3 of this study.

#### 3.5.5.1 Steps when using the Delphi method

Adhering to specific steps or acknowledging the importance of design considerations can ensure success when using the Delphi method. This includes selecting the Delphi method, identifying the expert population, determining the sample size and deciding on the number of rounds (Skulmoski et al 2007: 3,9). The researcher therefore adhered to the following steps in the Delphi method which are discussed in detail below: 1) rationale for selecting the e-Delphi method, 2) identifying the population, 3) sampling and 4) procedure for conducting the Delphi rounds.

##### *3.5.5.1.1 Rationale for selecting the e-Delphi method*

Devenish, Pollard & Kerr (2012:1) argue that although numerous attempts have been made to define the Delphi process, there is no "one true Delphi" but rather different variants that have evolved from the Classic Delphi. These include the Policy Delphi, e-

Delphi and Decision Delphi to name but a few (Devenish et al 2012:1). Additional adaptations to the Delphi method allow for data to be collected not only by open-ended questionnaires, but also through electronic questionnaires or literature review (Du Plessis & Human 2007:20; Devenish et al 2012:2). The choice of Delphi methodology is dependent on whether the purpose is to develop, identify, forecast or validate in an area of research (Skulmoski et al 2007:5).

The e-Delphi method is suitable for use on the internet and is considered advantageous as it is useful in streamlining the Delphi process by reducing the time in which the study is conducted (Cramer et al 2008:212). The use of electronic communication allows for the anonymity of the participants and prevents group pressure and undue influence of participants on each other (Polit & Beck 2012:267; Donohoe, Stellefson & Tennant 2012:40). The e-Delphi method further allows for a group of participants situated in different locations to share their expertise without physically being present in the same place at the same time (Devenish et al 2012:5). It therefore made sense for the researcher to use the e-Delphi method as the panel of experts were situated in different districts of KwaZulu-Natal and had access to electronic mail facilities. The e-Delphi method is considered convenient, cost-saving and time and labour efficient (Donohoe et al 2015:40). This is largely because the rounds progress quickly and the data is managed more effectively when using electronic mail (Donohoe et al 2015:40; Cramer et al 2008:212). Thus, the quick turn-around time for refinement of the guidelines was also a motivating factor for the researcher to use the e-Delphi method. The researcher used electronic mail to forward the guidelines on ICATT implementation that had been developed to all the experts. The experts were asked to review and refine the guidelines based on their expertise in the areas of IMCI and ICATT and communicate their responses via electronic mail. The iterative process of giving and receiving feedback was conducted electronically between the researcher and the panel of experts until consensus was attained. The process of refinement of the guidelines using the e-Delphi method took approximately three months.

#### *3.5.5.1.2 Identifying the population*

Delbecq, Van de Ven and Gustafson (1975) cited in Hsu and Sandford (2007:3) state that the subjects of a Delphi panel should be the decision makers from senior management, and professional staff members. Hsu and Sandford (2007:3) further state that the subjects

of the Delphi panel should be experts in the specific field of interest. The population of interest in phase 3 of the study were therefore experts in the fields of nursing education, curriculum development, nursing management and IMCI case management training. Other inclusion criteria that were considered for the formation of the Delphi panel included position and seniority within the KwaZulu-Natal College of Nursing, and experience and expertise in transforming nursing education. Du Plessis and Human (2007:16) state that careful consideration must be applied when identifying who an expert is, in relation to the Delphi method. Their argument centres on the fact that there is no universal measure to identify experts. However according to Devenish et al (2012:3), Delphi experts have a "high level of knowledge and understanding of the issues, can provide input that is relevant, widely recognised and verifiable, have a sense of vision, interest and commitment, and bring in a variety of viewpoints." Pill (1971) and Oh (1974) cited in Hsu and Sandford (2007:3) concur that the value of the Delphi experts lies not just with their knowledge regarding the subject matter, but their ability to offer meaningful feedback and revise their opinions to achieve consensus.

Table 3.8 presents an overview of the expertise of the Delphi panel members that were consulted in this study. The researcher compiled a questionnaire to obtain information pertaining to the experience and expertise of the panel members (Annexure V). Their job title, educational qualifications and experience and expertise is listed accordingly.

**Table 3.8 Members of the Delphi expert panel**

| Job title | Educational qualifications | Experience and areas of expertise |
|---|---|---|
| Vice Principal – KwaZulu-Natal College of Nursing | RN, B Cur, Honours Degree (Community Nursing Science), MCur (Nursing Science) | • Clinical facilitator and lecturer from 1982 to 1996<br>• Assistant Manager (Nursing Education) in 1997<br>• Deputy Principal (Natal College of Nursing) at the head office for nurse training and education in 1998, and then Principal until 2005<br>• Also served as co-ordinator of all examinations processes (head office for nurse training and education)<br>• Participated in the restructuring of the curriculum and governance processes for the amalgamated nursing college |

| Job title | Educational qualifications | Experience and areas of expertise |
|---|---|---|
| | | • Currently supervising 14 nurse training institutions within the Northern Regions of KwaZulu-Natal<br>• Contributor to chapters in Community Nursing Science textbooks |
| Vice Principal – KwaZulu-Natal College of Nursing | RN, B Cur, M Tech Nursing, Diploma in Child Health Nursing Science | • Unit Manager of a District Hospital for 8 years<br>• Primary Health Care Training Officer at Provincial Health Office for 5 years<br>• Vice Principal (KZNCN) for Primary Health Care Training and Special Projects for 11 years |
| Campus Principal | RN, B Cur, Honours degree, M Cur<br>Specialist nurse (Mother & Child) | • Lecturer since 1992<br>• Head of Department (Midwifery)<br>• 25 years of teaching experience at a nursing campus<br>• Vast experience in campus administration and curriculum development |
| Campus Principal | RN, B Cur, Honours Degree, M Cur (Health studies), Advanced Diploma in Health Services Management | • Experience in paediatric nursing<br>• 18 years of teaching experience at a nursing campus<br>• Head of Department (Fundamental Nursing Science)<br>• Deputy principal prior to promotion to a Campus Principal<br>• Currently a member of the KZNCN policy making committee |
| Senior nurse educator (Community Nursing Science & Midwifery) | RN, B Cur, Post-basic Diploma in Advanced Midwifery, B Cur, M Cur (Health studies) | • Experience as a midwife, clinical bedside midwife and a midwifery clinical instructor<br>• 17 years of teaching experience at a nursing campus<br>• Head of Department Midwifery and implemented midwifery training programme for the four year and one year midwifery programmes<br>• Trained in IMCI case management and as an IMCI facilitator; facilitates IMCI training at the campus<br>• Currently working on curriculum development for the new nursing qualifications |

| Job title | Educational qualifications | Experience and areas of expertise |
|---|---|---|
| Head of Department (Community Nursing Science) | RN, Post-basic Diploma in Critical care nursing, B Cur | • 5 years of ICU experience<br>• 17 years of teaching experience at a nursing campus<br>• 11 years of experience in campus administration<br>• Trained in IMCI case management and as an IMCI facilitator; facilitates IMCI training at the campus; trained in ICATT |
| Head of Department (Community Nursing Science) | RN, Post- basic diplomas in Psychiatry and Primary health care, B Cur, Diploma in Nursing Management | • 7 years of teaching experience at a nursing campus in midwifery and primary health care<br>• Trained in IMCI case management and as an IMCI facilitator; facilitates IMCI training at the campus<br>• 2 years of experience as a manager of the community nursing science discipline |
| Head of Department (General Nursing Science) | RN, Post basic diploma in Critical care nursing, B Cur, M Cur (Health studies) | • Vast experience as an RN in medical and surgical wards<br>• Experience as an RN in TB settlement clinic<br>• 6 years of ICU experience<br>• 14 years of teaching experience at a nursing campus, of which 4 years has been as a manager of the general nursing science discipline<br>• Trained in IMCI case management and as an IMCI facilitator; facilitates IMCI training at the campus |
| Senior nurse educator | RN, Diploma in Psychiatry, B Cur, M Cur (Mental Health) | • Clinical nurse specialist (General & Psychiatry)– Royal College of Dublin<br>• Clinical lecturer at academic hospital in Durban since 1998<br>• Lecturer since 2001 teaching Midwifery<br>• Teaching Community Nursing Science since 2008<br>• Trained in IMCI case management and as an IMCI facilitator; facilitates IMCI training at the campus; trained in ICATT |
| Senior nurse educator | RN, B Cur, Honours Degree (Community Nursing Science | • Has over 20 years as an RN in family planning<br>• Has over 20 years' experience as a nurse educator co-ordinating |

| Job title | Educational qualifications | Experience and areas of expertise |
|---|---|---|
| | | community clinical practica and lecturing in community nursing science<br>• One of the first nurse educators to attend a national conference in Bloemfontein, in 2001, on IMCI and IMCI implementation at nursing colleges<br>• Trained in IMCI case management and as an IMCI facilitator; facilitates IMCI training at the campus; trained in ICATT |
| Senior Nurse educator | RN, Post-basic diploma in Trauma & Emergency care, B Cur (Nursing education, nursing administration) | • 7 years of clinical experience in trauma and emergency care<br>• 6 years of experience as a clinical facilitator<br>• 10 years of experience as a lecturer (community nursing science and social science)<br>• Trained in IMCI case management and as an IMCI facilitator; facilitates IMCI training at the campus |

(Adapted from: Chilemba, Van Wyk and Leech 2014:1194)

#### *3.5.5.1.3 Sampling*

Fong, Ch'ng, Pe and Por (2013:305) state that there is a degree of flexibility when ascertaining the sample size of the Delphi panel. Devenish et al (2012:5) agree that both small and large sample sizes are acceptable. Furthermore, Briedenhann and Butts (2006) cited in Donohoe and Needham (2009:430) suggest that a smaller panel of experts is preferred provided the background of the Delphi participants is homogeneous. According to Donohoe and Needham (2009:430), several researchers suggest that seven to fifteen participants could be adequate. Chilemba et al (2014: 1193) used ten participants to refine draft guidelines. Cramer et al (2008:218) argue that thirteen up to sixty participants will ensure adequate representation. Based on these arguments the researcher sampled thirteen participants for the Delphi panel. The researcher used purposive sampling to identify participants who were qualified to be invited and appointed as the Delphi panel of this study (Du Plessis & Human 2007:18; Chilemba et al 2014:1193). The participants were sampled from the National Department of Health, the ten nursing campuses and the head office of the KwaZulu Natal College of Nursing. The prospective participants were sent letters of invitation (Annexure U) and an information sheet (Annexure T) via

electronic mail. The letters invited the prospective participants to be experts on a Delphi panel and indicated the purpose and benefits of the study. Eleven out of thirteen experts contacted the researcher via electronic mail and agreed to be appointed to the Delphi panel. The sample size of eleven is considered adequate and has been widely used in many studies which have used the Delphi method (Skulmoski et al 2007:6). All eleven experts were female, who had between 7 and 30 years of experience in nursing education.

#### *3.5.5.1.4 Procedure for the e-Delphi method*

Prior to initiating the Delphi rounds the researcher considered the following processes which are unique to the Delphi method and are discussed below: 1) determining the number of rounds or iterations, 2) determining the response times between rounds, 3) maintaining the anonymity of the panel of experts and 4) determining a measure of consensus (Cramer et al 2008:212; Devenish et al 2012:[2]).

- *Rounds or iterations*

One of the principles underpinning the Delphi method is to have as many rounds as needed to achieve consensus (Keeney et al 2006:207; Hsu & Sandford 2007:2). In stating this, there are no set guidelines on the correct number of rounds (Keeney et al 2006:207). Hasson (2000) cited in Keeney et al (2006:207) adopted a two-round approach to reach consensus whilst researchers cited by Hsu and Sandford (2007:2) stated that three rounds are usually adequate to collect the requisite information and reach a consensus in most cases. It has been further suggested that two to four or more rounds or iterations can be used until consensus emerges (Donohoe & Needham 2009:426). Keeney (2000) cited in Keeney et al (2006:207) used four rounds to reach consensus. Researchers also present arguments for limiting the number of rounds. The reason for this is that although Delphi reliability may increase with an increase in iterations, it may also hamper response rates (Keeney et al 2006:207). Chilemba et al (2014:1195) used two rounds to reach consensus for the refinement of guidelines. The researcher planned on using an open round and anticipated using two to four rounds to attain consensus in this study. This is because ICATT is a new teaching strategy and currently no guidelines exist for computer-based learning at the KwaZulu-Natal College of Nursing.

- *Response times between rounds*

High attrition rates by members of the Delphi panel can be prevented by ensuring reasonable turnaround times for their responses (Devenish et al 2012:6). Delbecq et al (1975) cited in Hsu and Sanford (2007:4) state that a two-week response time from participants between iterations is considered acceptable. The researcher gave the participants one week to respond to the invitation to participate in this study in the open round and, a response time of two weeks in subsequent rounds to review the guidelines.

- *Maintaining anonymity during the e-Delphi rounds*

It is important for respondents to feel at ease when divulging information and, anonymity is considered when using the Delphi method. A challenge with maintaining anonymity is that some experts may know their colleagues are taking part in the study, which may lead to information sharing and discussions about preferred responses (Keeney et al 2006:209). The participants were requested not to discuss with colleagues that they were invited to be on the Delphi panel to ensure their anonymity. Communication between the researcher and the participants in this study was conducted remotely on a one-to-one basis (Donohoe et al 2012:40). Additionally, the participants were situated in the different districts and campuses of KwaZulu-Natal. The use of e-Delphi therefore provided the advantage of maintaining the anonymity of the participants in this study (Donohoe et al 2012:40). Cramer et al (2008:212) states that anonymous input from peer experts prevents intimidation and generates an expert unbiased opinion until consensus is obtained. Donohoe and Needham (2009) cited in Donohoe et al (2012:40) state that anonymity allows for participants to interact with each other without fear of personality conflicts or status relations which may negatively influence their opinions or suggestions. The participants in this study were not informed of the identities of their fellow expert panel members thus ensuring anonymity amongst the Delphi experts, preventing peer pressure and ensuring objective feedback. However, the identities of the participants and their individual responses were known to the researcher. Anonymity in this study can be thus be described as perceived anonymity (Donohoe et al 2012:42).

- *Determining a measure of consensus*

Linstone and Turoff (1975) cited in Donohoe and Needham (2009:416) define consensus as “opinion stability or the collective agreement among members of a group.” The reason for using the Delphi method is to achieve a convergence of opinion or to gain consensus on a specific issue (Pinnock et al 2015: [2]). Keeney (2006) cited in McIlrath, Keeney, McKenna and McLaughlin (2009:271) states that a consensus level determines what can be included and what should be discarded as the rounds unfold in a Delphi survey. It is reported that many studies have used the traditional Delphi method exclusively to determine consensus (Donohoe et al 2012:39). However, Heiko (2012:1527) argues that although consensus measurement plays an important role in Delphi research it should not be the primary reason for using the method. Hasson (2000) cited in McIlrath et al (2009:271) states that no literature exists on deciding a standard threshold for consensus. It is further argued that experts may have varied opinions which makes 100 % consensus difficult to attain (Keeney et al 2006:210). Dajani et al (1979) cited in Heiko (2012:1527) identified consensus being reached when more than 50% of the respondents are in agreement on the areas of concern. Donohoe and Needham (2009:422) suggests that a 60% agreement amongst panellists is considered an acceptable measure of consensus, whilst Devenish et al (2012:3) state that a two thirds majority is acceptable. According to Cramer et al (2008:212) and McIlrath et al (2009:272) 70% is considered the bench mark for attaining consensus. It was for this reason that a 70% cut-off point was used in this study. The researcher developed the guidelines and consensus was required to determine whether each statement was relevant and could be included in the guidelines for ICATT implementation.

*3.5.5.1.4.1 Open round*

An open round and subsequent scoring rounds can be adopted when using the e-Delphi method (Pinnock, Epiphaniou, Sheikh, Griffiths, Eldridge, Craig & Taylor 2015:[2]). An open round invites the expert panel to participate and make contributions to the area of concern (Pinnock et al 2015:[2]). In this round an invitation was extended via electronic mail inviting prospective participants to be members of the Delphi panel based on their expertise (Annexure U). The prospective participants were informed that their role was to contribute towards the refinement of the guidelines for the implementation of ICATT at the nursing campuses of the KwaZulu-Natal College of Nursing (Annexure U). An information sheet which provided a brief explanation regarding the research purpose and objectives and the Delphi process for refinement of the guidelines was electronically

mailed to the prospective participants (Annexure T). The experts were asked to complete the consent form (Annexure S) if they agreed to be appointed to the Delphi panel to make a contribution to the refinement of guidelines. The experts were given seven days to respond using electronic mail. Four experts responded immediately whilst seven experts responded a few days later. In total, 11 experts responded within the prescribed seven-day period confirming their appointment to the Delphi panel.

*3.5.5.1.4.2 Round one*

The first or initial round of the Delphi process is an exploratory round which serves to obtain a broad range of views about a content area (Hsu & Sanford 2007:2; Du Plessis & Human 2007:20). The experts are given the opportunity to provide information or opinion on aspects they consider important on the relevant field of study during the first round (Du Plessis & Human 2007:20; Donohoe & Needham 2009:426). In round one, the researcher sent a copy of the guidelines to the panel members via electronic mail. The panel members were given a two-week deadline date to review the guidelines (McIlrath et al 2009:272). The panel members were asked to critically review the guidelines with the purpose of refining the guidelines to ensure they are relevant and would support ICATT implementation at the nursing campuses (Chilemba et al 2014: 1193). The panel members were therefore instructed to: make the necessary suggestions or corrections for improving and strengthening the guidelines, comment on whether each guideline statement is appropriate in the context of the nursing campuses and lastly amend the guidelines where necessary to include any information that has been omitted. The researcher sent follow-up emails to the non-responders who failed to provide feedback timeously to ensure their continued participation (McIlrath et al 2009:272). Subsequently all the panel members contributed information they considered relevant for the refinement of the guidelines. The researcher analysed and interpreted the feedback from the panel members. A repeat round was necessary as no consensus had been reached regarding agreement on the suggested amendments to the guidelines (Keeney et al 2006:206). The modified guidelines which incorporated all the suggestions were forwarded to the panel members for round two of the Delphi method.

*3.5.5.1.4.3 Round two*

The researcher emailed the modified guidelines to the panel members signalling the start of round two. In round two the Delphi participants are encouraged to reconsider their views or opinions based on the responses of the other Delphi participants (Keeney et al 2006:206). It is in this round that consensus begins forming (Hsu & Sanford 2007:3). The researcher informed the panel members that the purpose of round two was to review the modified guidelines. The panel members were given feedback on how the group initially viewed the guidelines which could be compared against their own feedback (Devenish et al 2012:[2]). The researcher therefore highlighted the group responses which included corrections and suggestions for improvement. The panel members were asked to indicate their agreement regarding the modified guidelines or they could offer further suggestions for refining the guidelines (Hsu & Sandford 2007:3). The panel members were reminded of the two-week deadline date to provide feedback. Nine panel members responded timeously by the deadline date. Two panel members responded after the deadline date. The feedback from all the panel members was that the guidelines required no further refinement. Consensus from the panel members was attained for all the areas in the guidelines and hence the Delphi round stopped.

#### *3.5.5.2 Analysis of the comments*

The researcher developed the guidelines. Expert opinions were sought to refine the guidelines so that they would be suitable for dissemination and implementation in the nursing campuses in KwaZulu-Natal. The experts were instructed to review the guidelines with the intention of offering suggestions for improving the guidelines and making corrections where necessary. The comments were analysed and interpreted by the researcher and key themes were identified from the feedback received from the participants. This is presented in Annexure W of this study. In round one, seven of the eleven experts indicated that the terminologies used were incorrect, and there was incorrect phrasing of some statements. Some experts suggested additional statements to strengthen the guidelines and rearranging the guidelines according to importance. The guidelines were amended to reflect the corrections to the terminologies, proper phrasing of the statements and the inclusion of statements that were considered relevant but had been omitted. The guidelines were arranged according to their levels of importance for ICATT implementation as perceived by the Delphi experts. In round one there was a 63% consensus regarding the changes to the guidelines. Literature indicates that 100% consensus is difficult to attain (Keeney et al 2006:210). Despite this in round two there

was 100% consensus by the experts regarding the amendments made to the guidelines. This meant that the entire Delphi panel agreed with all the changes incorporated into the guidelines at the end of round two.

## 3.6 ETHICAL CONSIDERATIONS

According to the code of ethics the dignity and welfare of research participants should take precedence over research findings (Terre Blanche et al 2006:63). Ethics in research is therefore focused on protecting the rights of research participants (Brink et al 2012:33). However, some researchers state that although the well-being of research participants is at the core of research ethics, other aspects such as scientific misconduct, manipulation of design and methods and plagiarism should also be taken under consideration (Terre Blanche et al 2006:61; Brink et al 2012:44). Researchers should be guided by three fundamental principles when conducting research which are respect for persons, beneficence and justice (Brink et al 2012:35). The principles are based on the human rights of autonomy, privacy, anonymity, confidentiality, fairness and protection from harm which should be adhered to when conducting a research study (Brink et al 2012:35). The ethical principles were applied in this study to protect the participants' rights, the institutional rights and ensure scientific honesty during data collection and data reporting.

### 3.6.1 The research participants

The researcher applied the principles of respect and justice to protect the rights of the research participants in this study. Researchers should acknowledge and respect the autonomy of all research participants and their freedom to choose whether to participate in a research study (Brink et al 2012:35). The participants were informed that the decision to participate in this study is voluntary. The researcher did not offer the participants any inducements to participate in the study. The research participants were informed that they can withdraw from the study without providing a reason, and without prejudice or penalty. Data collection commenced only once informed written consent was obtained from all research participants. The researcher adhered to the principle of justice by ensuring that all research participants had an equal chance of being selected for the study and were treated fairly during the research process (Brink et al 2012:36). The researcher gave all prospective participants a letter of information (Annexure I) and discussed the inclusion criteria and process of selection for this study. The researcher provided participants with

an opportunity to ask questions pertaining to the research study and data collection (Sandy & Shaw 2012:67). The principle of justice protects the privacy, anonymity and confidentiality of the participants (Brink et al 2012:37). The researcher ensured there was no breaches of confidentiality during data collection for the qualitative and quantitative components of this study. All the questionnaires were therefore numbered prior to distribution, and the participants were requested not to write their personal details on the questionnaires. Similarly, the researcher did not identify the participants by name during the interviews. The researcher informed the participants of the use of recording devices during the interviews but assured the participants that their responses will be processed anonymously. The completed questionnaires were stored in a lockable unit and the transcriptions from the interviews and audiotaped interviews were stored in a password protected computer to prevent unauthorised access to the information.

### 3.6.2 The institution

The researcher applied the principle of beneficence to acknowledge and protect the rights of the institution and prevent any institutional risk to the institution when undertaking research (Brink et al 2012:36). The researcher ensured that gatekeeper approval was received from The Health Research and Knowledge Management sub-component of the KwaZulu-Natal Department of Health prior to data collection from the research sites. Permission was sought and obtained from the Acting Head of the KwaZulu-Natal College of Nursing for access to the nursing campuses for data collection purposes. The researcher demonstrated respect for organisational culture by obtaining permission from the campus principal of each nursing campus to collect data from the research participants at the site (Brink et al 2012:38). The researcher further ensured that the rights of the nursing campuses were protected by not disclosing the names of the sites at which data collection occurred during the presentation of the findings in this study. It is the intention of the researcher to not disclose the names of the sites during the dissemination of the findings in research reports or journal articles. The researcher ensured that the reputation of the University of South Africa was protected by applying for and obtaining ethical clearance from the Higher Degree Committee at the Department of Health Studies, of the University of South Africa. The researcher disclosed to the KwaZulu-Natal Department of Health and the KwaZulu-Natal College of Nursing that the research study was being conducted under the auspices of the University of South Africa and ethical approval had been obtained. The researcher also sought and obtained permission from

the National Department of Health (Maternal and Child Health) for use of the ICATT software.

### 3.6.3 The researcher and scientific honesty

The ethical conduct of the researcher is demonstrated by honesty, accuracy and competency during the research process and when reporting findings (Brink et al 2012:43). The researcher must therefore show respect for the scientific community by protecting the integrity of the scientific data that has been collected and collated (Brink et al 2012:43). The researcher ensured that the findings from the research study were accurately reported by the researcher and were a true reflection of how the research was conducted. The researcher did not misrepresent any data that was used in this study. There was no manipulation of the research design or the methods so that it corresponded to the findings of the study. All the data that was collected in this research study was presented objectively and without bias. All the sources were acknowledged by the researcher using University of South Africa's recommended referencing method. All the scheduled appointments for data collection at the nursing campuses were adhered to and participants were notified via the liaison person at each campus of any time delays. Permission was sought and obtained from all the relevant authorities prior to data collection (Brink et al 2012:44):

- A plan of the proposed research was submitted to the Higher Degree Committee at the Department of Health Studies, of the University of South Africa and an ethical clearance certificate was obtained (Annexure A).
- A plan of the proposed research was submitted to The Health Research and Knowledge Management sub-component of the KwaZulu-Natal Department of Health and permission was obtained to collect data from the nursing campuses (Annexure C).
- A plan of the proposed research was submitted to the Acting Principal of the KwaZulu-Natal College of Nursing and permission was obtained to collect data from the nursing campuses (Annexure E).
- Permission was sought and obtained from the National Department of Health to use the ICATT software for research purposes (Annexure G).
- Permission was sought and obtained from a fellow researcher to use a research tool that was adapted for use in this research study (Annexure K).

## 3.7 SUMMARY

The chapter provided insight into the research design and methodology chosen for this study. Considering all the dimensions required to elicit rich, generalisable data, it was argued that the most appropriate approach for enquiry was the mixed methods approach, which progressed in two stages. The phases of the study were clearly outlined including the population and the sampling and sampling techniques that were used in this study. The data collection instruments and the methods that were used to collect the data were described. An in-depth discussion on the ethical considerations that were adhered to during data collection was presented. The next chapter, which is chapter 4 presents the results from the qualitative and quantitative components of this study.

# CHAPTER 4

# THE RESULTS OF THE QUALITATIVE AND QUANTITATIVE COMPONENTS OF THE STUDY

# (PHASES 1 AND 2)

## 4.1 INTRODUCTION

This chapter presents the results from the qualitative and quantitative components of this study. The results are presented here according to how the phases of this study were conducted. In addition, the results are mixed which further validate the findings of this mixed methods research study.

## 4.2 PHASE 1:

In phase 1 of this study, data were collected from campus principals using individual interviews. This was followed by administering questionnaires to the campus principals.

### 4.2.1 QUALITATIVE COMPONENT RESULTS FOR CAMPUS PRINCIPALS

The results presented in this section emerged from the individual interviews conducted with the campus principals using an interview schedule (Annexure O). The researcher identified a super-ordinate theme, themes and sub-themes following data analysis using the IPA framework (Sandy & Shaw 2012:67). Table 4.1 shows the master table of themes with one super-ordinate theme, themes and numerous sub-themes.

**Table 4.1 Master table of themes: individual interviews of campus principals**

| Super-ordinate theme | Themes | Sub-themes |
|---|---|---|
| The implementation and use of ICATT for IMCI case management training | Positive attitude | • Characteristics of nurse educators<br>• Use of technology<br>• Training |
| | Benefits | • Campus<br>• Nurse educators<br>• Learners |
| | Challenges | • Human resources<br>• Material resources<br>• Infrastructure |
| | Recommendations | • Training<br>• Resources<br>• Support |

A detailed narrative was provided by the participants regarding their attitude to ICATT implementation at the nursing campuses. The super-ordinate theme following data analysis was: the implementation and use of ICATT for IMCI case management training. Four themes and a number of sub-themes emerged, as illustrated in Table 4.1. The results are presented using quotations from the transcripts which support the discussions of the themes (Sandy & Shaw 2012:67). At the end of each quotation the initials “In” appear. Following the initials are numbers, for example, (1, 3) with “1” indicating the number of the individual interview and “3” indicating the page number of the transcript in which the quotation appears (Sandy & Shaw 2012:67). The themes and sub-themes are discussed in detail below.

#### *4.2.1.1 Positive attitude*

One of the emerging themes from this study concerns the positive attitude of campus principals towards ICATT use and implementation. A detailed review of the data revealed that all the campus principals (n=7) expressed positive sentiments regarding ICATT implementation. The positive views of the campus principals regarding ICATT suggest that they are more likely to implement it at nursing campuses.

> “It is a good thing to have this ICATT. I am positive about it.” (In: 3, 1).

> “We are ready to embrace and utilise it.” (In: 6, 2).

Participants added that they were positive about using ICATT as an alternative to the conventional method and that it may be beneficial for IMCI case management training at the nursing campuses.

> “We feel that it’s going to be fine. It’s a good method.” (In: 2, 1).

> “It’s going to benefit us; we like it.” (In: 2, 2).

Embedded within the positive attitude towards ICATT, expressed by 3 participants, is that nursing campuses are shifting from the traditional approaches to teaching and learning to technology-based teaching and learning, which is viewed as progressive. Change should be embraced, so the use of technology in nursing education, which is a National Department of Health initiative, should be supported.

> “I am excited about it. I must honestly say I actually wish I could have had this as a student in my training because I think it is exciting that it is in keeping with progress. I foresee growth and success in the programme.” (In: 1, 3).

> “I think it is a good strategy which needs to be supported.” (In: 7, 4).

> “I think ICATT has actually started something that we should have thought of long, long time ago.” (In: 7, 9).

Arguably, expressing a positive attitude is important for the successful implementation of ICATT. However, it is important that engagement with all the role-players takes place, as pointed out by one participant.

> “I have no problem with implementing it, if the whole concept is told to us. I have got absolutely no reservations about that.” (In: 8, 1).

> “I have absolutely no problem provided that the necessary ground work is done so that we commence.” (In: 8, 4).

It is therefore considered prudent for educational institutions to establish their readiness and needs prior to implementing an e-learning programme.

#### *4.2.1.1.1 Characteristics of nurse educators*

More than half of the campus principals (n=4) expressed the view that the characteristics of nurse educators would affect the implementation of ICATT at nursing campuses.

> "Nurse educators are prepared effectively and efficiently for this as part of their post-graduate qualifications." (In: 1, 3).

> "Nurse educators were very free in facilitating this whole thing; because of dedication and enthusiasm, we found that they were very much fluent in doing so." (In: 7, 2).

> "… but I am sure they can go in and do the training as facilitators, and they are very capable." (In: 8, 1).

> "I think they are innovative. They will be able to teach." (In: 3, 1).

They asserted that the nurse educators were dedicated, enthusiastic, capable and innovative and would be able to use ICATT for IMCI case management training. Campus principals were also of the opinion that nurse educators possess the necessary post-basic qualifications which in effect has prepared them to use a computerised adapted training tool. The assumption that can be drawn from the findings of this study is that campus principals are convinced that ICATT can be successfully implemented and integrated into IMCI case management training at nursing campuses, because of the character traits displayed by the nurse educators.

#### *4.2.1.1.2 Use of technology*

Participants expressed positive views about the use of technology by the nurse educators and learners. It was asserted that the nurse educators and learners are exposed to the use of technology in everyday life as the world they live in is technology driven. This makes them comfortable around technology and with technology use. This is evident in

that learners are able to easily access information on the World Wide Web and the search engine Google using cellular phone technology.

> "Everything today starting from the basic cell phone is technology oriented. The TVs, the DVDs and everything is technology oriented and therefore the younger students and the younger staff seemed to be more aufait in the actual ease of use and handling of technology." (In: 1, 1).

> "Because of the calibre of our students and the type of students that we teach today, they are so much into technology." (In: 7, 3).

> "They are all on Google and they are all using their cell phones, and that is also technology." (In: 8:1).

Nurse educators have also integrated some form of technology into their teaching through the use of DVDs and data projectors at the nursing campuses for teaching purposes. This suggests a degree of familiarity with the use of technology.

> "We have a room which we have designated as the information technology room for the campus. We have ordered 20 computers for a start, which is going to be specifically for student use. Fortunately for us we do have an Informatics department here and I have been communicating with them." (In: 1, 2).

> "We've tried to start utilising IT … computers, data projectors as opposed to the old overhead projectors. I actually got interested in one of the things that are IT in nature. You just buy the software and the programmes and you use it in class, and it is Internet based." (In: 6, 1).

Some campus principals indicated that they are preparing for the use of technology by allocating rooms for use as computer laboratories, ordering computers for learner use and communicating with the information technology department for additional support. The views expressed by the campus principals regarding their interest in the use of e-learning can have positive outcomes for the implementation of ICATT at campus level.

*4.2.1.1.3 Training*

More than 70% of the campus principals (n=5) expressed the view that ICATT can be adopted and implemented as nurse educators are trained in IMCI, some have received training on computer-based learning and ICATT. In addition, they held the view that nurse educators that are trained in IMCI and are experienced in facilitating IMCI case management training will be able to use ICATT for IMCI case management training.

> "Our lecturers have attended the workshop." (In: 7, 1).

> "I must say following the training that two of our lecturers had in Durban, which I think was about ICATT, we tried to actually put together a small computer lab." (In: 6, 2).

> "We have staff that did IMCI case management training." (In: 8, 1).

The findings of this study therefore confirm that ICATT can be adopted as a training method for IMCI as many nurse educators are trained in IMCI, and some do have computer skills to manage the ICATT software and facilitate learning using computers. In addition, some nurse educators have attended the ICATT training course, albeit that there is low training coverage in this respect.

### *4.2.1.2 Benefits*

Participants agreed that the implementation of ICATT would have many benefits. Participants asserted that the benefits would impact positively on teaching and learning in the nursing campuses. The following three sub-themes were identified: the campus, the nurse educators and the learners, as illustrated in Table 4.1.

*4.2.1.2.1 Campus*

All the participants mentioned (n=7; 100%) that ICATT implementation would be beneficial for the campuses. There was a clear agreement between five of the seven campus principals that one of the benefits of implementing ICATT was that nursing campuses will now be on par with universities with regards to integrating technology for

teaching and learning. Nursing campuses appeared to be lagging behind schools and universities in the use of information and communication technologies.

> "It is good that the campuses are actually being involved so that they can also keep pace with development, especially these new methods of teaching and especially the new technology. We do not want to break the cycle, which has started in the school just because they are coming to a nursing campus because when they go to a university that continues … So we are trying to also make sure that we also keep pace and not be the Cinderella's and be left behind." (In: 1, 3).

> "So I think it is the way forward as an innovative teaching strategy, why must we lag behind?" (In: 8, 2).

At least four out of seven participants highlighted the effective utilisation of staff for ICATT implementation, as fewer lecturers are required for IMCI case management training using ICATT. This could possibly relieve the pressure on campus principals as they address the problems of high staff turnover, and not enough staff to facilitate IMCI case management training in the conventional manner.

> "It's a good method, and I think it will relieve pressure, because as we are doing it right now, we need more than one nurse educator to do the facilitation." (In: 2, 1).

> "Using ICATT will help in IMCI case management, and the effective utilisation of staff." (In: 4, 1).

At least three out of seven participants mentioned ICATT being cost effective, because it obviates the need for printing of chart booklets and modules, which was done at enormous costs to the nursing campuses. The ICATT software contains an electronic copy of the chart booklet, which is easily accessible. There is no need for printing of chart booklets or modules as these aspects are contained within the software. Videos can be watched and exercises can be completed on the software.

> "It's cost effective, especially because everything will be there. The expenditure will be less, so then I think it's going to benefit us." (In: 2, 2).

> "It is a good thing to have this ICATT as it will help us with paperwork. As it is, when we want to make copies of this chart booklet that is used, we have to go to our head office to get that done. Now, if we use this computer programme we will not be doing that, and that is a good thing." (In: 3, 1).

The use of ICATT for IMCI case management training need not be restricted to just the discipline of child health. A few of the participants expressed the view that there is the possibility that the use of this technology can be emulated by other disciplines. ICATT implementation therefore provides an opportunity for the use of technology for teaching and learning in all disciplines of nurse training programmes.

> "I have no doubt that it will infiltrate to all other disciplines as well." (In: 1, 4).

These findings indicate that the participants can recognise the benefits of implementing ICATT namely from a cost and human resource perspective for the nursing campuses.

*4.2.1.2.2 Nurse educators*

All the participants (n=7; 100%) agreed that ICATT could be beneficial for nurse educators as it integrates technology into the nursing curricula. The view that has been expressed is that the use of technology has opened the door to developing new teaching strategies in nursing education. Nurse educators can benefit from using technology as an innovative teaching strategy, as opposed to the conventional methods of teaching. The additional benefit of using technology for teaching is that it is time-saving and allows for the educators to engage in other tasks. Nurse educators can derive some benefit from integrating technology into teaching, as learners will be less dependent and more active in their own learning.

> "Technology is actually being used as a method of teaching more and more every day. It provides more innovative ideas for guiding the students." (In: 1, 2).

> "I like that one also, because the lecturers will know how to facilitate instead of actually teaching out of the book. In that case it's going to assist the lecturers also to develop new methods, and not have one way of teaching students." (In: 2, 2).

> “Nurse educators can schedule their times the way they want to using technology.” (In: 7, 5).

The suggested benefits of ICATT for nurse educators can be a motivating factor for the integration and use of technology for teaching.

#### *4.2.1.2.3 Learners*

It can be said that the benefits for learners outweighs the benefits for the campus and the nurse educators. All the campus principals (n=7; 100%) were in agreement that ICATT implementation would be beneficial for the learners.

> “Ideal for students to keep updated with new information pertaining to growth and development, and with the various ways that are used in terms of identifying and treating illnesses and diseases in children especially, which I understand, this programme is geared towards.” (In: 1, 1).

> “I actually think with guidance and proper orientation they will be able to work on their own because self-activity is one of the methods that we orientate the students to in this campus. There are times when they have to engage in self-directed learning which is acceptable in the R425 programme.” (In: 1, 3).

> “The use of ICATT allows for students to work at their own pace and not to be held up by other students who are slow learners.” (In: 2, 1).

> “Giving them computers allows them to learn on their own.” (In: 7, 3).

Participants emphasised that the use of ICATT provides learners with the opportunity to keep abreast with changes in child health and, use technology for learning and accessing of current information. The implementation and use of ICATT allows for learners to use computers for the first time at nursing campuses for learning purposes. Participants expressed that learners will be motivated to work independently, at their own pace using the ICATT software. It was also suggested that the use of the ICATT software could be the impetus for learners to engage in self-directed learning. The implementation of ICATT will allow learners who have used technology in the social sphere to now integrate technology into the sphere of learning.

#### *4.2.1.3 Challenges*

Participants appeared to be most concerned about the presence of challenges that could impact on ICATT implementation. It appears as though the challenges outweigh the benefits of ICATT implementation. The following three sub-themes were identified: human resources, material resources and infrastructure.

##### *4.2.1.3.1 Human resources*

The participants asserted that the lack of training in IMCI and ICATT, low computer literacy rates amongst nurse educators and learners, and high numbers of learners in a class could be considered as challenges to ICATT implementation at nursing campuses. The lack of information technology support personnel could also negatively impact on ICATT implementation at the nursing campuses.

The concerns expressed by three of the seven participants were related to the nurse educators at their nursing campuses not trained in IMCI or the use of ICATT for facilitation. Educators must be trained in IMCI case management and must have completed the IMCI facilitators' course. This is a pre-requisite for ICATT training. Nurse educators that are not trained in IMCI will not be able to facilitate IMCI case management training using ICATT. To ensure a successful outcome all nurse educators trained in IMCI should be trained in ICATT to ensure maximum capacitation at the nursing campuses.

> "The unfortunate part is that when we do implement ICATT, the nurse educators who use it will have to have basic IMCI training." (In: 2, 2).

> "Nurse educators will require training and orientation on the use of ICATT before they use it to teach the learners, if ICATT implementation is to be successful." (In: 1, 1).

> "My challenge was that not enough nurse educators have received ICATT training." (In: 7, 2).

Five of the seven participants were concerned that the computer literacy rates of nurse educators and learners were not adequate, and they would not have the requisite skills

to use the ICATT software. Participants were of the opinion that if nurse educators and learners were not computer literate, it would not be possible to use ICATT for IMCI case management training. The ICATT software contains many different applications which can be overwhelming for nurse educators during facilitation if they are not confident in undertaking tasks on the computer. Not knowing what to do and lack of skills can be a stumbling block to ICATT implementation.

> "Some of our lecturers can't actually do a simple task on a computer. Some of them if we say read emails, open an attachment, it's a challenge." (In: 6, 1).

> "My worry is that not all students are computer literate, which is also a problem." (In: 3, 1).

More than fifty percent (n=4) of the participants were of the opinion that the number of students in a group could be problematic due to constraints related to a lack of or limited resources. The larger number of learners in a group seemed to create problems in the context of accessibility to material resources and infrastructure. Concern was expressed regarding the number of learners and the lack of space.

> "If we accept 50 learners for training which classroom can we use? Are we going to take one of the exam halls and make it a computer lab?" (In: 3, 1).

> "We have got too few computers for the number of students." (In: 7, 2).

> "We have an intake of 25 learners now, and I can split the learners into groups. I do have that facility for example 13 learners can occupy one room and 12 in another. However, with the new curriculum we may have an intake of 50 learners a year and then I do not see myself having that infrastructure to even start using ICATT." (In: 8, 1).

Two participants (n=2) highlighted how ICATT implementation can be hampered due to the lack of information technology support personnel based at the nursing colleges to assist with maintenance of local area networks and computer systems and computer glitches that may arise.

> "You cannot have one student being left behind when others are working on the ICATT software, which will be a challenge. You do need technical support when using computers for learning." (In: 7, 3).

> "We do not have technical support for the campus, but we do have technical support in the hospital. However, 50 learners on computers would be too much for him to handle. The technical guy also takes 45 minutes to come to the campus so there should be a backup system. But what does happen some of the time is that the computers freeze, the server is not working and then all our things go down." (In: 8, 2 and 3).

The human resource challenges presented by the participants may have dire consequences for the implementation of any e-learning programme at the nursing campuses.

#### *4.2.1.3.2 Material resources*

All the participants (n=7; 100%) mentioned that their nursing campuses lacked the material resources necessary for the implementation of ICATT. Campus principals stated that they had too few or no computers at all for use by learners. Some nursing campuses were not equipped with either laptops or data projectors. Participants were of the view that if they did not have computers they were unable to implement ICATT for IMCI case management training.

> "At the moment we do not have the resources, which are necessary. We do have the room but no computers. We have 3 laptops and data projectors at the moment, which are not sufficient." (In: 1, 1).

> "The challenge is that we do not have enough computers. Therefore it may not be possible for us to implement ICATT for IMCI case management training right now." (In: 2, 1).

> "We cannot do it because we lack the computers here. But it is in the pipeline. We are hoping that in the near future we will have the network points to have the computers, laptops and a data projector and all those things." (In: 4, 1)

This confirms that if there are no computers or too few computers for learners, they may be unable to use ICATT. It serves to reason that if there are no computers then ICATT will not be used for IMCI case management training.

#### *4.2.1.3.3 Infrastructure*

All the participants (n=7; 100%) reported that their nursing campuses did not have the infrastructure to support ICATT implementation. The campus principals reported that nursing campuses either did not have local area networks or designated computer laboratories, or adequate space in which to set up computer laboratories for large groups of learners. Two participants based in rural nursing campuses were of the view that it was not possible to set up for ICATT implementation as the area was not equipped for information technology use.

> "It's just not possible because of the area where we are." (In: 2, 1).

> "The venue also is another problem. Which classroom can we use? Are we going to take one of the exam halls and make it a computer lab? Infrastructure is very important and the problem I foresee is the lack of infrastructure and resources." (In: 3, 1).

> "No one actually looked at the preparation and the readiness of all of the campuses in terms of rendering such a software or tool. At the campuses we are at different levels in terms of resources. Some campuses have computers and computer local area networks and some of us do not have that." (In: 7, 1).

> "Even if you give me the computers, I do not have the infrastructure like a huge hall or a big classroom to convert into a computer laboratory." (In: 8, 1).

The fact that nursing campuses differ in their access to information and communication technologies is an area of concern expressed by some participants. Similarly, the fact that a readiness assessment was not conducted prior to the possible implementation of an e-learning programme was also viewed as a concern by participants. The absence of information and communication technologies infrastructure is viewed as a barrier to information and communication technologies adoption and integration.

#### *4.2.1.4 Recommendations*

This section discusses the recommendations that could support ICATT implementation. Recommendations by participants regarding ICATT emerged during an intensive review of the data. The discussions were focused around training, resources and support.

##### *4.2.1.4.1 Training*

Six of the seven campus principals (86%) recommended that the training of nurse educators and learners was necessary if ICATT were to be implemented at the nursing campuses. The campus principals suggested that nurse educators needed development in the areas of computer literacy and training in ICATT. In addition, it was suggested that learners who come from rural backgrounds are not exposed to information and communication technologies, have inadequate levels of computer literacy and therefore require computer training.

> "Definitely I feel that they will need guidance because our students come from a rural area, where not all the students are exposed to technology as much as the urban youngsters are exposed to in schools." (In: 1, 1 and 2).

> "Some of our staff need training as they are not skilled in using the IT equipment. We are positive that if our nurse educators receive training in ICATT, then we will be able to facilitate IMCI case management training using ICATT." (In: 6, 1and 2).

> "All nurse educators lecturing in Community Nursing Science and Primary Health Care must be trained in ICATT." (In: 7, 6).

The majority of the participants are of the opinion that computer skills training is a necessity for both nurse educators and learners with both groups currently lacking in this area.

##### *4.2.1.4.2 Resources*

Six of the seven campus principals (86%) further recommended that resources be made available to nursing campuses in order to facilitate ICATT implementation. One participant suggested that a situational analysis must be conducted to assess the needs of the

nursing campuses for ICATT implementation. The majority of the participants asserted that infrastructure and information and communication technology resources must be provided if ICATT implementation is to become a reality. Nursing campuses must be upgraded to allow for the use of e-learning.

> "Once the resources are there and proper orientation takes place I do not really foresee a problem." (In: 1, 2).

> "Campus X must be upgraded." (In: 2, 2).

> "It will be beneficial for the campus if we can have access to IT equipment and more interactive systems for teaching and learning." (In: 6, 1).

> "Someone from the district and the province, especially because this project was run by a provincial training department, should have visited the campuses to check if they are ready for ICATT implementation. They should ask questions like how many computers do you have? But no one followed up." (In: 7, 1).

> "The ICATT software must be downloaded on to students' cellular phones so that the software is accessible even in their rooms, at night or whenever it is needed." (In: 7, 9).

According to the participants the implementation of e-learning is largely dependent on the upgrading of the nursing campuses and the provision of information and communication technologies that are easily accessible to the learners both on and off campus. This can be achieved by downloading the ICATT software onto learners' cellular phones.

#### *4.2.1.4.3 Support*

Three of the seven principals recommended that nursing campuses should receive adequate support from numerous sources that will facilitate and sustain ICATT implementation.

> "We would need at least one person who will be permanently employed to oversee the management of a computer laboratory. This would include the maintenance and control of the resources." (In: 1, 3).

"I will fully support the implementation of ICATT if the resources are made available like technical support and rooms, which are ventilated. I will support it 100%." (In: 7, 3).

"I feel because it is a government initiative, that we should be able to access funds from the government to implement ICATT." (In: 8, 2).

"Yes, we can share an IT support person between campuses especially if it is campuses close by. I am just asking for it to be workable." (In 8, 3)

Participants suggested that technical support be provided on an on- going basis to maintain computer laboratories. One participant suggested sharing the technical support between nursing campuses that are in close proximity to one another to enable the implementation and use of ICATT. There was also the assertion that support from the national department of health will ensure the provision of adequate financial support for ICATT implementation.

### 4.2.2 QUANTITATIVE COMPONENT RESULTS FOR CAMPUS PRINCIPALS

#### *4.2.2.1 Response rate*

A response rate is also known as a completion rate or a return rate. A response rate is calculated by dividing the number of people who responded to a survey by the number of people in the sample and is expressed as a percentage (Polit & Beck 2012:741; Nulty 2008:308). Response rates of 60% or above are considered adequate (Nulty 2008:306).

The table below reflects the response rate for the campus principals.

**Table 4.2 Response rate for campus principals**

| Campus | Despatched | Returned | Response rate |
|---|---|---|---|
| A | 1 | 1 | 100% |
| B | 1 | 1 | 100% |
| C | 1 | 1 | 100% |
| D | 1 | 1 | 100% |
| E | 1 | 1 | 100% |
| F | 1 | 1 | 100% |
| G | 1 | 1 | 100% |
| H | 1 | 1 | 100% |
| I | 1 | 1 | 100% |
| **Total** | **9** | **9** | **100%** |

Table 4.2 indicates the response rate for the campus principals in this study. In total, nine questionnaires were despatched and nine were returned, which provided a 100% response rate. The campuses from which the sample was drawn is shown above. The principal from each of the campuses surveyed responded. The response rate can possibly be attributed to the fact that the participants found the study relevant to the current changes in the landscape of nursing education at public nursing colleges.

#### *4.2.2.2 Results*

The results of this phase are presented here in the form of descriptive or inferential statistics. The results are presented under the following headings: -demographic data, resource availability, challenges and benefits and ICATT implementation.

##### *4.2.2.2.1 Demographic data*

The demographic data of the research participants is presented in this section. The age, gender, the number of years of working as a campus principal and the type of nurse training offered at the nursing campuses is also included in this section. Table 4.3 presents the overall gender and age distribution of the participants.

**Table 4.3 Gender distribution by age of campus principals (n=9)**

| Gender distribution | | | Gender | | Total |
|---|---|---|---|---|---|
| | | | Female | Male | |
| Age | 41–50 | Count | 1 | 1 | 2 |
| | | % within Age | 50.0% | 50.0% | 100.0% |
| | | % within Gender | 12.5% | 100.0% | 22.2% |
| | | % of Total | 11.1% | 11.1% | 22.2% |
| | 51–60 | Count | 7 | 0 | 7 |
| | | % within Age | 100.0% | 0.0% | 100.0% |
| | | % within Gender | 87.5% | 0.0% | 77.8% |
| | | % of Total | 77.8% | 0.0% | 77.8% |
| Total | | Count | 8 | 1 | 9 |
| | | % within Age | 88.9% | 11.1% | 100.0% |
| | | % within Gender | 100.0% | 100.0% | 100.0% |
| | | % of Total | 88.9% | 11.1% | 100.0% |

Table 4.3 shows that in this study there are nine (88.9%) female campus principals and one (11.1%) male campus principal, hence more female than male campus principals. Overall, the ratio of males to females is approximately 1:8. In addition, Table 4.3 shows the age distribution of the nine campus principals. Most of the participants (n=7; 77.8%) were aged between 51 years and 60 years. Within the age category of 51 to 60 years, 100.0% were female. Within the category of females only, 87.5% were between the ages of 51 to 60 years. Two campus principals fell into the age category of between 41years and 50 years (n=2; 22. 2%). There were no campus principals between the ages of 21years and 40 years.

Figure 4.1 indicates the number of years the respondents have worked as a campus principal.

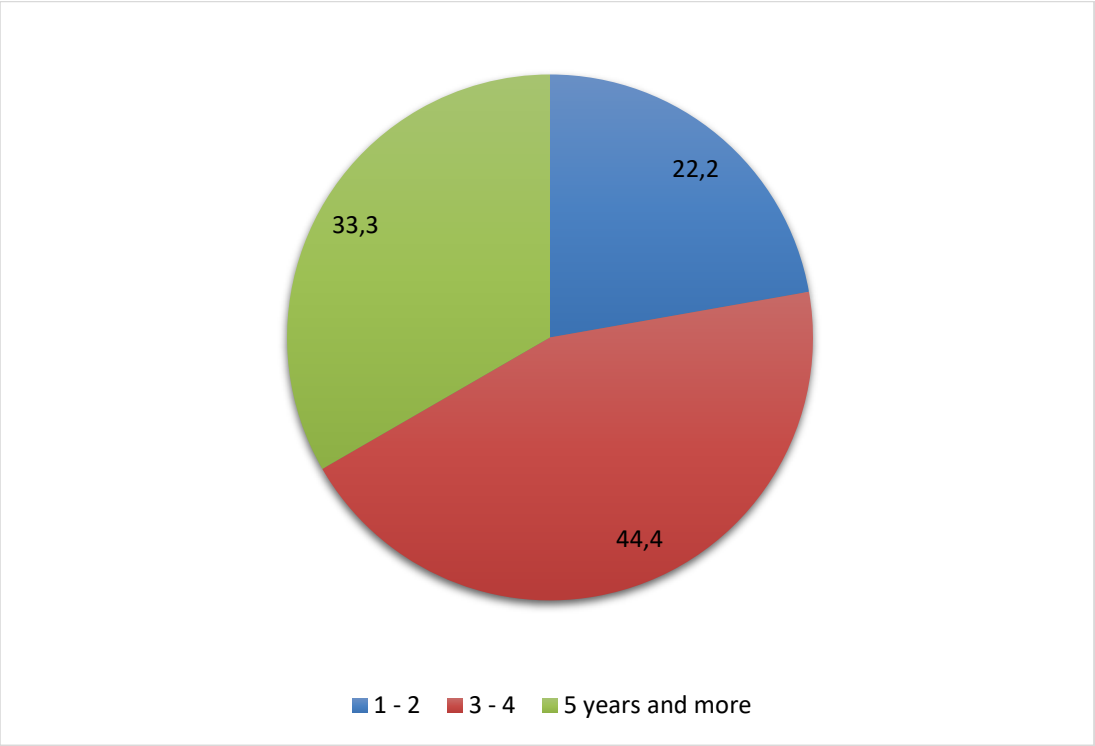


**Figure 4.1 Number of years as a Campus Principal (n=9)**

A third of the participants (33.3%) have been campus principals for more than five years. A larger proportion of the participants (77.7%) have between one and four years of work experience. This indicates that the responses gathered would be from an informed and experienced source. In addition, the participants will have the requisite knowledge and competencies to make recommendations for ICATT implementation at the nursing campuses.

The types of nurse training programmes that are offered at the nursing campuses are shown in Table 4.4.

**Table 4.4 Type of nurse training programmes offered at the nursing campuses (n=9)**

| Campus | Campus Principals (n=9) | R425 | R2175 | R48 | R254 | R683 | R880 |
|---|---|---|---|---|---|---|---|
| **A** | 1 | Yes | Yes | | Yes | Yes | |
| **B** | 1 | Yes | | | Yes | | |
| **C** | 1 | Yes | Yes | | Yes | Yes | |
| **D** | 1 | Yes | | | Yes | Yes | Yes |
| **E** | 1 | Yes | | | Yes | | |
| **F** | 1 | Yes | | | Yes | | |
| **G** | 1 | Yes | Yes | | Yes | Yes | |
| **H** | 1 | Yes | Yes | Yes | Yes | | |
| **I** | 1 | Yes | | | | | |

The nursing campuses in KwaZulu-Natal offer a variety of training programmes as indicated by the campus principals and reflected in Table 4.4. All the campus principals (100%) indicated that they offered the R425 nurse training programme, which can lead to the registration of a nurse (General, Psychiatric and Community) and midwife. The IMCI case management training course is only offered to those learners registered as student nurses in the R425 course. The IMCI case management training is conducted in the second year of the R425 nurse training programme. In addition to the R425 nurse training programme, eight campus principals indicated that they also offer the R254 nurse training programme. Five campus principals indicated that their campuses offered four training programmes in total. Therefore, considering that many of the nursing campuses offer a variety of nurse training courses, it follows that the campus principals have to allocate human and material resources as determined by the needs of these training courses.

*4.2.2.2.2 Resource availability*

This section presents the results of the availability of resource at nursing campuses. They are presented here in the following sub-sections.

- **Human resources**

Table 4.5 indicates the responses from the campus principals regarding the number of nurse educators trained in IMCI at the nursing campuses and the number of nurse educators trained in IMCI and currently facilitating IMCI case management training at the same nursing campuses.

**Table 4.5 The number of nurse educators trained in IMCI at the nursing campuses, and the number of nurse educators trained in IMCI and currently facilitating IMCI case management training at the nursing colleges (n=9)**

| **Nurse educators trained in IMCI and facilitation at nursing campuses** | **Number of nurse educators trained in IMCI in the nursing campus** | | | | | |
|---|---|---|---|---|---|---|
| Number of nurse educators trained in IMCI and currently facilitating IMCI case management training for learners at nursing campuses | | **1-2** | **3-4** | **5-6** | **>6** | **Total** |
| | 1-2 | 1 | 1 | | | **2** |
| | 3-4 | | 1 | 2 | 1 | **4** |
| | 5-6 | | | 1 | 1 | **2** |
| | >6 | | 1 | | | **1** |
| | **Total** | **1** | **3** | **3** | **2** | **9** |

It is evident from Table 4.5, and as indicated by the campus principals that four nursing campuses have between one and four nurse educators trained in IMCI. Three nursing campuses have between five and six nurse educators trained in IMCI. Two nursing campuses have more than six nurse educators trained in IMCI. From these results, it appears as though that nurse educators have been trained in IMCI case management training as IMCI facilitators. However, in saying that, it is noted that one nursing campus has few nurse educators trained in IMCI (between one and two).

Table 4.5 further indicates the responses from the campus principals regarding the number of nurse educators trained in IMCI currently facilitating IMCI case management training at the nursing colleges. The researcher has identified an anomaly in the results presented above due to the response from one campus principal. The data provided indicate that although only three to four nurse educators have been trained in IMCI, five to six nurse educators are currently facilitating IMCI case management training. There can be two reasons for this anomaly namely: either the participant answered incorrectly

or nurse educators not trained in IMCI case management are conducting training for learners. This could have far-reaching consequences as it could compromise the quality of training for learners. However , the data presented also suggests that although there are nurse educators trained in IMCI, fewer nurse educators are available to facilitate IMCI case management training at their nursing campuses. Two nursing campuses have between three to four nurse educators trained in IMCI, but only one of these campuses has all nurse educators facilitating IMCI case management training for the learners. Similarly, three nursing campuses have between five to six four nurse educators trained in IMCI, but only one of these campuses has all nurse educators facilitating IMCI case management training for the learners. Less than six nurse educators trained in IMCI case management are currently facilitating IMCI case management training for the learners at the two nursing campuses which have more than six nurse educators trained in IMCI.

Table 4.6 presents the responses from campus principals regarding the IMCI case management training at the nursing campuses.

**Table 4.6 The IMCI case management training at the nursing campuses(n=9)**

| IMCI case management training at nursing campuses | Disagree | | Neutral | | Agree | | Total |
|---|---|---|---|---|---|---|---|
| | Count | Row n % | Count | Row n % | Count | Row n % | |
| There are an adequate number of educators trained in IMCI, in respect of educator-learner ratios for case management training | 2 | 22.2% | 1 | 11.1% | 6 | 66.7% | 9 |
| I would be willing to motivate for educators trained in IMCI to be sent for ICATT training, to improve IMCI case management training at this institution | 1 | 11.1% | 0 | 0.0% | 8 | 88.9% | 9 |

All the campus principals answered the questions pertaining to the adequacy in respect of the number of nurse educators trained in IMCI, and the need for nurse educators trained in IMCI to be sent for ICATT training to facilitate ICATT implementation as an alternative training method. They had to indicate whether they strongly disagree, disagree, neutral, agree or strongly agree with the statements. As shown in Table 4.6, two thirds (66.7%) of the campus principals indicated that the number of nurse educators

trained in IMCI were adequate in respect of nurse educator-learner ratios for IMCI case management training. The researcher is of the opinion that the campus principals may be unaware of the prescribed facilitator: participant ratios stipulated by WHO for IMCI case management training. Anecdotally, the number of second year learners per group and per campus is between 25 to 40 learners. This, together with the data presented in Table 4.5, shows that that there are few nurse educators trained in IMCI, and even fewer nurse educators available for conducting IMCI case management training for learners suggests an inadequate nurse educator-learner ratio at nursing campuses in KwaZulu-Natal. Almost all of the campus principals (88.9%) were willing to send nurse educators for ICATT training with only one campus principal indicating an unwillingness to do so.

- **Information and communication technologies for teaching and learning**

Table 4.7 presents the responses of the campus principals concerning nurses educators' access to the intranet and internet search facilities at the nursing campuses.

**Table 4.7 Access to the intranet and internet search facilities for nurse educators (n=9)**

| Access to intranet and internet search facilities | Yes | | No | | Total |
|---|---|---|---|---|---|
| | Count | Row n % | Count | Row n % | |
| Does this nursing campus offer nurse educators access to the intranet search facilities for teaching and learning purposes? | 6 | 66.7% | 3 | 33.3% | 9 |
| Does this nursing campus offer nurse educators access to the internet search facilities for teaching and learning purposes? | 5 | 55.6% | 4 | 44.4% | 9 |

Table 4.7 shows that according to the participants, six (66.7%) of the nursing campuses offer their nurse educators access to the intranet, compared to three (33. 3%) nursing campuses where nurse educators did not have access to these facilities. A lower percentage of nursing campuses (55.6%) offer their nurse educators access to the internet.

Table 4.8 presents the responses of campus principals regarding the importance of nurse educators being able to access and use search facilities, and the need to incorporate information and communication technology for teaching and learning purposes at nursing campuses.

**Table 4.8 The importance of access to search facilities and use of new technologies (n=9)**

| Importance of access to search facilities and use of new technologies | Disagree | | Neutral | | Agree | | Total |
|---|---|---|---|---|---|---|---|
| | Count | Row n % | Count | Row n % | Count | Row n % | |
| It is important for nurse educators to have access to intranet search facilities | 0 | 0.0% | 0 | 0.0% | 9 | 100.0% | 9 |
| It is important for nurse educators to have access to the internet search facilities | 0 | 0.0% | 0 | 0.0% | 9 | 100.0% | 9 |
| It is important to incorporate new technologies (computer-based) for teaching and learning | 0 | 0.0% | 0 | 0.0% | 9 | 100.0% | 9 |

Table 4.8 shows that all nine campus principals (100%) agree that it is important for nurse educators to have access to intranet and internet search facilities for teaching and learning tasks. In addition, all nine campus principals (100%) agree that it is important to incorporate new technologies for teaching and learning purposes. It is therefore an area of concern that although all the campus principals (100%) are in agreement regarding the importance of access to the intranet and the internet, and incorporating new technologies for teaching and learning, only two thirds of the nursing campuses offer their nurse educators access to the intranet, and just over half of the nursing campuses allow their nurse educators access to the internet. It can therefore be concluded from the above findings that not all nursing campuses will be able to access or use the ICATT training player through the internet or intranet settings. This may be a challenge to incorporating new technologies for teaching and learning at nursing campuses.

- **Situational readiness**

Table 4.9 presents the responses from the campus principals pertaining to the availability of infrastructure that would support the use of ICATT at nursing campuses.

**Table 4.9 Infrastructure at nursing campuses (n=9)**

| Infrastructure | Yes | | No | | Total |
|---|---|---|---|---|---|
| | Count | Row n % | Count | Row n % | |
| Is/are there computer laboratory/ laboratories at this institution for use by learners? | 5 | 55.6% | 4 | 44.4% | 9 |
| Is/are there plans to develop/build computer laboratories at this institution for use by learners? | 7 | 77.8% | 2 | 22.2% | 9 |
| Are classrooms connected to a power source that will enable the use of laptops, projectors and accessibility to the internet/intranet? | 8 | 88.9% | 1 | 11.1% | 9 |

Table 4.9 shows that five (55. 6%) nursing campuses have computer laboratories for use by the learners. Seven (77.8%) nursing campuses have plans to further develop or build computer laboratories for use by learners. Eight (88.9%) nursing campuses have classrooms that are connected to a power source that will enable the use of laptops and projectors and facilitate the use of the internet and the intranet. These results provide an insight into the readiness of the nursing campuses for the adoption of information and communication technologies (ICT). Although over half of the nursing campuses have computer laboratories for use by learners, a greater number of nursing campuses need to further develop or build computer laboratories. Despite the existence of a power source at almost all the nursing campuses, the limitations in infrastructure development at the nursing campuses could hamper the use of ICATT for IMCI case management training.

- **Technology readiness**

Table 4.10 presents the responses from the campus principals pertaining to nurse educators and their accessibility to computers and computer training.

**Table 4.10 Accessibility to computers, data projectors, and basic computer training for nurse educators (n=9)**

| Accessibility to computers, data projectors and computer training | Yes | | No | | Total |
|---|---|---|---|---|---|
| | Count | Row n % | Count | Row n % | |
| Do nurse educators at this institution have access to computers at this campus? | 8 | 88.9% | 1 | 11.1% | 9 |
| Have educators at this institution received any basic computer training/ instruction? | 9 | 100.0% | 0 | 0.0% | 9 |
| Is/are there laptop computers and projectors for use by nurse educators at this institution, for classroom teaching? | 8 | 88.9% | 1 | 11.1% | 9 |

It is evident from Table 4.10 that there are high levels (or complete) agreement with the above statements with the majority of participants (88.9%) indicating that nurse educators have access to computers at their nursing campuses,and, that there are laptop computers and projectors for use by nurse educators at the nursing campuses for classroom teaching. All the participants (100%) indicated that the nurse educators at their nursing campuses have received basic computer training or instruction. It is apparent from these findings that nurse educators at the nursing campuses will be able to use ICATT as they have access to computers, laptop computers and projectors.

Figure 4.2 presents the responses from the participants regarding the availability of information and communication technologies for use by the learners.

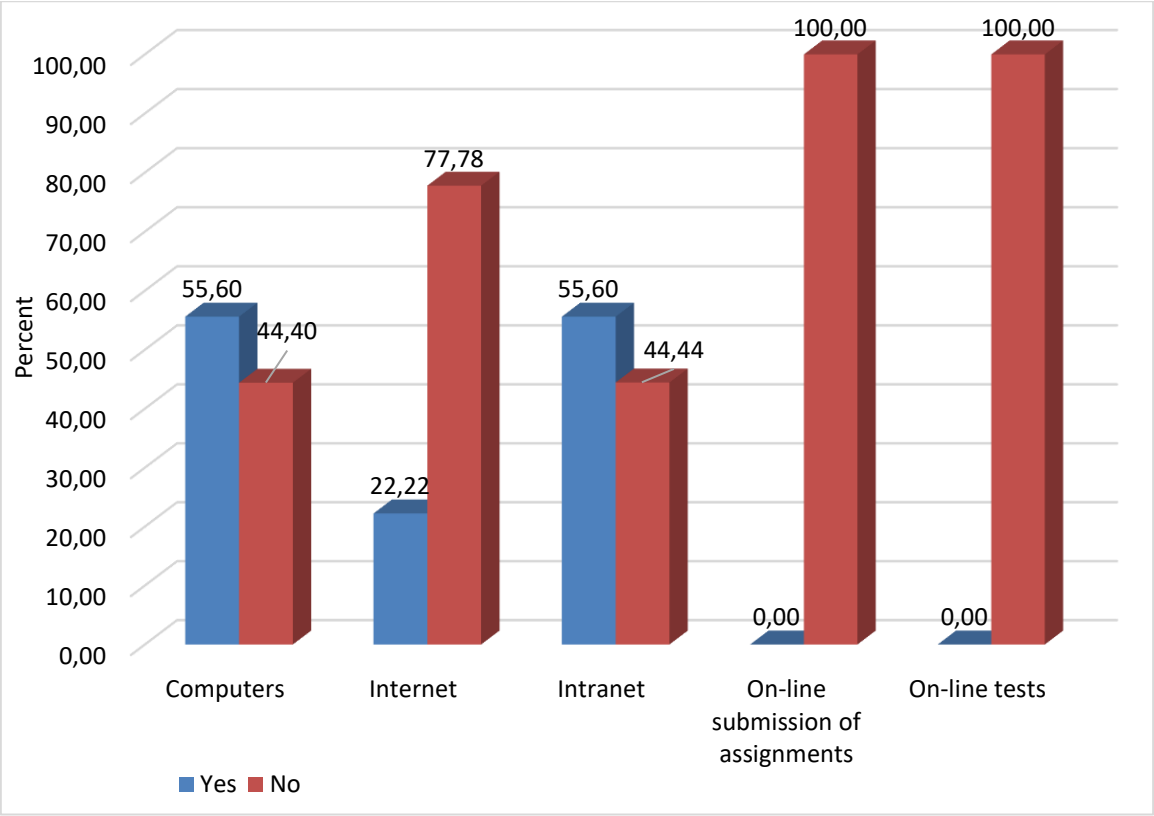


**Figure 4.2 The availability of information and communication technologies for use by the learners at nursing campuses (n=9)**

The results reflected in figure 4.2 are more negative than positive. The majority of the campus principals (77.78%) have indicated that internet is not available for use by learners at the nursing campuses. All the campus principals (100%) indicated that their learners do not submit assignments on-line, or complete tests on-line. However, just over half of the campus principals (55.6%) indicated that computers and the intranet are available for use by learners at their nursing campuses. The general understanding from these results is that a greater number of nursing campuses have made available intranet search facilities as opposed to internet search facilities for learners. It can be concluded that the limited access to the internet and the low percentage of learners with access to computers could be the reason for learners not submitting assignments on-line or completing tests on-line. However the fact that few nursing campuses have made computers and the internet available to learners could impact on the use and implementation of ICATT for IMCI case management training. This may also influence the the rate at which nursing campuses evolve in adopting technology for teaching and learning purposes.

Table 4.11 presents the responses of campus principals regarding whether information and communication technologies will be beneficial for learners and learning at the nursing campuses.

**Table 4.11 The use of technology for learners at nursing campuses (n=9)**

| Use of technology for learners | Somewhat beneficial | | Uncertain | | Beneficial | | Total |
|---|---|---|---|---|---|---|---|
| | Count | Row n % | Count | Row n % | Count | Row n % | |
| Computers | 0 | 0.0% | 0 | 0.0% | 9 | 100.0% | 9 |
| Internet access | 0 | 0.0% | 0 | 0.0% | 9 | 100.0% | 9 |
| Intranet access | 0 | 0.0% | 0 | 0.0% | 9 | 100.0% | 9 |
| On-line submission of assignments | 0 | 0.0% | 0 | 0.0% | 9 | 100.0% | 9 |
| On-line tests | 0 | 0.0% | 1 | 11.1% | 8 | 88.9% | 9 |

Table 4.11 shows that all of the campus principals (100%) indicated that the use of computers would be beneficial for learners. Similarly, the majority of the campus principals (100%) thought that internet and intranet access, and the submission of assignments on-line would benefit the learners. Eight campus principals (88.9%) thought that the completion of tests on-line would be beneficial for learners, whilst one campus principal (11.1%) was uncertain regarding the benefit of completing tests on-line

- **Financial resources**

It is necessary to evaluate the cost-effectiveness of the conventional method of training versus the implementation of an e-learning method that is ICATT. The costs incurred for IMCI pre-service training using the conventional method will serve as a guide for assessing whether adopting an e-learning method will be more cost-effective over the long-term for nursing campuses.

Table 4.12 presents the current costs incurred by nursing campuses in respect of printing training materials for IMCI implementation annually.

**Table 4.12 The costs incurred by nursing campuses for the printing of training material (n=9)**

| N | Average | Minimum | Maximum |
|---|---|---|---|
| 7 | ZAR 23428. | ZAR 5000.00 | ZAR 50000.00 |

Seven of the nine campus principals responded to this question on the costs incurred for printing learning materials. Two campus principals did not furnish any information regarding costs incurred. The costs incurred by nursing campuses annually for printing training materials varied from a minimum amount of ZAR 5000 to a maximum amount of ZAR 50000.

Table 4.13 presents the responses of the campus principals with regard to the number of nursing campuses that have incurred costs for the training of nurse educators for IMCI implementation.

**Table 4.13 The number of nursing campuses that incurred costs for training nurse educators in IMCI case management (n=9)**

| Costs incurred by nursing campuses for training nurse educators | Frequency | Percentage |
|---|---|---|
| Yes | 4 | 44.4 |
| No | 5 | 55.6 |
| **Total** | **9** | **100.0** |

Table 4.13 shows that five (55.6%) campus principals indicated that the nursing campuses did not bear any costs towards the training of nurse educators for IMCI case management. Four (44.4%) campus principals indicated differently, i.e their nursing campuses did incur costs for the training of nurse educators for IMCI management.

Table 4.14 presents the costs incurred by nursing campuses in respect of training nurse educators for IMCI case management.

**Table 4.14 The costs incurred by nursing campuses for the training of nurse educators (n=9)**

| Amount | (ZAR) | Frequency | Percentage |
|---|---|---|---|
| ≤ | 5000.00 | 2 | 22.2 |
| > | 5000.00 | 1 | 11.1 |
| | No response | 6 | 66.7 |
| **Total** | | **9** | **100.0** |

Table 4.14 reflects the responses of the campus principals regarding the costs borne by the nursing campuses for the training of nurse educators for IMCI implementation. Only one third (33.3%) of the campus principals responded to this question and were able to furnish estimates of the costs borne for training. The costs ranged from a minimum of ZAR 3500 to a maximum of ZAR 25000.

Table 4.15 presents the costs incurred by nursing campuses in respect of the purchase of equipment and additional teaching resources for IMCI case management training.

**Table 4.15 The costs incurred by nursing campuses for equipment and teaching resources (n=9)**

| Equipment purchased | Number of nursing campuses | Minimum (ZAR) | Maximum (ZAR) |
|---|---|---|---|
| Television | 1 | 5000.00 | 5000.00 |
| DVD player | 1 | 2000.00 | 2000.00 |
| Additional Copies of DVDs | 3 | 250.00 | 20000.00 |
| Additional copies of colour printed, bound photograph booklets | 4 | 2000.00 | 25000.00 |
| **Total** | **9** | | |

Table 4.15 reflects the responses of the campus principals regarding the costs borne by the nursing campuses for the purchase of televisions and DVD players as well as other teaching resources used for the conventional method of IMCI case management training. This included additional copies of DVDs and additional copies of colour printed, bound photograph booklets. All nine campus principals responded to this question. However, the costs incurred for the purchase of equipment and teaching resources differed. One

campus principal (11.1%) purchased a television for IMCI case management training at a cost of ZAR 5000. One campus principal (11.1%) purchased a DVD player for IMCI case management training at a cost of ZAR 2000. Three campus principals (33.3%) indicated that additional copies of DVDs were purchased. The costs incurred ranged between a minimum amount of ZAR 250 and a maximum amount of ZAR 20000. Four campus principals (44.4%) indicated that the costs were incurred for additional copies of colour printed, bound photograph booklets. The costs incurred ranged from a minimum amount of ZAR 2000 to a maximum amount ZAR 25000. Table 4.15 reflects the breakdown of costs incurred with a minimum amount of ZAR 250 and a maximum amount of ZAR 25000. However, it is difficult to place relevance on these findings as a true reflection of costs incurred at nursing campuses, as not all campus principals furnished information pertaining to costing.

#### *4.2.2.2.3 The enablers and barriers to ICATT implementation within the nursing campuses*

One of the objectives of this study was to identify the enablers and barriers to ICATT use and implementation within the nursing campuses. The enablers were identified as the perceived benefits of ICATT implementation, whilst the barriers were identified as the challenges to ICATT implementation.

Table 4.16 indicates the perceived challenges to ICATT implementation at the nursing campuses. All the campus principals answered the questions pertaining to the perceived challenges to ICATT implementation at the nursing campuses.

**Table 4.16 The possible challenges to ICATT implementation at the nursing campuses (n=9)**

| Possible challenges | Somewhat challenging | | Uncertain | | Not considered a challenge | | Total |
|---|---|---|---|---|---|---|---|
| | Count | Row n % | Count | Row n % | Count | Row n % | |
| Buy-in from stakeholders | 3 | 33.3% | 3 | 33.3% | 3 | 33.3% | 9 |
| Competing priorities | 6 | 66.7% | 2 | 22.2% | 1 | 11.1% | 9 |
| Cost of implementation | 7 | 77.8% | 2 | 22.2% | 0 | 0.0% | 9 |
| Funds for printing modules | 8 | 88.9% | 1 | 11.1% | 0 | 0.0% | 9 |
| Funds for purchasing computers, memory sticks, CD-ROM | 6 | 66.7% | 1 | 11.1% | 2 | 22.2% | 9 |
| Prohibitive financial regulations | 8 | 88.9% | 0 | 0.0% | 1 | 11.1% | 9 |
| ICATT trained facilitators | 3 | 33.3% | 2 | 22.2% | 4 | 44.4% | 9 |
| IT support to provide direct help for educators with difficulties | 5 | 55.6% | 2 | 22.2% | 2 | 22.2% | 9 |
| Computer availability | 6 | 66.7% | 2 | 22.2% | 1 | 11.1% | 9 |
| Computer laboratories | 6 | 66.7% | 1 | 11.1% | 2 | 22.2% | 9 |
| Accessibility to internet or intranet | 6 | 66.7% | 0 | 0.0% | 3 | 33.3% | 9 |

Overall, there were more statements that were considered “somewhat challenging” compared to “not considered a challenge.” The following factors were considered to be somewhat of a challenge to ICATT implementation by over two thirds of the campus principals: competing priorities; the cost of implementation; funds for printing modules; funds for purchasing computers, memory sticks, CD-ROM; prohibitive financial regulations; computer availability; computer laboratories and accessibility to internet or intranet. The findings suggest that the dominant challenges identified by the campus principals for ICATT implementation and use are mainly finance-related and infrastructural constraints. Just over 55.6% of the campus principals indicated that IT support for educators with difficulties would also be considered somewhat of a challenge. Three campus principals (33.3%) indicated that the buy-in from stakeholders was not considered a challenge, whilst three campus principals (33.3%) indicated that the buy-in from stakeholders was somewhat of a challenge. Three campus principals (33.3%) were uncertain of whether the buy-in from stakeholders was a challenge or not. A larger percentage of campus principals (44.4%) indicated that the availability of facilitators trained in ICATT was not considered a challenge. However, three campus principals (33.3%) indicated that it might present somewhat of a challenge to implement ICATT. The

challenges to the implementation of e-learning (ICATT) exists, although e-learning can be modified or adapted to meet the teaching and learning needs at nursing colleges.

All the campus principals answered the questions pertaining to the perceived benefits to ICATT implementation at the nursing campuses. Table 4.17 indicates the perceived benefits to ICATT implementation at the nursing campuses.

**Table 4.17 The possible benefits to ICATT implementation at the nursing campuses (n=9)**

| Possible benefits | Somewhat beneficial | | Uncertain | | Beneficial | |
|---|---|---|---|---|---|---|
| | Count | Row n % | Count | Row n % | Count | Row n % |
| Economical, as does not require printing of hard copy training material | 0 | 0.0% | 0 | 0.0% | 9 | 100.0% |
| Easier to make changes or do updates electronically at no cost | 0 | 0.0% | 0 | 0.0% | 9 | 100.0% |
| ICATT still allows for educator-learner interaction | 0 | 0.0% | 2 | 22.2% | 7 | 77.8% |
| Provides for ideal educator-learner ratios as group learning and facilitation can take place with one or two nurse educators trained in IMCI | 1 | 11.1% | 1 | 11.1% | 7 | 77.8% |
| Viewed as an alternative training approach that stimulates independent thinking amongst learners | 0 | 0.0% | 0 | 0.0% | 9 | 100.0% |
| Learners can work at their own pace | 0 | 0.0% | 0 | 0.0% | 9 | 100.0% |
| Course can be done in a shorter period of time | 0 | 0.0% | 0 | 0.0% | 9 | 100.0% |

The responses from the campus principals indicate a 100% agreement with almost all of the statements that ICATT implementation would be beneficial at the nursing campuses. All the campus principals (100%) indicated that one of the benefits of ICATT implementation is its cost-effectiveness. The campus principals identified that initially the costs related to implementation may be high (Table 4.16), but recognise that long term ICATT implementation for IMCI case management training will be cost-saving (Table 4.17). The two statements where the campus principals responded differently relate to the use of ICATT for IMCI case management training. Two campus principals (22.2%) indicated that they were uncertain of whether ICATT would be beneficial in allowing for

educator- learner interaction and whether an ideal educator-learner ratio would be attained. However, the majority of the campus principals (77.8%) acknowledged the benefits of ICATT use in maintaining educator-learner interactions and in achieving an ideal educator-learner ratio.

*4.2.2.2.4 Attaining the goals and objectives for IMCI implementation using ICATT*

Table 4.18 presents the responses from campus principals regarding whether the goals and objectives of IMCI will be met through the implementation of ICATT for IMCI case management training at nursing campuses.

**Table 4.18 The attainment of the goals and objectives for IMCI when using ICATT for IMCI case management training at nursing colleges (n=9)**

| Attainment of goals and objectives | Disagree | | Neutral | | Agree | | Total |
|---|---|---|---|---|---|---|---|
| | Count | Row n% | Count | Row n % | Count | Row n % | |
| To effectively scale up IMCI saturation through self-learning methods: IMCI Computerized Adaptation Training Tool (ICATT) | 0 | 0.0% | 0 | 0.0% | 9 | 100.0% | 9 |
| To ensure competent practitioners in IMCI implementation | 0 | 0.0% | 1 | 11.1% | 8 | 88.9% | 9 |
| To engender sustainable commitment from National Department of Health partners in IMCI training and implementation | 0 | 0.0% | 0 | 0.0% | 9 | 100.0% | 9 |
| To align IMCI and ICATT materials with recent updates and software | 0 | 0.0% | 0 | 0.0% | 9 | 100.0% | 9 |
| To build capacity in health professionals through ICATT learning | 0 | 0.0% | 0 | 0.0% | 9 | 100.0% | 9 |
| To monitor and evaluate the effectiveness of self- learning methods | 0 | 0.0% | 0 | 0.0% | 9 | 100.0% | 9 |

There is 100% agreement with all the statements that the goals and objectives of IMCI will be met through the implementation of ICATT, except one which had a neutral response. The campus principals responses indicate that they are in agreement with regards to the use of ICATT, for attaining the goals and objectives of IMCI.

## 4.3 PHASE 2

### 4.3.1 QUALITATIVE COMPONENT RESULTS FOR NURSE EDUCATORS - PRE-ICATT USE

The results in this section emerged from the focus group interviews conducted with nurse educators using an interview schedule (Annexure O). Table 4.19 shows the master table of themes with one super-ordinate theme, themes and sub-themes.

**Table 4.19 Master table of themes: Focus group interviews of nurse educators pre-ICATT use**

| Super-ordinate theme | Themes | Sub-themes |
|---|---|---|
| The implementation and use of ICATT for IMCI case management training | Positive attitude | • ICATT |
| | Benefits | • Campus<br>• Nurse educators<br>• Learners<br>• Using ICATT |
| | Challenges | • Human resources<br>• Material resources<br>• Infrastructure |
| | Recommendations | • Resources<br>• Support<br>• Implementing ICATT |

A detailed narrative was provided by the participants regarding their attitude to ICATT implementation at the nursing campuses. Analysis of the data using the IPA framework led to the identification of a super-ordinate theme, themes and sub-themes (Sandy & Shaw 2012:67). The super-ordinate theme was the implementation of ICATT for IMCI case management training. The four themes and numerous sub-themes are illustrated in Table 4.19. The results are presented using quotations from the transcripts which support the discussions of the themes (Sandy & Shaw 2012:67). At the end of each quotation the initials “In” appear. Following the initials are numbers, for example, (1, 3) with “1” indicating the number of the individual interview and “3” indicating the page number of the transcript in which the quotation appears (Sandy & Shaw 2012:67). The themes and sub-themes are discussed in detail below.

#### *4.3.1.1 Positive attitude*

In this study, one of the themes that emerged from the focus group interviews with nurse educators is their positive attitude regarding ICATT implementation. Participants expressed positive views regarding the intention to use ICATT for IMCI case management training.

> "It won't be a problem adjusting to ICATT as it is computerised. It's actually a wonderful idea." (Fgp: 1, 1).

> "Learners are going to enjoy it because they love things that are not paper-based. ICATT will be exciting and more interesting." (Fgp: 2, 1).

> "I support this idea for the implementation of ICATT software." (Fgp: 4, 1).

Participants did not anticipate experiencing any problems regarding the use of computers for training which would replace the conventional paper-based method which is currently in use. It was suggested that the use of ICATT for IMCI case management training will be an easy transition which they supported. The participants asserted that there was a need to integrate technology in teaching, which is more suitable for learners in the 21st century. The views of the participants regarding ICATT were that it was exciting and interesting.

#### *4.3.1.2 Benefits*

There was a clear agreement amongst the participants that the implementation of ICATT would have many benefits. The following sub-themes were identified: the campus, the nurse educators and the learners, and using ICATTfor teaching and learning as illustrated in Table 4.19.

##### *4.3.1.2.1 Benefits of ICATT implementation for the nursing campuses*

Participants stressed that the main benefit for the nursing campuses is from a cost efficiency perspective. According to the participants high costs have been incurred by the nursing campuses as they used the conventional paper-based method of IMCI case

management training. The reasons for this were directly linked to the costs of photocopying the modules that are required when facilitating IMCI case management training. The learning material for IMCI case management training includes a chart booklet and eight modules. All learners must be in possession of these modules, which necessitates nurse educators printing and re-printing at high costs to the nursing campuses. Additional costs can be attached to the on-going replacement of the DVDs that support the exercise module. The DVDs may need replacement due to wear and tear or due to loss.

> "We have to change. We don't want to use the conventional method. It's a burden on our budget because although we use the government printers they charge us. The printing of modules is very expensive and I took 13 modules for printing." (Fgp: 8, 1)

> "ICATT will be cost effective as there is no need to photocopy all the modules. Sometimes there is a problem with regards to not being able to access DVDs." (Fgp: 7, 1).

Participants indicated that implementing ICATT for IMCI case management training might be a solution in curtailing the high costs linked to the conventional manner of training.

The use of ICATT at nursing campuses can therefore address the issues of high costs related to printing of learning materials for the use of the conventional method.

#### *4.3.1.2.2 Benefit of ICATT implementation for nurse educators*

The benefit of ICATT implementation for nurse educators was a theme that was mentioned frequently during the focus group interviews. Embedded within this theme are the concepts of teaching, integrating technology for IMCI case management training and human resources. Participants indicated that ICATT could in a way revolutionise IMCI case management training at nursing campuses. The use of ICATT provides nurse educators with the opportunity to use interactive computer-based learning for the first time in the classrooms. The use of ICATT can be leveraged to address the current human resource challenges being experienced at some of the nursing campuses.

- **Teaching**

Participants reported that the use of ICATT could be advantageous for nurse educators from a teaching perspective. Many participants alluded to the fact that the conventional method of IMCI case management training was beset by challenges. The challenges included the use of out-dated training material, difficulty accessing and using the accompanying videos, the use of many hard copy modules to facilitate training and the length of time it took to conduct training. The general consensus amongst the participants was that ICATT could be beneficial for nurse educators. Participants asserted that the use of ICATT will ensure that nurse educators are using modern methods of facilitation to share updated information on IMCI.

> "It motivates the nurse educators to be updated and knowledgeable because you really don't want your learners to know more than you." (Fgp: 4, 2).

> "Information in the discipline of community nursing science is continuously changing, and learners should be given new information. The ICATT software can be easily updated and allows for new information to be easily disseminated so it should be used." (Fgp: 8, 2).

> "It is easier for nurse educators to use ICATT than the conventional method because the software has a read section and videos that are easy to access." (Fgp: 7, 1).

> "It also reduces the burden on the lecturer because you can actually leave the student to work on the programme on their own as most of the information is known to them." (Fgp: 8, 1).

> "It's very important because it will save time. When we are using the old way of lecturing where you actually use the hard copies it takes time." (Fgp: 3, 1).

It was further suggested that the use of ICATT as a new method of facilitation could reduce the teaching workload on nurse educators. This is because the ICATT software allows for learners to create their own user profile and monitors their progress whilst they complete tasks during the training. Learners thus become independent and actively involved in their own learning. Participants mentioned that the use of ICATT could save

time and shorten the training period. This can be attributed to the fact that the ICATT software has incorporated all the modules into a READ, SEE, PRACTICE and TEST format, which is easier to use for teaching and learning. The findings suggest that the use of ICATT can be beneficial for teaching IMCI at nursing campuses

- **Integrating technology into IMCI case management training**

There was a general feeling of optimism amongst the participants with regards to integrating technology for IMCI case management training.

> "It's advantageous for the nurse educator to use ICATT for facilitation because it's easier to access the information." (Fgp: 1, 2).

> "It's easy to review and update information using technology as opposed to discarding outdated paper copies used in the conventional training." (Fgp: 2, 1).

> "Time saving and economical." (Fgp: 2, 1).

Participants claimed that the use of technology would make teaching easier, as it is convenient to access the information. They were cognisant of the fact that technology allows for information to be accessed at the touch of a button as opposed to paging through books to find information. Participants agreed that the use of technology allows for information to be updated and shared more efficiently and effectively, which is cost and time-saving. One participant even suggested that the use of technology for teaching may be more beneficial for teachers than learners.

- **Human resources for ICATT implementation**

The WHO guidelines for IMCI case management training stipulate a facilitator to participant ratio of 1:4 which can be difficult to adhere to if there are human resource constraints. Participants therefore indicated that the use of ICATT could address the problem of a shortage of IMCI facilitators that is currently a reality at some nursing campuses.

> “It lessens the burden from a human resource point of view.” (Fgp: 1, 1).

> “It’s going to be more efficient because it does not need many facilitators. One facilitator may be adequate.” (Fgp: 2, 1).

Participants suggested that ICATT would be more suitable than the conventional method of IMCI case management training as fewer facilitators are needed to conduct training. This fact highlights the need for nursing campuses to adopt ICATT for the more efficient use of nurse educators for IMCI case management training.

#### *4.3.1.2.3 Benefit of ICATT implementation for learners*

All the participants were in agreement that ICATT implementation would be beneficial for the learners. The following concepts of learning, learner behaviour and the use of technology are embedded within this theme. Participants were of the opinion that the learners should be using computers in the classroom during the course of their nurse training. Participants suggested that the use of ICATT could influence learning and learner behaviour positively.

- **Learning**

Participants indicated that ICATT would be beneficial for learners as it allowed them to learn at their own pace. The conventional method of facilitating IMCI case management training expected all learners to work at the same pace irrespective of whether they were able to do so. This meant that some learners were left behind which had a negative outcome for their learning. Based on the information they received on ICATT, participants stated that using ICATT allows learners to control how quickly or how slowly they work through and complete the IMCI modules based on individual learning abilities.

> “It is going to be very effective for learning on a one-to-one basis. Learners will work through each module at their pace”. (Fgp: 2, 1).

> “If we are presenting it in the classroom we expect all learners to keep up. ICATT allows the learners to work on their own and work at their own pace.” (Fgp: 8, 2).

Participants were of the opinion that ICATT offers the learners a creative, interesting and user-friendly way of learning IMCI case management training. It allows for a better understanding of the content.

> "They're going to be very creative at the same time." (Fgp: 2, 1).

> "The use of ICATT facilitates active listening as it allows them to read, see and practice." (Fgp: 3, 1).

Participants claimed that using ICATT allows learners to actively engage in their own learning using the software. The ICATT software is designed to allow learners to identify their mistakes first hand and make corrections. This facilitates confidence in their own abilities, independence during learning and a deeper understanding of the content being taught.

> "They can evaluate themselves in the TEST section so they can see where their mistakes are so it's going to be more of a help to the students." (Fgp: 3, 1).

> "It will be an interactive process and I think that is what the students want right now. Lecturer interaction is good but I think we all have come to the conclusion that somewhere along the line we lose them and their concentration is not so good." (Fgp: 4, 1).

> "At the end of each section there's a test section so students can see how they progressed, which is good." (Fgp: 8, 1).

Participants asserted that learners no longer want to be passive recipients of information, but rather prefer an interactive environment for learning. Learners expect an immediate response on completion of a task which occurs when using the ICATT software. A stimulating environment can ensure that learners focus on the tasks at hand and not lose concentration due to loss of interest. Participants further indicated that ICATT allows learners to monitor their progress and do a self-evaluation of their knowledge. Participants of this study have identified these as being beneficial for learners.

- **Learner behaviour**

According to some of the participants, learner behaviour might change as computer use is integrated into the curriculum. Participants suggested that learners might evolve into independent, critical thinkers who will take the initiative to learn.

> "Start to think critically and I think that's what we want from the potential pre-nurses that are coming out of here." (Fgp: 4, 1).

> "The young ones they become so bored and you find others are not concentrating. At least with this they are active participants as they work on the PRACTICE section." (Fgp: 7, 2).

Participants of this study are of the view that learner behaviour can change for the better if different training methodologies are adopted for IMCI case management training. The use of the PRACTICE section on ICATT will allow learners to apply their knowledge and practice their skills and get immediate feedback.

- **Use of technology for learning**

Nursing campuses have never used computers with software packages for learning. Participants were however optimistic that the introduction of technology for learning will be beneficial for the learners. Computer literacy and computer skills can be developed.

> "It will also improve their computer skills." (Fgp: 2, 1).

> "It is advantageous for the learners as they now have an introduction into basic computer literacy, and then from there on can develop their skills further." (Fgp: 5, 1).

> "The students can download the software on to their personal laptops or a memory stick, so that they can go home and work on it. They don't have to be on campus to access and use the ICATT software but can carry their laptops around and work with it anywhere." (Fgp: 8, 2).

Participants suggested that the use of ICATT will be advantageous as learners who have not used computers will now become computer literate and have the opportunity to develop their computer skills further. Participants indicated that the use of technology at nursing campuses will allow learners to have access to computers with the ICATT software. Learners will also have the opportunity to download the software on to data sticks or their laptop computers which they can use at their own convenience in the home or work environment.

#### *4.3.1.2.4 Using ICATT*

Participants asserted that ICATT had many advantages for IMCI case management training as opposed to the conventional method.

> "It's going to really shorten the time frame for teaching the students. Considering the calibre of nurses we have today, it won't be a problem adjusting to this new ICATT." (Fgp: 1, 1).

> "We're moving with the times now where everything is computerised. It's actually a wonderful idea because with the conventional method there are many modules to work through. Using the software on the computer will be much easier and we can get the work done quicker." (Fgp: 1, 1).

> "It's paperless so obviously its cost-effective and less time consuming than the old method. So it's quicker. Yes, I think it is more user-friendly." (Fgp: 7, 2).

The general the opinion was that the use of ICATT can shorten the time frame for IMCI case management training without impacting negatively on learning. The conventional method of training was paper-based and working through the modules of IMCI was time -consuming for the nurse educators and learners. Participants therefore indicated that ICATT would not only be time saving and cost effective, but user-friendly.

Participants were positive that using ICATT would set the tone for using technology for learning across other nursing subjects.

> "Once we start with ICATT, I see it spreading to other subjects. Our students are very good with technology. It will be of interest to them." (Fgp: 1, 3).

Participants were hopeful that ICATT would ease the burden currently experienced at nursing campuses with regards to the shortage of facilitators for IMCI case management training.

> "I support this idea for the implementation of ICATT software. Especially with the number of facilitators available, it's a good idea that you have one facilitator facilitating a bigger group because that's the main challenge we are having at the moment." (Fgp: 4, 1).

Participants identified that the ICATT software would address the problems currently experienced at nursing campuses regarding black and white photograph booklets and videos and DVDs, which were faded and old. The videos on the ICATT software allowed learners access to clinical information that they sometimes would not see in the clinical area. This would strengthen and enhance their knowledge base, where the conventional method failed to do so.

> We also find that most of the DVDs that we were using, or video tapes, they're very old and they're not very clear, and so maybe that problem will be resolved. (Fgp: 4, 1).

> The videos in the SEE section of ICATT are interactive. One can see clinical signs that are being discussed. It allows you to views cases that you may necessarily get to see in the practical area. (Fgp: 7, 1).

> At the present moment we are using the picture books, which are not clear because they are in black and white. With ICATT, you see the pictures in colour and you are able to hear a lot of things. (Fgp: 1, 3).

Participants stressed that the ICATT is easily updated which gave both nurse educators and learners access to current information as national protocols and regimens frequently changed. Teaching and learning will not be constrained by old, outdated information which was a challenge with the paper copies of the IMCI chart booklet and modules.

> "The other advantage for example, when the learners are sick they, miss out. In this case all of the information is stored, and they can access it when they come back." (Fgp: 1, 2).

> "It is a very good learning methodology because it is easier to update new information on the computer. So, this will be an easier way to get the information updated as well as share the updated information with the students as well." (Fgp: 4, 2).

Participants commented on the fact that ICATT will be advantageous as it allows information to be stored and accessed at a later stage. This allows learners who have been away from the classroom due to illness to pick up where they left off as their profiles are stored on the ICATT software.

#### *4.3.1.3 Challenges for ICATT implementation at nursing campuses*

This section discusses the challenges for ICATT implementation at nursing campuses. Almost all of the participants were concerned about the challenges that could impact on ICATT implementation. The following three sub-themes were identified: human resources, material resources and infrastructure.

##### *4.3.1.3.1 Human resources*

Participants highlighted the human resource constraints that could hamper ICATT implementation at the nursing campuses.

> "A few lecturers are trained in ICATT so it's going to be a problem and we need to have a technician to assist us when we are running this project." (Fgp: 5, 1).

> "It's going to be okay if nurse educators are computer literate and trained on ICATT." (Fgp: 6, 1).

> "Some of our students they don't even know how to log on." (Fgp: 3, 1).

> "We have students from different levels. They are not computer literate and that's our challenge for now." (Fgp: 4, 1).

Participants reported that the challenges regarding nurse educators are twofold namely that some nurse educators are not computer literate and many nurse educators are not trained as ICATT facilitators. Participants expressed a need for information technology

support for example technicians who will be available to assist nurse educators in the classroom when ICATT is used for case management training. In addition, participants were concerned about the computer literacy skills of the learners. Some participants intimated that a few of their learners would not be able to put on a computer or log on to the relevant software programmes.

#### *4.3.1.3.2 Material resources*

Participants expressed doubt regarding the implementation of ICATT at nursing campuses for IMCI case management training. This was because there were no computers for use by learners, or not enough computers because of the number of learners. There was concern regarding the provision of computers and if computers were provided was it going to be on a one-to-one basis.

> "Are students going to be provided with computers? Are there going to be an equal number of students and computers for the course?" (Fgp: 2, 1).

> "We are really short of equipment like computers. We as lecturers don't have computers and it is worse for the students at this campus. That is our problem." (Fgp: 3, 1).

> "We don't have computers for the students." (Fgp: 3, 1).

> "Now it is not easy for the campuses to use ICATT because we are running short of computers for each learner." (Fgp: 8, 1).

Participants also expressed concern that in some campuses nurse educators did not have access to computers. This confirms that the use of ICATT cannot be implemented at some nursing campuses if nurse educators and learners do not have access to computers.

#### *4.3.1.3.3 Infrastructure*

Participants were concerned that a lack of infrastructure for example no computer laboratories could hamper ICATT implementation at nursing campuses.

> “We don’t have a computer laboratory.” (Fgp: 4, 1).

> “We have inadequate facilities in order to run the project.” (Fgp: 5, 1).

It therefore serves to reason that if nursing campuses lack infrastructure, nurse educators would see no reason to adopt or integrate ICATT into IMCI case management training.

#### *4.3.1.4 Recommendations for ICATT implementation at nursing campuses*

This section discusses the recommendations made by the participants for ICATT implementation at nursing campuses. The following three sub-themes were identified: resources, support and use of ICATT.

##### *4.3.1.4.1 Resources*

Participants indicated that ICATT could be implemented provided there was adequate infrastructure and resources.

> “Before implementation we need to ensure that we have a proper laboratory with computers, and then it can be rolled out.” (Fgp: 1, 1).

> “If you have the necessary facilities it would be easy for us to implement ICATT.” (Fgp: 5, 1).

Participants stressed the need for computer laboratories and local area networks and, access to computers and computer laboratories for learners.

##### 4.3.1.4.2 Support

The need for nurse educators to be trained and information technology support to be available was the most mentioned and discussed under recommendations.

> “We will need an information technology technician that will be in charge of the computer laboratory. He/she will ensure that the computers are in working order and are regularly serviced.” (Fgp: 1, 2).

> "Not only do we require the nurse educators that are trained in IMCI and ICATT to facilitate but, we also need computer technicians to attend to problems like computers being offline." (Fgp: 1, 2).

> "Nurse educators must be trained in ICATT, then it's going to be okay". (Fgp: 6, 1).

Participants were in agreement that in order for ICATT to be implemented successfully all nurse educators trained in IMCI are also trained in ICATT. This can be a motivating factor for ICATT implementation at nursing campuses. Similarly, participants suggested that information technology technicians must be on hand to deal with computer related problems and ensure that the computers are maintained in working order.

#### *4.3.1.4.3 Implementing ICATT*

One participant stressed the importance of standardisation that is if ICATT is implemented for IMCI case management training at one campus, it should be implemented at all campuses.

> It's also standardisation because what's done here will be done everywhere else. It's in the system." (Fgp: 1, 2).

This implies that the conventional method of IMCI case management training will no longer be used at nursing campuses. However, this will be dependent on the availability of resources at all nursing campuses.

### 4.3.2 QUALITATIVE COMPONENT RESULTS FOR NURSE EDUCATORS – POST-ICATT USE

The results presented in this section emerged from the focus group discussions conducted with the nurse educators after the use of the ICATT software using an interview schedule (Annexure P). Table 4.20 shows the master table of themes with a super-ordinate theme, themes and sub-themes.

**Table 4.20 Master table of themes: focus group interviews of nurse educators post-ICATT**

| Super-ordinate theme | Themes | Sub-themes |
|---|---|---|
| Nurse educator perceptions related to the use of ICATT | Technological characteristics of the ICATT software | • Use with ease<br>• Clear directions<br>• Moving between sections<br>• Use of keyboard<br>• Software application<br>• Problems encountered |
| | Usefulness of ICATT for nursing campuses | • Improving facilitation<br>• Addressing the challenges |
| | Advantages for nurse educators | • Software<br>• Economical<br>• Facilitation<br>• Learner behaviour |
| | Role of ICATT | • Teaching<br>• Learning |
| | Challenges at nursing campuses regarding the use of ICATT | • Financial resources<br>• Human resources<br>• Infrastructure<br>• Material resources |
| | Recommendations regarding the use of ICATT | • Finances<br>• Infrastructure and support systems<br>• Nurse educators<br>• ICATT |

A detailed narrative was provided by the participants of their experience of using ICATT. The super-ordinate theme based on the focus group interviews was the nurse educators' understanding related to the use of the ICATT software. The six themes were developed from the questions contained in the interview schedule. The themes and numerous sub-themes are discussed in detail below. The results are presented using quotations from the transcripts which support the discussions of the themes (Sandy & Shaw 2012:67).

#### *4.3.2.1 Technological characteristics of the ICATT software*

This section discusses the characteristics of this new technology and how it is perceived by the participants, as shown in Table 4.20. Almost all the participants were seeing and or using the ICATT software for the first time. It is evident from the narrative that participants have identified ICATT as an innovative teaching strategy for IMCI case management training. In general, all the participants reported that their encounter with

the software was favourable and highlighted the positive characteristics of the software. Participants indicated that it was user-friendly, exciting and interesting, and the software further allowed for users to work at their own pace. They acknowledged that the software allowed them to make corrections when working on it and appreciated that they had easy access to pictures and videos. Participants claimed that using the software could save time during IMCI case management training.

> "Yes, it was interesting. It is a big innovation for teaching and learning at the nursing campuses. It isn't time consuming." (Fgp: 2, 1).

> "It was very easy to use. It was exciting. I didn't feel that I was bored. It's also good, if I'm a slow learner as it gives me time to catch up on the information before moving on to the next step." (Fgp: 4, 1).

> "What's good about it is that you, you go at your own pace. You go back, you can go forward, and you can correct whatever mistake you make. That's what makes me happy. It was very easy." (Fgp: 5, 1).

> "You can access the pictures and the videos and you can do this without any assistance. It is hassle free and it's time efficient." (Fgp: 8, 1).

The results from this study with regards to the positive perceptions of the participants toward the ICATT software can hasten its implementation at all the nursing colleges, for IMCI case management training.

*4.3.2.1.1 Use with ease*

The ability to use the software with ease was the most mentioned theme under technological characteristics.

> "It's easy to use. Actually, it is interesting. It's nice that you can even take it home." (Fgp: 1, 1).

> "It's quick, it saves time and you gain confidence with what you are doing. It's super." (Fgp: 4, 1).

> "I think it's very easy to use. It is definitely something that will keep the student's attention and keep them wanting more of it, because that's how I felt when I used it. You wanted to see what's next." (Fgp: 8, 1).

Many of the participants reported that the software was easy to use. Participants favoured the instructions or guidelines on the software, which contributed to making it easy to use. Participants reinforced the fact that the software was "interesting" and "easy and doable," which contributed to their keenness in using and exploring the different parts of the software. One participant expressed their appreciation for the portability of the software that is it can be taken home, in other words, it is easy to carry.

#### *4.3.2.1.2 Clear directions*

The majority of the participants indicated that the directions on the software were clear and easy to follow.

> "The directions are clear because at the top there are sections of topics, sub-topics that you needed to double click on. You then access these areas and the instructions guide you on moving forwards and back." (Fgp: 2, 2).

> "What an encounter! Firstly, it was so easy to follow the directions. It was a good experience for me. You don't need specialised skills." (Fgp: 5, 1).

> "I find that with the directions, so long as there is a person or some guidance then there will be no problem." (Fgp 1; 1).

They further indicated that the different aspects of IMCI, for example, the sick child and young infant were visible at the top of the page, with easy to understand instructions on how to access the information. Participants were reassured by the fact that no specialised skills were required to use the software and access the relevant information. It was asserted that the learners too would find the directions simple to follow. However, one participant indicated that the support of a facilitator is required to ensure that the directions are understood and followed. These findings confirm that participants have found the directions on the software to be clear, and that this could further be a motivating factor in the adoption of ICATT for IMCI case management training.

*4.3.2.1.3 Moving between sections*

Participants reported that moving or navigating between the different sections in the ICATT software was easy. They also indicated that the colour coded READ, SEE, PRACTICE and TEST sections in the drop-down boxed would make it easy for learners to use. The highlighted areas also provide learners with indicators of what is important in respect of the content.

> "The colour coding because of that drop-down box on your left makes it easy for you to navigate all the areas." (Fgp: 1, 1).

> "I like the use of the different colours denoting different things whether to read, see or do the tests. The highlighted things were very good so that the student knows that these were important things to remember." (Fgp: 4, 1).

> "I think it's easy once you get used to it." (Fgp: 7, 1).

Participants suggested that the ease with which they moved between sections could save time, and in actual fact was quicker to use than the conventional method that consisted of modules that learners read through. One participant added that it would get easier to use with time, as they familiarised themselves with the software.

4.3.2.1.4 Using the keyboard

In general, most of the participants were able to use the keyboard and considered it simple and easy to use.

> "I think it was basic typing skills, and if you can use a cell phone you can type on the keyboard." (Fgp: 4, 1).

> "The directions are simple and I think in terms of challenges with computer literacy, at this stage of our lives, most people are computer literate. They will be able to type at least a few words." (Fgp: 8, 2).

> "It was okay for us the nurse educators who have a personal computer. However, it may be a problem for the person who is not computer literate, as with students who have never used computers before." (Fgp: 7, 2).

> “It was not easy to type because when you press enter to go to the next paragraph, in the software, you continue typing in the same line.” (Fgp: 1, 2).

It was asserted that all computer keyboards are the same so there should be no problem with using the keyboard. Similarly, if one is able to type on a cellular phone then using the keyboard should not be problematic. One participant indicated that today most people are computer literate and should be able to use the keyboard to complete tasks. However, one participant expressed that although nurse educators are computer literate and have their own computers, this may not be true for learners who are not computer literate and do not have access to computers. Hence, the use of the keyboard may be challenging for learners who have never used a computer keyboard. This reinforced the statement of the one participant who highlighted that typing in the text box was problematic.

*4.3.2.1.5 Software applications*

The ICATT software applications include a computerised version of the chart booklet and a library with reference and educational materials and local reference documents, photographs and videos. Participants identified that the software applications were easy to access by “just clicking.” They were intrigued that they could also access different aspects of IMCI very easily and that there were links to additional information that could be accessed whenever the need arose. Participants appreciated that the software contained drop down boxes that allowed them to view the different IMCI modules, so that they could decide how to proceed. They enjoyed being able to visualise the colour pictures contained within the software, which they claimed facilitated learning.

> “The drop-down menu and applications were just easy to follow. They appear quickly after clicking.” (Fgp: 5, 2).

> “I like the systematic way in which everything is arranged in the software. The software has incorporated statistics and additional information on which you can read more about.” (Fgp: 1, 3).

> “It’s wonderful how this is made. What I like is that you can view whatever is in the content, as it contains a drop-down index.” (Fgp: 5, 2).

The findings from this study reflect that the participants find the software both user-friendly and interactive and have expressed satisfaction with the usage of software.

#### *4.3.2.1.6 Problems encountered*

The participants reported that no problems were experienced with the use of the ICATT software. Participants were in agreement that the software was easy to use and it was therefore unlikely that they would have encountered any problems. Participants indicated that if the instructions or guidelines are followed, problems with the software are unlikely.

> "I didn't have any problem. It was easy, everything was just easy. It just requires practice." (Fgp: 3, 2).

> "There is no challenge, because the software is already put on the computer and you just have to follow instructions." (Fgp: 4, 1).

Although participants in this study held the view that no problems were experienced whilst using the software, technology can be temperamental, and it is likely that sometime in the future challenges may be encountered.

### *4.3.2.2 Usefulness of the ICATT software*

One of the emergent themes from the focus group interviews with the participants is the usefulness of the ICATT software. Computer-based learning, and in particular ICATT has never been used for training purposes by the nursing campuses before. It was therefore important to ascertain whether the participants after using the ICATT software for the first time, would find it useful for IMCI case management training in the future.

> "It will be useful in our setting as nurse educators." (Fgp: 1, 4).

> "I think it will be very helpful because we've had a lot of problems with facilitating IMCI in the conventional manner. We couldn't find solutions to the problems. ICATT can be the solution because our students are technologically savvy." (Fgp: 1, 4).

All the participants confirmed that using ICATT would be useful at the nursing campuses. Participants indicated that using ICATT would be useful for both nurse educators and

learners. It was suggested that using ICATT for IMCI case management training would resolve some of the problems currently being experienced with the conventional manner of IMCI case management training. One participant suggested that it would be useful to start using ICATT as learners are technologically ready for it. The view of the participants on the 'perceived usefulness' can ensure a positive attitude towards the use of technology and a stronger likelihood that technology would be implemented and used for training purposes.

#### *4.3.2.2.1 Improving facilitation*

The discussions were focused on how useful ICATT would be for the facilitation of IMCI case management training.

> "It's going to be very easy to implement if only one facilitator is required. However, there must an adequate number of computers for all the learners." (Fgp: 2, 2).

> "It will be useful as it saves time and you are able to teach as many students as possible. The students will be able to gain knowledge, skills and aptitude and I think they will be very excited when they use the computer." (Fgp: 3, 3).

> "The cartoons although childlike, make learning a fun activity." (Fgp: 8, 5).

Participants suggested that ICATT would be useful for facilitation as it is simple and easy to use. The number of facilitators required for the conventional manner of IMCI case management training could put a strain on human resources at the nursing campuses. Participants therefore indicated that ICATT implementation would be useful as fewer facilitators are required. Participants also claimed that ICATT would be useful as it saves time, and more learners could be trained in a shorter period of time. ICATT can be the stimulus for adopting computer-based learning which will further enhance the knowledge, skills and aptitude of learners. Learning could also take place in a more creative manner as the ICATT software contains comic style cartoons. ICATT will be useful in changing the modes of teaching from the lecture method where the nurse educators do all the talking, to learners becoming actively engaged in their own learning.

#### *4.3.2.2.2 Addressing the challenges*

The presence of numerous barriers or challenges to the conventional IMCI case management training has acted as the spring-board to exploring alternative training methods. The implementation of ICATT, an innovative software technology can be useful in these cases.

> "In my campus it can be implemented because we've got the place for students to sit with their computers. However, only if computers are available for all students then we will be relieved from teaching for 10 days." (Fgp: 1, 3).

> "Using ICATT will be very useful because unlike the conventional manner of training you cannot skip a page, it cannot go missing, it cannot be torn and the module will not be missing sections." (Fgp: 5, 3).

> "Another problem with the conventional manner of training is we need so many chart booklets and modules for the students, which tend to get torn, and you don't have all the information. ICATT will address this problem." (Fgp: 4, 2).

One participant indicated that space is available for computer laboratories, and once computers are available, then ICATT can be implemented. It was also felt that it would not be necessary to conduct IMCI case management training for 10 days. Participants indicated that there are challenges with the chart booklets and modules, for example, torn pages, lost modules and booklets and missing sections from the modules. It would therefore be more useful and economical to implement ICATT for IMCI case management training as the software contains modules, chart booklets and photographs.

#### *4.3.2.3 Advantages for nurse educators*

Using ICATT instead of continuing with the conventional method of IMCI case management training can be advantageous for nurse educators. It can certainly play a pivotal role in ensuring that ICATT implementation takes place successfully at nursing campuses. Embedded within this theme of how ICATT can be advantageous for the nurse educators is discussed further in respect of the software design, how economical it can be, it's role in facilitation and the impact its implementation will have on the learners.

##### *4.3.2.3.1 Software*

The interactive, innovative design of the ICATT software contains all the aspects of IMCI necessary for training in an electronic format. This varies from the conventional method of IMCI case management training as the training package is made up of hard copies of chart booklets, modules and picture books and DVDs.

> "The videos convey messages of for example clinical practice scenarios without leaving important information out." (Fgp: 1, 4).

> "At the end of the IMCI training there is no need for nurse educators to set a test for the learners. The ICATT software contains a pre-set TEST after every section." (Fgp: 6, 3).

> "ICATT stores learner profiles thereby allowing learners to work at their own pace and catch-up any sections they have missed if they were absent, Nurse educators do not need to set aside time to do the catch-up". (Fgp: 1, 5).

> "Nurse educators do not need to spent time preparing for IMCI training by getting the chart booklets printed& be concerned about storage space. With ICATT it's just a computer and a data stick which you put into your pocket." (Fgp: 8, 3-4).

Participants indicated that the electronic format of IMCI is user friendly and easily accessible because the videos and tests are included within the software. The organisation of the different modules within the software is organised in a sequential manner which makes it difficult for information to be left out when nurse educators are conducting training. Participants indicated that the use of ICATT can be time-saving for nurse educators as formative and summative tests are included in the software, obviating the need for nurse educators to set tests on an on- going basis. Similarly, learners' profiles are saved on the software and book marked allowing them to access stored information and return to the point they were last at. This prevents learners from interrupting nurse educators who are facilitating. Participants appreciated that the electronic version of IMCI can be easily stored on a data stick, making it portable and easily accessible for the nurse educators and there is no longer the need for printing and storing paper copies on an on-going basis

#### *4.3.2.3.2 Economical*

The participants were eager to express their views regarding whether the adoption of ICATT would be economical for the nursing campuses.

> "Time saving and economical use of resources as there is no need to print and reprint modules." (Fgp: 2, 3).

> "Hard copies are very difficult to compile so it's going to be economical." (Fgp: 6, 3).

Participants indicated that the use of the software is economical from a time, cost and resource perspective. Participants indicated that the software design is quicker to work through and it is therefore possible to conduct training over a shorter period of time. The transition from a paper-based system to a paperless one saves costs as there is no need to print modules and chart booklets which are usually undertaken at great cost to the nursing campuses. Participants claimed that it is usually the domain of the nurse educators to oversee printing and compilation of modules, so adopting ICATT saves time and effort on the part of the nurse educators.

#### *4.3.2.3.3 Facilitation*

According to the participants, the advantages of using ICATT were greatest where facilitation was concerned.

> "The fact that we don't need many facilitators as compared to the conventional IMCI case management training. Previously we were concerned about the facilitator: learner ratio of one is to six." (Fgp:7, 4).

> "As facilitators we will only be guiding some of the learners, whilst other learners actively engage with the software on their own." (Fgp: 2, 3).

> "The ICATT software allows the facilitator to do many tasks at once: give information, in the READ section, test the knowledge gained in the PRACTICE section and evaluate in the TEST section." (Fgp: 3, 3).

> “The process is easier to facilitate. It’s less preparation. And the lecturer does not need to be in the classroom all of the time.” (Fgp: 8, 3).

Participants believed IMCI facilitation using ICATT was going to introduce a new dynamic to IMCI case management training. Their previous concerns regarding the ratio of facilitators to learners in the conventional method could be addressed positively through using ICATT. Fewer facilitators were required which meant that it was possible for nurse educators to either have some time off from facilitating IMCI or redirect their time to engaging in other duties. Participants also indicated that the role of the facilitator would change from being actively involved in facilitation to supervising and overseeing learners as they actively engaged with the software. Participants expressed enthusiasm that they were able to oversee the progress of the learners on the software through the practice and test sections without too much effort. Participants claimed that less preparation was required in facilitation, it was easier to facilitate, and there was no need to spend all their time in the classroom. The findings of this study have highlighted the value that participants see in ICATT especially in the context of facilitation and learning.

#### *4.3.2.3.4 Behaviour of learners*

Participants commented that by nurse educators using ICATT, it also impacted positively on the way learners learning behaviour changed. Participants suggested that learners could change from being passive recipients of information, to being self-directed learners. Participants also claimed that learners would also become more independent as they sought out information on the computer on their own and would be more interested in engaging with the content, as they became confident with the use of the software. This could lessen their dependence on nurse educators which would be advantageous for nurse educators. Participants believed today’s learners are more technology driven and would benefit from the use of computers as it stimulates their interest in the subject matter. The responsibility of teaching learners’ new content will no longer be the sole responsibility of nurse educators or facilitators, but learners can take responsibility for this process as well.

> “It’s a new and innovative process which is a conducive medium for learning for the young learners because they are used to the computers. I think it will capture their interest more than looking at and paging through books.” (Fgp: 7, 3).

> "It stimulates interest amongst the students because they gain more knowledge and also develop their skills on the computer." (Fgp: 3, 3).

It is evident from the findings of this study that the nurse educators have taken cognisance of the learner and the needs of the learner when exploring the advantages of using ICATT and its implementation.

#### *4.3.2.4 Role of ICATT*

According to the participants in this study, ICATT has a definite role to play in IMCI case management training. Participants were in agreement that ICATT has a role to play in IMCI case management training at the nursing campuses. The role that ICATT can play is not limited to just nurse educators but extends to learners as well. It must be reiterated that the implementation of ICATT at nursing campuses can set the trend for e-learning or computer-based learning to finally be introduced at the said institutions of higher learning for the benefit of teaching and learning.

##### *4.3.2.4.1 Teaching*

Participants believed implementing ICATT at nursing campuses for IMCI case management training provides an opportunity for not only the training of learners but also of other nurse educators. There was no need for nurse educators to await training from the local district office, or to leave the nursing campuses for long periods of time to access training outside. Nurse educators that have been trained in ICATT can facilitate training for their peers.

> "Nurse educators trained in ICATT can facilitate IMCI training for other nurse educators using ICATT. IMCI training does not have to be delayed due to the unavailability of district trainers." (Fgp: 1, 5).

> "The implementation of ICATT helps nurse educators become more skilled in using new methods and equipment for teaching and learning." (Fgp: 1, 6).

> "The use of the ICATT software can be adapted forother subjects like HIV and family planning. ICATT is setting a trend." (Fgp: 6, 3).

> "Yes, there'd be standardised teaching. All students would be exposed to the same quality, the same information and they can work through it on their own." (Fgp: 8, 6).

Participants acknowledged that the use of ICATT could strengthen their knowledge on new methods of facilitation and further develop their computer skills. It also served as the impetus for using technology across other disciplines in nursing, for example HIV training. Participants highlighted an important fact that ICATT can standardise the teaching of IMCI across all nursing campuses, with learners being the recipients of high quality, current information.

#### *4.3.2.4.2 Learning*

ICATT can play a positive role in learning, a theme that was repeated many times by the participants. It was evident from the interviews that participants felt it was time for technology to be introduced in the nursing campuses. Participants suggested that learners are aware of technology and are using it in everyday life, so ICATT will be welcomed for learning purposes. Participants claimed that learners would align themselves to tertiary level students at universities who are already using computers for learning which can ultimately be a motivating factor for learning.

> "ICATT is exciting and when it comes to any form of technology these students like it. They are always engaged with a form of technology whether it is cellular phones or computers." (Fgp: 3, 6).

> "Not just tertiary based universities will know what it is to use computers but so will the nursing campuses when we start implementing it. The learners will also feel they are tertiary students." (Fgp: 4, 3).

> "Yes, they can go back and work on their own. They can even do follow up on their own and revision at their own pace." (Fgp: 6, 3).

> "It's a mixture of visual and auditory skills, whereas when you're reading from the manual it's just visual. ICATT has videos and pictures which makes learning fun." (Fgp: 8, 4).

> "You can go back and you can go forward and if you click on the wrong response it corrects you. So there's interaction. Whereas if you're reading, it's just flat reading." (Fgp: 8, 5).

Participants acknowledged that ICATT can enhance learning in a variety of ways for learners namely: (1) increased accessibility to IMCI information which they can practice at any time; (2) the opportunity to work independently at one's own pace; and (3) the stimulating, interactive software which will capture their interest and further engage them in learning activities, which are in direct opposition to the conventional method of IMCI case management training.The participants in this study expressed strong views that ICATT can provide all of the aforementioned for the learners at the nursing campuses, if implemented.

#### *4.3.2.5 Challenges at the nursing campuses regarding the use of ICATT*

According to the participants in this study, challenges do exist that can impact on the adoption of e-learning at nursing campuses and ultimately the use of ICATT for IMCI case management training. The challenges that were identified were the lack of financial and human resources, and infrastructure and material constraints.

##### *4.3.2.5.1 Lack of financial resources*

Participants were aware that the lack of financial resources has a negative impact on teaching and learning at the nursing campuses.

> "We would love this to be known by the management so that they can start budgeting for the computers in our institutions." (Fgp: 2, 3).

Participants expressed concern that there is no money for the purchase of computers. Participants acknowledged that a lack of funding could obstruct ICATT implementation. They further acknowledged that the management should be aware of this and should budget for the computers.

##### *4.3.2.5.2 Human resource constraints*

Participants identified the following groups, namely nurse educators, learners and support staff when considering human resource constraints.

> "I will find the use of ICATT frightening for me because I have always used the older, conventional method." (Fgp: 2, 4).

> "We have more than 30 learners in each group." (Fgp: 6, 5).

> "The unavailability of a computer technician who will be able to assist with the maintenance and functioning of the computers". (Fgp: 5, 5).

> "Many of the nurse educators lack computer skills which remain a challenge and not all of us have done training in ICATT." (Fgp: 7, 5).

Participants claimed that some learners and nurse educators were not computer literate and would be at a disadvantage in terms of using ICATT. There are also nurse educators who have not received training in the use of ICATT. One participant suggested that using the conventional method was a comfort zone as there was a fear of using technology. Participants also indicated that large groups of more than 30 learners could be a challenge as there would not be enough computers for use. Participants claimed that nursing campuses do not have access to computer technicians who would maintain the computers.

#### *4.3.2.5.3 Infrastructural constraints*

A few participants were concerned about the impact of the interruption of power when using e-learning or computer-based learning.

> "Power cuts would be another challenge." (Fgp: 2, 4).

> "Facilities like a computer laboratory are not yet available." (Fgp: 6, 5).

The participants also indicated that their nursing campuses did not have computer laboratories or any available space which can be set up to use computer-based learning, ICATT.

#### *4.3.2.5.4 Material resource constraints*

Participants acknowledged that the lack of computers was an obvious issue that could hamper ICATT implementation. There are nursing campuses which either have few or no computers for learners to use.

> "There are campuses that I don't think will be able to supply all the learners with equipment." (Fgp: 1, 7).

> "We have a shortage of computers." (Fgp: 7, 5).

The views of the participants in this study have highlighted that the nursing campuses are experiencing similar challenges and that they too are resources constrained.

### ***4.3.2.6 Recommendations regarding the use of ICATT***

According to the participants in this study, some recommendations have been made in an effort to motivate for ICATT use. Participants suggested recommendations that could motivate and strengthen the use of ICATT.

#### *4.3.2.6.1 Finances*

Financial resources play an important role in supporting and sustaining e-learning.

> "We recommend that the budget must consider all the resources that are required for ICATT implementation." (Fgp: 3, 7).

> "I don't know whether the IMCI champions, principals, district managers can intervene in terms of finance and are aware of how effective this method is, if they can be brought on board I think really they can see how wonderful this method is and they can do something about it." (Fgp: 5, 5).

Participants suggested that management must be informed about ICATT so as to set aside funding for its implementation. Participants indicated the budget should be substantial enough to support human and material resources. Participants stressed that

outside funders have a role to play in supporting ICATT implementation at nursing campuses.

#### *4.3.2.6.2 Infrastructure and support systems*

The successful implementation of ICATT is dependent on the availability of computers and other infrastructure.

> "We need computers." (Fgp: 1, 8).

> "Our managers need to identify the space where they are going to place the laboratory for our students. Our campus is small and we need more buildings before we talk about the computers so we can accommodate our students depending on our intake of more students." (Fgp: 3, 7).

> "We need a computer technician who knows about computers." (Fgp: 1, 8).

Participants stressed the need for computers and local area networks that can support the use of the intranet and internet. Participants suggested that the individuals in authority need to be considerate of the number of learners and the size of the computer laboratories, so that all learners are comfortably accommodated.

#### *4.3.2.6.3 Nurse educators*

The training of nurse educators in ICATT facilitation is a priority area if nursing campuses adopt this method for case management training.

> "It's a good intervention, but nurse educators need training." (Fgp: 2, 5).

> "We need to be trained so that we are able to facilitate IMCI using ICATT." (Fgp: 4, 4).

Participants were of the opinion that there is an urgent need for nurse educators to be trained as soon as possible. They also indicated that there was a need for more facilitators at the nursing campuses. Participants suggested that all nurse educators should have basic computer skills or be computer literate.

#### *4.3.2.6.4 ICATT*

In light of the various challenges that face IMCI case management training at nursing campuses, ICATT implementation can contribute to the success of pre-service training for learners at these nursing campuses.

> "I think if we're looking at prevention and reducing mortality and morbidity in our children under five years of age we have to start with IMCI training using ICATT. So, I think if they realise the importance of it, the sooner we start and the better for everyone." (Fgp: 4, 4).

> "It has to be implemented as soon as possible because if you look at the students that go out into the clinic after doing IMCI, not all of them feel confident. I think this will build their confidence." (Fgp: 4, 5).

Participants called for the use of ICATT as soon as possible. Participants acknowledged that IMCI and ICATT have a vital role to play in child health and this should not be overlooked, hence the need to use ICATT for training purposes. Participants claimed that the use of ICATT could contribute to learners becoming more confident about the use of IMCI in clinical practice.

### 4.3.3 QUANTITATIVE COMPONENT RESULTS FOR NURSE EDUCATORS

#### ***4.3.3.1 Response rate***

In total, 42 questionnaires were despatched and 35 were returned which provided an 83% response rate.

The response rate for the nurse educators is reflected in Table 4.21 below. The names of the campuses from which the sample was drawn is not included in Table 4.21 for confidentiality purposes.

**Table 4.21 Response rate for nurse educators**

| Campus | Despatched | Returned | Percentage |
|---|---|---|---|
| A | 5 | 3 | 7.1 |
| B | 4 | 4 | 9.5 |
| C | 4 | 3 | 7.1 |
| D | 3 | 3 | 7.1 |
| E | 3 | 3 | 7.1 |
| F | 3 | 3 | 7.1 |
| G | 4 | 3 | 7.1 |
| H | 7 | 5 | 12 |
| I | 4 | 4 | 9.5 |
| J | 5 | 4 | 9.5 |
| **Total** | **42** | **35** | **83.0** |

There was a fairly even spread of participants from across the campuses. The number of nurse educators from which the sample was drawn is shown in Table 4.21. The good response rate could possibly be due to the fact that the nurse educators trained in IMCI are interested in the use of the ICATT software for IMCI case management training. The participants may also be aware that ICATT implementation could change the way in which IMCI case management training is conducted in nursing campuses.

#### *4.3.3.2 Results*

The results are presented under the following headings: - demographic data, human resources, information and communication technologies for teaching and learning, technology assessment, challenges and benefits and use of the ICATT software.

##### *4.3.3.2.1 Demographic data*

The demographic data of the research participants is presented in this section. The age, gender, the number of years working as a nurse educator and the type of nurse training offered at the institution are included in this section. Table 4.22 presents the overall gender distribution by age of the participants.

**Table 4.22 Gender distribution by age of nurse educators (n=35)**

| Gender distribution | | | Gender | | Total |
|---|---|---|---|---|---|
| | | | Female | Male | |
| Age | 21–30 | Count | 1 | 0 | 1 |
| | | % within Age | 100.0% | 0.0% | 100.0% |
| | | % within Gender | 3.0% | 0.0% | 2.9% |
| | | % of Total | 2.9% | 0.0% | 2.9% |
| | 31–40 | Count | 0 | 2 | 2 |
| | | % within Age | 0.0% | 100.0% | 100.0% |
| | | % within Gender | 0.0% | 100.0% | 5.7% |
| | | % of Total | 0.0% | 5.7% | 5.7% |
| | 41–50 | Count | 16 | 0 | 16 |
| | | % within Age | 100.0% | 0.0% | 100.0% |
| | | % within Gender | 48.5% | 0.0% | 45.7% |
| | | % of Total | 45.7% | 0.0% | 45.7% |
| | 51–60 | Count | 16 | 0 | 16 |
| | | % within Age | 100.0% | 0.0% | 100.0% |
| | | % within Gender | 48.5% | 0.0% | 45.7% |
| | | % of Total | 45.7% | 0.0% | 45.7% |
| Total | | Count | 33 | 2 | 35 |
| | | % within Age | 94.3% | 5.7% | 100.0% |
| | | % within Gender | 100.0% | 100.0% | 100.0% |
| | | % of Total | 94.3% | 5.7% | 100.0% |

Table 4.22 shows that the majority of nurse educators trained in IMCI are female. Overall, the ratio of males to females in this study is approximately 1:19 (5.7%: 94.3%). In addition, Table 4.22 shows the age distribution of the nurse educators trained in IMCI. Only three (8.6%) nurse educators trained in IMCI fell into the age category of between 21 years and 40 years. The majority of the participants (91.4%) were between the ages of 41 years and 60 years

Figure 4.3 indicates the number of years the participants have worked as a nurse educator.

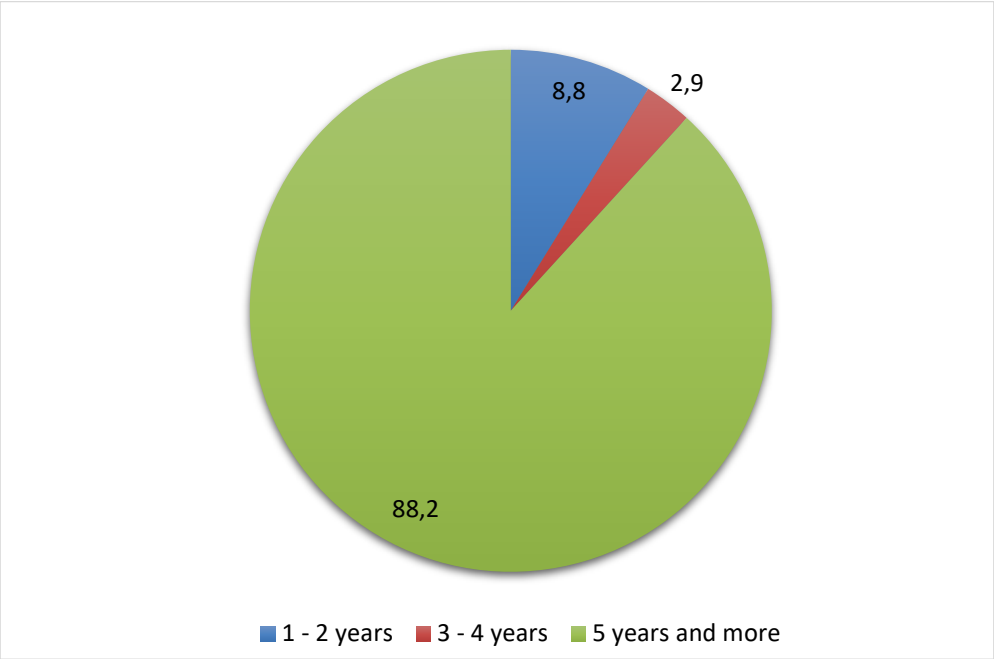


**Figure 4.3 Number of years as a nurse educator (n=35)**

The majority of nurse educators trained in IMCI (88.2%) had been in nursing education for more than 5 years. A small percentage (8.8%) of the nurse educators trained in IMCI had between one to two years of experience as a nurse educator. An even smaller percentage (2.9%) had between three to four years' experience. This is a useful statistic as it indicates that a large number of the nurse educators trained in IMCI have many years of work experience and that the responses gathered would be from an informed or experienced source. The consistency of the reporting is also seen in the high reliability scores obtained.

Table 4.23 presents the responses from the nurse educators trained in IMCI pertaining to the type of nurse training that is offered at the nursing campuses.

**Table 4.23 Type of nurse training offered at the nursing campuses (n=35)**

| Campus | Number of nurse educators | R425 | R2175 | R48 | R254 | R683 | R880 |
|---|---|---|---|---|---|---|---|
| A | 3 | Yes | Yes | | Yes | Yes | |
| B | 4 | Yes | | | Yes | | |
| C | 3 | Yes | Yes | | Yes | Yes | |
| D | 3 | Yes | | | Yes | Yes | Yes |
| E | 3 | Yes | | | Yes | | |
| F | 3 | Yes | | | Yes | | |
| G | 3 | Yes | Yes | | Yes | Yes | |
| H | 5 | Yes | Yes | Yes | Yes | | |
| I | 4 | Yes | | | | | |
| J | 4 | Yes | | | | Yes | |
| **Total** | **35** | | | | | | |

The type of nurse training that is offered at the nursing campuses is shown in Table 4.23. All the nursing campuses in KwaZulu-Natal offer a variety of training programmes as indicated by the nurse educators trained in IMCI. All of the nurse educators indicated that R425 was offered at their nursing campuses. The focus of this study is on learners currently undergoing nurse training in the R425 course. However, considering that many of the nursing campuses offer a variety of nurse training programmes, it makes sense to assume that the nurse educators trained in IMCI are engaged in teaching in some, if not all of the training programmes mentioned in Table 4.23.

*4.3.3.2.2 Findings related to the readiness of nurse educators for ICATT implementation*

This section explains findings relating to the readiness of the nurse educators for the implementation of ICATT.

- **Human resources**

Table 4.24 indicates the responses from the participants regarding the number of nurse educators trained in IMCI at the nursing campuses and, the number of nurse educators trained in IMCI currently facilitating IMCI case management training at the same nursing campuses.

**Table 4.24 The number of nurse educators trained in IMCI at the nursing campuses, and the number of nurse educators trained in IMCI currently facilitating IMCI case management training at the nursing campuses (n=35)**

| **Nurse educators trained in IMCI and involved in facilitation at nursing campuses** | **Number of nurse educators trained in IMCI in the nursing campus** | | | | |
|---|---|---|---|---|---|
| Number of nurse educators trained in IMCI and currently facilitating IMCI case management training for learners at nursing campuses | | **3-4** | **5-6** | **> 6** | **Total** |
| | 1-2 | 3 | | | 3 |
| | 3-4 | 6 | 11 | 3 | 20 |
| | 5-6 | | | 5 | 5 |
| | > 6 | | | 7 | 7 |
| | **Total** | **9** | **11** | **15** | **35** |

As shown in Table 4.24, eleven of the participants indicated that they had between five to six nurse educators that were trained in IMCI at their nursing campuses. Fifteen participants indicated that they had more than six nurse educators that were trained in IMCI at their nursing campuses. Only nine of the participants indicated that they had between three to four nurse educators that were trained in IMCI at their nursing campuses. It is therefore evident that nurse educators have received training in IMCI case management.

Table 4.24 also indicates that not all nurse educators trained in IMCI are engaged in facilitating IMCI case management training. Of the 15 participants that indicated that, more than six nurse educators are trained in IMCI in their campuses, eight indicated that fewer than six are facilitating IMCI case management training for learners. Similarly, 11 participants indicated that although between five and six nurse educators were trained in IMCI, only three to four were facilitating IMCI case management training for learners at the nursing campuses. It is concerning that in some campuses that have three to four nurse educators trained in IMCI, only one to two nurse educators are facilitating IMCI case management training for learners. It is not known why all nurse educators trained in IMCI are not actively teaching IMCI case management training. It can lead to a shortage of nurse educators trained in IMCI.

Table 4.25 presents the responses from nurse educators trained in IMCI regarding the IMCI case management training at the nursing campuses.

**Table 4.25 The IMCI case management training at the nursing campuses(n=35)**

| IMCI case management training at nursing campuses | Disagree | | Neutral | | Agree | | Total |
|---|---|---|---|---|---|---|---|
| | Count | Row n % | Count | Row n % | Count | Row n % | |
| There are adequate number of IMCI-trained educators, in respect of educator-learner ratios for case management training | 22 | 62.9% | 4 | 11.4% | 9 | 25.7% | 35 |
| I would be willing to attend ICATT training, to improve IMCI case management training at this institution | 1 | 3% | 5 | 14% | 29 | 83% | 35 |

All the nurse educators trained in IMCI responded to the statement pertaining to educator-learner ratios and their willingness to attend ICATT training to facilitate and improve IMCI case management training. As shown in Table 4.25, nearly two thirds of the participants indicated that the number of nurse educators trained in IMCI were inadequate in respect of the educator to learner ratios. These findings contradict the findings of the campus principals (Table 4.6) who indicated that there were an adequate number of nurse educators trained in IMCI in respect of the educator to learner ratios. This suggests that the nurse educators trained in IMCI are aware of the recommendations of the WHO. Over 80% of the nurse educators trained in IMCI were willing to attend ICATT training. Training in ICATT can motivate the nurse educators trained in IMCI to use ICATT for IMCI case management training. There is therfore a need for all IMCI trained nurse educators to be trained in ICATT use prior to ICATT implementation.

The chi-square test of independence is used in the analysis of nominal data to determine significant differences between observed frequencies within the data and frequencies that were expected (Grove et al 2013:688). To determine whether the scoring patterns per statement were significantly different per option, a chi-square test was done. Table 4.26 indicates the chi-square test for educator: learner ratios and ICATT training.

**Table 4.26 Chi-square test for educator learner ratios and ICATT training**

**Test Statistics**

| | There are adequate number of IMCI-trained educators, in respect of educator-learner ratios for case management training | I would be willing to attend ICATT training, to improve IMCI case management training at this institution |
|---|---|---|
| Chi-Square | 14.800[a] | 26.133[b] |
| Df | 2 | 1 |
| Asymp. Sig. | .001 | .000 |

a. 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 11.7.

b. 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 15.0.

Table 4.26 indicates a statistically significant difference in the responses to each of the two statements tested. This indicates a significant difference in the number of educators who agreed, disagreed or were neutral on these statements. A greater number of respondents disagreed that that there are adequate numbers of nurse educators trained in IMCI in respect of educator-learner ratios, than the number of respondents that agreed. Similarly, a greater number of respondents agreed that they would be prepared to attend ICATT training than the respondents that disagreed.

- **Information and communication technologies for teaching and learning**

Figure 4.4 presents the responses of the participants regarding whether the nursing campuses offer nurse educators access to the intranet and internet search facilities for teaching and learning.

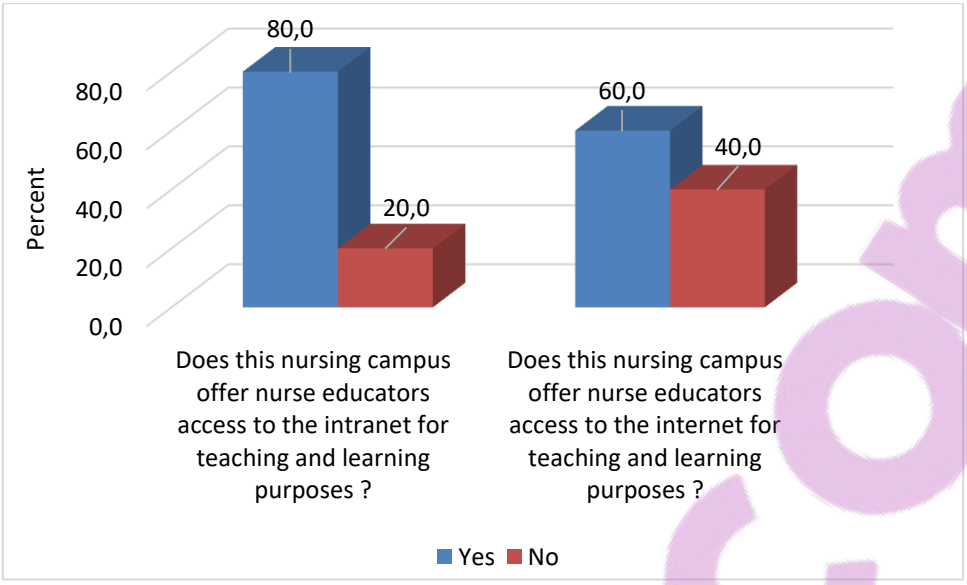


**Figure 4.4 Access to intranet and internet search facilities for nurse educators (n=35)**

Figure 4.4 shows that more IMCI trained nurse educators answered postively that their nursing campuses offered intranet and internet search facilities. Figure 4.4 also indicates that although 80% of the nurse educators trained in IMCI responded that their nursing campuses offered them access to intranet, only 60% nurse educators trained in IMCI responded that their nursing campuses offered them access to the internet. It is an area of concern that limited access to the intranet and internet at nursing campuses (as shown in Figure 4.4) can impact negatively on the use of ICATT which has been adapted to run on intranet and internet sites thereby facilitating training.

Table 4.27 presents the responses of the nurse educators trained in IMCI regarding the importance of having access to and using technology for teaching and learning purposes.

**Table 4.27 The importance of access to search facilities and use of technology for teaching and learning by nurse educators (n=35)**

| The importance of access to search facilities and use of technology for teaching and learning | Disagree | | Neutral | | Agree | | Total |
|---|---|---|---|---|---|---|---|
| | Count | Row n % | Count | Row n % | Count | Row n % | |
| It is important for nurse educators to have access to the intranet search facilities to keep abreast of the latest developments in health care and teaching practices | 2 | 5.7% | 0 | 0.0% | 33 | 94.3% | 35 |
| It is important for nurse educators to have access to the internet search facilities to keep abreast of the latest developments in health care and teaching practices | 2 | 5.7% | 0 | 0.0% | 33 | 94.3% | 35 |
| It is important to incorporate new technologies (computer-based) for teaching and learning purposes | 2 | 5.7% | 0 | 0.0% | 33 | 94.3% | 35 |

Table 4.27 shows that the majority (94.3%) of the participants are in agreement regarding the importance of access to the intranet and internet search facilities to keep abreast of the latest developments in health care and teaching practices. Similarly 94.3% of the participants agree that it is important to incorporate new technologies for teaching and learning purposes.

Table 4.28 indicates the chi-square test for the importance of accessibility to and use of technology for teaching and learning to determine whether the scoring patterns per statement were significantly different per option.

**Table 4.28 Chi-Square test for importance of access to search facilities and use of technology for teaching and learning by nurse educators**

**Test Statistics**

| | It is important for nurse educators to have access to the intranet search facilities to keep abreast of the latest developments in health care and teaching practices | It is important for nurse educators to have access to the internet search facilities to keep abreast of the latest developments in health care and teaching practices | It is important to incorporate new technologies (computer-based) for teaching and learning purposes |
|---|---|---|---|
| Chi-Square | 27.457[a] | 27.457[a] | 27.457[a] |
| Df | 1 | 1 | 1 |
| Asymp. Sig. | .000 | .000 | .000 |

a. 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 17.5.

Table 4.28 indicates a statistically significant difference in the responses to each of the three statements tested. This indicates a significant difference in the number of educators who agreed, disagreed or were neutral on these statements. The scoring patterns show that a significantly larger proportion of the respondents were in agreement with regards to the importance of access to the internet and intranet and, the integration of computers for teaching and learning.

- **Technology readiness**

This section presents data pertaining to technology assessment. Table 4.29 presents the responses of the participants pertaining to nurse educators accessibilty to computers and computer training.

**Table 4.29 Nurse educators accessibility to computers, data projectors and basic computer training (n=35)**

| Nurse educators' accessibility to computers, data projectors and computer training | Yes | | No | | Total |
|---|---|---|---|---|---|
| | Count | Row n % | Count | Row n % | |
| Do nurse educators have access to computers at this campus? | 33 | 94.3% | 2 | 5.7% | 35 |
| Do nurse educators at this campus receive any basic computer training/instruction? | 27 | 77.1% | 8 | 22.9% | 35 |
| Is/are there laptop computers and projectors for use by educators at this institution, for classroom teaching? | 30 | 85.7% | 5 | 14.3% | 35 |

It is evident from the responses presented in Table 4.29 that there are high levels of agreement with the above statements. Table 4.29 shows that the majority of the participants (94.3%) have indicated that nurse educators do have access to computers at the nursing campuses. In addition, 30 (85.7%) of the participants answered in the affirmative that laptop computers and projectors are available for classroom teaching. More than three quarters of the participants (77.1%) acceded to the fact that the nurse educators at the nursing campuses have received computer training. It is therefore advantageous that nurse educators have computer training that will support the implementation and use of ICATT for IMCI case management training.

Table 4.30 presents the responses of the nurse educators trained in IMCI regarding their computer literacy and competency.

**Table 4.30 Nurse educators' computer literacy and competency (n=35)**

| Computer literacy and competency | Frequency | Percentage |
|---|---|---|
| I am unable to operate any computer package | 1 | 2.9 |
| I am below the level of being able to function adequately on a computer | 2 | 5.7 |
| I can manage some computer operations relevant to work demand | 24 | 68.6 |
| I am competent in all packages available | 6 | 17.1 |
| I am highly computer literate enabling functioning at a high level of computer literacy | 2 | 5.7 |
| **Total** | **35** | **100.0** |

Table 4.30 indicates that the majority of the participants (68.6%) can use a computer for their work-related tasks. Six of the participants (17.1%) indicated that they were competent in all of the computer application software available to them. Two of the participants (5.7%) responded in the affirmative to being able to function at a high level of computer literacy. This is a strong indication that the majority of the nurse educators trained in IMCI are computer literate. The computer literacy rates amongst nurse educators in this study can be a motivating factor in the implementation and use of ICATT for IMCI case management training at nursing campuses.

Figure 4.5 presents the responses of the nurse educators trained in IMCI regarding nurse educators use of computers to perform tasks.

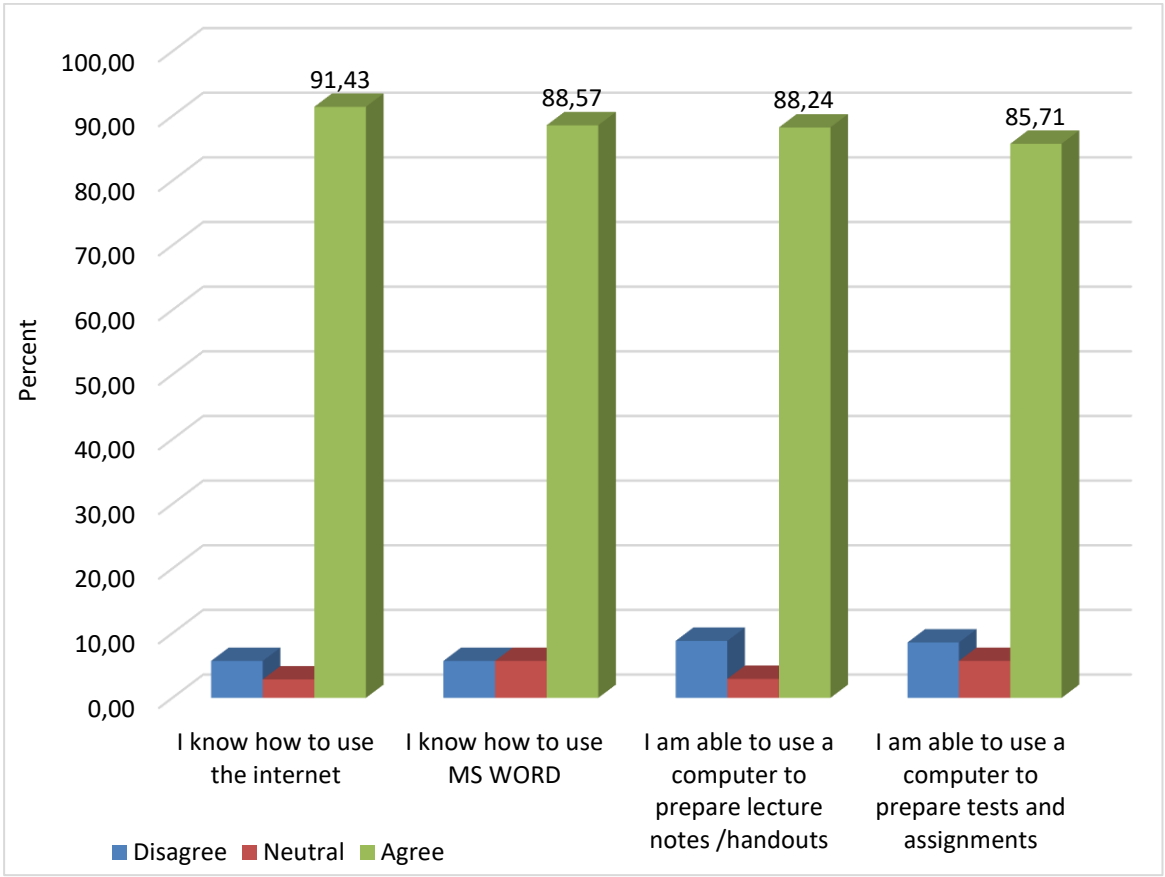


**Figure 4.5 Nurse educators' use of computers (n=35)**

Figure 4.5 indicates that the participants scored highly on all their responses on the use of computers for a variety of tasks. This may be due to the fact that over 68% of nurse educators indicated that they are computer literate. Over ninety one percent (91.4%) of the participants reported that they were able to use the internet. A high percentage (88.6%) of the participants indicated they were able to use the word processor, Microsoft

Word. An equally high percentage of the participants were able to use computers for lecture preparation and for compiling reading material for learners, and for tests and assignments, i.e 88.2% and 85.7% respectively. The findings from this study reveal that the majority of IMCI trained nurse educators do know how to use the internet, and have the experience of using computers. This can therefore only impact positively on the implementation and use of ICATT for IMCI case management training.

Table 4.31 presents the responses of the participants regarding whether the use of and access to information and communication technologies would benefit the learners at nursing campuses.

**Table 4.31 The use of and access to information and communication technologies for learners (n=35)**

| Use of and access to information communication technologies for learners | Very little benefit | | Unsure | | Very beneficial | | Total |
|---|---|---|---|---|---|---|---|
| | Count | Row n % | Count | Row n % | Count | Row n % | |
| Computers | 0 | 0.0% | 0 | 0.0% | 35 | 100.0% | 35 |
| Internet access | 0 | 0.0% | 1 | 2.9% | 34 | 97.1% | 35 |
| Intranet access | 1 | 2.9% | 1 | 2.9% | 33 | 94.3% | 35 |
| Submission of assignments online | 3 | 8.6% | 5 | 14.3% | 27 | 77.1% | 35 |
| Completion of tests online | 8 | 22.9% | 5 | 14.3% | 22 | 62.9% | 35 |

Table 4.31 shows that all the participants agreed that the use of computers is very beneficial for learners. Over 90% of the participants agreed that internet access and intranet access would also be beneficial for the learners. However, it is noted with concern that only 27 (77.1%) of the participants responded that the on-line submission of assignments would be beneficial for learners. Five (14.3%) of the participants were unsure of whether or not the on-line submission of assignments held any benefits, with three (8.6%) agreeing that it held very little benefit. The benefit of learners completing tests on-line displayed findings along similar lines, although here even fewer participants (62.9%) indicated that it would be very beneficial for learners. The same percentage of participants (14.3%) were unsure of whether or not the completion of tests on-line held any benefits, whilst a larger percentage were in agreement (22.9%) that on-line tests held

very little benefit for learners. The use of computers, internet, intranet, and completion of online assignments and tests can be beneficial in preparing learners to use ICATT for IMCI case management training, instead of the conventional paper-based method.

- **The goals and objectives of IMCI**

Table 4.32 presents the responses of the participants regarding whether the goals and objectives of IMCI will be met through the implementation of ICATT for IMCI case management training at nursing campuses.

**Table 4.32 The attainment of the goals and objectives of IMCI when using ICATT for IMCI case management training at nursing campuses (n=35)**

| Attainment of goals and objectives | Disagree | | Neutral | | Agree | | Total |
|---|---|---|---|---|---|---|---|
| | Count | Row n % | Count | Row n % | Count | Row n % | |
| To effectively scale up IMCI saturation through self-learning methods: IMCI Computerized Adaptation Training Tool (ICATT) | 0 | 0.0% | 0 | 0.0% | 35 | 100.0% | 35 |
| To ensure competent practitioners in IMCI implementation | 0 | 0.0% | 0 | 0.0% | 35 | 100.0% | 35 |
| To engender sustainable commitment from NDOH partners in IMCI training and implementation | 0 | 0.0% | 2 | 5.7% | 33 | 94.3% | 35 |
| To align IMCI and ICATT materials with recent updates and software | 0 | 0.0% | 0 | 0.0% | 35 | 100.0% | 35 |
| To build capacity in health professionals through ICATT learning | 0 | 0.0% | 0 | 0.0% | 35 | 100.0% | 35 |
| To monitor and evaluate the effectiveness of self- learning methods | 0 | 0.0% | 0 | 0.0% | 35 | 100.0% | 35 |

There is a 100% agreement with all the statements except one statement which nevertheless had a high level of agreement. The participants indicated that they are in agreement with regards to the use of ICATT, for attaining the goals and objectives of IMCI.

*4.3.3.2.3 Findings related to the enablers and barriers to ICATT implementation, as perceived by nurse educators*

The findings related to the enablers and barriers to ICATT implementation, as perceived by the nurse educators are presented in this section. The enablers were identified as the perceived benefits of ICATT implementation, whilst the barriers were identified as the challenges to ICATT implementation.

Figure 4.6 presents the possible challenges to ICATT implementation at the nursing campuses as perceived by the participants.

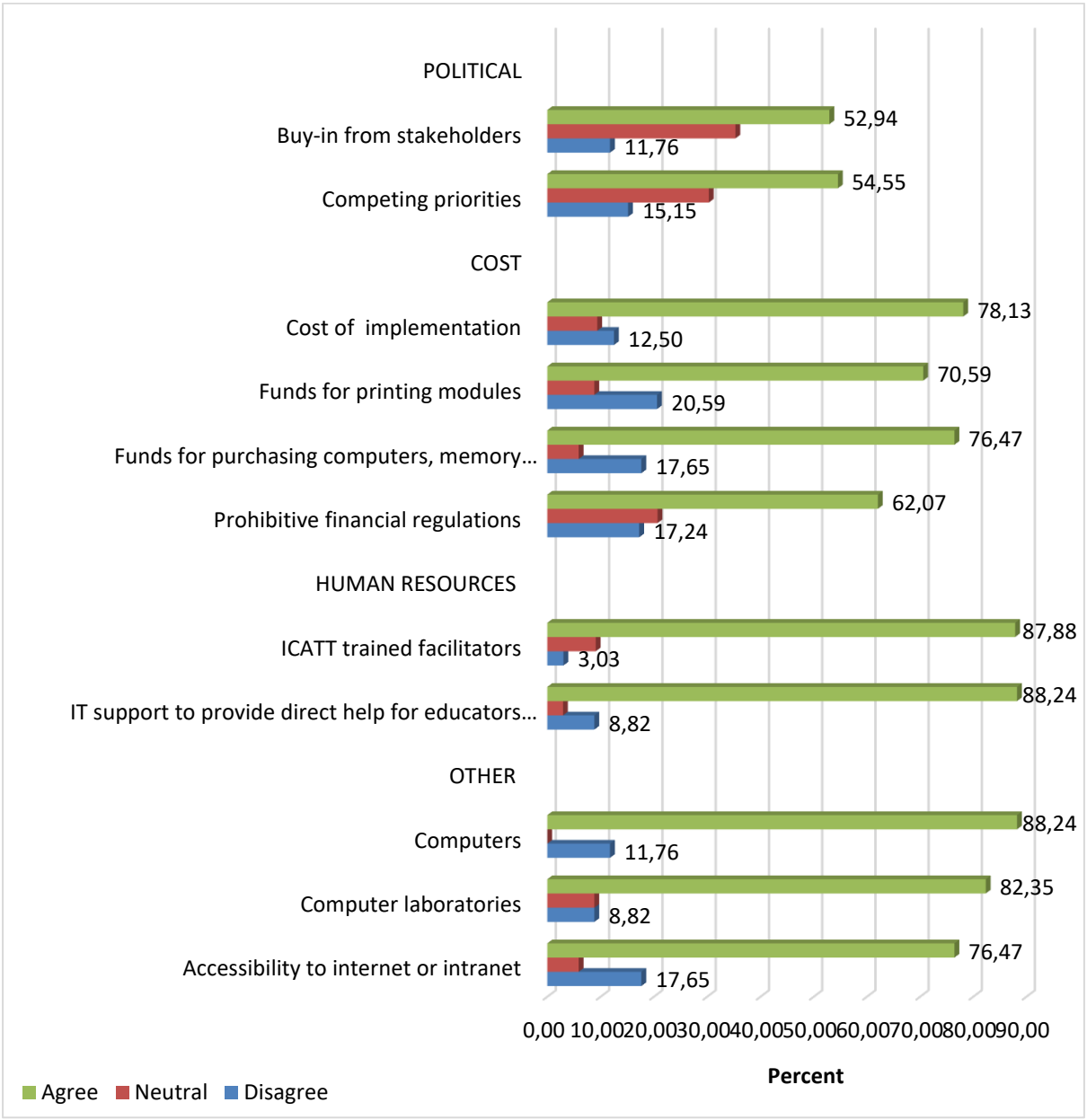


**Figure 4.6 The possible challenges to ICATT implementation at nursing campuses (n=35)**

There was a higher percentage of agreement amongst the participants as to what they perceived as challenges. More than 50% of the participants agreed that the buy-in from

stakeholders and competing priorities would be challenges to ICATT implementation. A slightly higher percentage (62.1%) agreed that prohibitive financial regulations could hamper ICATT implementation. The cost of implementation was perceived as a challenge by 78.1% of the participants. The funds for printing modules and the funds for purchasing computers, memory sticks and CD-ROMs had 70.6% and 76.5% of the participants respectively, in agreement with these as challenges to ICATT implementation. Between 87.9% and 88.2% of the participants were in agreement over human resources being a challenge to ICATT implementation. This referred to the availability of facilitators trained in ICATT and information technology support. The infrastructure to support ICATT namely computers, computer laboratories and accessibility to internet and intranet was also perceived as a challenge with over three quarters of the participants in agreement. similar challenges including the lack of skilled information technology personnel to offer support when e-learning programmes are being implemented.

Table 4.33 indicates the chi-square test for the challenges to ICATT implementation at nursing campuses to determine whether the scoring patterns for each of the challenges were significantly different per option.

**Table 4.33 Chi-square test for the possible challenges to ICATT implementation at nursing campuses**

| Chi-square test | Chi-Square | Df | Asymp. Sig. |
|---|---|---|---|
| Buy-in from stakeholders | 8.706 | 2 | .013 |
| Competing priorities | 7.818 | 2 | .020 |
| Cost of implementation | 28.938 | 2 | .000 |
| Funds for printing modules | 21.941 | 2 | .000 |
| Funds for purchasing computers, memory sticks, CD-ROM | 29.176 | 2 | .000 |
| Prohibitive financial regulations | 10.828 | 2 | .004 |
| ICATT trained facilitators | 44.364 | 2 | .000 |
| IT support to provide direct help for educators with difficulties | 46.294 | 2 | .000 |
| Computer availability | 19.882 | 1 | .000 |
| Computer laboratories | 36.765 | 2 | .000 |
| Accessibility to internet or intranet | 29.176 | 2 | .000 |

Table 4.33 indicates a statistically significant difference in the responses to each of the possible challenges tested. The overall pattern indicates higher levels of agreement with

all statements in Table 4.33. However, the levels of agreement are not similar, with some averaging in the 50 percentiles, and others in the 70 and 80 percentiles. The scoring patterns show that a significantly larger proportion of the participants were in agreement that there were political, financial, human resource and infrastructural challenges to ICATT implementation at the nursing campuses.

Figure 4.7 indicates the possible benefits to ICATT implementation as perceived by nurse educators. All the participants answered the questions pertaining to the benefits. They had to indicate whether they strongly disagree, disagree, neutral, agree or strongly agree with the statements.

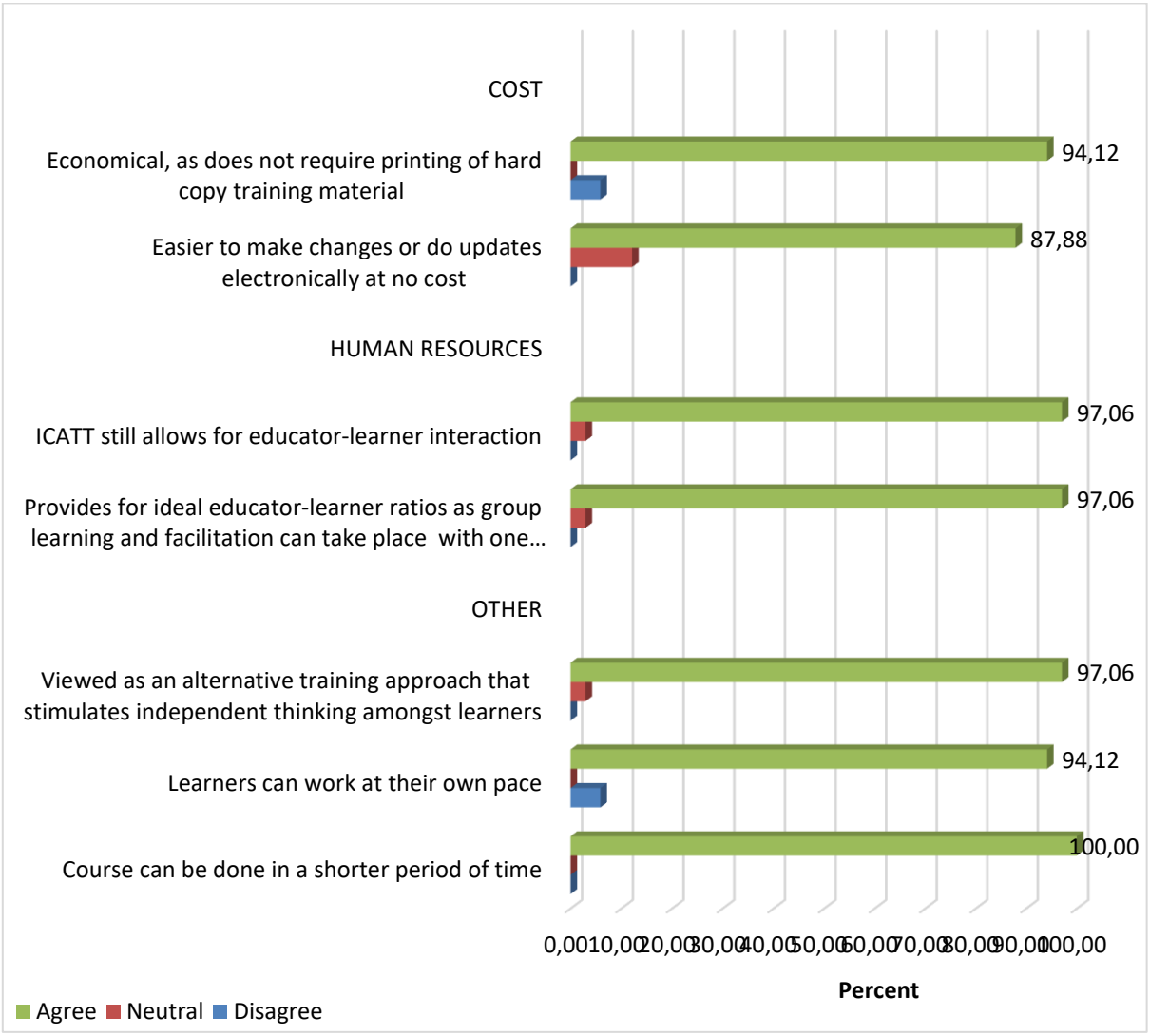


**Figure 4.7 The possible benefits to ICATT implementation at nursing campuses (n=35)**

Figure 4.7 indicates that there were high levels of agreement for all of the statements. All the participants (100%) were in agreement that one of the benefits to ICATT

implementation was that IMCI case management training could be conducted in a shorter period of time. Between 87.9% and 94.1% of the participants were in agreement that ICATT was economical. Between 94.1% and 97.1% of the participants were also in agreement that it was ideal for teaching and learning.

The chi-square test for the benefits to ICATT implementation at nursing campuses appears in Table 4.34. The chi-square test was done to determine whether the scoring patterns for each of the benefits listed were significantly different per option.

**Table 4.34 Chi-square test for the possible benefits to ICATT implementation at nursing campuses**

| Chi-square test | Chi-Square | Df | Asymp. Sig. |
|---|---|---|---|
| Economical, as does not require printing of hard copy training material | 26.471 | 1 | 0.000 |
| Easier to make changes or do updates electronically at no cost | 18.939[b] | 1 | 0.000 |
| ICATT still allows for educator-learner interaction | 30.118 | 1 | 0.000 |
| Provides for ideal educator-learner ratios as group learning and facilitation can take place with one or two IMCI trained educators | 30.118 | 1 | 0.000 |
| Viewed as an alternative training approach that stimulates independent thinking amongst learners | 30.118 | 1 | 0.000 |
| Learners can work at their own pace | 26.471 | 1 | 0.000 |

Table 4.34 indicates a statistically significant difference in the responses to each of the benefits tested. This indicates a significant difference in the number of educators who agreed, disagreed or were neutral on these statements. More participants were in agreement than disagreement with regards to the benefits of ICATT implementation.

*4.3.3.2.4 Findings related to the understanding of nurse educators regarding ICATT*

Table 4.35 indicates the views of the nurse educators trained in IMCI regarding the usefulness of the ICATT software. All the nurse educators trained in IMCI answered the questions pertaining to the usefulness of the ICATT software. They had to indicate whether they found the software very useful, useful, somewhat useful, or useless. For the purpose of analysis and discussion both very useful and useful were combined to give a response of ‘useful’ and ‘somewhat useful’ and ‘useless’ remained as is.

**Table 4.35 The views of the nurse educators trained in IMCI regarding the usefulness of the ICATT software (n=35)**

| The usefulness of the ICATT software | Useful | | Somewhat useful | | Useless | | Total |
|---|---|---|---|---|---|---|---|
| | Count | Row n % | Count | Row n % | Count | Row n % | |
| Session on navigation in ICATT (Moving through ICATT) | 35 | 100.0% | 0 | 0.0% | 0 | 0.0% | 35 |
| Introduction part (About IMCI, IMCI case management process, charts and recording forms) | 35 | 100.0% | 0 | 0.0% | 0 | 0.0% | 35 |
| Care of the sick child aged 2 months up to 5 Years | 35 | 100.0% | 0 | 0.0% | 0 | 0.0% | 35 |
| Assess and classify according to main symptoms | 35 | 100.0% | 0 | 0.0% | 0 | 0.0% | 35 |
| Identification of treatment | 35 | 100.0% | 0 | 0.0% | 0 | 0.0% | 35 |
| Treat the child | 34 | 97.1% | 1 | 2.9% | 0 | 0.0% | 35 |
| Counsel the mother | 35 | 100.0% | 0 | 0.0% | 0 | 0.0% | 35 |
| Follow-up care of the sick child | 35 | 100.0% | 0 | 0.0% | 0 | 0.0% | 35 |
| Care of young infant aged up to 2 months | 35 | 100.0% | 0 | 0.0% | 0 | 0.0% | 35 |
| Essential care | 35 | 100.0% | 0 | 0.0% | 0 | 0.0% | 35 |
| Assessment and classification of young infant | 35 | 100.0% | 0 | 0.0% | 0 | 0.0% | 35 |
| Identify treatment, treat and counsel | 35 | 100.0% | 0 | 0.0% | 0 | 0.0% | 35 |
| Follow-up care of the sick young infant | 35 | 100.0% | 0 | 0.0% | 0 | 0.0% | 35 |
| IMCI HIV training course | 34 | 97.1% | 1 | 2.9% | 0 | 0.0% | 35 |
| Introduction and standard of care | 33 | 94.3% | 2 | 5.7% | 0 | 0.0% | 35 |
| Initiating ART in children | 34 | 97.1% | 1 | 2.9% | 0 | 0.0% | 35 |
| Providing ART follow up | 34 | 97.1% | 1 | 2.9% | 0 | 0.0% | 35 |
| ICATT READ sections | 34 | 97.1% | 1 | 2.9% | 0 | 0.0% | 35 |
| ICATT SEE sections | 34 | 97.1% | 1 | 2.9% | 0 | 0.0% | 35 |
| ICATT PRACTISE sections | 34 | 97.1% | 1 | 2.9% | 0 | 0.0% | 35 |
| ICATT TEST sections | 34 | 97.1% | 1 | 2.9% | 0 | 0.0% | 35 |

As shown in Table 4.35, almost all the participants (97.1%) found the ICATT software useful. This makes it useful for training purposes in South Africa, nationally and locally in KwaZulu-Natal, as confirmed by the findings.

Table 4.36 indicates the views of the nurse educators trained in IMCI regarding the ease with which they can use the ICATT software. All the nurse educators trained in IMCI

answered the questions pertaining to the use of the ICATT software. They had to indicate whether they found the software easy, somewhat easy, somewhat difficult or difficult.

**Table 4.36 The views of the nurse educators trained in IMCI regarding the ease with which they can use the ICATT software (n=35)**

| Ease of use of the ICATT software | Somewhat easy | | Somewhat difficult | | Difficult | |
|---|---|---|---|---|---|---|
| | Count | Row n % | Count | Row n % | Count | Row n % |
| ICATT READ sections | 35 | 100.0% | 0 | 0.0% | 0 | 0.0% |
| ICATT SEE sections | 35 | 100.0% | 0 | 0.0% | 0 | 0.0% |
| ICATT PRACTISE sections | 35 | 100.0% | 0 | 0.0% | 0 | 0.0% |
| ICATT TEST sections | 34 | 97.1% | 1 | 2.9% | 0 | 0.0% |
| Entire ICATT | 35 | 100.0% | 0 | 0.0% | 0 | 0.0% |

Table 4.36 indicates that almost all the participants considered using ICATT as being easy than being difficult. This can be an indication that the ICATT software is user-friendly.

The nurse educators trained in IMCI were also asked to give details about what they did find difficult about the ICATT software. Table 4.37 gives an overview of the comments.

**Table 4.37 Aspects considered difficult regarding the ICATT software**

| Aspects considered difficult regarding the ICATT software | Count |
|---|---|
| Test section was a bit challenging | 5 |
| Some of the sections in practice was confusing | 2 |
| Feedback not given on test therefore corrections cannot be made | 1 |
| Orientation was needed as to where to click | 1 |
| Continuous practice would help | 1 |
| Using the second line with cursor i.e. "Enter" | 2 |
| The programmes are not responding to some of the key buttons | 1 |

Most of the comments were specific to technical skill with the use of a computer namely “orientation was needed as to where to click,” “continuous practice would help,” “using the cursor” and “the programmes is not responding to some of the key buttons.”

#### *4.3.3.3 Factor analysis and Rotated Component Matrix*

Table 4.38 indicates the Factor Analysis and Rotated Component Matrix for section B of the questionnaire (Annexure K) related to human resources, teaching and learning using technology and a technology assessment.

**Table 4.38 Rotated component matrix for human resources, teaching and learning using technology and technology assessment**

**Rotated Component Matrix[a]**

| Section B – Human resources, teaching and learning using technology and technology assessment | Component | | | |
|---|---|---|---|---|
| | 1 | 2 | 3 | 4 |
| There are adequate number of IMCI-trained educators, in respect of educator-learner ratios for case management training | .128 | .274 | .307 | .670 |
| I would be willing to attend ICATT training, to improve IMCI case management training at this institution | .321 | .107 | .244 | -.218 |
| It is important for nurse educators to have access to the intranet search facilities to keep abreast of the latest developments in health care and teaching practices | -.022 | .983 | -.012 | -.022 |
| It is important for nurse educators to have access to the internet search facilities to keep abreast of the latest developments in health care and teaching practices | -.002 | .989 | -.029 | -.032 |
| It is important to incorporate new technologies (computer-based) for teaching and learning purposes | .013 | .981 | -.050 | -.064 |
| I know how to use the internet | .858 | -.064 | .117 | .111 |
| I know how to use MS WORD | .863 | -.067 | -.141 | .142 |
| I am able to use a computer to prepare lecture notes/handouts | .901 | -.023 | -.104 | .095 |
| I am able to use the computer to prepare tests and assignments | .892 | .105 | -.027 | .078 |
| Computer use | -.130 | -.047 | .720 | .054 |
| Internet access | .211 | -.096 | .040 | .762 |
| Intranet access | -.008 | -.122 | -.127 | .642 |
| Submission of assignments online | -.159 | -.242 | .765 | -.126 |
| Completion of tests online | .356 | .237 | .714 | .195 |

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 5 iterations.

The Rotated Component Matrix highlighted moderate to strong correlations along four components. In section B, the first and last sub-themes split along two other sub-themes.

The overlapping of components means those participants identified statements as belonging to other sub-themes.

The first component relates to the belief of the participants regarding their computer skills. The second component suggests recognition of skills improvement through access to technology. The third component highlights the importance of computer availability for access to on-line learning activities. Split from this component is the demand for internet and intranet access. The last component highlights two sub-themes namely nurse-educator learner ratios in IMCI case management training and ICATT training for nurse educators.

Table 4.39 indicates the Factor Analysis and Rotated Component Matrix for section C of the questionnaire (Annexure K) related to the challenges and benefits of ICATT implementation at nursing campuses.

**Table 4.39 Rotated component matrix for challenges and benefits of ICATT implementation at nursing campuses**

**Rotated Component Matrix[a]**

| Section C - Challenges and benefits | Component | | |
|---|---|---|---|
| | 1 | 2 | 3 |
| Buy-in from stakeholders | .199 | -.126 | .798 |
| Competing priorities | .120 | -.202 | .786 |
| Cost of implementation | .816 | -.113 | .181 |
| Funds for printing modules | .669 | -.239 | -.074 |
| Funds for purchasing computers, memory sticks, CD-ROM | .870 | -.034 | .023 |
| Prohibitive financial regulations | .523 | -.148 | -.171 |
| ICATT trained facilitators | .768 | .096 | .131 |
| IT support to provide direct help for educators with difficulties | .781 | -.047 | .020 |
| Computer availability | .808 | -.005 | -.143 |
| Computer laboratories | .485 | .073 | .162 |
| Accessibility to internet or intranet | .811 | -.086 | -.078 |
| Economical, as does not require printing of hard copy training material | -.234 | -.137 | .618 |
| Easier to make changes or do updates electronically at no cost | -.083 | .124 | .659 |
| ICATT still allows for educator-learner interaction | .052 | .512 | .480 |
| Provides for ideal educator-learner ratios as group learning and facilitation can take place with one or two IMCI trained educators | .036 | .326 | .842 |
| Viewed as an alternative training approach that stimulates independent thinking amongst learners | .221 | .466 | .392 |
| Learners can work at their own pace | -.184 | .659 | -.044 |
| Course can be done in a shorter period of time | -.040 | .315 | .516 |
| To effectively scale up IMCI saturation through self-learning methods: IMCI Computerized Adaptation Training Tool (ICATT) | .047 | .631 | .103 |
| To ensure competent practitioners in IMCI implementation | -.162 | .592 | .005 |
| To engender sustainable commitment from NDOH partners in IMCI training and implementation | .038 | .789 | -.131 |
| To align IMCI and ICATT materials with recent updates and software | -.150 | .717 | .031 |
| To build capacity in health professionals through ICATT learning | -.030 | .884 | .209 |
| To monitor and evaluate the effectiveness of self- learning methods | -.060 | .765 | -.005 |

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 4 iterations.

In section C, the first and last sub-themes split along two other sub-themes. The overlapping of components means those participants identified statements as belonging to other sub-themes. The Rotated Component Matrix highlighted moderate to strong correlations along three components namely infrastructure funding, alternate cost-effective and efficient learning methods and competing priorities.

The first component revolved around costs for implementation and the associated impact of lack of funding, together with infrastructural constraints. Ultimately this means that if there is no money, there is no infrastructure.

The second component spoke to the efficiency and benefits of the ICATT method and the long-term impact of ICATT implementation and use at nursing campuses.

The third component highlights that whilst the efficiencies of ICATT use and implementation are recognised, lack of stakeholder buy-in and competing priorities could have negatively implications for ICATT implementation at nursing campuses.

Table 4.40 indicates the Factor Analysis and Rotated Component Matrix for section D of the questionnaire (Annexure K) related to the use of the ICATT software.

**Table 4.40 Rotated Component Matrix for the use of the ICATT software**

**Rotated Component Matrix[a]**

| Section D - Use of the ICATT Software | Component | |
|---|---|---|
| | 1 | 2 |
| Session on navigation in ICATT (Moving through ICATT) | .685 | .112 |
| Introduction part (About IMCI, IMCI case management process, charts and recording forms) | .589 | .210 |
| Care of the sick child aged 2 months up to 5 Years | .826 | .058 |
| Assess and classify according to main symptoms | .885 | .225 |
| Identification of treatment | .863 | -.062 |
| Treat the child | .899 | -.040 |
| Counsel the mother | .884 | -.251 |
| Follow-up care of the sick child | .922 | -.216 |
| Care of young infant aged up to 2 months | .839 | -.210 |
| Essential care | .548 | .025 |
| Assessment and classification of young infant | .914 | -.229 |
| Identify treatment, treat and counsel | .936 | -.179 |
| Follow-up care of the sick young infant | .914 | -.229 |
| IMCI HIV training course | .825 | .089 |
| Introduction and standard of care | .549 | .208 |
| Initiating ART in children | .832 | -.018 |
| Providing ART follow up | .802 | -.146 |
| Usefulness ICATT READ sections | .832 | .342 |
| Usefulness ICATT SEE sections | .875 | .286 |
| Usefulness ICATT PRACTISE sections | .778 | .381 |
| Usefulness ICATT TEST sections | .778 | .381 |
| Ease of use ICATT READ sections | -.120 | .743 |
| Ease of use ICATT SEE sections | -.033 | .819 |
| Ease of use ICATT PRACTISE sections | .001 | .580 |
| Ease of use ICATT TEST sections | .091 | .561 |

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 3 iterations.

The rotated component matrix highlighted correlations along two components. In essence one was correlation along content and the second was correlation along process. This may be indicative of the nurse educators' acceptance and affinity for the ICATT content and the process of using the software.

## 4.4 PHASE 2

### 4.4.1 QUALITATIVE COMPONENT RESULTS FOR LEARNERS- PRE-ICATT USE

The results presented in this section emerged from the focus group interviews conducted with the learners using an interview schedule (Annexure O). Table 4.41 shows the master table of themes with one super-ordinate theme, three themes and numerous sub-themes.

**Table 4.41 Master table of themes: focus group interviews of learners pre-ICATT use**

| Super-ordinate theme | Themes | Sub-themes |
|---|---|---|
| The implementation and use of ICATT for IMCI case management training | Positive attitude | • ICATT |
| | Benefits of a new method for teaching and learning | • Use of computers for learning<br>• A preference for ICATT for IMCI case management training |
| | Challenges with the conventional method | • Facilitation<br>• Learning material |
| | Concerns regarding ICATT | • Availability of Material Resources<br>• Computer literacy |

A detailed narrative was provided by the participants regarding their attitude to ICATT implementation at the nursing campuses. The researcher identified one super-ordinate theme following data analysis using the IPA framework: the implementation and use of ICATT for IMCI case management training. Three themes and a number of sub-themes emerged as illustrated in Table 4.41. The results are presented using quotations from the transcripts which support the discussions of the themes (Sandy & Shaw 2012:67). The themes and sub-themes are discussed in detail below.

#### *4.4.1.1 Positive attitude*

This theme focuses on the attitudes of the learners in relation to ICATT implementation at the nursing campuses. A detailed review of the data during the focus group interviews revealed that participants were positive regarding using computers for learning.

"Using the ICATT software would actually be advantageous." (Fgp: 1, 1).

"I'm going to be excited about using the computer." (Fgp: 2, 1).

"It's a good thing as things are changing and everything is technology driven." (Fgp: 3, 1)."

"It's a great idea because I love computers and I think it's in keeping with the technological era." (Fgp: 6, 1).

Participants suggested that the use of computers and ICATT in particular would be advantageous for learners. Participants further indicated that the use of technology for learning in nursing campuses should be embraced as it was viewed as an important part of everyday life. The fact that the learners had positive attitudes towards the use of computers and ICATT may have favourable outcomes for its use in IMCI case management training at nursing campuses.

#### *4.4.1.2 Benefits of a new method for teaching and learning*

This theme relates to the benefits of a new method for teaching and learning. The participants were in agreement that the implementation of ICATT would be beneficial. The following two sub-themes were identified: the use of computers for learning, and a preference for ICATT for IMCI case management training.

##### *4.4.1.2.1 The use of computers for learning*

Participants expressed obvious interest in the use of computers for learning as they viewed themselves as part of a technology generation. They were enthusiastic to incorporate the use of computers into their learning as they felt it would prepare them for the work environment where computers have already been introduced and play a significant role in clinical care. Participants were of the opinion that using computers for learning in nursing campuses will prepare them in making the transition to universities where computers are already being used for education. Participants were eager to align themselves with universities and even suggested that using computers instead of books meant they were finally on par with students who attend universities. Storage of

information on USBs and increased accessibility to the information when it was required made computer use more attractive for the participants. Participants indicated that the use of computers will not only impact on their learning but will also develop their computer skills which were limited in some cases. Participants were aware that not everyone had access to computers mainly due to their disadvantaged backgrounds and were enthusiastic that the use of computers in nursing campuses will increase their access to technology. Participants suggested that using computers will be beneficial as it saved time and would give them greater access to current and updated information. The use of books was viewed as out of date. Participants were also keen to illustrate that they were eager to embrace a new method for teaching and learning like using computers for doing assignments. Some participants expressed enthusiasm regarding being able to access information very easily at the "click of a button."

> "It will be a great experience for learners from disadvantaged backgrounds who have not been exposed to computers, yet are part of a technology driven generation. This provides an opportunity to develop their computer skills and stay ahead." (Fgp: 1, 2).

> "It's about time that we had access to computers, because it's already being used at universities. When I attend university sometime in the future I do not want to be at a disadvantage due to a lack of knowledge in computer-based learning." (Fgp: 1, 2).

> "It's a good thing to develop our computer skills as learners, so that we are more proficient when we enter in to the clinical environment where computers are already being used for administrative tasks." (Fgp: 3, 2).

> "We will enjoy the convenience of using computers. For example, we are not going to carry books but USBs on which we can save the information we need and access it whenever it is required, even in the clinical environment." (Fgp: 3, 2).

> "It will be less time consuming since it will be done on the computer." (Fgp: 2, 1).

> "For those of us who already use computers, it will be useful for doing assignments. I think it will be great." (Fgp: 5, 1).

> "Books become out dated which makes it difficult for us to get current information. Computers are frequently updated which allows us access to updated information." (Fgp: 8, 1).

Central to the discussions is the fact that the participants identified the benefits of using computers in the different areas of nursing namely the classroom and the clinical areas. They therefore displayed a strong leaning towards adopting computers for nursing education.

#### *4.4.1.2.2 A preference for ICATT for IMCI case management training*

Participants displayed a strong preference for ICATT for IMCI case management training and appeared eager to use ICATT instead of continuing with the conventional method of training.

> "I think we can become independent learners because we don't need our nurse educators to read through the modules and explain everything to us. We can work on the computers by ourselves." (Fgp: 3, 2).

> "I think it's going to be a more efficient way of doing IMCI other than carrying lots of books and turning pages. Working on the ICATT software is going to make life a whole lot easier in terms of improving our academics." (Fgp: 5, 1).

> "You will be able to SEE as the software contains videos, and you're going to READ and do exercises which allow you to be involved in your own learning. This allows you to evaluate yourself and know where you are lacking." (Fgp: 7, 1-2).

> "It's better if we've got a computerised system so that whenever you need the information it's always available to you. There are no chances of it getting lost." (Fgp: 7, 2).

Participants were able to easily identify the many benefits of using ICATT. The conventional IMCI case management training course used the method of facilitation in the classroom to complete training modules, written exercises, group discussions, drills presentations, demonstrations and role plays, which was best suited to group teaching. Participants, however, favoured using ICATT which highlighted an individual approach

that were focused on self-activity independent learning, and being able to learn at one's own pace. IMCI training is conducted using seven modules and an IMCI chart booklet, which learners are expected to carry. Participants were honest in indicating that carrying these modules and chart booklets, and paging through them looking for information was extremely cumbersome. Participants indicated that using ICATT obviated the need for this as all the information from the modules and the chart booklet was incorporated into the software. They anticipated that this would make "their lives easier." Participants identified that the videos and pictures that were incorporated into the ICATT software would ensure easier accessibility. It was an advantage that the pictures would be clearer and brighter. Participants were keen to use the format of "READ, SEE, PRACTICE and TEST" of ICATT which they felt would allow them to be actively engaged in their own learning. They indicated that this would strengthen their understanding and knowledge of IMCI. The IMCI algorithm is constantly updated and changed as new disease profiles emerge and treatment protocols change. The updating of modules and chart booklets is tedious and expensive and can interrupt learning. Participants were encouraged by the fact that the ICATT software is easy to update, and therefore learners will always be exposed to current and updated learning material, and can access additional reading material. The ICATT software allows learners to sign in and save their user profile and all "PRACTICE, TEST" sections they have completed. Participants indicated that this overcomes the challenge of learners losing their hard copies of chart booklets, modules and exercises. There is a strong indication that the learners are ready to use ICATT based on their preference for it over the conventional method of training for IMCI.

#### *4.4.1.3 Challenges with the conventional method*

The participants were in agreement that there are many challenges with the conventional method of IMCI case management training. The following two sub-themes were identified: challenges with facilitation and challenges with the learning material as illustrated in Table 4.41.

##### *4.4.1.3.1 Facilitation*

Challenges with facilitation in the conventional method of IMCI case management training were identified by almost all the participants. Participants were candid about their

dissatisfaction with the facilitation methods employed by nurse educators for IMCI case management training.

> "When we did IMCI we were not interested because it was classroom-based and either we would do all the talking or we would have a lecturer standing in front of us reading from the booklet. We can only concentrate for 15 minutes and then we lose concentration and fall off to sleep." (Fgp: 4, 1).

> "During IMCI we read through the chart booklets and were expected to do all the exercises which felt like information overload. We also did more of the exercises as homework." (Fgp: 5, 1).

> "In lectures we are concentrating more on writing then actually paying attention." (Fgp: 8, 2).

> "If you are unable to keep up with the other learners and you are left behind, then you feel afraid to ask the nurse educator to repeat what has already been taught." (Fgp: 4, 3).

> "I remember when we were doing IMCI, that there were three or four lecturers in the classroom with us and they all had to come around to check that we had done the exercises correctly." (Fgp: 5, 1).

Participants reported that the facilitators still leaned towards a traditional teaching style, which led to boredom, loss of interest in the content and lost learning time. Many participants reported that there was a lot of information to be covered and too many exercises that needed to be completed, with one participant describing it as "information overload." Participants indicated that facilitators expected individual learners to keep pace with the group, with facilitators actively supervising learners to ensure they did not fall behind. One participant indicated that this could be intimidating as she/he was afraid to ask a facilitator to go back. Participants are aware of the challenges associated with the conventional method of IMCI training, and view ICATT implementation as a solution.

#### *4.4.1.3.2 Learning material*

Participants indicated that there were many problems with the learning material used in the conventional method of IMCI training.

> "It was difficult to determine which information was contained within which module." (Fgp: 1, 1).

> "When we did IMCI we used many modules which made it confusing. There were some modules that would get mislaid and we'd end up not learning everything we needed to learn about IMCI." (Fgp: 4, 1).

> "We have to return the booklets and the modules, and there's nowhere that we can refer to when we forget the information." (Fgp: 1, 1).

> "The chart booklets get outdated and then we are referred to other sources for current information. We then have an accumulation of old and new information." (Fgp: 8, 1).

> "In the photograph books, the pictures are very blurry making it difficult to see and use, and the videos are outdated." (Fgp: 8, 1).

Participants identified that having too many IMCI modules made it difficult to access the necessary information easily. Participants also reported that the information in the modules was often out-dated which impacted on learning. According to some participants, the chart booklets are collected at the end of a training session, which means they have no way of accessing the relevant information for future use. Participants cited the unclear pictures in the picture booklets and videos as a barrier to their learning.

ICATT therefore addresses almost all of the challenges associated with the conventional method and can therefore be a strong motivation for the implementation of ICATT.

#### *4.4.1.4 Concerns regarding ICATT implementation*

The participants indicated that there were a few concerns regarding ICATT implementation. The following two sub-themes were identified: the availability of material resources and information and technology skills.

#### *4.4.1.4.1 The availability of material resources*

Participants expressed concern regarding the lack of computers at nursing campuses for ICATT implementation. Participants indicated that it was unlikely that computers would be provided for learners on a one-to-one basis. One participant expressed concern at not having access to computers outside of the nursing campus. This meant that they would not be able to use the ICATT software to do the READ, PRACTICE and TEST sections which could hamper their learning.

> "We don't have the necessary equipment here at the campus." (Fgp: 2, 1).

> "The challenge in the campus is that we don't have access to computers. We also don't have an adequate number of computers that is 35 computers to cater for the 35 learners so that all can have access to ICATT." (Fgp: 4, 2).

> "How do we go about doing our homework? What if we don't have access to computers at home?" (Fgp: 5, 1).

The concerns of learners regarding the lack of computers in nursing campuses is valid as this means ICATT implementation may be hindered by these limitations.

#### *4.4.1.4.2 Computer literacy*

Participants indicated that they were either not computer literate or their computer literacy was limited. Participants asserted that not being computer literate was going to be a disadvantage when using ICATT. They were of the opinion that they may be slower when using ICATT but were determined to adapt and be able to use ICATT.

> "It's not good because most of the learners are not computer literate so it's going to be difficult for them to use the computers." (Fgp: 1, 1).

> "Learners who used computers in high school may be fast and other who did not use computers in high school may be slow so that's going to be the first problem. The second problem is the slow learners are not going to be able to do tasks on the computer, or keep up as the nurse educator gives instructions on the use of the ICATT software." (Fgp: 1, 2).

"If I'm using the computer for the first time it's going to be time consuming." (Fgp: 2, 1).

"Most of the time we find it hard to manage our time so it's something that we have to adapt to and try to figure out as we use the ICATT software on our own." (Fgp: 4, 3).

Albeit that computer literacy is a concern of the participants in this study, it is clearly indicated that ICATT can still be used by learners for IMCI case management training at nursing campuses.

### 4.4.2 QUALITATIVE COMPONENT RESULTS FOR LEARNERS- POST-ICATT USE

The results presented in this section emerged from the focus group interviews conducted with the learners using an interview schedule (Annexure Q) after the use of the ICATT software. Table 4.42 shows the master table of themes with one super-ordinate theme, six themes and numerous sub-themes.

**Table 4.42 Master table of themes: focus group interviews of learners post-ICATT use**

| Super-ordinate theme | Themes | Sub-themes |
|---|---|---|
| Learners perceptions related to using ICATT | Technological characteristics of the ICATT software | • Use with ease<br>• Clear directions<br>• Moving between sections<br>• Use of keyboard<br>• Software application<br>• Problems encountered |
| | Usefulness of ICATT | • Computer-based learning<br>• Impact on learners and learning<br>• Addresses challenges |
| | Problems during use | • Software<br>• Computers<br>• Skills |
| | Advantages of ICATT | • Use of computers<br>• Impact on learning<br>• Software |
| | Preference | • ICATT<br>• Conventional method |

| | | |
|---|---|---|
| | Recommendations | • Software<br>• Learners<br>• Computers<br>• Implementation |

A detailed narrative was provided by the participants of their experience when using the ICATT software. The researcher identified one super-ordinate theme following data analysis using the IPA framework which was the learners' perceptions related to the use of the ICATT software. The themes were developed from the questions contained in the interview schedule. The emergent themes and sub-themes are illustrated in Table 4.42. The results are presented using quotations from the transcripts which support the discussions of the themes (Sandy & Shaw 2012:67). The themes and sub-themes are discussed in detail below.

### *4.4.2.1 Technological characteristics of the ICATT software*

In this study, one of the emergent themes is the technological characteristics of the ICATT software. The participants in this study were seeing and using the ICATT software for the first time and their perceptions regarding the technological characteristics of ICATT can influence its implementation at nursing campuses.

> "ICATT is very simple and straightforward. All of whatever you need to know is contained in one software package. It includes features that will direct you on its use. It's very user friendly." (Fgp: 1, 1).

> "The computer is very nice. I'm happy now. Yes, nice and easy." (Fgp: 6, 1).

Almost all the participants claimed that they found ICATT user friendly and easy to use. They identified and appreciated that all aspects of IMCI case management were included in the software. One participant expressed joy at finally being able to use a computer. This is in keeping with the trends of learners using computers and computer software to strengthen and enhance their learning at tertiary level.

#### *4.4.2.1.1 Use with ease*

This was the most expressed theme by the participants. Participants claimed that the software was easy to use and expressed surprise that they did not need to be computer literate to use it. However, one participant expressed that being computer literate made it even easier to use the software, whilst another suggested that limited exposure to computers meant that the use of the software was challenging. Participants appreciated that the user-friendly software had an interactive component with clear instructions that made it easy to use. Participants indicated that the software was user-friendly which allowed them to access information quite easily, as opposed to the conventional method which was paper-based. Participants were of the opinion that because the software was easy to use it was also time-saving.

> "The software is interactive and also user friendly therefore it's not difficult to use at all. The instructions are pretty clear." (Fgp: 2, 1).

> "It was very simple. There is nothing complicated about the software so anyone can use it, whether they know computers or not." (Fgp: 3, 1).

> "It was quite interesting and it seems as if it will save time and you can do more." (Fgp: 4, 1).

In this study perceived ease of use is the degree to which the user believes that using the ICATT software is effortless. The study reveals that the majority of learners at the nursing campuses have found ICATT easy to use.

#### *4.4.2.1.2 Clear directions*

The majority of the participants expressed that the software provided clear directions for use. The software provides instructions for accessing different sections on IMCI case management training.

> "The task bar is visible, so you don't have to look for it. It makes it easier to remember the things that you learn because you're seeing them, for example wrong answers are highlighted with crosses." (Fgp: 5, 1).

> "I thought it was basic reading and you just go back and forth." (Fgp: 1, 1).

> “The direction and language is clear.” (Fgp: 2, 1).

The participants indicated that the directions contained within the ICATT software were clear. The software prompts for example “BACK” and “NEXT” gives one an indication of what to do, and where to go next on the software. Participants also claimed that the directions were simple and easy to understand which adds to the learning experience. The language of instruction on the ICATT software is English, with one participant adding that if one understands English, then one is able to follow the directions.

#### *4.4.2.1.3 Moving between sections*

Participants indicated that they were able to comfortably move between the different sections on the software.

> “You can move between the different sections a few times if you don’t understand something as there’s no time limit. I thought the picture quality was good, and it’s good that you can read and watch videos at your own time and you do not have to share with the group.” (Fgp: 1, 1).

> “It’s easy to move between sections and it is an interesting version of learning IMCI, rather than the module.” (Fgp: 5, 1).

The opportunity of using their own computer allowed for a degree of independence and afforded them the opportunity to work at their own pace, as they moved between the different sections of the ICATT software. Participants suggested that moving between the different sections on the software provided a better learning experience than the conventional method of IMCI case management training. The findings of this study have identified that the participants have found the ICATT software easy to navigate, and therefore easy to use.

#### *4.4.2.1.4 Use of keyboard*

Participants reported on their experience of using the keyboard to type in information on the ICATT software. Participants claimed that they encountered no problems with using the keyboard on the computer as it was the same as typing on a smartphone. Participants

claimed that the lack of computer skills was not a barrier to using a keyboard and typing on the ICATT software. Participants further claimed that they were encouraged by the fact that they could take their time with typing on the keyboard so as to familiarise themselves with this action. Participants expressed enthusiasm for typing as opposed to writing which has its own challenges for example losing written work, incorrect spelling and illegibility which can hamper learning. Two participants did express reservations with typing on the ICATT software due to a lack of skill.

> "The computer keyboard layout is the same as all the smart phones that most of us have these days. So if you know how to type on the phone then you can type on a keyboard, using your one finger." (Fgp: 1, 2).

> "There's no time limit, so even if you don't know how to use a keyboard you can take your time to type out. It's just a fun experience." (Fgp: 1, 2).

> "It was quite interesting, I don't have any computer skills, but it was easy." (Fgp: 4, 2).

> "Very simple, easy, straight forward and everything you do on the computer is very clear because sometimes when you're writing in a rush your handwriting is not legible and when you review what you've written down you find that you don't even understand your writing. Notes might get lost. On the computer everything is clear with even spell check. It's great." (Fgp: 7, 2).

It is evident from the findings of this study that participants found writing tedious and preferred using the keyboard when working on the ICATT software.

*4.4.2.1.5 Software applications*

The software applications are easy to access and provided links to the different IMCI modules.

> "The drop-down boxes came up quickly and showed us the different aspects of IMCI that we needed and, it also showed us where to go from there." (Fgp: 1, 3).

> “It’s clear and when you just click, the software applications automatically appear.” (Fgp: 2, 2).

> “It was easy to use and it was functioning perfectly.” (Fgp: 4, 3).

> “They’re very easy to use and the drop-down boxes actually makes things much faster and easy to use.” (Fgp: 7, 2).

Participants indicated that all that was required was a “click” on an application. They further claimed that there was no real problem accessing the different software applications. The drop-down boxes act as an index which makes it convenient and quick to access specific information as opposed to using an index and searching for information in the paper-based modules.

#### *4.4.2.1.6 Problems encountered*

One of the negative aspects of e-learning can be attributed to unreliable computer systems for example when computer applications do not work or computer screens freeze.

> “The computer was slow so we thought that we didn’t press it properly. We then continued to press the enter button. At the next page it was slow, so we pressed enter again.” (Fgp 8; 2)

The majority of the participants did not experience any problems when using the ICATT software. One participant indicated that there was a computer glitch that hampered progress on the ICATT software.

### ***4.4.2.2 Usefulness of the ICATT software***

The usefulness of the ICATT software was an emergent theme which was discussed by the participants in this study.

> “I think if we had sufficient resources it would be an effective method of learning at this campus.” (Fgp: 1, 3).

> "Yes, it will be useful rather than doing it the conventional way using the chart booklet." (Fgp 2; 2)

All of the participants have confidently indicated that they would find ICATT useful for IMCI case management training. Participants claimed that ICATT would be more useful than the conventional paper-based method. Participants are mindful of the fact that even though ICATT would be useful, resources to support it are a current challenge at almost all the nursing campuses.

#### *4.4.2.2.1 Computer-based learning*

ICATT is a form of computer-based learning and participants eagerly highlighted the usefulness of using computers for IMCI case management training.

> "Using a computer is great because you have to use your own initiative to learn something which is new and exciting. You are working at your own pace and if there is a problem there is a facilitator who can assist." (Fgp: 1, 3).

> "Provides an opportunity for learners to learn how to use computers for learning." (Fgp: 2, 3).

> "It will be very useful for us all to use computers and that includes nurse educators as well, as it saves time." (Fgp: 3, 3).

> "We can learn at our own pace and there is no need to carry books. What more can you ask for." (Fgp: 4, 3).

> "Sitting in class and watching the videos can be long and boring, whereas with the ICATT software it is interactive. You only watch the videos when you have completed the theoretical work. So most definitely, rather than watching a lecturer talking, one prefers the one on one interaction with the software." (Fgp: 8, 3).

Participants highlighted all the benefits of computer-based learning. Increased access to computers and becoming computer literate was a positive factor. Taking the initiative to access new information, working at one's own pace and still having the support of a facilitator were identified as useful. Participants claimed computer-based learning would

be time saving for nurse educators and learners alike. Computer-based learning obviates the need to carry hard copies of the IMCI chart booklets and modules, and the convenience of accessing information on the software, instead of paging through hard copies was also considered an advantage. Participants appreciated that computer-based learning could be interactive allowing learners to actively engage with the software instead of being passive recipients of information.

#### *4.4.2.2.2 Impact on learners and learning*

Participants suggested that using ICATT will impact positively on learners and learning. Participants indicated that using ICATT will help them evolve into independent learners capable of resolving problems by "thinking out of the box." Participants claimed that they would be actively engaged in their own learning when using the ICATT software as opposed to being directed to read from the IMCI modules.

> "It helps us to think out of the box instead of always being told what to do; it helps us to initiate our own learning." (Fgp: 1, 4).

> "It engages the students into actually reading and then answering questions, thereby testing your knowledge as well, rather than just reading through the book." (Fgp: 3, 3).

> "Now it's going to be more active participation as you READ about and SEE aspects of IMCI." (Fgp: 5, 2).

In this study, learners believe that the use of technology is going to add value to their learning.

#### *4.4.2.2.3 Addresses challenges*

Participants were quick to point out that they experienced challenges with IMCI case management training. They strongly advocated the use of computer-based learning to resolve the challenges.

> "Yes, it's a bit more exciting because the conventional way was very boring." (Fgp: 1, 3).

> “Its not boring and allows you to move ahead when you are ready; you therefore look forward to learning.” (Fgp: 7, 3).

Participants claimed that the conventional method was considered boring, and the use of ICATT injects some excitement into learning IMCI. Participants suggested that the use of ICATT recognises that all learners work at different paces. This allows for those learners to move ahead with learning and not wait for the rest of the group as in the conventional manner. Whether or not ICATT can address all the challenges of the conventional method of IMCI case management training needs to be explored further.

#### *4.4.2.3 Problems encountered during the use of ICATT*

Participants reported that the problems encountered during the use of ICATT were related to the software, the computers and the skills of the users.

##### *4.4.2.3.1 Problems pertaining to the software*

Participants indicated that there were spelling mistakes in the software, and there was a need for more pictures to be added. One participant suggested for the future development of the software that it should be made more exciting each time it is updated.

> “I noticed that there was a spelling mistake on the front page.” (Fgp: 1, 4).

> “They could add more pictures.” (Fgp 3; 4)

> “For the future they have to make it more and more exciting.” (Fgp 6; 3)

##### *4.4.2.3.2 Problems pertaining to the computer*

Participants indicated that there was a problem with the computer, which appeared to be unresponsive to a command.

> “The computer was not responsive to a command so we thought that we didn’t press it properly and continued to press enter. Before the next page it was not responsive, so we pressed again.” (Fgp 8; 3)

Technology and software failures are inevitable but can be managed accordingly by trained technicians.

#### *4.4.2.3.3 Problems pertaining to skills*

The use of the ICATT software does not require specialised computer training or skills. In stating that according to the participants, one of the problems that had arisen was as a result of the lack of skills of the users.

> "I think it's just a matter of getting acquainted with the computer and being able to do the double clicking." (Fgp: 5, 3).

> "Not all learners are young in the campus. Some of us are old." (Fgp: 7, 3).

Participants were concerned that the not being exposed to computers and the lack of computer skills could be problematic when using ICATT. In addition one participant was concerned that older learners could experience problems when using ICATT.

### ***4.4.2.4 Advantages of ICATT***

Participants claimed that there were advantages to using the ICATT software as opposed to the conventional manner of IMCI case management.

#### *4.4.2.4.1 Use of computers*

Participants will be using computers for the first time for learning and indicated using ICATT means enjoying the benefits that computers offer.

> "If you have access to your own laptop its means that the focus is on individualised learning." (Fgp: 1, 5).

> "It will save time and help develop one's computer skills." (Fgp: 4, 4).

> "Aside from getting the information, you also learn how to use a computer and how to type. If you're bad at typing you have the opportunity to practice and become efficient. This means it is has a dual effect." (Fgp: 7, 3).

> "It's convenient. It's cost effective, you don't have to make copies like universities." (Fgp: 8, 4).

> "It can be easily implemented and it is something that is viable." (Fgp: 7, 3).

Participants mentioned that the use of computers allowed for individualised learning, as opposed to the conventional method of IMCI training which focused on group work. They claimed using the computers will save time and will allow them to become computer literate at the same time. Participants indicated that using computers is more convenient as there is no need to carry hardcopies as all the information can be easily accessed on the computer. There is also no need to print additional notes, which makes the use of computers economical. One participant claimed that the implementation of ICATT would be easy and a more viable option than the conventional method of training.

*4.4.2.4.2 Impact on learning*

Participants claimed that using ICATT can have a positive impact on their learning.

> "I think it's good that you can learn at your own pace, you don't need to have somebody always showing you what to do and, you can work on your own from the beginning to the end." (Fgp: 1, 5).

> "You get to learn at your own pace. When questions are asked on the software you can pause, and repeat, and get an understanding of what is being asked." (Fgp: 3, 4).

> "In as much as it's easy and simple to use, it makes learning exciting. So it's not boring at all and it makes you want to explore all aspects of the ICATT software. So you look forward to learning." (Fgp: 7, 3).

Participants claimed that using ICATT allows them to work at their own pace, and affords them the opportunity to go back and forth where the information is concerned, until they have a clear understanding of what is expected of them. Participants were encouraged

by the fact that the use of ICATT focuses on self-directed learning. They were eager to be independent learners who required the assistance of facilitators only if there were problems.

#### *4.4.2.4.3 Usability of the software*

Participants suggested that the easy to use software makes ICATT an advantageous method for facilitating IMCI case management training. This was the most expressed theme when exploring the advantages of ICATT (22 times).

> "I like the fact that in the testing section when asked a question, even if it was wrong you can still continue to try. ICATT allows you to save what you did today so that you can start from that point and continue the next day." (Fgp: 1, 5).

> "When you answer the questions, you also get feedback in the form of the correct answer. So that was also helpful as it gives you more perspective on the actual question itself." (Fgp: 1, 5).

> "I like the fact that you are able to save your profile as well." (Fgp: 3, 4).

> "I also liked the fact that the keywords are highlighted. So you look at those key words and you are able to remember information that you have already read." (Fgp: 4, 4).

> "Instead of having modules you click on the drop boxes. You just click and everything comes up, including further readings." (Fgp 8; 4)

Participants expressed positive views about the various aspects of the ICATT software. Participants indicated that saving their profiles on the ICATT software allowed them to easily return to areas where they experienced problems. The feedback from the "PRACTICE" section of the ICATT software allowed them to receive immediate feedback on correct or incorrect responses which they deemed valuable. Participants claimed that the highlighted words for example "READ, SEE, PRACTICE and TEST" and in the modules made learning and remembering easy. Participants mentioned that the software was interactive and not boring which contributed to its usability over the conventional book-based method. They also indicated that just clicking on a drop-down box assisted in accessing information more easily. The advantages highlighted by the participants in

this study are the common advantages to e-learning which can be a motivating factor for adoption of ICATT at nursing colleges.

#### *4.4.2.5 Preference for a method*

Participants indicated that they did have a preference for the way in which IMCI case management training is conducted. The majority of the participants were able to express what their preference is for IMCI case management training. It makes sense that after participants used the software, that in all likelihood they would express a preference for one method over the other.

##### *4.4.2.5.1 ICATT*

Almost all the participants preferred ICATT over the conventional method of training.

> "It makes sense to use the software programme and computers as we are training in a tertiary institution, and it's the way the world is advancing." (Fgp: 1, 6).

> "Computer literacy is going to help in terms of using our computer skills in the ward. We are also exposed to the different types of teaching methods." (Fgp: 1, 6).

> "Maybe other lecturers in other disciplines like GNS can use similar software for teaching once ICATT has started." (Fgp: 8, 4).

> "It's available for us to download on our own computers, so you always have it with you, even when you're finished the course and are working in a community setting. You have it on your computer and you can refer to it instead of having the booklet." (Fgp: 8, 4).

Participants acknowledged that technology was revolutionising the world and that nursing education should follow. Participants claimed that the use of technology in education will strengthen clinical practice especially with regards to having computer skills. Participants indicated that the use of ICATT will be beneficial for both nurse educators and learners during IMCI case management training. The use of ICATT can open the way for the use of technology in other disciplines of nursing. Participants indicated a preference for ICATT due to the strengths of e-learning for example accessibility and mobility.

#### *4.4.2.5.2 Conventional method*

Although the majority of the participants have expressed their preference for ICATT a few participants have expressed some doubt and reluctance regarding ICATT use. Their view is that a blended approach should be adopted which incorporates the conventional method with the new computer-based method.

> "ICATT would be advantageous but you would still get people who would prefer the conventional method. So I'm not saying do away with the conventional method, but let's not forget it. I like ICATT, but we should still use books." (Fgp: 3, 5).

> "You are not always going to have access to the computer and to the software. So when you're unable to access computers, you can always use the hard copy." (Fgp: 3, 5).

The participants were especially concerned about the challenges related to technology and indicated that they preferred the conventional method as opposed to ICATT. Accessibility to the software and computers were cited as possible challenges.

### ***4.4.2.6 Recommendations for the use of ICATT***

Participants offered recommendations that would impact positively on ICATT implementation at the nursing campuses, and these are presented below.

#### *4.4.2.6.1 Software*

Participants indicated that it is a good idea to transform learning by introducing computer -based learning.

> "ICATT is the way to go and it is a good idea to implement technology that is efficient." (Fgp: 1, 6).

They believed that introducing ICATT for IMCI case management training can make learning more efficient.

#### *4.4.2.6.2 Learners*

Participants suggested that there is a need for learners to undergo computer training to strengthen their computer skills. This theme was mentioned four times.

> "That the students undergo training for the usage, a computer course so they wouldn't feel intimidated by using the laptop as some people still do." (Fgp 3;5)

It is evident that some learners lack confidence with regards to the use of computers, hence their request for computer training.

#### *4.4.2.6.3 Computers*

Participants stressed the urgency of computers being supplied to nursing campuses for use by the learners.

> "You should tell them to get us computers." (Fgp: 1, 6).

The indication was that if no computers were made available then ICATT would not be able to be implemented.

#### *4.4.2.6.4 Implementation*

It is obvious from the focus group discussions that participants feel strongly about using ICATT for case management training.

> "I hope they implement it sooner rather than later." (Fgp: 1, 6).

Participants therefore recommended that ICATT be implemented as soon as possible for IMCI case management training.

### 4.4.3 QUANTITATIVE COMPONENT RESULTS FOR LEARNERS

#### *4.4.3.1 Response rate*

In total, 265 questionnaires were despatched and 235 were returned which provided a 88.6% response rate. The sample was drawn from 10 campuses as seen in Table 4.43.

**Table 4.43 Response rate for learners**

| Campus | Despatched | Returned | Percent |
|---|---|---|---|
| A | 25 | 24 | 9.0 |
| B | 30 | 29 | 11.0 |
| C | 25 | 20 | 7.5 |
| D | 25 | 21 | 8.0 |
| E | 20 | 17 | 6.4 |
| F | 25 | 23 | 8.7 |
| G | 30 | 26 | 9.8 |
| H | 35 | 32 | 12.0 |
| I | 30 | 26 | 9.8 |
| J | 20 | 17 | 6.4 |
| **Total** | **265** | **235** | **88.6** |

There was more or less an even spread of participants from across the campuses. The number of learners and campuses from which the sample was drawn is shown in Table 4.43. The response rate can possibly be attributed to learners' interest in the use of technology for learning.

#### *4.4.3.2 Results*

The results are presented under the following headings: - demographic data, access to information and communication technologies (ICT), technology assessment and use of the ICATT software.

*4.4.3.2.1 Demographic data*

The demographic data of the research participants is presented in this section. The age, gender and the type of nurse training they are currently registered for are also included in this section. Table 4.44 below describes the overall gender distribution by age.

**Table 4.44 Gender distribution by age (n=235)**

| Gender distribution | | | Gender | | Total |
|---|---|---|---|---|---|
| | | | Female | Male | |
| Age (years) | 21-30 | Count | 180 | 24 | 204 |
| | | % within Age (years) | 88.2% | 11.8% | 100.0% |
| | | % within Gender | 87.0% | 85.7% | 86.8% |
| | | % of Total | 76.6% | 10.2% | 86.8% |
| | 31-40 | Count | 25 | 4 | 29 |
| | | % within Age (years) | 86.2% | 13.8% | 100.0% |
| | | % within Gender | 12.1% | 14.3% | 12.3% |
| | | % of Total | 10.6% | 1.7% | 12.3% |
| | 41-50 | Count | 2 | 0 | 2 |
| | | % within Age (years) | 100.0% | 0.0% | 100.0% |
| | | % within Gender | 1.0% | 0.0% | 0.9% |
| | | % of Total | 0.9% | 0.0% | 0.9% |
| Total | | Count | 207 | 28 | 235 |
| | | % within Age (years) | 88.1% | 11.9% | 100.0% |
| | | % within Gender | 100.0% | 100.0% | 100.0% |
| | | % of Total | 88.1% | 11.9% | 100.0% |

Table 4.44 shows that within the gender category, the majority of learners are female. Overall, the ratio of males to females in this study is approximately 1:8 (11.9%: 88.1%). In addition, Table 4.44 also indicates the age distribution of the learners. A significant percentage (86.8%) of the learners fell into the age group 21 years to 30 years. Within the age category of 21years to 30 years, 88.2% were female. This category of females between the ages of 21 to 30 years formed 76.6% of the total sample. A smaller percentage (12.3%) of learners fell into the age category of 31 years to 40 years, whilst there were only two learners (0.9%) who fell into the age category of 41 years to 50 years.

All the learners (100%) in this study are registered for the R425 programme. The R425 programme is currently the only programme that is offering IMCI pre-service training to under-graduate nursing students. The IMCI case management course is offered at the second year of training, of the R425 programme at all nursing campuses in KwaZulu-Natal.

#### *4.4.3.2.2 Access to Information and Communication Technology (ICT) and Technology Assessment*

In this section, the findings are explained from the perspective of the learners. The findings that are presented are guided by objective 2 of this study, which is to explore the readiness of the learners for ICATT implementation. The researcher investigated the readiness of the learners for ICATT implementation by examining the following: accessibility to Information and Communication Technology (ICT) and a technology assessment.

The researcher used the Likert scale format type of questions and some closed questions to collect data from the learners. The section that follows analyses the scoring patterns of the respondents per variable per section. Where applicable, levels of disagreement (negative statements) were collapsed to show a single category of “Disagree”. A similar procedure was followed for the levels of agreement (positive statements). The results are first presented using summarised percentages for the variables that constitute each section. Results are then further analysed according to the importance of the statements.

- **Availability of information and communication technologies (ICT)**

Figure 4.8 presents the responses of the learners regarding the availability of information and communication technologies for use by learners at the nursing campuses.

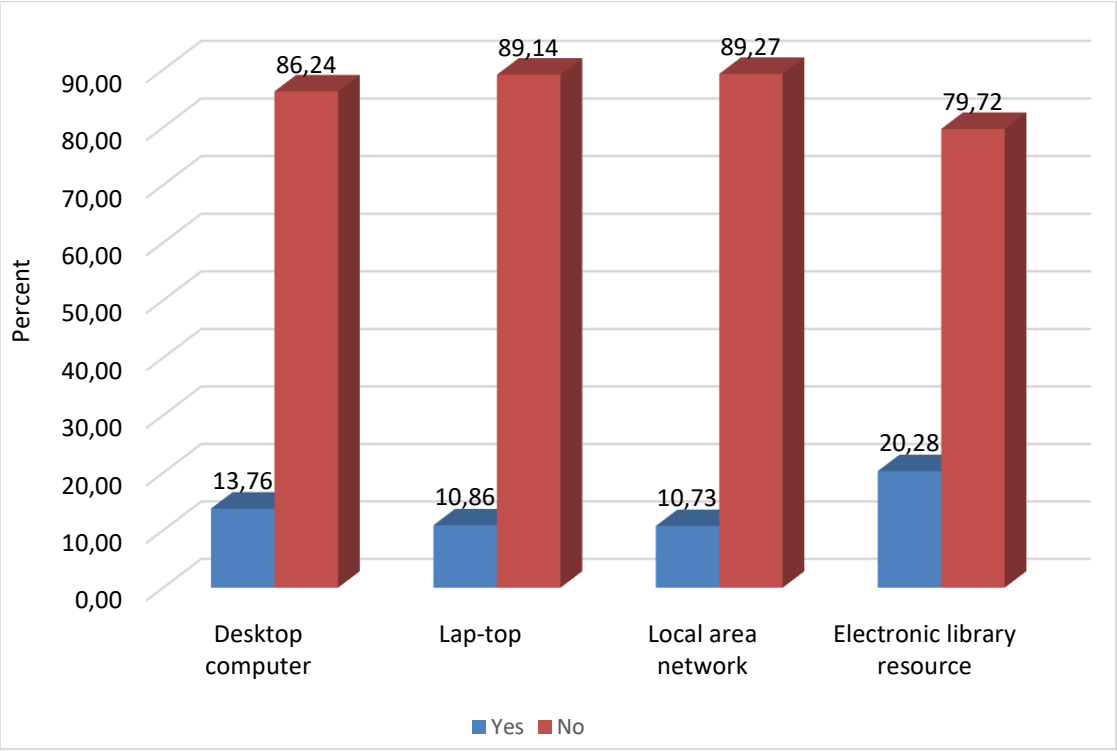


**Figure 4.8 Availability of information and communication technologies for learners (n=235)**

Figure 4.8 indicates that there are more negative responses than positive responses regarding the availability of information and communication technologies (ICT) for learners. The majority of the learners stated that there are no desk-top computers (86.2%) or lap-tops (89.1%) available for use by learners. The learners further indicated that they do not have access to local area networks (89.3%) or electronic library resources (79.7%) at their nursing campuses.

To determine whether the scoring patterns of the responses per statement were significantly different, a chi-square test was done. The results are shown in Table 4.45.

**Table 4.45 Chi-square test: access to information and communication technology for learners**

**Test Statistics**

| Chi-square test | Desktop computer | Lap-top | Local area network | Electronic library resource |
|---|---|---|---|---|
| Chi-Square | 114.514[a] | 135.425[b] | 126.444[c] | 74.887[d] |
| Df | 1 | 1 | 1 | 1 |
| Asymp. Sig. | .000 | .000 | .000 | .000 |

a, b, c, d 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 109.0.

Table 4.45 indicates a statistically significant difference in the responses to each of the statements tested. This indicates a signifcant difference in the number of learners who scored no compared to yes for these statements. During data analysis the following patterns were observed which were that most of the responses are negative, and each option has approximately the same value for the different options.

Table 4.46 presents the responses of the learners regarding whether or not they have access to intranet and internet search facilities at the nursing campuses.

**Table 4.46 Access to the intranet and internet search facilities by learners (n=235)**

| Access to intranet and internet search facilities | Yes | | No | | Total |
|---|---|---|---|---|---|
| | Count | Row n % | Count | Row n % | |
| Does this nursing campus offer learners access to the intranet search facilities for learning purposes? | 38 | 16.2% | 197 | 83.8% | 235 |
| Does this nursing campus offer learners access to the internet search facilities for learning purposes? | 44 | 19.0% | 191 | 81.0% | 235 |

According to Table 4.46, there are more negative responses than positive responses. Over 80% of learners lacked access to internet and intranet search facilities at the nursing campuses. A higher percentage of learners (83.8%) did not have access to intranet than internet (81.0%) search facilities.

Table 4.47 presents the responses of the participants regarding the importance of access to the intranet and internet for learners, and the need to incorporate technology for teaching and learning purposes.

**Table 4.47 The importance of access to search facilities, and incorporating technology for teaching and learning (n=235)**

| The importance of access to search facilities and incorporating technology for teaching and learning | Disagree | | Neutral | | Agree | | Total |
|---|---|---|---|---|---|---|---|
| | Count | Row n % | Count | Row n % | Count | Row n % | |
| It is important for learners to have access to the intranet search facilities for learning purposes and to keep abreast of the latest developments in health care | 20 | 8.5% | 9 | 3.8% | 206 | 87.7% | 235 |
| It is important for learners to have access to the internet search facilities for learning purposes and to keep abreast of the latest developments in health care | 18 | 7.7% | 7 | 2.6% | 210 | 89.7% | 235 |
| It is important to incorporate new technologies (computer-based) for teaching and learning purposes | 17 | 7.4% | 13 | 3.9% | 205 | 88.7% | 235 |

Table 4.47 indicates there are high levels of agreement by the learners regarding the importance of having accessibility to information and communication technologies for teaching and learning purposes. This is despite the fact that the majority of the learners do not have access to the internet or internet for their learning needs (Table 4.46). Between 87.7% and 89.7% of the learners respectively agreed that it is important for them to have access to the intranet and the internet search facilities. A high percentage of the learners (88.7%) agreed that it is important to incorporate new technologies for teaching and learning purposes.

**Technology readiness**

This section presents data pertaining to the technology assessment. Table 4.48 presents the responses from the learners regarding computer training.

**Table 4.48 Basic computer training/instruction for learners (n=235)**

| Training for learners | Yes | | No | | Total |
|---|---|---|---|---|---|
| | Count | Row n % | Count | Row n % | |
| Basic computer training/instruction | 2 | 0.9% | 233 | 99.1% | 235 |

Table 4.48 shows that the learners were almost unanimous in indicating that they did not receive any basic computer training or instruction during the course of their nurse training. This means that the nursing campuses have not included computer training into the undergraduate nursing programme. It can then be assumed that students with no basic computer training would have a negative attitude to the use of the ICATT software, which could have an impact on IMCI case management training at the nursing campuses.

Figure 4.9 presents the responses of the learners regarding their overall computer competency and literacy.

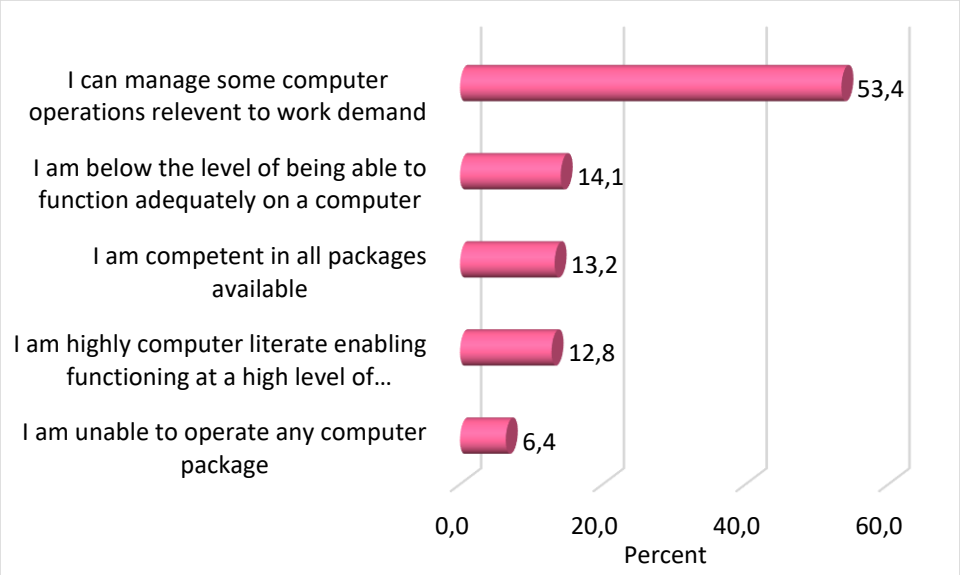


**Figure 4.9 Computer competency and literacy of the learners (n=235)**

Figure 4.9 indicates that a little more than half of the learners (53.4%) were able to use a computer for work related tasks. About a quarter of the learners (26.0%) indicated that they were competent, of which 12.8% of this group indicated that their competency extended to a high level of functioning. A small percentage of learners (14.1%) indicated that they function at a sub-optimal level, and a few learners (6.4%) indicated that they were not able to use a computer. This means that more learners are computer literate

than computer illiterate. The findings from this study suggest that a very small percentage of learners who are not computer literate may encounter difficulties when using computers to access the ICATT software.

Table 4.49 presents the responses of the learners regarding their ability to use the computer.

**Table 4.49 Use of the computer by learners (n=235)**

| Use of the computer Applications | Disagree | | Neutral | | Agree | | Total |
|---|---|---|---|---|---|---|---|
| | Count | Row n % | Count | Row n % | Count | Row n % | |
| I am confident using the internet | 22 | 9.4% | 38 | 16.1% | 175 | 74.5% | 235 |
| I am confident using MS WORD | 42 | 18% | 46 | 19.5% | 147 | 62.5% | 235 |
| I am able to use the computer to prepare assignments | 56 | 24.0% | 28 | 12% | 151 | 64% | 235 |
| I would like to use computer-based training programmes in the course of my training to enhance my learning | 15 | 6.4% | 8 | 3.4% | 212 | 90.2% | 235 |

In Table 4.49, the patterns indicate that the levels of agreement are greater than the levels of disagreement. Although Table 4.48 shows that the learners did not receive any basic computer training during nurse training, over 60% of learners (Table 4.49) expressed confidence that they were able to use the Microsoft Word processor. An even higher percentage (74.5%) was able to use the internet to search for information. The majority of the learners (90.2%) would like to use computer-based learning programmes in the course of their training to enhance their learning. However, more learners were confident about using the internet than with using Microsoft Word or using the computer to prepare assignments. The findings of this study suggest that over 60% of the learners are confident in their abilities to use the computer when preparing assignments, use Microsoft Word and use the internet. One can assume that a greater number of learners may be able to use the ICATT software at the nursing campuses.

Table 4.50 presents the responses of the learners regarding the benefit of using electronic applications.

**Table 4.50 The use of information and communication technologies for learners (n=235)**

| The use of information and communication technologies for learners | Very little benefit | | Unsure | | Very beneficial | | Total |
|---|---|---|---|---|---|---|---|
| | Count | Row n % | Count | Row n % | Count | Row n % | |
| Computers | 6 | 2.6% | 6 | 2.6% | 222 | 94.9% | 235 |
| Internet access | 2 | 0.9% | 9 | 3.9% | 222 | 95.3% | 235 |
| Intranet access | 10 | 4.3% | 15 | 6.5% | 207 | 89.2% | 235 |
| Submission of assignments online | 32 | 13.7% | 49 | 21.0% | 152 | 65.2% | 233 |
| Completion of tests online | 53 | 22.8% | 37 | 15.9% | 142 | 61.2% | 232 |

Table 4.50 shows that the majority of participants, that is between 89.2% and 95.3%, are in agreement that computers, internet access and intranet access are very beneficial for learners in their learning environment. Fewer learners (65.2% and 61.2% respectively) acknowledged that the online submission of assignments and the completion of tests online are very beneficial. However, not all the learners responded to the statements regarding the benefit of online assignments and online tests.The learners have limited access to information and communication technologies and some computer skills, but the majority of learners indicated that its use will be beneficial for learning. ICATT implementation is a means of affording learners at some of the nursing campuses first time access to computers, the internet and the intranet, and an opportunity to do on-line assignments and on-line tests for learning purposes.

Figure 4.10 shows the responses of the learners regarding the use of technology by nurse educators for teaching at the nursing campuses.

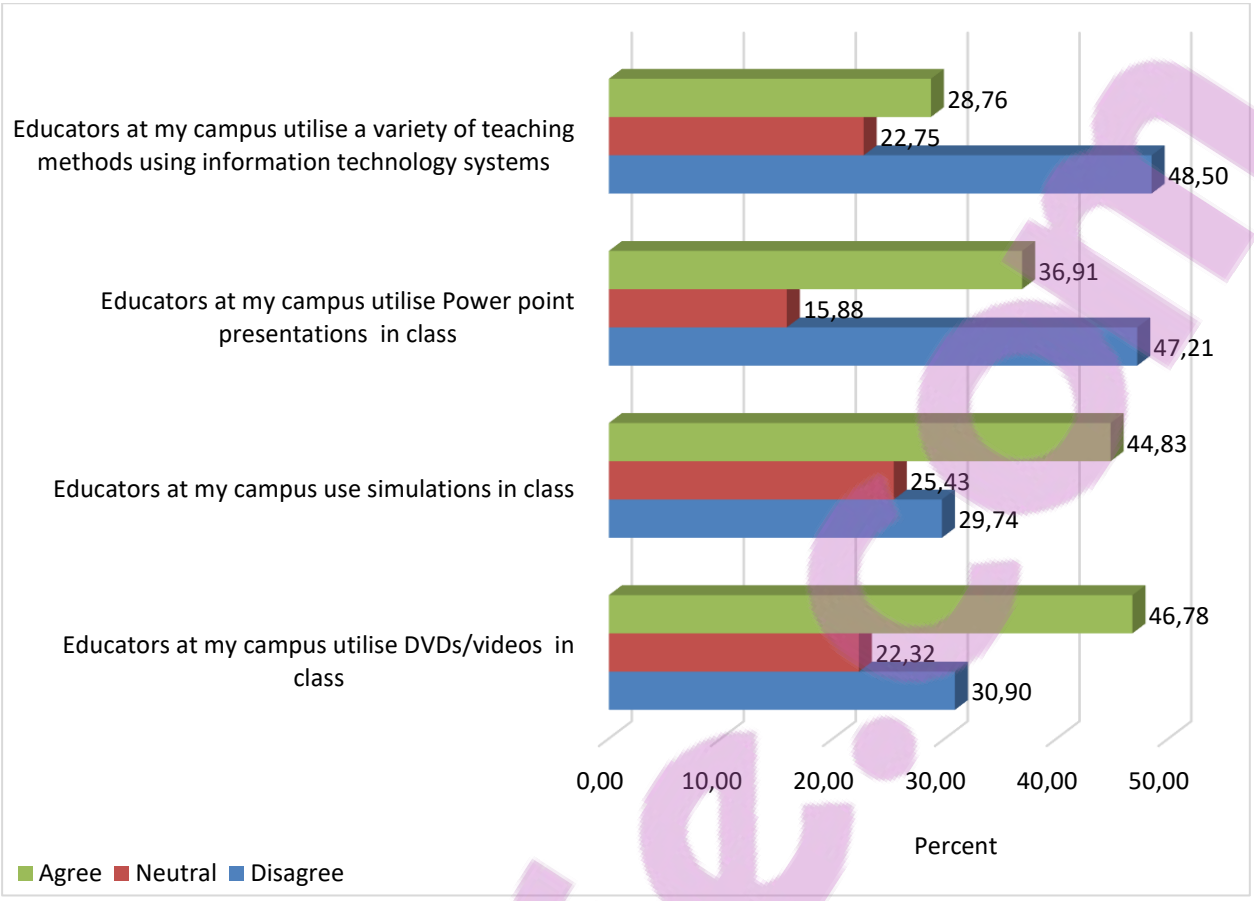


**Figure 4.10 The use of technology for teaching at the nursing campuses (n=235)**

It is evident from these findings that the use of information and communication technologies as a teaching method by nurse educators in nursing campuses is low. Figure 4.10 shows that a higher percentage of learners that is 48.5% and 47.2% disagree that the nurse educators at the nursing campuses use information and communication technology to support their teaching. More learners are in agreement that educators utilise simulations (44.8%) and DVDs or videos (46.8%) in the classroom. Findings from this study show that nursing campuses do have infrastructural constraints for example few computers. It can therefore be assumed that this is the reason why nurse educators still use simulations and DVDs and videos as opposed to the use of information and communication technologies to facilitate teaching and learning at the nursing campuses.

Table 4.51 presents the learners' responses to computer-based learning.

**Table 4.51 Learners and their preparedness for computer-based learning (n=235)**

| Learners and their preparation for computer-based learning | Disagree | | Neutral | | Agree | | Total |
|---|---|---|---|---|---|---|---|
| | Count | Row n % | Count | Row n % | Count | Row n % | |
| As a nursing student I am being adequately prepared for the highly technological clinical environment | 120 | 51% | 38 | 16 % | 77 | 33% | 235 |
| Nursing students would be better prepared if computer-based learning programmes were included into the current curriculum | 9 | 3.8% | 11 | 4.7% | 215 | 91.5% | 235 |
| As a nursing student I would feel more confident about using computer-based learning programmes, if I had more access to computers, and the internet during the course of my training | 6 | 2.6% | 6 | 2.6% | 223 | 94.8% | 235 |

Table 4.51 shows that more than half of the learners (51%) disagreed that they were being adequately prepared for a highly technological clinical environment. This can be attributed to the fact that nursing campuses do not expose learners to technology in the teaching and learning environment. The majority of the learners (91.5%) agreed that they would be more skilled at using technology if computer-based learning were incorporated in to the current nursing programmes. The majority of the learners (94.8%) were also in agreement regarding having more confidence about using computer-based learning programmes if they had access to computers and computer training. It is evident from the results that learners are aware that a lack of preparedness in computer-based learning can impact negatively on their learning in the classroom and their clinical practice. The implementation of ICATT for IMCI case management training is one way for nursing campuses in KwaZulu-Natal to integrate information and communication technologies into the nursing curriculum.

*4.4.3.2.3 Findings related to the understanding of learners regarding ICATT*

This section presents the views of the learners regarding the use of the ICATT software. The researcher used the Likert scale format type of questions. The result from the data analysis is presented in the following sub-section. Table 4.52 indicates the views of the learners regarding the usefulness of the ICATT software. The learners had to indicate whether they found the software very useful, useful, somewhat useful, or useless. For the purpose of analysis and discussion both very useful and useful were combined to give a response of 'useful' and 'somewhat useful' and 'useless' remained as is.

**Table 4.52 The views of the learners regarding the usefulness of the ICATT software (n=235)**

| Usefulness of the ICATT software | Useful | | Somewhat useful | | Useless | | Total |
|---|---|---|---|---|---|---|---|
| | Count | Row n % | Count | Row n % | Count | Row n % | |
| Session on navigation in ICATT (Moving through ICATT) | 229 | 98.3% | 4 | 1.7% | 0 | 0.0% | 233 |
| Introduction part (About IMCI, IMCI case management process, charts and recording forms) | 228 | 97.9% | 4 | 1.7% | 1 | 0.4% | 232 |
| Care of the sick child aged 2 months up to 5 years | 232 | 99.6% | 1 | 0.4% | 0 | 0.0% | 233 |
| Assess and classify | 232 | 99.6% | 1 | 0.4% | 0 | 0.0% | 233 |
| Identify treatment | 225 | 97.4% | 5 | 2.2% | 1 | 0.4% | 231 |
| Treat the child | 232 | 99.6% | 0 | 0.0% | 1 | 0.4% | 233 |
| Counsel the mother | 230 | 98.7% | 1 | 0.4% | 2 | 0.9% | 233 |
| Follow-up | 229 | 98.7% | 2 | 0.9% | 1 | 0.4% | 232 |
| Care of young infant aged up to 2 months | 230 | 98.7% | 1 | 0.4% | 2 | 0.9% | 233 |
| Essential care | 224 | 97.0% | 6 | 2.6% | 1 | 0.4% | 231 |
| Assess and classify young infant | 232 | 100.0% | 0 | 0.0% | 0 | 0.0% | 232 |
| Identify treatment, treat and counsel | 229 | 98.7% | 2 | 0.9% | 1 | 0.4% | 232 |
| Follow-up | 228 | 99.1% | 2 | 0.9% | 0 | 0.0% | 230 |
| IMCI HIV training course | 221 | 98.7% | 2 | 0.9% | 1 | 0.4% | 224 |
| Introduction and standard care | 220 | 98.2% | 4 | 1.8% | 0 | 0.0% | 224 |
| Initiating ART in children | 219 | 97.3% | 4 | 1.8% | 2 | 0.9% | 225 |
| Providing ART follow up | 220 | 97.8% | 5 | 2.2% | 0 | 0.0% | 225 |
| ICATT READ sections | 228 | 99.1% | 2 | 0.9% | 0 | 0.0% | 230 |
| ICATT SEE sections | 228 | 99.6% | 0 | 0.0% | 1 | 0.4% | 229 |
| ICATT PRACTISE sections | 227 | 98.7% | 1 | 0.4% | 2 | 0.9% | 230 |
| ICATT TEST sections | 227 | 99.1% | 1 | 0.4% | 1 | 0.4% | 229 |

Table 4.52 indicates the responses of the learners regarding the usefulness of the ICATT software. Not all the respondents completed this section, which can be a limitation in the interpretation of the result for this section. However, for those that did respond the majority of the learners agreed that the different sections contained within the ICATT software were useful. The average level of “Useful” ranking is 98.65%. In effect then, a greater number of respondents have identified all of the sections as being useful.

Figure 4.11 indicates the views of the learners regarding the ease with which they can use the ICATT software. The learners had to indicate whether they found the software easy, somewhat easy, somewhat difficult or difficult. For the purpose of analysis and discussion both easy and somewhat easy were combined to give a response of ‘somewhat easy’, and ‘somewhat difficult’ and ‘difficult’ remained as is.

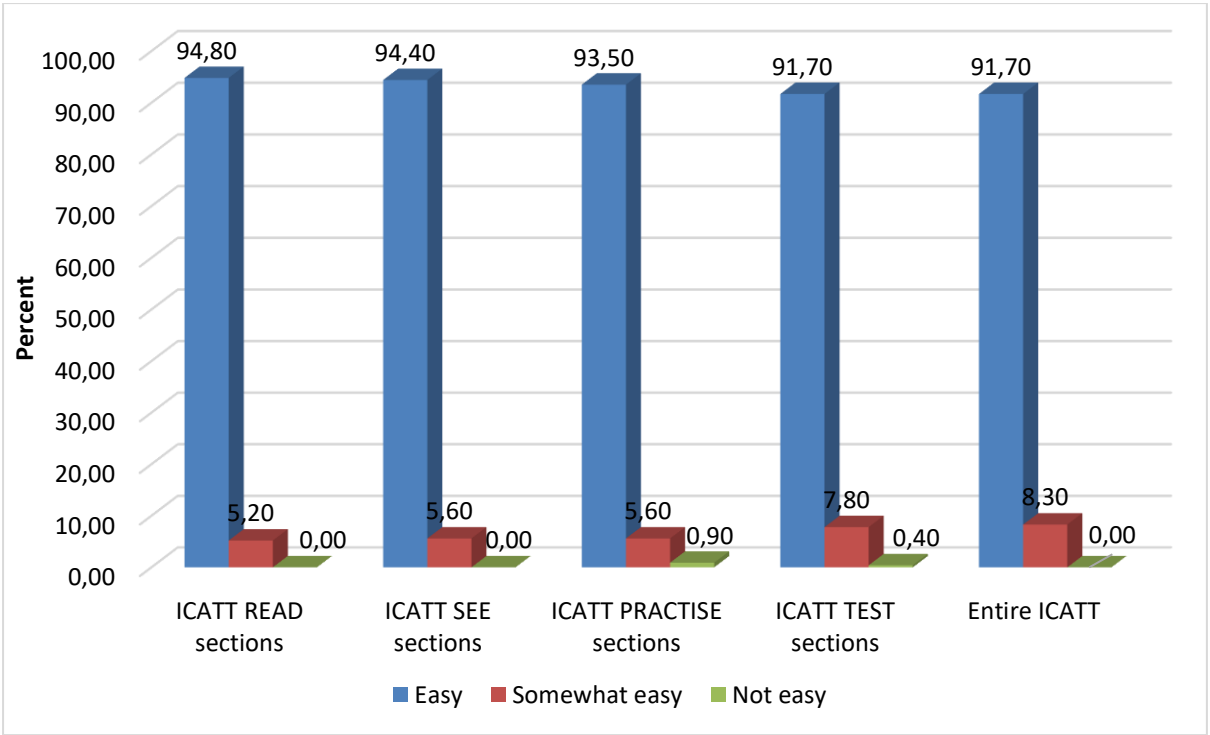


**Figure 4.11 The views of the learners regarding the ease with which they can use the ICATT software**

Figure 4.11 indicates that almost all the learners found the different sections of ICATT easy to use. On average, 93.22% of the learners felt the software easy to use. A higher percentage of learners found the ICATT “READ, SEE, PRACTICE” sections easy. Fewer learners (91.7%) found the test sections easy.

The IMCI trained learners were also asked to give details about what they did find difficult about the ICATT software. For those that experienced difficulty, the following reasons as indicated in Table 4.53 were listed.

**Table 4.53 Aspects considered difficult regarding the ICATT software**

| Difficulties encountered with the ICATT software | Count |
|---|---|
| It was not easy to use the computer fast as some were not trained to use a computer | 4 |
| Easy but facilitators should assist | 2 |
| Could not understand initially until guided | 2 |
| Typing answers in point/bullet form | 2 |
| Getting used to hands on typing with the keyboard | 2 |
| It was not easy navigating from one section to another, it should flow consecutively | 1 |
| Clicking was a problem when using the computer | 1 |
| Scrolling down the page was a bit challenging | 1 |
| The format of ICATT gets very busy and confusing | 1 |
| Co-ordinating a mousepad | 1 |
| The side menus or pop-ups were confusing | 1 |

Table 4.53 presents the aspects that were considered difficult by the learners. Only 18 (8%) of the respondents experienced these difficulties. Many of the difficulties relate to the computer literacy of the learners or lack thereof as they are unable to use the computer for example “getting used to hands on typing with the keyboard,” “clicking was a problem when using the computer,” and “scrolling down the page was a bit challenging.” Three learners experienced problems related to the software itself namely “the format of ICATT gets very busy and confusing,” and “the side menus or pop-ups were confusing,” and “it was not easy navigating between sections.”

#### *4.4.3.3 Factor analysis and Rotated Component Matrix*

The outcome of the factor analysis is presented in the tables that follow. The variables in tables 4.54, 4.55, 4.57, 4.58 and 4.60 loaded perfectly along a single component. This implies that the statements in the section measured what they set out to measure. In the remaining tables (4.56 and 4.59) the variables loaded along 2 components (sub-themes). This means that respondents identified different trends within the section.

**Table 4.54 Rotated Component Matrix: Importance of access to information and communication technology**

**Rotated Component Matrix[a]**

| B6 Importance of access to information and communication technology | Component |
|---|---|
| | 1 |
| It is important for learners to have access to the intranet search facilities for learning purposes and to keep abreast of the latest developments in health care | .948 |
| It is important for learners to have access to the internet search facilities for learning purposes and to keep abreast of the latest developments in health care | .966 |
| It is important to incorporate new technologies (computer-based) for teaching and learning purposes | .952 |

Extraction Method: Principal Component Analysis.

a. 1 component extracted.

The findings of this study show that a greater number of campuses do not give learners access to the internet or intranet. There are high correlations for these statements with respondents demanding for access to and incorporation of information and communication technologies for teaching and learning.

**Table 4.55 Rotated Component Matrix: Use of computers by learners**

**Rotated Component Matrix[a]**

| B8 Use of computers by learners | Component |
|---|---|
| | 1 |
| I am confident using the internet | .881 |
| I am confident using MS WORD | .922 |
| I am able to use the computer to prepare assignments | .843 |
| I would like to use computer-based training programs in the course of my training to enhance my learning | .635 |

Extraction Method: Principal Component Analysis.

a. 1 component extracted.

There are high correlations between these variables. Even though no specialised computer skills are required for the use of the ICATT software, it is positive that the respondents are displaying confidence and competence to use information and communication technologies for learning.

**Table 4.56 Rotated Component Matrix: Value of information and communication technology**

**Rotated Component Matrix[a]**

| B10 Value of information and communication technology | Component | |
|---|---|---|
| | 1 | 2 |
| Computers use | .789 | .194 |
| Internet access | .869 | .032 |
| Intranet access | .761 | .271 |
| Submission of assignments online | .218 | .867 |
| Completion of tests online | .118 | .904 |

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 3 iterations.

The Rotated Component Matrix shows correlations along two components. The first component suggests that the respondents identified that computers are essential for teaching and learning but will also allow for access to the internet and intranet. The second component suggests that the completion of tests online and online submission of assignments is not only essential in today's teaching and learning environment but can strengthen teaching and learning.

**Table 4.57 Rotated Component Matrix**: **Utilisation of varied teaching methods**

**Rotated Component Matrix[a]**

| B11 Utilisation of varied teaching methods | Component |
|---|---|
| | 1 |
| Educators at my campus utilise a variety of teaching methods using information technology systems | .787 |
| Educators at my campus utilise Power point presentations in class | .748 |
| Educators at my campus use simulations in class | .716 |
| Educators at my campus utilise DVDs/videos in class | .727 |

Extraction Method: Principal Component Analysis.

a. 1 component extracted.

There are high correlations between these variables. Respondents agree that nurse educators are more inclined to use roleplay and DVDs as teaching methods, and less likely to use information and communication technologies to facilitate teaching and learning.

**Table 4.58 Rotated Component Matrix: Preparedness for computer-based learning**

**Rotated Component Matrix[a]**

| B12 Preparedness for computer-based learning | Component |
|---|---|
| | 1 |
| Nursing students would be better prepared if computer- based learning programmes were included into the current curriculum | .917 |
| As a nursing student I would feel more confident about using computer-based learning programmes, if I had more access to computers, and the internet during the course of my training | .917 |

Extraction Method: Principal Component Analysis.

a. 1 component extracted.

There are high correlations between these variables. Respondents were in agreement regarding the inclusion of computer-based learning programmes in nursing education. Accessibility to computers and the internet can further strengthen the use of computer-based learning programmes in nursing education.

**Table 4.59 Rotated Component Matrix: Content of ICATT**

**Rotated Component Matrix[a]**

| C13 Content of ICATT | Component | |
|---|---|---|
| | 1 | 2 |
| Session on navigation in ICATT (Moving through ICATT) | .527 | .361 |
| Introduction part (About IMCI, IMCI case management process, charts and recording forms) | .690 | .270 |
| Care of the sick child aged 2 months up to 5 years | .822 | .271 |
| Assess and classify | .794 | .358 |
| Identify treatment | .818 | .298 |
| Treat the child | .850 | .223 |
| Counsel the mother | .748 | .329 |
| Follow-up | .808 | .245 |
| Care of young infant aged up to 2 months | .735 | .387 |
| Essential care | .690 | .432 |
| Assess and classify young infant | .711 | .478 |

| | | |
|---|---|---|
| Identify treatment, treat and counsel | .706 | .466 |
| Follow-up | .732 | .473 |
| IMCI HIV training course | .523 | .604 |
| Introduction and standard care | .670 | .449 |
| Initiating ART in children | .649 | .497 |
| Providing ART follow up | .597 | .551 |
| ICATT READ sections | .379 | .779 |
| ICATT SEE sections | .317 | .847 |
| ICATT PRACTISE sections | .299 | .827 |
| ICATT TEST sections | .241 | .862 |

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 3 iterations.

The Rotated Component Matrix shows correlations along two components. The first component suggests that respondents identified that the content from the IMCI case management training modules was contained within the ICATT software. ICATT would therefore be useful for IMCI case management training as the relevant modules are contained herein. The second component suggests that the ICATT READ, SEE, PRACTICE and TEST sections are useful for learning purposes.

**Table 4.60 Rotated Component Matrix: Process of ICATT**

**Rotated Component Matrix[a]**

| C14 Process of ICATT | Component |
|---|---|
| | 1 |
| ICATT READ sections | .840 |
| ICATT SEE sections | .802 |
| ICATT PRACTISE sections | .818 |
| ICATT TEST sections | .834 |
| Entire ICATT | .768 |

Extraction Method: Principal Component Analysis.

a. 1 component extracted.

The Rotated Component Matrix shows high correlations between these variables regarding the ease with which respondents navigated the different sections of the ICATT software.

## 4.5 MIXING OF RESULTS

This study has adopted the mixed methods approach and it is for this reason that the researcher has mixed the results for the campus principals, nurse educators and learners.

### 4.5.1 Mixing of the qualitative and quantitative results for the campus principals

Table 4.61 shows the mixing of the qualitative and quantitative results for the campus principals.

**Table 4.61 Phase 1: Mixing of the qualitative and quantitative results for the campus principals**

| Qualitative results | Quantitative results |
|---|---|
| **Positive attitude**<br>• **Training**<br>"We have staff that did IMCI case management training." (In: 8, 1).<br><br>• **Use of technology**<br>"… the younger staff seemed to be more au-fait in the actual ease of use and handling of technology." (In: 1,1).<br><br>"We've tried to start utilising IT … computers, data projectors as opposed to the old overhead projectors." (In: 6, 1). | **Readiness of nursing campuses**<br>• **Training**<br>Eight nursing campuses have more than three nurse educators trained in IMCI.<br><br>• **Use of technology**<br>Of the nursing campuses 66.7% offered nurse educators access to and the use of the intranet and 55.6% internet for teaching and learning purposes respectively.<br><br>Of the nursing campuses 88.9% provided nurse educators with access to computers.<br><br>At the nursing campuses 88.9% had laptops and data projectors for use by nurse educators in the campuses. |
| **Enablers of ICATT use**<br>• **Campus**<br>"It's cost effective, especially because everything will be there. The expenditure will be less, so then I think it's going to benefit us." (In: 2, 2). | **Enablers of ICATT use**<br>• **Campus**<br>All campus principals (100%) agreed that the benefit of using ICATT is that it is economical. |

| Qualitative results | Quantitative results |
|---|---|
| "Using ICATT will help in IMCI case management, and the effective utilisation of staff." (In: 4, 1). | All campus principals (100%) agreed the benefit of using ICATT is that it is easier to make changes or do updates electronically at no cost. |
| • **Nurse educators**<br>"Technology is actually being used as a method of teaching more and more every day. It provides more innovative ideas for guiding the students." (In: 1, 2). | • **Nurse educators**<br>More than two thirds of the campus principals (77.8%) were in agreement that using ICATT is beneficial as it provides for ideal educator -learner ratios as group learning and facilitation can take place with one or two nurse educators trained in IMCI. |
| • **Learners**<br>"The use of ICATT allows for students to work at their own pace and not to be held up by other students who are slow learners." (In: 2, 1). | • **Learners**<br>All campus principals (100%) agreed that the benefit of using ICATT is that it is an alternative training approach that stimulates independent thinking amongst learners.<br><br>All campus principals (100%) agreed that the benefit of using ICATT is that learners can work at their own pace. |
| **Recommendations for ICATT use**<br>• **Training**<br>"All nurse educators lecturing in Community Nursing Science and Primary Health Care must be trained in ICATT." (In: 7, 6). | **Recommendations for ICATT use**<br>• **Training**<br>Of the campus principals 88.9% are willing to motivate for nurse educators trained in IMCI to be sent for ICATT training, to improve IMCI case management training at their campuses. |
| • **Resources**<br>"The ICATT software must be downloaded on to students' cellular phones so that the software is accessible even in their rooms, at night or whenever it is needed." (In: 7, 9). | • **Resources**<br>All the campus principals (100%) agreed that to achieve the goals and objectives of IMCI when using ICATT there is a need to align IMCI and ICATT materials with recent updates and software. |
| • **Support** | • **Support** |

| Qualitative results | Quantitative results |
|---|---|
| "I feel because it is a government initiative, that we should be able to access funds from the government to implement ICATT." (In: 8, 2). | All the campus principals (100%) agreed that there is a need to engender sustainable commitment from the National Department of Health partners. |

### 4.5.2 Mixing of the qualitative and quantitative results for the nurse educators

The mixing of the qualitative and quantitative results for the nurse educators is shown in Table 4.62 below.

**Table 4.62 Phase 2: Mixing of the qualitative and quantitative results for the nurse educators**

| Qualitative results | Quantitative results |
|---|---|
| **Positive attitude**<br>• **ICATT**<br>"It won't be a problem adjusting to ICATT as it is computerised. It's actually a wonderful idea." (Fgp: 1, 1). | **Use of technology**<br>Of the nurse educators 94.3% indicated that it is important to incorporate new technologies (computer-based) for teaching and learning purposes. |
| **Enablers of ICATT use**<br>• **Campus**<br>"ICATT will be cost effective as there is no need to photocopy all the modules. Sometimes there is a problem with regards to not being able to access DVDs." (Fgp: 7, 1).<br>• **Nurse educators**<br>"It also reduces the burden on the lecturer because you can actually leave the student to work on the programme on their own as most of the information is known to them." (Fgp: 8, 1). | **Enablers of ICATT use**<br>• **Campus**<br>Of the nurse educators 94.12% agree that the ICATT implementation is economical for nursing campuses, as it does not require printing of hard copy training material.<br>• **Nurse educators**<br>Of the nurse educators 97.6% agree that ICATT provides for ideal educator-learner ratios as group learning and facilitation can take place with one or two IMCI trained educators. |

| Qualitative results | Quantitative results |
|---|---|
| "It's easy to review and update information using technology as opposed to discarding outdated paper copies used in the conventional training." (Fgp: 2, 1). | Of the nurse educators 87.88% agree that it is easier to make changes or do updates electronically at no cost. |
| "It is easier for nurse educators to use ICATT than the conventional method because the software has a read section and videos that are easy to access." (Fgp: 7, 1). | Of the nurse educators 68.6% are able to use computers for work related tasks.<br><br>Between 97.1% to 100% of the nurse educators indicated that the ICATT READ, SEE, PRACTICE and TEST sections were somewhat easy to use. |
| • **Learners**<br>"It is going to be very effective for learning on a one-to-one basis. Learners will work through each module at their pace". (Fgp: 2, 1).<br><br>"They can evaluate themselves in the TEST section so they can see where their mistakes are so it's going to be more of a help to the students." (Fgp: 3, 1). | • **Learners**<br>Of the nurse educators 94.12% indicated the benefit of ICATT is that learners can work at their own pace.<br><br>Of the nurse educators 97.06% agree that the benefit of ICATT is that it is an alternative training approach that stimulates independent thinking amongst learners. |
| • **Using ICATT**<br>"It's paperless so obviously its cost-effective and less time consuming than the old method. So it's quicker. Yes, I think it is more user-friendly." (Fgp: 7, 2). | • **Using ICATT**<br>All the nurse educators (100%) agree that benefit of using ICATT means that the training course can be done in a shorter period of time. |
| **Recommendations for readiness for ICATT use**<br>• **Resources** | **Recommendations for readiness for ICATT use**<br>• **Resources** |

| Qualitative results | Quantitative results |
|---|---|
| "If you have the necessary facilities it would be easy for us to implement ICATT." (Fgp: 5, 1). | Of the nurse educators 94.3% indicated that it is important for nurse educators to have access to the intranet and internet search facilities to keep abreast of the latest developments in health care and teaching practices.<br><br>Of the nurse educators 94.3% indicated that it is important for nurse educators to incorporate new technologies for teaching and learning purposes. |
| • **Support**<br>"We need computers." (Fgp: 1, 8).<br><br>"Nurse educators must be trained in ICATT, then it's going to be okay". (Fgp: 6, 1). | • **Support**<br>Of the nurse educators 94.3% do have access to computers at their campuses.<br><br>Of the nurse educators 83% agreed that they will be willing to attend ICATT training, to improve IMCI case management training at their nursing campuses. |

### 4.5.3 Mixing of the qualitative and quantitative results for the learners

The qualitative and quantitative results for the learners have been mixed. Table 4.63 shows the mixing of both the results for the learners.

**Table 4.63 Phase 2: Mixing of the qualitative and quantitative results for the learners**

| Qualitative results | Quantitative results |
|---|---|
| **Positive attitude**<br>• **ICATT**<br>"It's a great idea because I love computers and I think it's in keeping with the technological era." (Fgp: 6, 1). | **Positive attitude**<br>• **ICATT**<br>Of the learners 88.7% agree that it is important to incorporate new technologies |

| Qualitative results | Quantitative results |
|---|---|
| | (computer-based) for teaching and learning purposes. |
| **Benefits of ICATT**<br>• **Use of computers**<br>"It's about time that we had access to computers because it's already being used at universities.<br><br>When I attend university sometime in the future I do not want to be at a disadvantage due to a lack of knowledge in computer-based learning." (Fgp: 1, 2).<br><br>"For those of us who already use computers, it will be useful for doing assignments. I think it will be great." (Fgp: 5, 1).<br><br>• **Preference for ICATT**<br>"You will be able to SEE as the software contains videos, and you're going to READ and do exercises which allow you to be involved in your own learning. This allows you to evaluate yourself and know where you are lacking." (Fgp: 7, 1-2). | **Benefits of ICATT**<br>• **Use of computers**<br>Of the learners 94.9% agree that access to computers will be beneficial for learning.<br><br>Of the learners 65.2% agree that on-line submission of assignments will be beneficial.<br><br>• **Preference for ICATT**<br>Of the learners 90.2% agree that they would like to use computer-based programmes in the course of their training to enhance their learning. |
| • **Readiness to use ICATT**<br>"ICATT is very simple and straightforward. All of whatever you need to know is contained in one software package. It includes features that will direct you on its use. It's very user friendly." (Fgp: 1, 1).<br><br>"It makes sense to use the software programme and computers as we are training in a tertiary institution, and it's the way the world is advancing." (Fgp: 1, 6). | • **Readiness to use ICATT**<br>On average 93.22% of learners found the ICATT READ, SEE, PRACTICE and TEST easy to use.<br><br>Of the learners 74.5% agree that they can use the internet. 62.5% of the learners agree that they can use Microsoft Word. 53.4% of |

| Qualitative results | Quantitative results |
|---|---|
| | the learners indicated they were able to perform basic computer operations. |

The qualitative findings corrobate the quantitative findings for campus principals, nurse educators and learners. The positive attitude towards ICATT implementation, the enablers for ICATT use and the recommendations were used to formulate guidelines and develop a model for best practice for ICATT implementation at the nursing campuses.

## 4.6 SUMMARY

This chapter presents findings from the individual interviews with campus principals and the focus group interviews with nurse educators and learners from nursing campuses in KwaZulu-Natal. In addition, this chapter presents the findings from the data collected from the questionnaires distributed to campus principals, nurse educators and learners. The qualitative and quantitative data findings are first presented separately for the campus principals, nurse educators and learners. The qualitative and quantitative findings for the campus principals, nurse educators and learners which have been mixed are presented in tables as this study has adopted a mixed methods approach. The findings address the objectives of this study and present an overall picture of the understanding of the campus principals, nurse educators and learners regarding ICATT implementation. The benefits and challenges to ICATT implementation have been identified and the findings that determine the state of readiness of the nursing campuses, nurse educators and learners are presented. The findings from phases 1 and 2 and the mixing of the results support the development of the guidelines and model in phase 3 of this study.

Chapter 5 discusses phase 3 which is the final outcome of this study that is the development and refinement of the guidelines and a model for the implementation of ICATT at nursing campuses in KwaZulu-Natal.

# CHAPTER 5

# THE DEVELOPMENT OF GUIDELINES AND A MODEL FOR THE IMPLEMENTATION OF ICATT AT NURSING CAMPUSES OF THE KWAZULU-NATAL COLLEGE OF NURSING (PHASE 3)

## 5.1 INTRODUCTION

Based on the findings discussed in the previous chapter, derived from phases 1 and 2 of this study, this chapter now presents phase 3. This phase sees the development of guidelines and a model for the implementation of ICATT at nursing campuses are presented. A discussion of the development of the guidelines and a model is presented in this chapter and its aim is to facilitate the implementation of ICATT at nursing campuses of the KwaZulu-Natal College of Nursing.

## 5.2 THE FOUNDATION FOR GUIDELINE AND MODEL DEVELOPMENT

The analysis and synthesis of data and the mixing of the results from phase 1 and 2 of this study provided the foundation for the development of guidelines and a model for ICATT implementation. The emerging themes were identified and used for guideline and model development. The themes included nursing campus readiness, nurse educator and learner readiness, the enablers for ICATT use and recommendations to guide implementation. The literature relating to IMCI case management training and the use of a computerised adapted training tool has also been considered in developing the model and the guidelines. A detailed discussion on the development of guidelines and a model are discussed in the sections below.

## 5.3 GUIDELINE DEVELOPMENT

At the outset the definition of ‘guideline’ requires clarification. According to Garner, Hill and Schünemann (2015: v), guidelines are evidence-based statements that are systematically developed to assist providers, recipients and stakeholders to make informed decisions about health interventions. Guidelines are important as they use information from many sources to develop action statements (Rosenfeld, Shiffman &

Robertson 2013: S5, Vander Schaaf, Seashore & Randolph 2015:230). They can be a guide to best practices, a framework for decision-making and a tool for evaluating performance (Rosenfeld et al 2013: S4). The purpose of guidelines is to produce optimum outcomes for example to improve clinical care or in some instances to reduce costs although this may not be the primary focus (Rosenfeld et al 2013: S7). The purpose of developing guidelines for ICATT implementation is to optimise teaching and learning using innovative technologies in the resource constrained environments of nursing campuses. Evidence indicates that if guidelines are properly developed they can strengthen clinical practice when disseminated and implemented (Grimshaw & Russell 1993:243). Researchers therefore suggest that the guideline development process should be quality driven and evidence-based. An efficient and transparent methodology should be used during development. Actionable recommendations must emerge and there should be multidisciplinary involvement (Rosenfeld et al 2013: S4).

The guidelines for ICATT implementation emerged from the findings of a two-phase sequential exploratory study. The understanding of the campus principals, nurse educators and learners regarding the implementation of ICATT at nursing campuses were explored and described in a qualitative descriptive study. Additionally, the findings from the quantitative study investigated the readiness of the campus principals, nurse educators and learners to use and implement ICATT.The researcher's knowledge and understanding of ICATT use and implementation, together with the empirical evidence from the extant literature further supported the development of the guidelines.

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According to the WHO handbook for guideline development (2014:2), a guideline focuses on a specific population and addresses an area of uncertainty. In the context of this study the focus is on campus principals, nurse educators and learners and the area of uncertainty is ICATT implementation at the nursing campuses. When developing guidelines, they can either comprise of a list of elements or be presented as an algorithm, broad statements or prose statements (Grimshaw & Russell 1993:243,244). The guidelines for the implementation of ICATT at nursing campuses are presented as broad statements which are : 1) re-engineer nursing campuses to adopt electronic teaching and learning (ICATT) and become e-learning centres, 2) allocate a budget and resources that will support the implementation of ICATT at nursing campuses, 3) provide adequate infrastructure to support ICATT use, 4) support and enable the development of nurse educators in the use of ICATT, 5) prepare learners for the use of ICATT (e-learning), 6)

employ Information and Communication Technologies (ICT) technical expertise at nursing campuses for ICATT implementation and 7) establish benchmarking criteria for ICATT implementation. The guidelines can be used to support best practices and assist stakeholders with decision-making regarding the use of a computerised training tool in the nursing campuses.

### 5.3.1 The conceptual framework for the development of the guidelines for the implementation of ICATT at nursing campuses

Many guideline development instruments and theories are available to a researcher who hopes to make recommendations or develop guidelines. Grimshaw and Russell (1993:245) suggest using a set of nine attributes proposed by the Agency for Health Care Policy and Research for guideline development. It is further suggested that the Centre for Disease Control steps and the United Nations Population Fund phases can be used for guideline development (Nangombe & Amukugo 2016b:55). However, it is stated that the guidelines used for decision making in areas of clinical practice, policy and system development often vary in quality (Brouwers, Kho, Browman, Burgers, Cluzeau, Feder, Fevers, Graham, Grimshaw, Hanna, Littlejohns, Makarski & Zitzelsberger 2010:1308).

How, then, does one measure the quality of guidelines? The Appraisal of Guidelines Research and Evaluation instrument (AGREE II) is commonly used as a measure of the quality of guidelines and a framework for the development of guidelines (Rosenfeld et al 2013: S5). The researcher is of the opinion that guidelines should adhere to specific quality criteria and it is for this reason that the researcher used the Appraisal of Guidelines Research and Evaluation instrument (AGREE II). This served as the contextual framework that guided the development of the guidelines for ICATT implementation. The researcher used the following AGREE II criteria for the development of the guidelines: 1) scope and purpose, 2) stakeholder involvement, 3) rigour of development, 4) clarity of presentation, 5) applicability and 6) editorial independence (Brouwer et al 2010:1310).

The guidelines that were developed have a scope and purpose that identify the objectives of the guidelines and the population to whom the guideline applies (Brouwer et al 2010:1310, Rosenfeld et al 2013: S5). The scope and purpose of the guidelines is to support the implementation of ICATT at nursing campuses in KwaZulu Natal as no guidelines currently exist. The population to whom the guidelines apply are the campus

principals, nurse educators and the management of the Kwazulu Natal College of Nursing. The researcher considered the suggestions of all the relevant stakeholders namely the guideline development group and target users during the process of guideline development (Brouwer et al 2010:1310, Rosenfeld et al 2013: S5). The first group of stakeholders were the campus principals, nurse educators and learners who contributed to the development of the guidelines. Other stakeholders that were identified by the researcher were the participants with expertise in nursing education and IMCI case management training who refined the guidelines. The campus principals and nurse educators are also the target users. According to the AGREE II criteria the steps for data collection and supporting evidence should be clear during the process of guideline development. This addresses the rigour of guideline development. In addition, the process for updating the guidelines must be clearly stated (Brouwer et al 2010:1310, Rosenfeld et al 2013: S5). The quantitative and qualitative data collected from campus principals, nurse educators and learners were reviewed together with current literature which provided the foundation for the guideline development. The guidelines were further refined by a panel of experts using the Delphi method until consensus was attained. The guidelines will be updated as per the policy of the KwaZulu Natal College of Nursing. The AGREE II criteria highlights the importance of clarity in the presentation of the guidelines. The guidelines must be easy to follow with key recommendations clearly articulated in a language that can be understood by the stakeholders (Brouwer et al 2010:1310, Rosenfeld et al 2013: S5). The researcher used language that is precise, and the guidelines are specific and presented according to the areas considered important for ICATT implementation. The criterion of applicability should provide guidance on how the recommendations can be implemented, the resources necessary and the barriers and facilitators to implementation (Brouwer et al 2010:1310, Rosenfeld et al 2013: S5). The guidelines in this study clearly outline the recommendations for implementation and the resources that are necessary for ICATT implementation in the nursing campuses. Editorial independence can ensure objectivity and limit bias during the process of guideline development. The development of the guidelines must not be influenced by the views of the researcher or a funding body which requested the development of the guidelines (Brouwer et al 2010:1310, Rosenfeld et al 2013: S5). The researcher developed the guidelines independently based on the research findings of this study.

The AGREE II criteria provided the researcher with a framework for guideline development. However, researchers state that whilst the AGREE II instrument provides

a rigorous framework for guideline development, there may be gaps regarding the validity of the guidelines being produced (Brouwer et al 2010:1310). The researcher can address the issue of validity by identifying the strengths and limitations of the guidelines which will be further discussed in this chapter (Brouwer et al 2010:1310).

### 5.3.2 Guideline development and the Delphi method

According to Grimshaw and Russell (1993:246) there are three main methods for developing guidelines namely: peer groups, Delphi techniques and consensus conferences. The guidelines emerged from the findings of the two phases of this study. As already stated the researcher used the AGREE II criteria to develop the guidelines for ICATT implementation at the nursing campuses. The e-Delphi method was used to refine the guidelines. Refinement is defined as clarifying, elaborating or making small changes for improvement (*The Free Dictionary by Farlex* 2017). The Delphi experts had to critically review the guidelines and provide feedback based on their expertise on whether the guideline statements were appropriate and relevant. The experts could therefore improve, clarify or elaborate on the guidelines. An iterative process of controlled feedback was used until consensus was attained (Cramer et al 2008:212). A summary of the Delphi method is presented below.

*Open round*

In the open round the researcher invited the experts to be appointed to the Delphi panel for the purpose of refining a set of guidelines. The e-Delphi method was explained to the participants in the information letter. All the experts agreed to be a part of the study.

*Feedback from round one*

The guidelines were electronically mailed to the experts in round one of the Delphi method. The experts were asked to review the guidelines by making corrections to the guidelines or by contributing additional information to strengthen the guidelines. The following is a summary of the feedback from the experts:

- Rephrase the aim of the guidelines to ensure it is grammatically correct.

- Rearrange the guidelines according to that which is considered a priority for the implementation of e-learning. The experts suggested that the budget and resouces, together with the provision of infrastructure that are required to support e-learning should appear before nurse educator and learner training.
- Correct the terms used in the statements so that they are appropriate and rephrase the statements.
- Additional statements were suggested to strengthen the guidelines.

A 63% consensus was reached on the suggested changes to the guidelines in round one. The researcher made the changes to the guidelines which were then electronically mailed to the experts.

*Feedback from round two*

In round two the experts were asked to review the modified guidelines. The modified guidelines included the information considered relevant by all the participants. There was a 100% consensus regarding the acceptance of the amendments from round one. At the end of round two no further suggestions for change or corrections to the guidelines were made by the experts. Based on this the Delphi rounds stopped as consensus had been attained.

Annexure W contains a comprehensive overview of the suggested changes that were made to the guidelines in round one and round two.

### 5.3.3 Presentation of the guidelines

#### *5.3.3.1 Overview of the guidelines*

The implementation of the IMCI strategy and IMCI pre-service training for nurses are national priority areas in South Africa (Fick 2017:208). In spite of this being the case the implementation of pre-service training has been problematic (Fick 2017:208). ICATT has been identified as an innovative way to improve and strengthen IMCI training for learners at nursing campuses (Fick 2017:211). Therefore, these guidelines can be a useful tool for the managers, campus principals and nurse educators on how to implement a computerised adaptation and training tool at nursing campuses for IMCI case

management training. This provides the scope for the guidelines (Brouwer et al 2010:1310). The structure of the guidelines includes an aim, guideline statements, rationale and recommendations (Brouwer et al 2010:1310; Chilemba et al 2014:1196). The aim of the guidelines is to identify the best practices which can support ICATT implementation at the nursing campuses in KwaZulu-Natal. The rationale provides evidence from available literature to support the guideline statements (Rosenfeld et al 2013: S4; Chilemba et al 2014:1196). The guideline statements are the key determinants to ensure the readiness of the nursing campuses in establishing e-learning programmes. They are listed according to their importance. The recommendations provide guidance on how the guideline can be achieved (Brouwer et al 2010:1310, Rosenfeld et al 2013: S5). The guidelines have been refined by a panel of experts and further edited (see Annexure Y).

#### *5.3.3.2 The guidelines for the implementation of ICATT at the nursing campuses of the KwaZulu-Natal College of Nursing*

**Aim:** To produce best practice guidelines on implementing ICATT for IMCI case management training at nursing campuses.

**1. Re-engineer nursing campuses to adopt electronic teaching and learning (ICATT) and become e-learning centres**

**Rationale**

Globally, IT-empowered learning is a reality especially with the younger generation of learners (Frenk, Chen, Bhutta, Cohen, Crisp, Evans, Fineberg, Garcia, Ke, Kelley, Kistnasamy, Meleis, Naylor, Pablos-Mendez, Reddy, Scrimshaw, Sepulveda, Serwadda, & Zurayk 2010:[18]). Educational institutions must therefore be re-engineered to adopt new forms of learning that has been made possible by information technology (Frenk et al 2010:[24]). This can facilitate ICATT implementation and other e-learning methods, in order to meet the changing educational needs from a teaching and learning perspective.

**Recommendations**

- The relevant stakeholders (the management of the KwaZulu-Natal College of Nursing, the principals and nurse educators) should strategise with educational policymakers to develop policies and standards with regards to the use of e-learning at nursing campuses, in particular ICATT for IMCI case management training.
- Principals at nursing campuses must play a collaborative role in supporting sustainable e-learning by promoting partnerships between nursing campuses that are resource constrained, and nursing campuses that are resource rich, which allows for sharing of resources.
- Principals as managers of nursing campuses should develop plans for technology integration with nurse educators, to motivate them to adopt technology for teaching purposes.
- Principals at nursing campuses must encourage innovation in teaching and learning by providing support systems for nurse educators' and learners in the acquisition of computer skills.
- Principals and nurse educators should work together to identify the nursing campuses' readiness by conducting a needs and situational assessment to ensure that ICATT implementation is sustainable.
- The stakeholders (the management of the KwaZulu-Natal College of Nursing, the principals and nurse educators) and educational policymakers must work towards synchronising e-learning (ICATT) across all nursing campuses to ensure standardization of practice for IMCI case management training.
- Principals and nurse educators should prioritise computer literacy for learners and motivate that it should be a prerequisite for learners in all nurse training programmes.
- Principals must prioritise the training of nurse educators and learners in the use of e-learning platforms, with particular reference to ICATT.

**2. Allocate a budget and resources that will support the implementation of ICATT at nursing campuses**

**Rationale**

Educators and institutions should develop financial models to ensure the sustainability of e-learning (Frehywot et al 2013:[13]). This would allow for the implementation of ICATT

and other e-learning programmes to be realised at nursing campuses. Additionally, understanding the feasibility and true costs of e-learning tools can lead to positive outcomes (Frehywot et al 2013:[13]).

**Recommendations**

- The management of the KwaZulu-Natal College of Nursing should develop partnerships or collaborate with the Department of Health (national, provincial, district) for financial support and resources in order to implement and sustain implementation of ICATT at nursing campuses for IMCI case management training.
- Nursing campuses must adopt funding models and develop annual budgetary plans to support the implementation of e-learning.
- Campuses should explore innovative ways to secure funding including collaboration with non-governmental organisations and other interested parties in education.
- Education and government institutions must explore and identify local individuals or organisations that can provide access to resources used in ICATT training.

**3. Provide adequate infrastructure to support ICATT use**

**Rationale**

The infrastructure that supports an e-learning programme should be in place prior to implementation, to ensure successful implementation and long-term sustainability of the programme (Frehywot et al 2013:[12]). Infrastructure includes hardware needs such as a network and computers and software (Frehywot et al 2013:[12]). The ICATT software runs off computers and the training approach adopted by nursing campuses is classroom training with individual computers.

**Recommendations**

- Nursing institutions and government must support the development of computer laboratories or convert classrooms into computer laboratories.

- These roleplayers should ensure network connections are in place to support e-learning.
- An adequate number of computers must be made available for students with a one-to-one ratio being the ideal for the use of ICATT for IMCI case management training.
- The ICATT software must be downloaded to all computer terminals.
- Campus principals must engage with the National Department of Health, regarding the copyright and licensing of the ICATT software for teaching and learning purposes.

**4. Support and enable the development of nurse educators in the use of ICATT**

**Rationale**

Offering support to and training teachers can influence their adoption and integration of technologies in the classroom (Andoh 2012:147). It is further stated that teachers' professional development is vital for the successful integration of computers into classroom teaching (Andoh 2012:147). Developing the technical competence of nurse educators, and encouraging innovative teaching methods is essential for the successful implementation of ICATT.

**Recommendations**

- Nursing campuses must develop the Information and Communication Technologies skills of nurse educators by encouraging them to attend computer training courses to enhance skill and confidence when using ICATT and other e-learning programmes.
- All nurse educators facilitating IMCI case management training must be sent for ICATT training.
- Nurse educators should be competent in the facilitator techniques that are required when using ICATT for IMCI training.
- Nurse educators who are ICATT facilitators must have unrestricted access to computers during the training period.

- All nurse educators facilitating IMCI case management training using ICATT must be given the opportunity to strengthen their skills in the use of the software and accompanying IMCI materials prior to training learners.
- ICATT champions (nurse educators trained in IMCI and ICATT) must be identified at every nursing campus so that they offer support and address challenges experienced by nurse educators facilitating IMCI using ICATT.
- Nurse educators who work together with Information and Communication Technologies technical experts must be acknowledged in terms of their role in creating an enabling e-learning environment which supports the implementation of ICATT.
- Nurse educators must be key roleplayers in incorporating electronic learning, in particular ICATT, into the existing curriculum. This includes the adoption of classroom-based trainings with individual computers for IMCI case management training using ICATT.
- Nursing campuses must support nurse educators in adopting the new approach to facilitation which is advantageous when using ICATT for IMCI case management training. A facilitator: participant ratio 1:10-15 is sufficient for ICATT work.
- In addition, they must support nurse educators as they use and further develop monitoring and evaluation tools on the ICATT software for assessing the progress of learners.

## 5. Prepare learners for the use of ICATT (e-learning)

### Rationale

Numerous studies indicate that learner characteristics such as computer self- efficacy, computer experience and attitude towards e-learning may influence e-learning adoption (Bhuasiri et al 2012:846; Frehywot 2013: [12]). Learners' technical competency and perceptions about electronic learning (e-learning) are critical success factors for the implementation of ICATT.

### Recommendations

- Nurse educators must assist in the development of the computer skills of learners so that they are able to participate in e-learning.

- All learners should have unlimited access to computers and the ICATT software.
- All learners should have unlimited access to computer laboratories and libraries; this encourages self-directed learning whenever time and opportunity permits.
- All learners must receive instructions and accompanying guidelines which will allow them to understand that they control their own learning when using ICATT.
- Nursing campuses must make provision for ICATT to be downloaded on to learners' personal computers to accommodate after-hours learning.
- Educators must encourage leaners to work independently, at their own pace (within time limits) when using the ICATT guidelines.
- Educators must encourage learners to take responsibility for monitoring their own progress (progress bar) using the ICATT software.

### 6. Employ Information and Communication Technologies (ICT) technical expertise at nursing campuses for ICATT implementation

**Rationale**

The provision of adequate information and communication technology facilities as well as technical support is important to encourage involvement in e-learning (Chong, Francis, Cooper, Abdullah, Hmwe & Sohod 2016:2). Frehywot et al (2013: [12]) highlights the value of information and communication technology experts in creating an enabling e-learning environment by clarifying their roles and offering them incentives. Accessibility to Information and Communication Technologies technical expertise will ensure the maintenance of e-learning infrastructure and support the implementation of ICATT and other e-learning programmes at the nursing campuses.

**Recommendations**

- The appointment of Information and Communication Technologies experts at every nursing campus must be made a key priority.
- Nursing campuses must specify the responsibilities of the Information and Communication Technologies experts in the implementation of ICATT.
- Nursing campuses should facilitate the development of a relationship between the nurse educators trained in ICATT and the Information and Communication Technologies experts in working together to create an e-learning environment that

is suitable for ICATT implementation and the development of other e-learning programmes.

- Nursing campuses must acknowledge Information and Communication Technologies experts for creating and maintaining an enabling e-learning environment which supports the implementation of ICATT and other e-learning programmes.
- Information and Communication Technologies experts must be available through a helpdesk that will assist users who are impeded by computer viruses and/or out-dated hardware or unlicensed software when using the ICATT software.

## 7. Establish benchmarking criteria for ICATT implementation

### Rationale

It is important to evaluate an e-learning programme, so improvements or amendments can be undertaken (Ruggeri et al 2013:[8]). The data may take the form of participant or stakeholder feedback, information technology reports or results from an audit (Ruggeri et al 2013:[8]). Identifying success criteria, assessing progress and communicating direction and accomplishments will ensure that ICATT remains a priority and that support is sustained.

### Recommendations

- Early involvement of campus principals, heads of department, lecturers, learners and other stakeholders in the use and implementation of ICATT is one of the pathways to success.
- Regular and critical audit of the progress of ICATT implementation which includes reassessing teaching needs, learning needs and teaching and learning plans is important for successful outcomes.
- Nursing campuses should provide the Department of Health (national and local) and donor partners with evidence that the investments made for ICATT implementation have produced positive outcomes for teaching and learning.
- Roleplayers must engage other educational institutions with current e-learning programmes to evaluate ICATT implementation at nursing campuses against set criteria, as part of the bench marking process.

These guidelines can be used to guide and support the implementation of ICATT for IMCI training at nursing campuses in KwaZulu-Natal, as no guidelines currently exist.

### 5.3.4 Reviewing and updating the guidelines

An external review of the guidelines should be undertaken prior to the dissemination and implementation of the guidelines (Rosenfeld et al 2013:S48). Guidelines should be reviewed against three main guideline standards which are validity, reliability and feasibility (Rosenfeld et al 2013:S48). The external review of the guidelines was not the aim of this study. However, an external review of the guidelines can be undertaken by the KwaZulu-Natal College of Nursing. The process would involve the researcher forwarding the guidelines to the Policy Committee of the KwaZulu-Natal College of Nursing. The committee can review the guidelines and then decide whether or not to adopt the guidelines for use at the nursing campuses. The criteria for determining how and when an update will be undertaken should include for example when new information is presented or there are changes to clinical practice. There should also be a policy that states how often guidelines should be reviewed or "retired" with three to five years being an acceptable time period (Rosenfeld et al 2013: S47). If the guidelines for ICATT implementation are adopted by the KwaZulu-Natal College of Nursing, they will be reviewed annually. This is in keeping with the review policy of the nursing education institution to ensure that they remain current and relevant to the changing needs in nursing education.

### 5.3.5 Dissemination and implementation of the guidelines

There is a method in which guidelines may be communicated in order to ensure adoption and adherence. According to the WHO handbook for guideline development (2014:18), guidelines must be disseminated and implemented to bring about positive changes or improvements to a situation. Gagnier, Kienle, Altman, Moher, Sox, Riley and the Care Group (2014:48) state that the person or persons who developed the guidelines should take responsibility for the dissemination and implementation of the guidelines. It is further stated that when disseminating and implementing guidelines careful consideration must be given to the following areas: who will implement the guidelines, what level of support is required and whether infrastructure and services are in place for implementation (WHO handbook 2014:18). The researcher developed the guidelines and will therefore take

responsibility for disseminating the guidelines to the nursing campuses. However, guideline implementation will be dependent on whether the nursing campuses have the necessary support, infrastructure and services. The AGREE II criterion of applicability states that the barriers to implementation and the cost implications must be considered when developing guidelines (Brouwers et al 2010:1310). The researcher is aware that financial, human resource and infrastructural constraints as identified in this study may be a barrier to the implementation of the guidelines. The researcher therefore suggests that aspects of the guideline implementation planning checklist developed by Gagliardi, Marshall, Huckson, James and Moore (2015:[4]) be adopted by the nursing campuses for the implementation of the guidelines. The following steps from the checklist may be used: 1) form an implementation team, 2) identify and assemble available resources, 3) consider using only the relevant aspects of the guidelines rather than the entire guideline, 4) develop an implementation plan and 5) develop an audit and feedback plan regarding the implementation of the guidelines. The implementation of the guidelines developed by the researcher, either in part or its entirety can support the implementation of a computerised adapted training tool at the nursing campuses. Table 5.1 provides an overview of the factors that can affect guideline implementation as per the AGREE II criteria (Brouwers et al 2010:1310).

**Table 5.1 Factors affecting guideline implementation**

| Guidelines | Relevance | Organizational and stakeholder acceptability | Affordability | Measure of Impact |
|---|---|---|---|---|
| 1. Re-engineer nursing campuses to adopt electronic teaching and learning (ICATT) and become e-learning centres. | -National and local priority guided by the SANC nursing and education standards 2005; Nursing Act 33 | -SANC<br>-Local Department of Health<br>-KZN College of Nursing | -Budgetary constraints | -Have nursing campuses adopted ICATT? |
| 2. Allocate a budget and resources that will support the implementation of ICATT at nursing campuses. | -National and local priority guided by The South African National Department of Health, in their 2013/2014 | -Local Department of Health<br>-KZN College of Nursing | -Budgetary constraints | -Is there an approved budget?<br>-Are there resources to support ICATT implementation? |

| Guidelines | Relevance | Organizational and stakeholder acceptability | Affordability | Measure of Impact |
|---|---|---|---|---|
| | Workplan for Integrated Management of Childhood Illness on Self Learning Methods | | | |
| 3. Provide adequate infrastructure to support ICATT use. | -National and local priority guided by The South African National Department of Health, in their 2013/2014 Workplan for Integrated Management of Childhood Illness on Self Learning Methods | Local Department of Health<br>-KZN College of Nursing | -Budgetary constraints | -Is there infrastructure to support ICATT implementation? |
| 4. Support and enable the development of nurse educators in the use of ICATT. | -National and local priority guided by The South African National Department of Health, in their 2013/2014 Workplan for Integrated Management of Childhood Illness on Self Learning Methods | Local Department of Health<br>-KZN College of Nursing<br>-Nurse educators | -Affordable | -Have nurse educators been trained in ICATT? |
| 5. Prepare learners for the use of ICATT (e-learning) | Nursing campus priority | -KZN College of Nursing<br>-Nursing campuses<br>-Nurse educators | -Affordable | -Are learners using ICATT at nursing campuses? |
| 6. Employ Information and Communication Technologies (ICT) technical expertise at nursing campuses for | -National and local priority guided by The South African National | Local Department of Health<br>-KZN College of Nursing | -Budgetary constraints | -Have nursing campuses employed IT support staff? |

| Guidelines | Relevance | Organizational and stakeholder acceptability | Affordability | Measure of Impact |
|---|---|---|---|---|
| ICATT implementation | Department of Health, in their 2013/2014 Workplan for Integrated Management of Childhood Illness on Self Learning Methods | | | |
| 7. Establish benchmarking criteria for ICATT implementation | -National and local priority guided by The South African National Department of Health, in their 2013/2014 Workplan for Integrated Management of Childhood Illness on Self Learning Methods | -National Department of Health<br>-Local Department of Health<br>-KZN College of Nursing | -Affordable | -Have the successes and failures been recorded and reported to relevant stakeholders? |

The researcher acknowledges that the following factors may influence the implementation of the guidelines namely: relevance, stakeholder acceptability, affordability and impact evaluation (Brouwers et al 2010:1310). The aforementioned guidelines are priority areas in respect of both health and education. As has been mentioned the South African Nursing Council has stated in the education and training standards and the Nursing Act 33 that technology must be integrated in nurse training (South African Nursing Council Nursing Education and Training Standards [s.a]:81). Pre-service training for nurses in the IMCI strategy is currently a training priority (Strategic Plan …South Africa 2012-2016:23). This speaks to the relevance of the implementation of ICATT and the accompanying guidelines. The stakeholders have been identified and are the drivers in both health and education sectors in South Africa. However, the financial challenges may have a negative bearing on implementation of the guidelines at the nursing campuses. The impact of the guideline implementation is measurable as indicated in Table 5.1.

## 5.4 MODEL DEVELOPMENT

Through the development of the guidelines and emerging relationships between variables, the key findings of this study led to the emergence of a model. Models are simplified representations of a phenomenon or what exists in reality (Nilsen 2015:[2]). Models can be used to describe or guide the process of changing knowledge into practice (Nilsen 2015:[3]). Models highlight important issues that need to be considered and steps that need to be adhered to when translating knowledge into practice (Nilsen 2015:[4]). Models can take the form of actual objects or be abstract in nature for example sketches, mathematical formulas or diagrams (Shafique & Mahmood 2010:4). In this study, the model is diagrammatic in nature.

### 5.4.1 The readiness for ICATT use model

The model is entitled the readiness for ICATT use and is presented here in Figure 5.1.

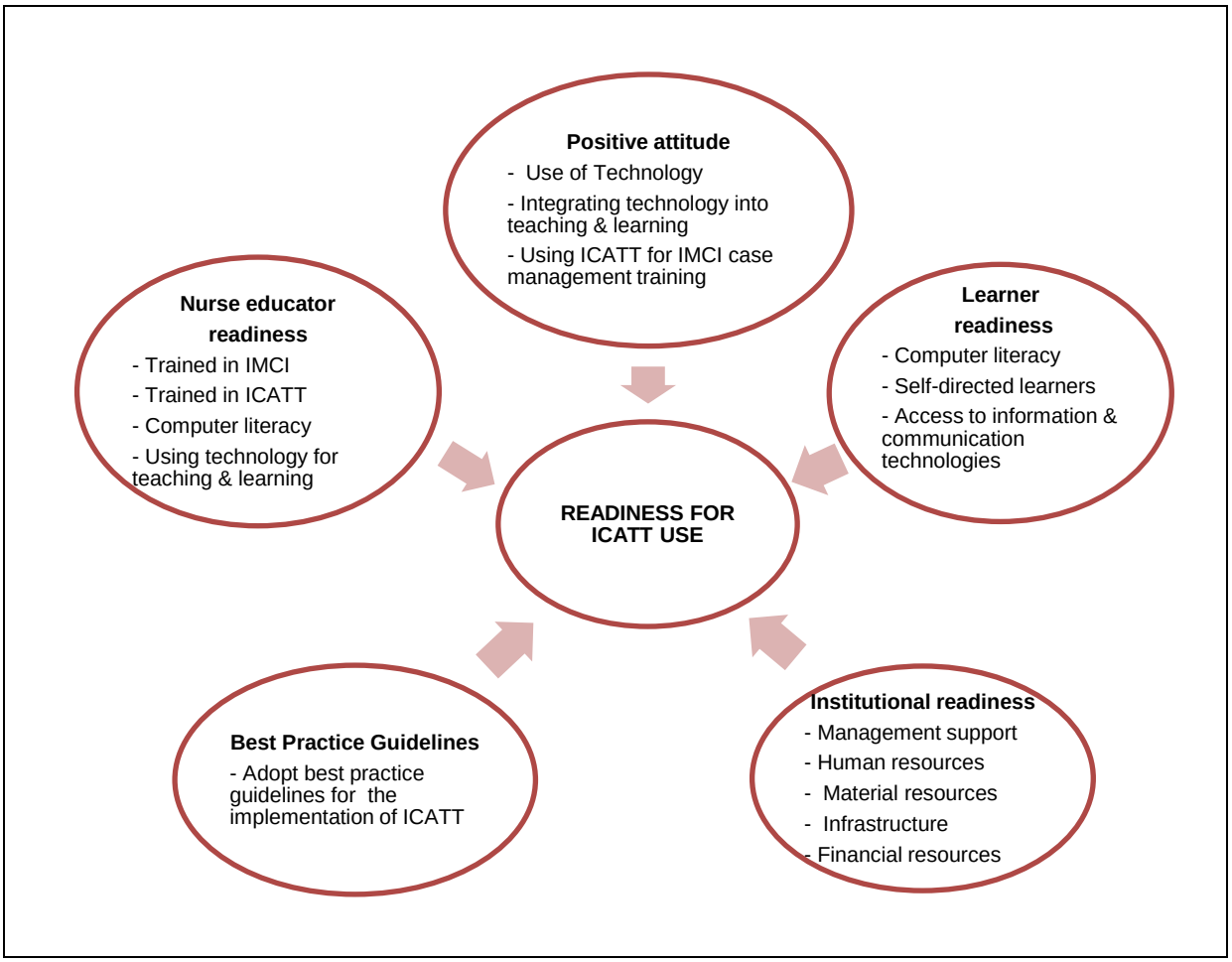


**Figure 5.1 The readiness for ICATT use model**

One of the key findings of this study is the positive attitudes displayed by the campus principals, nurse educators and learners towards the use of technology for teaching and learning. The findings further indicated that if ICATT is to be implemented for IMCI case management training, there is a need to strengthen the skills of nurse educators and learners, and the capacity of nursing campuses for the integration of information and communication technologies for teaching and learning. Additionally, this study acknowledged the recommendations made by campus principals, nurse educators and learners, and together with the literature review developed best practice guidelines for ICATT implementation and use. The key findings of this study were then integrated and used for the development of the readiness for ICATT use model. The model illustrates the key elements influencing the adoption of technology for teaching and learning at nursing campuses which include the following: (1) the positive attitudes or perceptions of the key role players engaged in the implementation and use of ICATT at the nursing campuses, (2) the readiness of nurse educators, (3) the readiness of learners (4) the readiness of nursing campuses and (5) adoption of best practice guidelines for ICATT use. The direction of arrows in the figure shows that the five elements contribute to the readiness for ICATT use. The value of this model is that it can be adopted by any educational institution in South Africa that intends to use ICATT for IMCI case management training.

## 5.5 SUMMARY

This chapter presented the two main contributions of the study – the development of guidelines as well as the emergence of a model, based on the findings of the study. In detail, it focused on the conceptual framework for guideline development, the process adopted for the refinement of the guidelines and the guidelines with their rationale and recommendations. An overview for reviewing and dissemination and implementation of the guidelines is presented. In addition, the readiness for ICATT use model which emerged from the findings of phases one and two of this study is also presented in this chapter.

Chapter 6 culminates in the final chapter of this study and includes the discussion of key findings, summary of the results, limitations to the study, recommendations, the scientific rigour of the study and the conclusion.

# CHAPTER 6

# DISCUSSION, LIMITATIONS, RECOMMENDATIONS AND CONCLUSION

## 6.1 INTRODUCTION

This study investigated the determinants of the nursing campuses' readiness to use a computerised adaptation training tool. This sixth and final chapter discusses the findings and limitations of the study. This chapter also makes recommendations for education and research and includes a discussion on the scientific rigour adhered to in this study.

## 6.2 DISCUSSION OF THE FINDINGS

The key findings of the phases of the study are presented in this chapter. The discussion of the findings of the qualitative and quantitative components of the study are mixed as the researcher adopted a sequential, exploratory mixed methods design.

The findings are discussed under the following subheadings which are in line with the objectives of the study:

- Attitudes toward ICATT use
- Enablers of ICATT use
- Barriers to ICATT use
- Readiness for the use of ICATT
- Best practice for the use of ICATT

### 6.2.1 Attitude towards ICATT use

- **Positive attitude**

Numerous studies have explored the attitudes of nurses toward computer use, with many reporting that nurses had positive attitudes toward the use of computers in nursing (Gurdas Topkaya & Kaya 2014:7; Kipturgo et al 2014:[7], Chong et al 2016:[3]). The

outcomes of this study support these earlier findings as one of the emergent themes in this study was the positive attitude displayed by the campus principals, nurse educators and learners regarding ICATT implementation and use. This suggests that they are more likely to implement and use a computerised training tool for teaching and learning at the nursing campuses. Campus principals expressed positive sentiments with regards to the characteristics of nurse educators, the use of technology by nurse educators and learners, and the training of nurse educators. Nurse educators and learners limited their positive opinions to ICATT use and implementation.

At least half of the campus principals expressed positive views regarding the characteristics of nurse educators, which would influence ICATT implementation at nursing campuses. Age and educational qualifications were cited as reasons why ICATT would be used for IMCI case management training. Ashfari, Bakar, Su Luan, Samah and Fooi (2009:80), Andoh (2012:137) and Kipturgo et al (2014:[3]) have presented arguments which concur with the findings of this study. They argue that personal characteristics such as age and educational level can influence the adoption and use of information and communication technologies in the classroom.

Campus principals had positive attitudes regarding the use of technology by nurse educators and learners. They asserted that computers and data projectors were currently being used by nurse educators in the classrooms, and learners were using their cellular phone technology to access the World Wide Web and Google. These assertions are supported by Maboe and De Villiers (2011:94) and Usher, Woods, Casella, Glass, Wilson, Mayner, Jackson, Brown, Duffy, Mather, Cummings and Irwin (2014:99) who concluded that learners and nurse educators respectively, are using information and communication technologies. The findings of this study further reinforce the fact by providing evidence that 88.9% of nursing campuses offer nurse educators access to computers, and that laptop computers and data projectors are available for use in the classroom. However, contrary to the positive views expressed by campus principals regarding the use of technology by nurse educators and learners, only 55.6% of nursing campuses offer nurse educators access to internet search facilities. The findings of this study further provide evidence that 55.6% of nursing campuses provide learners with access to computers, and 22.2% of nursing campuses provide learners with access to internet search facilities. This could be the reason why learners access the World Wide Web through their cellular phone technology. All campus principals (100%) are in agreement regarding the

importance of access intranet and internet search facilities and computers for both nurse educators and learners. However, the divide in the access to computers and intranet and internet search facilities between the two groups may negatively impact on the implementation and use of ICATT for IMCI case management training. Evidence provided by Makokha and Mutisya (2016:[5]) and Tarus, Gichoya and Muumbo (2015:129) indicate that a lack of computers and limited access to information and communication technologies is a major challenge to the implementation of e-learning.

Campus principals expressed positivity with regards to the view that nurse educators are adequately trained in respect of IMCI case management and computer-based learning. The quantitative evidence concurs with the qualitative evidence with 66.7 % of campus principals stating that nurse educators at the nursing campuses have been trained in IMCI case management. This is in keeping with the directive from the National Health Department that nurse educators must be trained in IMCI case management to facilitate IMCI pre-service training at the nursing campuses (South African National Department of Health work plan for 2013/2014). All campus principals (100%) indicated that nurse educators have received computer training. Several researchers in this area (Mahmud & Ismail 2010:8; Ruggiero & Mong 2013:12) are of the view that it is not only important for educators to be computer literate, but they must be taught how to use technology in the classroom. A very good proportion of the campus principals (88.9%) indicated their willingness to send nurse educators for ICATT training. Nurse educators that are adequately prepared to teach using technology will be able to implement ICATT for IMCI case management training.

Nurse educators and learners generally expressed a positive attitude towards implementing ICATT and using computers for teaching and learning. This study revealed that 94.3% of nurse educators and 88.7% of learners were in agreement regarding the importance of incorporating new technologies for teaching and learning purposes. Hennessy et al (2010:41) are of the view that a teacher's attitude towards information and communication technologies can be either a facilitator or a barrier to the use of technology in the classroom. Al-Senaidi, Lin and Poirot (2009:580) have identified that lecturers do not fear using technology, but rather accept that information and communication technologies has a positive role to play in teaching and learning. Harerimana, Mtshali, Hewing, Maniriho, Kyamusoke, Mukankaka, Rukundo, Gasurira, Mukamana and Mugarura (2016:69) reported that nurse educators are displaying positive attitudes

towards the integration of information and communication technologies into the teaching and learning environment. Similarly, Chong et al (2016:[4]) found that the majority of nurses had favourable attitudes toward e-learning, and that an interest in e-learning did positively affect attitude towards e-learning. Globally and locally, it appears as though educators and learners are embracing the use of technology in the classroom. Kudlova and Lejnev (2011:12) reported in their pilot study of ICATT as a training tool that all facilitators and trainees expressed positive sentiments with regards to working with ICATT, which concurs with the findings of this study. The positive interest displayed by nurse educators and learners towards integrating computers into teaching and learning can be a motivating factor towards ICATT use and implementation at nursing campuses.

### 6.2.2 Enablers (benefits) of ICATT use

The enablers were also identified as the perceived benefits of ICATT implementation. One of the emergent themes in the study was that the campus principals, nurse educators and learners generally acknowledged that the implementation and use of ICATT could be beneficial. Many studies in the literature have reported that nursing education may benefit from the use of information and communication technologies (Ruggeri et al 2013:[2]; Frehywot et al 2013:[9]). In this study, the qualitative findings supported the quantitative findings on the benefits of using e-learning for the nursing campuses, nurse educators and learners.

Campus principals and nurse educators shared the same opinion that ICATT implementation and use would be cost effective, would allow for the efficient utilisation of staff and the use of technology as an alternative teaching strategy. Participants expressed the view that using technology for training has cost-saving benefits for nursing campuses. Campus principals provided evidence of the costs incurred by nursing campuses in the implementation of the conventional IMCI case management training at nursing campuses. Campus principals indicated that currently between ZAR 5000 and ZAR 50000 was being spent on the printing of training materials for IMCI case management training. Three campus principals indicated that the costs incurred by nursing campuses for the training of nurse educators for IMCI case management training was about ZAR 5000. Additionally, all nursing campuses purchased televisions, DVD players, additional copies of DVDs and additional copies of bound, colour printed photograph booklets at additional costs of between ZAR 250 and ZAR 25000.The majority of nurse educators

(between 87.88% and 94.12%) and all campus principals (100%) identified that the implementation of ICATT is cost-effective as it requires no printing of chart booklets or purchasing of televisions or DVD players. The ICATT software is stored on the computers and includes videos and chart booklets and can be easily updated at no cost to the users (Kudlova & Lejnev 2011:7). The cost of ICATT-based training is also lower than the conventional IMCI case management training (Kudlova & Lejnev 2011:21). According to Frehywot et al (2013:[10]) the initial set-up and costs incurred for an e-learning programme can be high, but in the long term it can provide substantial cost savings. Hennessy et al (2010:44) support the use of affordable, portable technologies which are low-cost, low-energy and low maintenance especially in resource limited settings such as in Sub-Saharan African countries. This can therefore be a strong argument for the adoption of ICATT in nursing campuses in KwaZulu-Natal.

Campus principals and nurse educators were in agreement that implementing ICATT at the nursing campuses would allow for the efficient utilisation of nurse educators for IMCI case management training. Nurse educators were also of the opinion that implementing ICATT will assist with resolving the issue of a shortage of IMCI facilitators at nursing campuses. However, the quantitative findings of the campus principals contradict that of the nurse educators with regards to the adequacy of the number of nurse educators trained in IMCI in respect of educator-learner ratios. A greater number of campus principals (66.7%) compared to only 25.7% of nurse educators were in agreement that there are adequate number of nurse educators trained in IMCI in respect of educator-learner ratios. Similarly, nurse educators indicated that not all nurse educators trained in IMCI were facilitating IMCI case management training at the nursing campuses. This could be as a result of the variety of nurse training programmes being offered at the nursing campuses with five campuses offering four different nurse training programmes. The findings of this study therefore provide a strong motivation to use ICATT as fewer nurse educators are required with a facilitator: participant ratios of 1:10-15 being sufficient for ICATT work (Kudlova & Lejnev 2011:14). Participants also held the view that using ICATT would be time saving because the training time for learners with conventional IMCI case management training is 11 days. All the campus principals (100%) and nurse educators (100%) indicated that one of the benefits of ICATT was that it can be conducted in a shorter period of time. Kudlova and Lejnev (2011:14) highlighted the numerous strengths of using classroom-based trainings with individual computers including the fact that the duration of training is between six to eight days. This too can be a motivating

factor for nursing campuses to adopt ICATT for IMCI case management training. Chigona et al (2014:[1]) are of the view that one of the factors that could motivate educators to use information and communication technologies is that use of these available technologies would help in resolving the problems being experienced.

According to 48.5% of the learners, nurse educators are currently not using information and communication technologies as a teaching method. This scenario can change because campus principals and nurse educators were of the opinion that using ICATT would be beneficial for nurse educators as opposed to the conventional manner of IMCI case management training. They also expressed the view that using ICATT allowed for the integration of technology for IMCI case management training which could impact positively on teaching in the classroom. The quantitative findings add credence to these opinions as almost all of the nurse educators (97.06%) and all the campus principals (100%) identified that ICATT can be viewed as an alternative training approach which can stimulate independent learning in the classroom. The findings of this study suggest that technology can be integrated into teaching and learning because 94.3% of nurse educators at nursing campuses state that they do have access to computers, with the majority of nurse educators (68.6%) being computer literate and able to use the various software applications to complete tasks related to teaching and learning. Perrota (2013:[6]) reported that teachers acknowledge that the use of technology has significant benefit for teaching namely access to learning content and resources. Chigona et al (2014:[4]) suggest that teachers are more likely to integrate technology in the classroom if they believe that technology makes teaching easier. Additionally, if teachers believe that integrating information and technology resources in teaching would be rewarding, then this too would be a motivating factor to integrate technology in their teaching (Chigona et al 2014:[4]).

Campus principals, nurse educators and learners shared the same view regarding the benefits of ICATT for learners and learning. According to the campus principals and nurse educators, ICATT implementation would benefit learners by strengthening learning, changing learners' behaviour and providing the opportunity to use technology for learning at nursing campuses. All the campus principals (100%) and the majority of the nurse educators (94.12%) identified one of the benefits of ICATT use was that it allowed learners to work at their own pace. Similarly, learners indicated that they favoured ICATT which highlighted independent learning, working at one's own pace, and the convenience

of accessing updated information, videos and pictures from the software instead of often outdated books and modules. The majority of learners (90.2%) indicated that they would like to use computer-based training programmes to enhance their learning. Evidence provided by Koong, Yang, Wu, Li and Tseng (2014:184) indicate that computer assisted learning when incorporated with different learning strategies can strengthen learning effectiveness. Sun, Tsai, Finger, Chen and Yeh (2006:[12]) are of the view that e-learning is not limited by space, time and location and therefore strengthens learning by virtue of its flexibility, and the opportunity for learners to work at their own pace. According to Parker, Bianchi and Cheah (2008:289), learners' preference for technology does not necessarily enhance learning. However, evidence provided by Parker et al (2008:291) further suggest that if technology is used to organize course content and make the information delivery process more efficient, it may have positive outcomes. In addition, if technology facilitates problem-based learning and is able to simulate clinical experiences it can be more beneficial than conventional classroom teaching and learning (Parker et al 2008:291). The ICATT software is an example of a well-organised course content and does facilitate problem-based learning. The ICATT training set is organised into training units with READ, SEE, PRACTICE and TEST sections (Kudlova & Lejnev (2011:7). Similarly, the ICATT software allows learners to work at their own pace (Kudlova & Lejnev 2011:14). The learner benefits linked to ICATT use can be a motivator for adopting ICATT for IMCI pre-service training at nursing campuses.

Learners further indicated that one of the benefits of implementing ICATT for IMCI case management training was that they will have access to computers for learning. Currently, the access to computers at the nursing campuses in KwaZulu-Natal is lacking as confirmed by the quantitative findings of this study. The majority of the learners (86.2%) stated that nursing campuses have not made desktop computers available for use. An even higher percentage of learners do not have access to laptops (89.1%) or local area networks (89.3%). According to Gonen, Sharon, Offir and Lev-Ari (2014:6) a strong correlation exists between computer access and attitudes to computer use, meaning that students with access to computers had more positive attitudes to computer use. Although the nursing campuses do not provide learners with access to computers, participants have expressed a strong leaning towards using computers for learning.

Overall, campus principals, nurse educators and learners have expressed a desire to implement ICATT due to the aforementioned benefits. Harerimana et al (2016:78)

reported that participants are eager to adopt e-learning in nursing education due largely to the number of benefits that are reported.

### 6.2.3 Challenges (barriers)

In this study the common challenges to ICATT implementation and use as identified by the campus principals, nurse educators and learners were related to human resources, material resources and financial and infrastructural constraints. The quantitative findings from this study confirmed the perceptions expressed by the participants regarding the challenges. Almost all the participants were in agreement that the existing challenges could impact negatively on the implementation and use of ICATT.

Both campus principals and nurse educators expressed the opinion that the number of nurse educators trained in IMCI was inadequate, and participants further expressed that few nurse educators received training on the use of ICATT. However, the qualitative findings in this instance do not support the quantitative findings. Whilst 87.88% of the nurse educators viewed the low number of nurse educators trained in ICATT as a challenge, only 33.3% of the campus principals indicated that this was a challenge. The reason for this can be attributed to the fact 88.9% of the campus principals indicated that they are willing to send nurse educators for training in the use of ICATT. Notwithstanding that 83% of nurse educators are willing to attend ICATT training, there could be a delay in ICATT implementation due to the fact that nurse educators must be trained in IMCI before receiving ICATT training. Khan, Hasan and Clement (2012:72) state that the lack of knowledge and skill regarding the use of information and communication technologies can limit the use of information and communication technology tools in teaching and learning. Campus principals and nurse educators expressed concern regarding the lack of information technology support staff. A larger percentage of nurse educators (88.4%) than campus principals (55.6%) viewed this as a challenge. Evidence provided by Chigona et al (2014:[5]) indicates that the lack of technical support and learners with few or no computer skills can have a negative impact on integrating technology into a teaching and learning environment. Campus principals, nurse educators and learners were of the opinion that the lack of computer literacy amongst learners could be a challenge to ICATT implementation at the nursing campuses. Some campus principals expressed the view that some nurse educators were not computer literate. However, this can be disputed as more nurse educators (over 90%) indicated that they are computer literate, with only 8.6%

indicating inadequate computer literacy. Similarly, the quantitative findings in this study contradict the qualitative findings with a large number of learners (over 60%) indicating that they are able to use the computer and many learners (over 60%) indicating that they are able to perform basic computer operations. Almost all the learners (99.1%) further indicated that they did not receive any basic computer training at the nursing campuses. Bhuasiri et al (2012:849) are of the view that computer training and computer efficacy in learners are critical success factors for e-learning implementation in developing countries. According to Kudlova and Lejnev (2011:7), trainees do not require specific computer skills. It can be assumed that the lack of computer training and computer efficacy in learners may not necessarily be a challenge to ICATT implementation at nursing campuses.

Campus principals (66.7%) and nurse educators (88.24%) concurred that few computers for use by learners at nursing campuses is a challenge. In as much as all the campus principals (100%) and all the nurse educators (100%) indicated that computer use would be beneficial for learners, a large percentage of learners (86.24%) further indicated that they did not have access to computers at the nursing campuses. The quantitative findings support the qualitative findings of this study. Campus principals and nurse educators also identified that there were infrastructural constraints at nursing campuses which were related to the lack of computer laboratories and local area networks. The quantitative findings further support the qualitative findings of this study with over 60% of campus principals and over 80% of nurse educators indicating that the lack of computer laboratories and local area networks could be a hindrance to ICATT implementation. Tarus et al (2015:131) have identified that inadequate infrastructure which includes the lack of computers, network and internet connectivity and computer laboratories are barriers to e-learning implementation.

One of the emergent sub-themes concerning challenges as expressed by the campus principals was that financial constraints could impact on ICATT implementation in the nursing campuses. The quantitative findings are in agreement with the qualitative findings as 77.8% of the campus principals and 78.13% of nurse educators were in agreement that the cost of implementation was a challenge. Evidence presented by Harerimana et al (2016:84), Tarus et al (2015:131) and Ruggeri et al (2013:3) indicate that the presence of challenges can hamper the implementation of e-learning. Tarus et al (2015:134) state

that the presence of challenges can be a reason for the failure in the implementation of e-learning.

### 6.2.4 The readiness for ICATT use

In this study, the campus principals, nurse educators and learners provided evidence on campus readiness, which allowed the researcher to conclude, that not all nursing campuses are ready for ICATT implementation. According to Frehywot et al (2013:[11]), institutional readiness refers to the human and infrastructural capacity of an institution to support e-learning. Quantitative findings supported the qualitative findings in assessing the readiness of nursing campuses. The findings from this study indicate that nurse educators need to be trained in the use of ICATT. Campus principals (88.9%) and nurse educators (83%) are in agreement that nurse educators require ICATT training. Campus principals (66.7%), nurse educators (88.24%) and learners (86.24%) are in agreement that nursing campuses do not have an adequate number of computers for learners. Similarly, campus principals (66.7%) and nurse educators (82.35%) both indicated that the lack of computer laboratories at nursing campuses is a challenge for ICATT implementation. Additionally, the quantitative evidence supports the qualitative findings that the provision of information technology support is lacking with a larger number of nurse educators (88.24%) than campus principals (55.6%) indicating that this is also a challenge. Just over 70% of campus principals and nurse educators were concerned about the initial cost of ICATT implementation which may be a challenge for the majority of the nursing campuses. The findings in this study therefore suggest that not all nursing campuses are ready to implement and use ICATT for IMCI case management training.

In addition, nurse educators and learners were given the opportunity to use the ICATT software for the first time. This provided additional evidence on the readiness of nurse educators and learners to use the ICATT software. The quantitative findings validate the qualitative findings in assessing the readiness of nurse educators and learners. In this study, all the nurse educators (100%) and the majority of learners reported (between 97% and 100%) indicated that the sections in the ICATT software were useful. All the nurse educators (100%) and the majority of the learners (between 91. 7% to 94. 8%) further indicated that they were able to use the software with ease and that the directions on the software were clear and easy to follow. The fact that the majority of participants indicated that they considered using ICATT as being easy than being difficult and, that almost all

the participants found the ICATT software useful is an indication that nurse educators and learners are ready to use e-learning. According to Liu, Liao, and Prat (2009:604) and Park (2009:159), an unsatisfactory perception will hamper students' motivation to use e-learning. The participants' expressions of positivity regarding their experience of using ICATT in this study are therefore an indicator of their readiness to use ICATT. Diemer, Fernandez and Streepey (2012:22) are of the view that students who stated that they were comfortable with modes of e-learning experienced greater levels of perception of learning and engagement.

The colour coded READ (IMCI modules), SEE (videos), PRACTICE (exercises with feedback) and TEST (short tests) sections made it easy for the nurse educators and learners to move between the different sections on the software. The software applications were also easy to access. According to Liu et al (2009:605), the findings, media rich software that contain text, audio and videos, as in the case of ICATT have a high level of perceived usefulness, than text and audio only or audio and video only. Perceived usefulness, ease of use and attitude has a significant impact on e-learner satisfaction and intention to use e-learning and can therefore strengthen e-learning use (Cheung & Vogel 2013:171).

Nurse educators stated that they encountered no problems although the quantitative findings indicated that some nurse educators (4.5%) did in fact encounter a few problems with the software. However, learners (7.6%) indicated that they did encounter a few computer glitches such as computers "freezing." Other technical problems highlighted in the quantitative findings can be attributed to limited computer skills. Different levels of computer skills can be a challenge when using ICATT during classroom training using individual computers (Kudlova & Lejnev 2011:14). This can be remedied by the presence of a facilitator who can offer assistance with IMCI or information technology problems (Kudlova & Lejnev 2011:14).

The findings of this study indicate that nurse educators are ready to use ICATT based on the fact that they acknowledge the benefits and the positive effect e-learning has on teaching and learning. This argument is strengthened by the fact that nurse educators found the software easy to use and encountered no problems during use of the software. However, their lack of training in ICATT may hamper their use of ICATT in the classroom, and their overall readiness to use ICATT. Hennessy et al (2010:49) are of the view that

the primary barrier to teachers' readiness in using information and communication technologies is their lack of training and preparation for e-learning.

Learners were of the opinion that ICATT will expose them to individualised learning on computers and working at their own pace and acknowledged the ease of use of the software. The student-centred approach to learning was identified as a benefit of e-learning in the study by Harerimana et al (2016:70). This acknowledgement of the benefits of e-learning is an indication of the readiness of learners to use a computer-based learning tool which concurs with the findings of Harerimana et al (2016:1). Although this may be the case, the lack of access to computers and information and communication technologies can negatively impact the readiness of learners. Learners (94.8%) were in agreement that they would feel more confident about using computer-based learning programmes if they had more access to computers and external search facilities. This study does provide evidence of low levels of access to computers and other information and communication technologies.

## 6.3 SUMMARY OF THE RESULTS

The qualitative and quantitative findings were discussed in the discussion section of this thesis. In most instances and in most areas, the qualitative findings supported the quantitative findings. The campus principals, nurse educators and learners had a positive attitude with regards to ICATT implementation and use. The enablers or enabling factors for ICATT use as reported by the participants included: cost effectiveness, the efficient utilisation of nurse educators, the use of technology as an alternative teaching strategy, strengthening learning by changing learners' behaviour and the opportunity to use computers for learning at nursing campuses. The barriers that were identified by the participants were the low number of nurse educators trained in ICATT, the lack of information technology support staff, low computer literacy rates amongst learners, few computers for use by learners at nursing campuses, the lack of computer laboratories and local area networks and financial constraints. The findings of this study indicate that not all nursing campuses are ready to implement and use ICATT for IMCI case management training. The findings also indicate that nurse educators and learners are ready for the implementation as they were able to use the ICATT software and did not encounter any problems. However, the fact that few nurse educators were trained in ICATT and that learners did not receive any basic computer training, coupled with the fact

that learners did not have access to computers can be an indicator that these can be obstacles to nurse educators' and learners' readiness.

### 6.3.1 Best practice for the use of ICATT

The guidelines for the implementation and use of ICATT at nursing campuses were developed following a systematic review of literature sources and the recommendations presented by the campus principals, nurse educators and learners during the individual interviews and focus group interviews. Based on the fact that ICATT will be the first electronic teaching and learning tool to be implemented at nursing campuses in KwaZulu-Natal and, that there are currently no operational guidelines or policies for e-learning implementation, necessitated the development of guidelines for best practices for e-learning.

Tarus et al (2015:132) are of the view that the lack of operational e-learning policies is in itself a challenge to e-learning implementation. According to Frehywot et al (2013:[11]), institutions should examine their readiness, needs and institutional capacity for implementing e-learning prior to the development of an e-learning strategy. Based on this, Frehywot et al (2013:[11]) developed an e-learning strategy model with the following elements: (1) institutional support, (2) faculty engagement, (3) student engagement, (4) Information and communication technical expertise, and (5) infrastructure and support systems. Frehywot et al (2013:[11]) is of the view that the success, sustainability and feasibility of an e-learning programme for medical education in a resource constrained setting is dependent on adherence to the e-learning strategy. Whilst Frehywot et al (2013:[11]) focused on readiness, needs and capacity, Ruggeri et al (2013:[4]) and Bhuasiri et al (2012:851) both identified critical success factors when adopting an e-learning system to ensure e-learning success. Ruggeri et al (2013:[4]) asserted that the critical success factors should be incorporated into a standardized framework which should consolidate information about new knowledge and best practice. Similarly, Bhuasiri et al (2012:851) used the critical success factors to develop a hierarchical model for e-learning in developing countries. Taking into account the strategy by Frehywot et al (2013:[11]), the standardized framework by Ruggeri et al (2013:[4]) and the hierarchical model by Bhuasiri et al (2012:851), together with the recommendations suggested by the participants, led to the development of the guidelines for ICATT implementation at nursing

campuses. In addition, the recommendations address the barriers to ICATT implementation in the nursing campuses, as identified by the participants.

The method suggested for pre-service settings is individual learning using computers (WHO Report of Technical ... 2008:26; ICATT Novartis [s.a]). This is therefore the method of training that nursing campuses will adopt when using ICATT. In an effort to overcome the challenges and to ensure a successful outcome for ICATT implementation and use, the following best practices were identified: (1) engaging relevant stakeholders to provide support and expertise, (2) critically assessing infrastructural needs, (3) engaging with and providing support and training for nurse educators and learners and (4) conducting continuous evaluation to further develop the capacity of the nursing campuses and ensuring long term sustainability of information and communication technologies use for teaching and learning. These best practices for integrating e-learning into nursing education are supported by Bhuasiri et al (2012:853), Kudlova and Lejnev (2011:23) and Kebaetse, Nkomazana and Havercamp (2014:45).

## 6.4 SCOPE AND LIMITATIONS OF THE STUDY

The researcher is aware of certain limitations in this research study despite adhering to the steps in the research process.

- **Scope**

Nurse training in particular the R425 nurse training programme is conducted in all nine provinces of the Republic of South Africa. The researcher confined her study to the province of KwaZulu-Natal. The researcher further confined her study to the public nursing college and its ten nursing campuses. This can therefore limit the generalisability of the findings of this study to the KwaZulu-Natal College of Nursing.

- **Resources**

The researcher was working with limited financial resources. This study did not receive any donor or external funding. If there were no challenges with funding the researcher

could have extended the study to other nursing colleges in other provinces in South Africa and Africa.

- **Limited number of study sites**

The researcher confined her study to the nursing campuses which conduct the R425 nurse training programme and undertake IMCI pre-service training for second year learners. If there were no challenges with funding and accessibility the researcher could have extended her study to universities and universities of technology where IMCI pre-service training is also conducted.

- **Accessibility to research participants**

Accessibility to the nursing campuses was a challenge due to the distances that the researcher needed to travel. The researcher encountered challenges with access to the research participants for this study. This was largely due to the work commitments of the participants, an inflexible campus block system for teaching and learning and the clinical area demands especially on learners. Although the researcher scheduled appointments in advance, nurse educators and learners were not always available.

## 6.5 RECOMMENDATIONS

Useful information pertaining to the readiness of nursing campuses to use a computerised adaptation training tool was identified during this study. In addition, limitations were identified with regards to the readiness of the nursing campuses, nurse educators and learners for computer-based learning. The researcher therefore makes the following recommendations for nursing education and training and research based on the findings of this study.

- **Nursing education and training**

The National Department of Health has indicated that an electronic learning tool called ICATT should be implemented at nursing campuses to facilitate teaching and learning of the IMCI strategy. The researcher therefore makes the following recommendations:

- All nurse educators to be offered comprehensive training on the implementation and use of e-learning to successfully facilitate the integration of information and communication technologies into the nursing curriculum.
- All first-year learners to undergo compulsory information and communication technologies training to equip them with the necessary skills to use computers in the nursing campuses for learning and in the clinical arena in paperless hospitals.
- Expanding the development of the infrastructure at all nursing campuses so as to allow nurse educators and learners access to information and communication technologies (hardware and software) for teaching and learning purposes. This can further allow for the standardisation of IMCI pre-service training at nursing campuses, that is all nursing campuses will use ICATT for MCI case management training.
- The nursing campuses can develop public-private partnerships to negotiate for the provision of laptops for learners at preferential rates or through the Department of Health bursary system.
- Nursing campuses can still implement ICATT for IMCI case management training despite the limitations identified in this study. This can be done by using classroom-based training with data projectors until all campuses have been sufficiently equipped for integrating information and communication technologies into the nursing curriculum. Classroom-based training with individual computers can then be implemented.

- **Research**

The focus of future research should be in the following areas:

- Investigating the readiness of first year nurses for e-learning as no study has been undertaken at the nursing campuses to establish whether new learners are ready to use information and communication technologies during the course of their training.
- A study on the effectiveness of ICATT implementation for distance learning in in-service training. Distance IMCI (dIMCI) training using ICATT has been recommended and was piloted by the South African National Department of Health for IMCI in-service training. No studies have been undertaken in KwaZulu-Natal with regards to the effectiveness of distance IMCI training using ICATT.

## 6.6 SCIENTIFIC RIGOUR

According to Creswell (2009:190), validity and reliability do not have the same meanings in qualitative research as it does in quantitative research. In addition, De Vos et al (2011:419) state that reliability and validity do not contribute to the “truth value” in qualitative research studies. However, trustworthiness in a qualitative study is the equivalent of validity and reliability in a quantitative study (Brink et al 2012:126).

Reliability and validity are two inter-related concepts that a researcher needs to consider when designing or selecting a research instrument in quantitative research, while trustworthiness in qualitative research ensures that its finding and the entire research process are unbiased (Brink et al 2012:126, 171)). This research study utilised a mixed methods approach, and the researcher will therefore consider reliability and validity from a quantitative perspective and trustworthiness from a qualitative perspective.

### 6.6.1 The criteria for ensuring trustworthiness of the qualitative component of the study

According to Mabuza, Govender, Ogunbanjo and Mash (2014:[3]) the writing up of qualitative research should be done so with clarity, which enhances the scientific rigour of the study. This further allows for the findings to be either accepted or refuted. Lincoln and Guba (1985) state that the aim of establishing trustworthiness in a qualitative inquiry is to lend support to the argument that the inquiry’s findings are “worth paying attention to” (Elo, Kääriäinen, Kanste, Pölkki, Utriainen & Kyngäs 2014:2). In the qualitative part of this study, the researcher used the Lincoln and Guba framework of trustworthiness to ensure scientific rigor. The criteria for developing the trustworthiness of a qualitative inquiry are: credibility, dependability, confirmability, transferability and authenticity (Polit & Beck 2012:584). These criteria are now discussed below.

#### *6.6.1.1 Credibility*

Credibility refers to the truth that research findings reveal, and the truthful manner in which the researcher interprets the findings of the study (Polit & Beck 2010:492). According to Lincoln and Guba (1985) cited in Anney (2014:276) credibility establishes whether or not the research findings reasonably and accurately present the participants

original data and is a correct interpretation of the original views of the participants. The following credibility strategies were used by the researcher in this study. The research assistant was present in focus group interviews and took observational notes which were discussed with the researcher after each focus group interview. The use of tape-recorders during focus group interviews when engaging with the research participants further ensured the credibility in this research study. Member checks were done by presenting the information gathered by the researcher back to the participants immediately after the individual interviews and focus group discussions, so they could comment on whether the key findings accurately capture their expressed views (Sandy & Shaw 2012:67). The participants agreed that the key findings that were written were accurate. This was done to eliminate researcher bias and further strengthen the rigour of this study. In addition, the researcher sought scholarly guidance and support from an experienced academic and seasoned qualitative researcher during the transcription of the audio recorded data and during data analysis (Sandy & Shaw 2012:67).

#### *6.6.1.2 Confirmability*

Confirmability is the corroboration of the results between two or more independent individuals with regards to its accuracy, relevance or meaning (Polit and Beck 2010:492). In this study the researcher ensured that the perceptions of the research participants were reflected in the findings by ensuring that the research assistant took notes during the interviews. In addition, the researcher was aware of herself as a research instrument and that the quality of data that was collected was dependent on her strengths as an interviewer (Mabuza et al 2014:[4]). The researcher therefore practiced using the semi-structured interview guides prior to the individual interviews and focus group interviews. The researcher forwarded the recorded data to a transcriber. Data analysis was done independently by the researcher and one other expert qualitative researcher. This was followed by a discussion about the research process and findings which contributed to the confirmability of the study (Sandy & Shaw 2012:67).

#### *6.6.1.3 Dependability*

According to Polit & Beck (2010:492) dependability questions whether the findings from a study would be repeated if the study is replicated using similar participants in a similar

setting. Thus, dependability refers to the stability of the data over time. The semi-structured interview guides were piloted on participants with similar characteristics to those of the main study (Sandy & Shaw 2012:67). Feedback was provided by the participants and the semi-structured interview guides were revised in line with the feedback offered. In addition, the use of a semi-structured interview guide adds to the dependability of the study. The researcher also ensured that all aspects of the research process were carefully and systematically documented by audio-taping all the interviews. This auditing trail adds to the dependability of the data (De Vos et al 2011:177; Mabuza et al 2014:[3]).

#### *6.6.1.4 Transferability*

Transferability is the extent to which qualitative findings can be transferred to other settings or groups (De Vos et al 2011:420). The researcher provided sufficient descriptive data that had been collected during the individual interviews and focus group interviews. The researcher ensured that the participants' excerpts were included in the qualitative data analysis and research findings. Bitsch (2005) cited in Anney (2014:278) presents an argument for the use of purposive sampling in qualitative research which facilitates the transferability of the inquiry. In this study the researcher sampled purposively to access specific information from participants who were particularly knowledgeable about the research topic which ensured transferability.

### 6.6.2 Validity and reliability of the quantitative component of the study

#### *6.6.2.1 Validity of the data-collecting instruments*

Validity is often debated within qualitative methods due to the reliance on the respondent's own interpretation of their experience and the inability to measure qualitative statements. In stating that, the validity of data collecting instruments in the quantitative context can be determined statistically through testing. The validity of an instrument can be determined by how effectively the instrument reflects the phenomenon being examined or measured (Grove et al 2013:393). Brink et al (2012:165) and Terre Blanche et al (2012: 147, 561) concur that validity is the degree to which an instrument does what it is intended to do i.e the instrument is suited to the purposes for which it will be used. Validity or construct validity is a broad measurement evaluation which includes

various types such as: face and content validity, validity from factor analysis, convergent and divergent validity, validity from contrasting groups and validity from the prediction of future and current events (Grove et al 2013:393). Validity is further categorised into two broad components which is internal and external validities (Bolarinwa 2015:195).

The instruments used in this study were examined for validity using content validity, face validity and factorial validity. The content validity is indicative of how representative the instrument is, in respect of all the components of the variables to be measured (Brink et al 2012:166). According to Polit and Beck (2010:377) content validity concerns the degree to which an instrument has an appropriate sample of items for the construct being measured, and adequately includes all aspects of that construct. The researcher developed a content validity index (CVI) (see Annexure R) to test the validity of the content included in the instruments used in this study. The researcher engaged “content experts” in the areas of research, public health and IMCI case management training to determine whether all the variables that were being measured had been included (Grove et al 2013:394; Brink et al 2012:166). The experts were asked to rate the items on the questionnaire from not relevant (1) to highly relevant (4). The items in the questionnaire that were rated 3 = quite relevant and 4 = highly relevant were used to calculate the item content validity index (I-CVI). The scale content validity index was taken to be the average of the item CVI for all items on the questionnaires which were as follows: for campus principals it was 47.75 divide by 48 equalled 0.994, for nurse educators it was 68.60 divide by 69 equalled 0.99, and for learners it was 45.75 divide by 46 equalled 0.99 as illustrated by Polit and Beck (2006:491, 2012:359). The results indicated that the instrument was regarded as valid by these experts. Polit and Beck (2010:377) state that face validity refers to whether the instrument looks as though it is measuring the appropriate construct for the people who will be completing the instrument. In this research study, the questionnaire contained specific instructions for the research participants for the completion of the self- administered questionnaire, as well as included all aspects for the needs analysis, cost analysis and evaluability assessment pertaining to ICATT implementation. Face validity was further addressed through consultation with individuals knowledgeable about IMCI and ICATT to ensure that the questionnaires addressed the aforementioned areas that were considered pertinent to this study. The factorial validity of the questionnaires was ensured as the statistician was able to use the statistical model called factor analysis for data collected from the nurse educators and learners (Bolarinwa 2015:198). The analysis of the piloted questionnaires for learners indicated that no

matrices (factor analysis) were available for two sections as the scoring was constant. This was alleviated in the main study where variation did allow for acceptable matrices (factor analysis) which contributed to the validity of the findings in this study.

The external validity is not relevant to this study hence the researcher will only discuss the relevance of internal validity to this study. Internal validity seeks to "determine the extent to which the conclusions represent the empirical reality" or whether the findings are a true reflection of the studied phenomenon (Brink et al 2012:127). The researcher used the inclusion criteria which ensured that all the participants that were selected had similar characteristics and that they were randomly selected further strengthened the internal validity of this study (Polit & Beck 2012:244; Onwuegbuzie 2000:22). Questionnaires must be developed with a specific purpose in mind and must be aligned to the objectives of the research study (Bolarinwa 2015:196). The internal validity of the study was addressed by ensuring that the questionnaires were developed to collect specific information with regards to the readiness of nursing campuses for ICATT use which was related to the objectives of the study. The consistency with which the participants answered questions further ensured the internal validity of this study (Onwuegbuzie 2000:22).

#### *6.6.2.2 Reliability of the data-collecting instruments*

Quality and generalisability of a study's findings is dependent on reliability. According to researchers' reliability is concerned with the consistency and dependability of an instrument in measuring a variable in a study or clinical practice (Grove et al 2013:389; Brink et al 2012:126). Thus, reliability is an important standard against which researchers assess the quality of an instrument used for data collection in a quantitative study (Polit & Beck 2010:373). The reliability of a questionnaire can be determined by conducting a pilot test or pre-test (Bolarinwa 2015:198). The researcher pilot-tested the questionnaires with a group of participants with similar attributes to the research participants sampled for the study. Instructions to research participants and conditions under which they completed the questionnaires were standardised to increase the reliability of the measures (De Vos et al 2011:177). The piloted questionnaires were submitted to the statistician to test for reliability. The statistician used Cronbach's Alpha coefficient to establish the reliability of the instrument (De Vos et al 2011:177). A reliability coefficient of 0.70 or higher is considered as "acceptable" (Polit & Beck 2012:722). The reliability

score for each section exceeded the recommended Cronbach's alpha value of 0.700. This indicates a high degree of acceptable, consistent scoring for the various sections in the self-administered questionnaires for nurse educators and learners in this study. The results of the pilot study also mirror the main study which added to the reliability of the data collection instruments used in this study. In addition, the statistician used the Kaiser-Meyer-Olkin Measure of Sampling Adequacy which was greater than 0.50 and Bartlett's Test of Sphericity which was less than 0.05, both indicating that the results from the factor analysis is useful (Grove et al 2013:566). This further strengthened the reliability of the questionnaires used in this study.

### 6.6.3 Scientific rigour in the Delphi method

Researchers are of the opinion that trustworthiness is more appropriate than validity and reliability in establishing the rigour of the Delphi method (Hasson & Keeney 2011:1700). The criteria that the researcher used in this study for ensuring the trustworthiness of the Delphi method are discussed below.

#### *6.6.3.1 Credibility*

Credibility is achieved as expert opinion was sought for the refinement of the guidelines in this study (Hasson & Keeney 2011:1699). The researcher sampled participants based on expertise and experience and their abilities to collectively contribute to the development of the guidelines in this study. The use of many rounds to achieve consensus adds to the credibility of the Delphi method. The feedback which is given to the experts between rounds further enhances credibility (Hasson & Keeney 2011:1700; Chilemba et al 2014:1195). The use of an open round and two rounds of Delphi and, the feedback given to the experts for refinement of the guidelines contributed to the credibility of the findings in this study. The researcher's interpretation of the findings from round one is the feedback to the experts for round two which allows for validation of the findings. Additionally, the researcher can check that the feedback received from the experts is accurate which contributes to the credibility of the findings (Hasson & Keeney 2011:1700). The feedback to the expert panel is also considered as member checking which further strengthens the credibility of the findings (Hasson & Keeney 2011:1700). Group opinion or consensus was used for the refinement of the guidelines that were developed by the researcher. The researcher used a 70% consensus cut-off point for agreement amongst

the experts regarding the refinement of the guidelines. It is suggested that group opinion is more valid than an opinion from a single person and contributes to the credibility of the findings (Hasson & Keeney 2011:1699).

#### *6.6.3.2 Dependability*

Dependability can be achieved by sampling respondents for the Delphi panel based on their knowledge and expertise (Hasson & Keeney 2011:1700). In this study the researcher purposively sampled a group of 13 experts with a background and expertise in the fields of nursing education, nursing management, curriculum development and IMCI case management training and facilitation.

#### *6.6.3.3 Confirmability*

Confirmability can be addressed by maintaining a detailed description of the Delphi collection and analysis process (Hasson & Keeney 2011:1700). The researcher kept a record of the suggested additions and amendments to the guidelines in Delphi round one and two. All electronic mail communications (open round, round one and round two) with the e-Delphi panel were saved in a password protected computer.

## 6.7 CONCLUSION

Nursing education must be responsive to a wide range of technological innovations, thus enabling the successful integration of computerised training tools into the nursing curriculum. Nursing education must, in equal measure, be responsive to the South African National Department of Health policies pertaining to child health, the achievement of the Sustainable Development Goals, and the use of innovative learning methods for in-service and pre-service training. The usage of a computerised training tool is therefore worthy of investigation. In this study the researcher used a sequential exploratory mixed method design to investigate the readiness of nursing campuses for the implementation and use of ICATT, a computerised training tool, and to develop guidelines for improving the use of ICATT at the nursing campuses. Based on the mixing of the results in this study, important similarities in respect of perceptions were observed among the three sample groups of campus principals, nurse educators and learners. All the participants had a positive attitude and notably concur on the adoption of ICATT for IMCI case

management training and, agree on its positive effects for teaching and learning. The findings also reflected in most instances that the quantitative findings supported the qualitative findings with regards to the enablers and barriers for ICATT implementation and use at the nursing campuses in KwaZulu-Natal.

The participants identified the following enabling factors of ICATT use for IMCI case management training for nursing campuses, nurse educators and learners such as: recognition as institutions of higher learning, cost and time-saving, effective utilisation of nurse educators trained in IMCI, opportunity to access and use information and communication technologies in the classroom, strengthening computer skills amongst learners, facilitating self-directed learning and allowing learners' to learn at their own pace. In addition, ICATT addresses most of the difficulties experienced with the conventional IMCI case management training. Despite the participants identifying enabling factors, the qualitative findings supported the quantitative findings in further identifying the existence of barriers that may affect the implementation of ICATT at the nursing campuses. The barriers to ICATT use were related to the lack of human and material resources, and infrastructural and financial constraints. The human and material resource barriers were identified as a lack of training in ICATT amongst nurse educators and low levels of computer training and literacy amongst learners, the lack of information technology support personnel at nursing campuses, the lack of computer laboratories or local area networks in the many of the nursing campuses, no computers and in some instances an inadequate number of computers for learner use. The current economic climate and the existing financial challenges within nursing campuses may make it difficult to address the human and material resource challenges and infrastructural constraints. It is therefore crucial to acknowledge that the implementation of computerised training tools is not only dependent on addressing the barriers, but rather developing and adhering to a framework or strategy to ensure growth and development in this arena. The development of guidelines and a model for the implementation of ICATT may therefore provide the KwaZulu-Natal College of Nursing and its campuses with an opportunity to implement and utilise computerised training tools for teaching and learning successfully. The KwaZulu-Natal College of Nursing can thus strengthen pre-service training for IMCI case management and align itself to other institutions of higher education which provide learners with online learning platforms.

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# ANNEXURES

**ANNEXURE A**

**Ethical Clearance of the Department of Health Studies**

UNISA university of south africa

**UNIVERSITY OF SOUTH AFRICA**
**Health Studies Higher Degrees Committee**
**College of Human Sciences**
**ETHICAL CLEARANCE CERTIFICATE**

**HSHDC/259/2013**

Date: 27 November 2013 Student No: 075-943-8

Project Title: The implementation of the IMCI Computerized Adaptation and Training Tool (ICATT) at Nursing college in KwaZulu Natal – A mixed method study.

Researcher: Udesvari Pillay

Degree: D Litt et Phil Code: DPCHS04

Supervisor: Prof JH Roos
Qualification: D Litt et Phil
Joint Supervisor: Prof P Sandy

**DECISION OF COMMITTEE**

**Approved** [√] **Conditionally Approved** [ ]

**Prof L Roets**
**CHAIRPERSON: HEALTH STUDIES HIGHER DEGREES COMMITTEE**

**Prof MM Moleki**
**ACADEMIC CHAIRPERSON: DEPARTMENT OF HEALTH STUDIES**

**PLEASE QUOTE THE PROJECT NUMBER IN ALL ENQUIRES**

UNIVERSITEIT VAN SUID-AFRIKA
PRETORIA
UNIVERSITY OF SOUTH AFRICA

## ANNEXURE B

## Permission to collect data at Nursing Campuses in KZN

**Naidoo Udesvari**

**From:** Lutge Elizabeth
**Sent:** 18 March 2014 09:40 AM
**To:** Naidoo Udesvari
**Cc:** Khumalo Gugu; Desai Rizwana; Hlazo Jabulisiwe
**Subject:** RE: Permission to collect data at Nursing Colleges in KZN

Dear Mrs Naidoo
Thank you for your application. It will be processed by Mrs Khumalo or Mr Xaba (copied above), who will be in touch with you shortly.
With best wishes
Elizabeth.

**From:** Naidoo Udesvari
**Sent:** 17 March 2014 08:25 AM
**To:** Lutge Elizabeth
**Cc:** Khumalo Gugu; Desai Rizwana; Hlazo Jabulisiwe
**Subject:** Permission to collect data at Nursing Colleges in KZN

Good morning Dr Lutge

I, Mrs. U.Naidoo (Pillay) am a lecturer at the Addington Nursing College. I would like to apply for permission to collect data from the KwaZulu Natal Colleges of Nursing for my study.I am currently registered with UNISA for my Doctoral Degree, and have received ethical clearance(see attached) for this study. I have received permission from Dr.Lesley Bamford (NDOH) to use the ICATT software(see attached), and the Acting Principal of KwaZulu Natal College of Nursing to collect data from the campuses (see attached).

The focus of this study is ICATT( IMCI Computerised Adaptation and Training Tool) implementation. The purpose of this research study is to:

- explore the perceptions of educators and learners regarding the implementation of IMCI Computerised Adaptation and Training Tool (ICATT), in order to successfully implement ICATT at nursing colleges.
- explore the use of computerised guidelines , that is ICATT, in order to strengthen teaching and learning of IMCI case management training.

At a recent training session held in Durban in November 2013, the National Facilitators for IMCI and ICATT training strongly expressed the opinion that all nursing colleges in South Africa should consider using ICATT. I have decided to limit my study to the province of KwaZulu Natal as this is my hometown, and financial and accessibility constraints preclude me from expanding this study, at this present time. The findings from my study can play a pivotal role in providing evidence on whether it is possible to implement ICATT at our nursing colleges in KZN. This research study can ensure us the opportunity of being positioned at the forefront of research. As this is a Doctoral study, the findings will not only pave the way for guideline development, but will also provide strong motivation to adopt computerized training guidelines for nurse education. This will catapult nursing training into the exciting 21st century of technology usage in the sphere of nursing education.

I have attached all of the relevant documents for your perusal. If there are any queries please do not hesitate to contact me. I did forward these documents to Ms.Hlazo first as I was directed to do so by Mrs.Hoosain at district office. However, Mrs.Sangeetha Maharaj (KZNCN) asked that I forward these documents to you as well. I have

1

corresponded with Ms. Desai and Ms.Khumalo for my Masters study previously, hence I have cc'd them on this email.

Kind regards
Mrs.U.Naidoo (Pillay)
Lecturer Community Nursing Science
Addington Campus
Tel. no : (031) 3272056/67
Cell. no : 0845544405

## ANNEXURE C

## Approval from Department of Health, KZN for research proposal

health
Department:
Health
PROVINCE OF KWAZULU-NATAL

**Health Research & Knowledge Management sub-component**
10 – 103 Natalia Building, 330 Langalibalele Street
Private Bag x9051
Pietermaritzburg
3200
Tel.: 033 – 3953189
Fax.: 033 – 394 3782
Email.: hrkm@kznhealth.gov.za
www.kznhealth.gov.za

**Reference : HRKM59 /14**
**Enquiries: Mrs G Khumalo**
**Telephone:** 033 – 395 3189

18 March 2014

Dear Mrs U Pillay

**Subject: Approval of a Research Proposal**

1. The research proposal titled **'The implementation of the IMCI computerised adaptation and training tool (ICATT) at Nursing Colleges in KwaZulu-Natal- A mixed method study'** was reviewed by the KwaZulu-Natal Department of Health (KZN-DoH).

The proposal is hereby **approved** for research to be undertaken at KwaZulu-Natal College of Nursing.

2. You are requested to take note of the following:
   a. Make the necessary arrangement with the identified facility before commencing with your research project.
   b. Provide an interim progress report and final report (electronic and hard copies) when your research is complete.

3. Your final report must be posted to **HEALTH RESEARCH AND KNOWLEDGE MANAGEMENT, 10-102, PRIVATE BAG X9051, PIETERMARITZBURG, 3200** and e-mail an electronic copy to hrkm@kznhealth.gov.za

For any additional information please contact Mrs G Khumalo on 033-395 3189.

Yours Sincerely

**Dr. E Lutge**
**Chairperson, KwaZulu-Natal Health Research Committee**
**Date:** 18/03/2014

## ANNEXURE D

## Permission from the KwaZulu-Natal College of Nursing to conduct study at the nursing campuses

**Naidoo Udesvari**

| | |
|---|---|
| **From:** | Makhathini Joan |
| **Sent:** | 06 March 2014 12:07 PM |
| **To:** | Naidoo Udesvari |
| **Cc:** | Sangeetha Maharaj |
| **Subject:** | FW: Permission to conduct study at KwaZulu Natal College of Nursing Campuses |
| **Attachments:** | ethical certificate PhD.pdf; permission letter Lesley Bamford.pdf; ICATT BOOKLET.doc; ICATT CONSENT OCTOBER 2013 P R.doc; Interview guide for Educators JHR SP October 2013 p R.doc; Interview guide for Learners JHR SP October 2013 P R.doc; QUESTIONNAIRE FOR CAMPUS PRINCIPALS JHR SP October 2013 p R.doc; questionnaire for learners JHR SP October 2013 P R.doc; questionnaire for nurse educators JHR SP October 2013 P R.doc; ICATT LETTER OF INFORMATION-October 2013 P R.doc; proposal janetta roos peter sandy October 2013 P R.doc |

Dear Ms Naidoo

Correspondence from yourself is acknowledged.
Please note that Mrs Maharaj; KZNCN; will revert to you in due course.

Kind regards,

*Ms J.T. Makhathini*
Acting Principal: KZN College of Nursing

Tel: 033 – 264 7810
Fax: 033 – 394 7238
Email: joan.makhathini@kznhealth.gov.za

---

**From:** Naidoo Udesvari
**Sent:** 04 March 2014 02:19 PM
**To:** Makhathini Joan
**Subject:** Permission to conduct study at KwaZulu Natal College of Nursing Campuses

Good afternoon Miss Makhathini

I, Mrs. U.Naidoo (Pillay) would like to apply for permission to collect data from the KwaZulu Natal Colleges of Nursing for my study.
I am currently registered with UNISA for my Doctoral Degree, and have received ethical clearance(see attached) for this study.

The focus of this study is ICATT( IMCI Computerised Adaptation and Training Tool) implementation. The purpose of this research study is to:

- explore the perceptions of educators and learners regarding the implementation of IMCI Computerised Adaptation and Training Tool (ICATT), in order to successfully implement ICATT at nursing colleges.

1

- explore the use of computerised guidelines , that is ICATT, in order to strengthen teaching and learning of IMCI case management training.

At a recent training session held in Durban in November 2013, the National Facilitators for IMCI and ICATT training strongly expressed the opinion that all nursing colleges in South Africa should consider using ICATT. I have decided to limit my study to the province of KwaZulu Natal as this is my hometown, and financial and accessibility constraints preclude me from expanding this study, at this present time. The findings from my study can play a pivotal role in providing evidence on whether it is possible to implement ICATT at our nursing colleges in KZN. This research study can ensure us the opportunity of being positioned at the forefront of research. As this is a Doctoral study, the findings will not only pave the way for guideline development, but will also provide strong motivation to adopt computerized training guidelines for nurse education. This will catapult nursing training into the exciting 21st century of technology usage in the sphere of nursing education.

I have attached all of the relevant documents for your perusal. If there are any queries please do not hesitate to contact me.

Kind regards
Mrs.U.Naidoo (Pillay)
Lecturer Community Nursing Science
Addington Campus
Tel. no : (031) 3272056/67
Cell. no : 0845544405

**ANNEXURE E**

**Permission granted from the KwaZulu-Natal College of Nursing to conduct study at the nursing campuses**

health
Department:
Health
PROVINCE OF KWAZULU-NATAL

**KWAZULU- NATAL COLLEGE OF NURSING**
P/Bag X9089, Pietermaritzburg, 3200
Tel.: (033) 264 7800, Fax: (033) 394 7238
e-mail: joan.makhathini@kznhealth.gov.za
www.kznhealth.gov.za

Enquiries: Mrs. S. Maharaj
Telephone: 033 – 264 7806
Date: 14 March 2014

Principal Investigator: Udersvari Pillay
University of South Africa
Student Number: 759-438-0

Dear Madam

RE: PERMISSION TO CONDUCT RESEARCH AT THE KZN COLLEGE OF NURSING NEI's.

**TITLE:** **THE IMPLEMENTATION OF IMCI COMPUTERIZED ADAPTATION AND TRAINING TOOL (ICATT) AT NURSING COLLEGES IN KWAZULU-NATAL - A MIXED METHOD STUDY.**

I have the pleasure in informing you that permission has been granted to you as per the above request by the Acting Principal of the KZN College of Nursing.

Data Collection sites : All Campuses of the KwaZulu-Natal College of Nursing.

Please note the following:

1. Please ensure that you adhere to all policies, procedures, protocols and guidelines of the Department of Health with regards to this research.
2. This Research will only commence once this office has received confirmation of approval from the Provincial Health Research Committee in the KZN Department of Health.
3. Please ensure this office is informed before you commence your research.
4. Permission is therefore granted for you to conduct this research at the identified campuses of the KZN College of Nursing.
5. The KwaZulu-Natal College and its NEI's will not provide any resources for this research.
6. You will be expected to provide feedback on your findings to the Acting Principal of the KwaZulu-Natal College of Nursing.
7. You are expected to make the necessary arrangements with the respective campus principals.
8. Kindly note that Edendale Campus is currently undergoing renovation and unable to accommodate research at the Campus, please make arrangements with the Campus Principal to check when you can be accommodated in the future.

Thanking You

.....
Ms JT Makhathini
Acting Principal: KwaZulu-Natal College of Nursing

## ANNEXURE F

## Permission to use ICATT

**Naidoo Udesvari**

**From:** Lesley Bamford <BamfoL@health.gov.za>
**Sent:** 10 February 2014 02:41 PM
**To:** Naidoo Udesvari
**Subject:** Re: Permission to use ICATT

Dear Udes

From our side we would welcome the work that you are proposing, and are very happy for you to use the ICATT software,

Please keep us informed about the outcome of the study.

Please indicate if you need anything else from us. If you need a formal letter then please indicate exactly what it should say.

Kind regards

Lesley

>>> Naidoo Udesvari <Udesvari.Naidoo@kznhealth.gov.za> 2/4/2014 1:38 PM >>>
Good morning Dr Bamford

I trust you are well.

Following our discussion in November, I am formally requesting for permission to use ICATT, as part of my PhD study.
See attached a copy of my ethical clearance certificate. I have also included a letter of information for perusal.
I intend starting my data collection as soon as possible, as most of the second year student nurses have at this point in time
completed the 10 day IMCI course. It is also more convenient as it is still early in the year, before students and lecturers start
focusing on examinations.

Thank you in advance for your co-operation.

Kind regards
Udes Naidoo (Pillay)
Community Nursing Science Lecturer
Addington Campus

## ANNEXURE G

## Permission granted for the use of ICATT at Nursing Colleges in KZN

health

Department:
Health
REPUBLIC OF SOUTH AFRICA

Private Bag X828, PRETORIA, 0001, Civitas Building, Pretoria
**Tel (012) 395 8292, Fax (012) 395 8486**

Ms.Udesvari Naidoo
KwaZulu-Natal Nursing College: Addington Campus
P O Box 977
**DURBAN**
4000

Dear Ms Naidoo

**IMPLEMENTATION OF ICATT AT NURSING COLLEGES IN KWAZULU-NATAL**

Thank you for sending the information letter regarding the study on the implementation of the IMCI Computerised Adaptation and Training Tool (ICATT) that you will be undertaking in nursing colleges in KwaZulu-Natal.

The National Department of Health endorses the use of ICATT especially in pre-service settings. The ICATT software is not copyrighted, and you would be welcome to use the software whilst conducting the study.

We would be very interested in the findings of your study. Please keep both ourselves and the provincial Department of Health informed about the outcome of the study.

Kind regards

LJ Bamford

**DR LESLEY BAMFORD**
**SPECIALIST AND ACTING DIRECTOR: CHILD AND YOUTH HEALTH**
**DATE: 11th February 2014**

**ANNEXURE H**

**Consent form**

**CONSENT**

**Consent to Participate in this Research Study**

- I hereby confirm that I have been informed by the researcher, **Ms. Udesvari Pillay (Naidoo),** about the nature, conduct and benefits of this study – Research Ethics Clearance Number: HSHDC/259/2013
- I have also received, read and understood the above written information (Participant Letter of information) regarding the study.
- I am aware that the results of the study, including personal details regarding my sex, age, date of birth and initials will be anonymously processed into a study report.
- In view of the requirements of research, I agree that the data collected during this study can be processed in a computerised system by the researcher.
- I may, at any stage, without prejudice, withdraw my consent and participation in the study.
- I have had sufficient opportunity to ask questions and (of my own free will) declare myself prepared to participate in the study.
- I understand that significant new findings developed during the course of this research which may relate to my participation will be made available to me.

| ..... | ……. | ……. |
|---|---|---|
| **Full name of participant** | **Date** | **Signature** |

I, **Udesvari Pillay (Naidoo)** hereby confirm that the above participant has been fully informed about the nature, conduct and benefits of the above study.

| **Udesvari Pillay (Naidoo)** | …….. | …… |
|---|---|---|
| **Full name of Researcher** | **Date** | **Signature** |

| ……. | ……. | ……. |
|---|---|---|
| **Full name of Witness** | **Date** | **Signature** |

Adapted from: Ethics form (www.dut.ac.za/research/ethics-forms/)

## ANNEXURE I

## Letter of information

Ethics clearance reference number: HSHDC/259/2013

**Title of the Research Study: DETERMINANTS OF THE NURSING CAMPUSES' READINESS TO USE A COMPUTERISED ADAPTATION TRAINING TOOL**

**Principal Researcher:** Ms Udesvari Pillay (Naidoo)

**Co-researchers/supervisor/co-supervisor:** Supervisor: Professor J Roos, Co-supervisor: Professor P Sandy

Dear Participant

My name is Udesvari Pillay and I am undertaking research for degree purposes at the University of South Africa. I am inviting you to participate in this study titled: Determinants of the nursing campuses' readiness to use a computerised adaptation and training tool. This information sheet highlights the purpose of the study and the value of your participating in the same. It is important for you to read through this information sheet that contains all the pertinent information relating to this study. If you feel you require additional information, the researcher will be happy to oblige.

The province of KwaZulu-Natal has both public and private nursing education institutions. The KwaZulu-Natal College of Nursing is the only public nursing education institution in the province. The College of Nursing has 11 campuses and 14 sub-campuses which are geographically dispersed in nine districts of this province. Each nursing campus has a campus principal who is assisted by a deputy principal, and nurse educators with regards to nurse training. The KwaZul-Natal College of Nursing offers a variety of nurse training programmes. The College of Nursing has been authorised to offer the R425 nurse training programme to learners at selected campuses. The IMCI case management strategy has been included in the R425 curriculum, and ICATT is a computerised tool that can be used for IMCI training. There are currently 10 campus principals, ±50 nurse educators trained in IMCI and ± 600 second and third year learners trained in IMCI. The South African Nursing Council (SANC) has stipulated in its nursing and education standards of 2005, and the Nursing Act 33, that nurse educators should integrate new technology in teaching and learning (South African Nursing Council Nursing Education and Training Standards [s.a]: 81). It is therefore worth exploring the perceptions of educators and learners to ICATT implementation at nursing campuses. Doing so would allow the researcher to evaluate

the readiness of the nursing campuses to use the tool and the effectiveness of this tool for IMCI case management training.

**Purpose of the study**

I am conducting this study to

- explore the perceptions of educators and learners regarding the implementation of IMCI Computerised Adaptation and Training Tool (ICATT), in order to successfully implement ICATT at nursing campuses
- explore the use of computerised guidelines, that is ICATT, in order to strengthen teaching and learning of IMCI case management training

**Nature of participation**

There are two phases for data collection: data will be collected from campus principals in phase 1 and from nurse educators and learners in phase 2. An interview schedule has been developed for the campus principals, nurse educators and learners that will be used for individual interviews and focus group interviews. Similarly, a questionnaire has been developed for the campus principals, nurse educators trained in IMCI currently facilitating IMCI case management training at the campuses, and second and third year learners that have completed IMCI case management training. The sites for data collection will be all of the campuses for this study namely: Addington, Benedictine, Charles Johnson Memorial, Edendale, Greys, Madadeni, Ngwelezane, Port Shepstone, Prince Mshiyeni Memorial and RK Khan. All participants/respondents will receive an ICATT information booklet prior to data collection. Data will be collected from campus principals, IMCI trained nurse educators and IMCI trained second and third year learners during one-on-one interviews and focus group interviews. Additional data will be collected using questionnaires at the site. IMCI trained educators and IMCI trained second and third year learners will use the ICATT software, and then proceed to completing the self-administered questionnaire. The campus principals will complete the questionnaires after the individual interviews. The time allocation for the interviews is between 30 minutes to an hour and the questionnaires should take between 25-35 minutes to complete.

**Inclusion criteria**

- Nurse educators trained in IMCI currently facilitating IMCI case management training at the ten campuses of nursing.

- IMCI trained second year and third year learners who have completed the IMCI case management training in the conventional manner, which included group discussion, demonstration and role-play using IMCI chart booklets, modules, exercise booklets, photographs, DVDs and recording forms using chart booklets, DVD's.
- Campus principals at nursing campuses where IMCI case management trainings are carried out.

**Exclusion criteria**

- Principals, educators and learners at sub-campuses will not be included, as IMCI case management training is not carried out as pre-service training.
- Nurse educators who have not completed the IMCI case management training and facilitators course.
- Second year learners that have not completed IMCI case management training.

**Benefits of taking part in this study**

The researcher believes that the findings of this study will contribute to the body of knowledge regarding ICATT and its probable implementation at nursing campuses in KwaZulu-Natal, and allow the educators and learners to explore computer assisted learning, in order to strengthen teaching and learning at nursing campuses. The results will be useful to other educational institutions in KwaZulu-Natal, as well as trainers at the eThekwini district, in enhancing their knowledge about, and determining their readiness for ICATT implementation in their areas.

**Risks or discomforts to the participants**

There are no forseeable risks to the participants who participate in the study. No injuries are anticipated during the course of this study.

**Reason/s why the Participant may be withdrawn from the study**

Participation is voluntary and participants are under no obligation to consent to participation. There is no penalty or loss of benefit for non-participation. You are free to withdraw at any time without giving a reason. If you decide to participate you will be expected to sign a written consent form.

**Payments or incentives**

There will be no payments or incentives offered to the partcipants during the course of the study. The participants will not incur any costs related to this study.

**Confidentiality**

You are not required to write your name on the questionnaire, and your anonymity is guaranteed. The researcher will ensure the secure storage of the questionnaires in a locked cupboard for a period of five years.

**Contact details of relevant persons regarding this research study**

Please contact the researcher: Ms Udesvari Pillay (Naidoo), tel no: 031 3272056/67

Cell no: 0845544405

Should you have any concerns about the way in which the research has been conducted, you may contact:

Supervisor: Prof J Roos

Co-supervisor: Prof P Sandy

**ANNEXURE J**

**Request for permission to use data collection tool**

13 Linum Place
Asherville
Durban
4001

8 October 2013

Attention: Mrs Sangeetha Maharaj

I am a doctoral student from UNISA writing my thesis titled: The implementation of ICATT at nursing colleges in KwaZulu-Natal – a mixed methods study.

My study relates to the implementation of a computerised tool at our nursing campuses. I have seen your tool which addresses many areas of my study. I have already developed a tool, and would like to incorporate only some aspects from your tool in my questionnaire. I would therefore like your permission to do so.

I will acknowledge your contribution in my study.

Kind regards

Mrs Udesvari Naidoo (Pillay)

**ANNEXURE K**

**Permission for use of survey tool**

54 Brixham Road

Orient Heights

Pietermaritzburg

3201

12 October 2013

Dear Mrs U Naidoo

**RE: REQUEST TO UTILISE DATA COLLECTION TOOL IN PHD STUDY**

Your letter dated 8th October 2013, and our discussions regarding use of the data collection tool refers:

Kindly note approval for use of aspects of the tool in your questionnaire is granted.

All the best with your study.

**Thank you**

**Mrs S Maharaj**

## ANNEXURE L

## Questionnaire for campus principals

**QUESTIONNAIRE FOR CAMPUS PRINCIPALS**

**ICATT IMPLEMENTATION**

**AT NURSING CAMPUSES IN KWAZULU-NATAL**

| Number of questionnaire | 1 | 2 | 3 |
|---|---|---|---|
| | | | |

Name of Campus: ..…….

Date: ……../…../……

Background: The IMCI Computerised Adaptation and Training Tool (ICATT) is an electronic learning tool with a computerized software application which allows for the adaptation of the generic guidelines of the IMCI strategy. South Africa has adopted ICATT as an additional training methodology to scale up IMCI saturation.

Purpose: To investigate the nursing campuses' readiness regarding the use of ICATT in KwaZulu-Natal. To develop guidelines for improving the use of ICATT for IMCI case management training at nursing campuses in KwaZulu-Natal.

***All information herewith provided will be treated confidentially. It is not necessary to indicate the name of the Campus Principal in this questionnaire.***

**INSTRUCTIONS**

1. **Please answer all questions by marking a "X" in the corresponding box**
2. **Please answer all the questions as honestly and objectively as possible**
3. **The questionnaire should take you approximately 30 minutes to complete**

**SECTION A: DEMOGRAPHIC DATA**

1. Age range

| **Age** | **Answer** |
|---|---|
| 1.1. 21-30 years | |
| 1.2. 31-40 years | |
| 1.3. 41-50 years | |
| 1.4. 51-60 years | |

*Office use*

| | |
|---|---|
| | |

2. Gender *Office use*

| | | |
|---|---|---|
| 2.1. Female | | |
| 2.2. Male | | |

3. Indicate the number of years working as a Campus Principal

| **Years working as a Campus Principal** | |
|---|---|
| 3.1. Less than 1 year | |
| 3.2. 1-2 years | |
| 3.3. 3-4 years | |
| 3.4. 5 years and more | |

4. Indicate the type of nurse training that is offered at this institution?

| **Type of Training** | **Yes** | **No** |
|---|---|---|
| 4.1. R425 | | |
| 4.2. R2175 | | |
| 4.3. Other | | |

**SECTION B**:

**HUMAN RESOURCES:**

5. Indicate the number of IMCI trained educators in your institution?

| No. of IMCI trained educators | |
|---|---|
| 5.1. 1-2 | |
| 5.2. 3-4 | |
| 5.3 5-6 | |
| 5.4 More than 6 | |

6. Indicate the number of IMCI trained educators currently facilitating IMCI case management training at your institution?

| **No. of IMCI trained facilitators currently facilitating IMCI case management training** | |
|---|---|
| 6.1. 1-2 | |
| 6.2. 3-4 | |
| 6.3. 5-6 | |
| 6.4. More than 6 | |

7. Indicate your agreement with the following statements:

| | | Strongly disagree | Disagree | Neutral | Agree | Strongly agree |
|---|---|---|---|---|---|---|
| 7.1. | There are an adequate number of IMCI-trained educators, in respect of educator-learner ratios for case management training | | | | | |
| 7.2. | I would be willing to motivate for IMCI trained educators to be sent for ICATT training, to improve IMCI case management training at this institution | | | | | |

**TEACHING AND LEARNING USING TECHNOLOGY**

8. Please select the option that best answers your situation for each of the following?

| | | YES | NO |
|---|---|---|---|
| 8.1. | Does this nursing campus offer nurse educators access to online internal (i.e intranet) search facilities for teaching and learning purposes? | | |
| 8.2. | Does this nursing campus offer nurse educators access to online external (i.e internet) search facilities for teaching and learning purposes? | | |

9. Indicate your agreement with the following statements:

| | | Strongly disagree | Disagree | Neutral | Agree | Strongly agree |
|---|---|---|---|---|---|---|
| 9.1. | It is important for nurse educators to have access to online internal (i.e intranet) search facilities | | | | | |
| 9.2. | It is important for nurse educators to have access to online external (i.e internet) search facilities | | | | | |
| 9.3. | It is important to incorporate new technologies (computer-based) for teaching and learning purposes | | | | | |

**SITUATIONAL ASSESSMENT**

10. Is/are there computer laboratory/ laboratories at this institution for use by learners?

| | |
|---|---|
| 10.1. | YES |
| 10.2. | NO |

| | |
|---|---|
| | |

11. Is/are there plans to develop/build computer laboratories at this institution for use by learners?

| | |
|---|---|
| 11.1. | YES |
| 11.2. | NO |

| | |
|---|---|
| | |

12. Are classrooms connected to a power source that will enable the use of laptops, projectors and accessibility to the internet/intranet?

| | |
|---|---|
| 12.1. | YES |
| 12.2. | NO |

| | |
|---|---|
| | |

**TECHNOLOGY ASSESSMENT**

13. Do nurse educators at this institution have access to computers at this campus?

| | |
|---|---|
| 13.1. | YES |
| 13.2. | NO |

| | |
|---|---|
| | |

14. Have nurse educators at this institution received any basic computer training/instruction?

| | |
|---|---|
| 14.1. | YES |
| 14.2. | NO |

| | |
|---|---|
| | |

15. Is/are there laptop computers and projectors for use by educators at this institution, for classroom teaching?

| | |
|---|---|
| 15.1. | YES |
| 15.2. | NO |

| | |
|---|---|
| | |

16. At your institution do learners have access to the following?

| | | **Yes** | **No** |
|---|---|---|---|
| 16.1 | Computers | | |
| 16.2. | Internet | | |
| 16.3. | Intranet | | |
| 16.4. | On-line submission of assignments | | |
| 16.5. | On-line tests | | |

| | |
|---|---|
| | |

17. Computer-assisted learning is a growing trend, and can complement teaching and learning practices in the classroom, for nursing students.
For each of the following items, indicate, with a score of 1 to 5, how beneficial the electronic applications would be for your students.

**1= Not at all beneficial, 5= Essential**

| | | |
|---|---|---|
| 17.1 | Computers | |
| 17.2. | Internet access | |
| 17.3. | Intranet access | |
| 17.4. | On-line submission of assignments | |
| 17.5. | On-line tests | |

**FINANCIAL RESOURCES**

18. What are the current costs that your institution incurs in respect of printing materials (modules) for IMCI implementation annually?

R……..

19. Has this institution incurred any costs in respect of training of nurse educators for IMCI implementation in the past?

| | |
|---|---|
| 19.1. YES | |
| 19.2. NO | |

| | |
|---|---|
| | |

If yes, what was the amount? R..……..

20. Has this institution incurred any additional costs for IMCI case management training, in respect of the following:

| **EQUIPMENT** | **YES** | **NO** | **AMOUNT (ZAR)** |
|---|---|---|---|
| 20.1. Television | | | |
| 20.2.DVD player | | | |
| 20.3. Additional Copies of DVDs | | | |
| 20.4. Additional copies of colour printed, bound photograph booklets | | | |

| | |
|---|---|
| | |

**SECTION C: POSSIBLE CHALLENGES AND BENEFITS TO ICATT IMPLEMENTATION**

21.Rate each of the items below on a scale from 1 to 5 **(1= extremely challenging** and **5= not considered a challenge)** to indicate perceived challenges to ICATT implementation at your campus

| **POSSIBLE CHALLENGES** | | **Office use** |
|---|---|---|
| **21.1. Political**<br>Buy-in from stakeholders | | |
| Competing priorities | | |
| **21.2. Cost**<br>Cost of implementation | | |
| Funds for printing modules | | |
| Funds for purchasing computers, memory sticks, CD-ROM | | |
| Prohibitive financial regulations | | |
| **21.3. Human Resources**<br>ICATT trained facilitators | | |
| IT support to provide direct help for educators with difficulties | | |
| **21.4. Other**<br>Computers | | |
| Computer laboratories | | |
| Accessibility to internet or intranet | | |

| | |
|---|---|
| | |

22**.** Rate each of the items below on a scale from 1 to 5 **(1= not beneficial** and **5= extremely beneficial)** to indicate perceived benefits to ICATT implementation at your campus

| **POSSIBLE BENEFITS** | | **Office use** |
|---|---|---|
| **22.1. Cost**<br>Economical, as does not require printing of hard copy training material | | |
| Easier to make changes or do updates electronically at no cost | | |
| **22.2. Human Resources**<br>ICATT still allows for educator-learner interaction | | |
| Provides for ideal educator-learner ratios as group learning and facilitation can take place with one or two IMCI trained educators | | |
| **22.3. Other**<br>Viewed as an alternative training approach that stimulates independent thinking amongst learners | | |
| Learners can work at their own pace | | |
| Course can be done in a shorter period of time | | |

| | |
|---|---|
| | |

**SECTION D: GOALS AND OBJECTIVES**

**23. Based on the literature that has been provided to you on ICATT, do you think ICATT implementation will assist in meeting the following goals and objectives for IMCI?**

**Indicate your agreement with the following statements:**

| GOALS AND OBJECTIVES | Strongly disagree | Disagree | Neutral | Agree | Strongly agree |
|---|---|---|---|---|---|
| **23.1. GOALS**<br>• To effectively scale up IMCI saturation through self-learning methods: IMCI Computerized Adaptation Training Tool (ICATT) | | | | | |
| • To ensure competent practitioners in IMCI implementation | | | | | |
| • To engender sustainable commitment from NDOH partners in IMCI training and implementation | | | | | |
| **23.2. OBJECTIVES**<br>• To align IMCI and ICATT materials with recent updates and software | | | | | |
| • To build capacity in health professionals through ICATT learning | | | | | |
| • To monitor and evaluate the effectiveness of self- learning methods | | | | | |

**THANK YOU FOR YOUR PARTICIPATION**

Ms Udesvari Pillay is a Lecturer in Community Nursing Science at the Addington Campus (KZNCN). She is currently studying with the University of South Africa for the D Litt et Phil (Health Studies) Degree.

This study is part of her thesis for the Doctoral Degree titled

**Determinants of the nursing campuses' readiness to use a computerised adaptation training tool**

You have been selected to participate in this study, and your co-operation is highly appreciated.

## ANNEXURE M

## Questionnaires for nurse educators

**QUESTIONNAIRE FOR NURSE EDUCATORS**

**ICATT IMPLEMENTATION**

**AT NURSING CAMPUSES IN KWAZULU-NATAL**

| Number of questionnaire | 1 | 2 | 3 |
|---|---|---|---|
| | | | |

Name of Campus: ..……

Date: ……../…../……

Background: The IMCI Computerised Adaptation and Training Tool (ICATT) is an electronic learning tool with a computerized software application which allows for the adaptation of the generic guidelines of the IMCI strategy. South Africa has adopted ICATT as an additional training methodology to scale up IMCI saturation.

Purpose: To investigate the nursing campuses' readiness regarding the use of ICATT in KwaZulu-Natal. To develop guidelines for improving the use of ICATT for IMCI case management training at nursing campuses in KwaZulu-Natal.

***All information herewith provided will be treated confidentially. It is not necessary to indicate your name in this questionnaire.***

**INSTRUCTIONS**

1. **Please answer all questions by marking a "X" in the corresponding box**
2. **Please answer all the questions as honestly and objectively as possible**
3. **The questionnaire should take you approximately 30 minutes to complete**

**SECTION A: DEMOGRAPHIC DATA**

1. Age range

| **Age** | **Answer** |
|---|---|
| 1.1. 21-30 years | |
| 1.2. 31-40 years | |
| 1.3. 41-50 years | |
| 1.4. 51-60 years | |

*Office use*

| | |
|---|---|
| | |

2. Gender *Office use*

| | | |
|---|---|---|
| 2.1. Female | | |
| 2.2. Male | | |

3. Indicate the number of years working as a nurse educator

| **Years working as a nurse educator** | |
|---|---|
| 3.1. Less than 1 year | |
| 3.2. 1-2 years | |
| 3.3. 3-4 years | |
| 3.4. 5 years and more | |

4. Indicate the type of nurse training that is offered at this institution?

| **Type of Training** | **Yes** | **No** |
|---|---|---|
| 4.1. R425 | | |
| 4.2. R2175 | | |
| 4.3. Other | | |

**SECTION B**:

**HUMAN RESOURCES**

5. Indicate the number of IMCI trained educators in your nursing college?

| **No. of IMCI trained educators** | |
|---|---|
| 5.1. 1-2 | |
| 5.2. 3-4 | |
| 5.3 5-6 | |
| 5.4 More than 6 | |

6. Indicate the number of IMCI trained educators currently facilitating IMCI case management training at your institution?

*Office use*

| **No. of IMCI trained facilitators currently facilitating IMCI case management training** | |
|---|---|
| 6.1. 1-2 | |
| 6.2. 3-4 | |
| 6.3. 5-6 | |
| 6.4. More than 6 | |

7. Indicate your agreement with the following statements:

| | | Strongly disagree | Disagree | Neutral | Agree | Strongly agree |
|---|---|---|---|---|---|---|
| 7.1. | There are an adequate number of IMCI-trained educators, in respect of educator-learner ratios for case management training | | | | | |
| 7.2. | I would be willing to attend ICATT training, to improve IMCI case management training at this institution | | | | | |

**TEACHING AND LEARNING USING TECHNOLOGY**

8. Please select the option that best answers the for each of the following?

| | | YES | NO |
|---|---|---|---|
| 8.1. | Does this nursing campus offer nurse educators access to online internal (i.e intranet) search facilities for teaching and learning purposes? | | |
| 8.2. | Does this nursing campus offer nurse educators access to online external (i.e internet) search facilities for teaching and learning purposes? | | |

9. Indicate your agreement with the following statements:

| | | Strongly disagree | Disagree | Neutral | Agree | Strongly agree |
|---|---|---|---|---|---|---|
| 9.1. | It is important for nurse educators to have access to on-line (i.e intranet) search facilities to keep abreast of the latest developments in health care, and teaching practices | | | | | |
| 9.2. | It is important for nurse educators to have access to on-line external (i.e internet) search facilities to keep abreast of the latest developments in health care and teaching practices | | | | | |
| 9.3. | It is important to incorporate new technologies (computer-based) for teaching and learning purposes | | | | | |

**TECHNOLOGY ASSESSMENT**

10. Do nurse educators at this institution have access to computers at this campus?

| | |
|---|---|
| 10.1. | YES |
| 10.2. | NO |

| | |
|---|---|
| | |

11. Do nurse educators at this institution receive any basic computer training/instruction?

| | |
|---|---|
| 11.1. | YES |
| 11.2. | NO |

| | |
|---|---|
| | |

12. Is/are there laptop computers and projectors for use by educators at this institution, for classroom teaching?

| | |
|---|---|
| 12.1. | YES |
| 12.2. | NO |

| | |
|---|---|
| | |

13. Indicate your agreement with the following statements:

| | | **Strongly disagree** | **Disagree** | **Neutral** | **Agree** | **Strongly agree** |
|---|---|---|---|---|---|---|
| 13.1. | I know how to use the internet | | | | | |
| 13.2. | I know how to use MS WORD | | | | | |
| 13.3. | I am able to use a computer to prepare lecture notes/handouts | | | | | |
| 13.4. | I am able to use the computer to prepare tests and assignments | | | | | |

14. Select ONE of the following options below that best describes your level of competency

| | |
|---|---|
| I am unable to operate any computer package | |
| I am below the level of being able to function adequately, on a computer | |
| I can mange some computer operations, relevant to work demand | |
| I am competent in all packages available | |
| I am highly computer literate enabling functioning at a high level of computer literacy | |

15. Computer-based learning is a growing trend, and can complement teaching and learning practices in the classroom, for nursing students.

For each of the following items, indicate, with a score of 1 to 5, how beneficial the electronic applications would be for your students.

**1= Not at all beneficial, 5= Essential**

| | | |
|---|---|---|
| 15.1 | Computers | |
| 15.2. | Internet access | |
| 15.3. | Intranet access | |
| 15.4. | On-line submission of assignments | |
| 15.5. | On-line tests | |

| | |
|---|---|
| | |

**SECTION C: Possible challenges and benefits of ICATT implementation**

16. Indicate your agreement with the following statements regarding the possible challenges to ICATT implementation at the nursing campus:

| | **POSSIBLE CHALLENGES** | **Strongly disagree** | **Disagree** | **Neutral** | **Agree** | **Strongly agree** |
|---|---|---|---|---|---|---|
| 16.1. | **POLITICAL**<br><br>16.1.1. Buy-in from stakeholders | | | | | |
| | 16.1.2. Competing priorities | | | | | |
| 16.2. | **COST**<br><br>16.2.1. Cost of implementation | | | | | |
| | 16.2.2. Funds for printing modules | | | | | |
| | 16.2.3. Funds for purchasing computers, memory sticks, CD-ROM | | | | | |
| | 16.2.4. Prohibitive financial regulations | | | | | |
| 16.3. | **HUMAN RESOURCES**<br>16.3.1. ICATT trained facilitators | | | | | |
| | 16.3.2. IT support to provide direct help for educators with difficulties | | | | | |
| 16.4. | **OTHER**<br><br>16.4.1. Computer availability | | | | | |
| | 16.4.2. Computer laboratories | | | | | |
| | 16.4.3. Accessibility to internet or intranet | | | | | |

17. Indicate your agreement with the following statements:

| | POSSIBLE BENEFITS | Strongly disagree | Disagree | Neutral | Agree | Strongly agree |
|---|---|---|---|---|---|---|
| 17.1. | **COST**<br>17.1.1. Economical, as does not require printing of hard copy training material | | | | | |
| | 17.1.2. Easier to make changes or do updates electronically at no cost | | | | | |
| 17.2. | **HUMAN RESOURCES**<br>17.2.1. ICATT still allows for educator-learner interaction | | | | | |
| | 17.2.2. Provides for ideal educator-learner ratios as group learning and facilitation can take place with one or two IMCI trained educators | | | | | |
| 17.3. | **OTHER**<br>17.3.1. Viewed as an alternative training approach that stimulates independent thinking amongst learners | | | | | |
| | 17.3.2. Learners can work at their own pace | | | | | |
| | 17.3.3. Course can be done in a shorter period of time | | | | | |

**18. Based on the literature that has been provided to you on ICATT, do you think ICATT implementation will assist in meeting the following goals and objectives for IMCI?**

**Indicate your agreement with the following statements:**

| GOALS AND OBJECTIVES | Strongly disagree | Disagree | Neutral | Agree | Strongly agree |
|---|---|---|---|---|---|
| **18.1. GOALS**<br>• To effectively scale up IMCI saturation through self-learning methods: IMCI Computerized Adaptation Training Tool (ICATT) | | | | | |
| • To ensure competent practitioners in IMCI implementation | | | | | |
| • To engender sustainable commitment from NDOH partners in IMCI training and implementation | | | | | |
| **18.2. OBJECTIVES**<br>• To align IMCI and ICATT materials with recent updates and software | | | | | |
| • To build capacity in health professionals through ICATT learning | | | | | |
| • To monitor and evaluate the effectiveness of self- learning methods | | | | | |

**SECTION D**

**USE OF THE ICATT SOFTWARE**

**Educators views on the training**

19. How did you, the educator consider the training components listed below as very useful, useful, somewhat useful, or useless**:**

| | **Very useful** | **Useful** | **Somewhat useful** | **Useless** |
|---|---|---|---|---|
| 19.1 Session on navigation in ICATT (Moving through ICATT) | | | | |
| 19.2 Introduction part (About IMCI, IMCI case management process, charts and recording forms) | | | | |
| 19.3. Care of the sick child aged 2 months up to 5 Years | | | | |
| 19.3.1. Assess and classify according to main symptoms | | | | |
| 19.3.2. Identification of treatment | | | | |
| 19.3.3. Treat the child | | | | |
| 19.3.4 Counsel the mother | | | | |
| 19.3.5 Follow-up care of the sick child | | | | |
| 19.4. Care of young infant aged up to 2 months | | | | |
| 19.4.1. Essential care | | | | |
| 19.4.2. Assessment and classification of young infant | | | | |
| 19.4.3. Identify treatment, treat and counsel | | | | |
| 19.4.4. Follow-up care of the sick young infant | | | | |
| 19.5. IMCI HIV training course | | | | |
| 19.5.1. Introduction and standard of care | | | | |
| 19.5.2. Initiating ART in children | | | | |
| 19.5.3. Providing ART follow up | | | | |
| 19.6. ICATT READ sections | | | | |
| 19.7. ICATT SEE sections | | | | |
| 19.8. ICATT PRACTISE sections | | | | |
| 19.9. ICATT TEST sections | | | | |

20. How did you, the educator consider working through ICATT items listed below as easy, somewhat easy or difficult:

| | Easy | Somewhat easy | Somewhat difficult | Difficult |
|---|---|---|---|---|
| 20.1. ICATT READ sections | | | | |
| 20.2. ICATT SEE sections | | | | |
| 20.3. ICATT PRACTISE sections | | | | |
| 20.4. ICATT TEST sections | | | | |
| 20.5. Entire ICATT | | | | |

Please give details about what was difficult:

_____

_____

_____

**THANK YOU FOR YOUR PARTICIPATION**

Ms UdesvariPillay is a Lecturer in Community Nursing Science at the Addington Campus (KZNCN). She is currently studying with the University of South Africa for the D Litt et Phil (Health Studies) Degree.

This study is part of her thesis for the Doctoral Degree titled

**"Determinants of the nursing campuses' readiness to use a computerised adaptation training tool"**

You have been selected to participate in this study, and your co-operation is highly appreciated.

## ANNEXURE N

## Questionnaires for learners

**QUESTIONNAIRE FOR LEARNERS**

**ICATT IMPLEMENTATION**

**AT NURSING CAMPUSES IN KWAZULU-NATAL**

| Number of questionnaire | 1 | 2 | 3 |
|---|---|---|---|
| | | | |

Name of Campus: ..……

Date: ……../…../……

Background: The IMCI Computerised Adaptation and Training Tool (ICATT) is an electronic learning tool with a computerized software application which allows for the adaptation of the generic guidelines of the IMCI strategy. South Africa has adopted ICATT as an additional training methodology to scale up IMCI saturation.

Purpose: To investigate the nursing campuses' readiness regarding the use of ICATT in KwaZulu-Natal. To develop guidelines for improving the use of ICATT for IMCI case management training at nursing campuses in KwaZulu-Natal.

***All information herewith provided will be treated confidentially. It is not necessary to indicate the name of the LEARNER in this questionnaire.***

**INSTRUCTIONS**

1. **Please answer all questions by marking a "X" in the corresponding box**
2. **Please answer all the questions as honestly and objectively as possible**
3. **The questionnaire should take you approximately 30 minutes to complete**

**SECTION A: DEMOGRAPHIC DATA**

1. Age range

| **Age** | **Answer** |
|---|---|
| 1.1. 21-30 years | |
| 1.2. 31-40 years | |
| 1.3. 41-50 years | |
| | |

*Office use*

| | |
|---|---|
| | |

2. Gender *Office use*

| | | | |
|---|---|---|---|
| 2.1. Female | | | |
| 2.2. Male | | | |

3. Indicate the training programme that you are currently registered for?

| **Type of Training** | | | |
|---|---|---|---|
| 3.1. R425 | | | |
| 3.2. R2175 | | | |
| 3.3. Other | | | |

**SECTION B**:

**ACCESS**

4. As a learner at this campus I have access to the following: -

| | | **YES** | **NO** | **Official use** |
|---|---|---|---|---|
| 4.1 | Desktop computer | | | |
| 4.2 | Lap-top | | | |
| 4.3 | Local area network | | | |
| 4.4 | Electronic library resource | | | |

5. Choose the relevant option regarding access to search facilities at your campus for each of the following:

| | | **YES** | **NO** | **Official use** |
|---|---|---|---|---|
| 5.1. | Does this nursing campus offer learners access to online internal (i.e intranet) search facilities for learning purposes? | | | |
| 5.2. | Does this nursing campus offer learners access to online external (i.e internet) search facilities for learning purposes? | | | |

6. Indicate your agreement with the following statements:

| | | Strongly disagree | Disagree | Neutral | Agree | Strongly agree | Official use |
|---|---|---|---|---|---|---|---|
| 6.1. | It is important for me to have access to on-line internal (i.e intranet) search facilities for learning purposes and to keep abreast of the latest developments in health care | | | | | | |
| 6.2. | It is important for me to have access to on-line external (i.e internet) search facilities for learning purposes and to keep abreast of the latest developments in health care | | | | | | |
| 6.3. | It is important to incorporate new technologies (computer-based) for teaching and learning purposes | | | | | | |

**TECHNOLOGY ASSESSMENT**

7. Do learners at this institution receive any basic computer training/instruction?

| | |
|---|---|
| 7.1. | YES |
| 7.2. | NO |

| | |
|---|---|
| | |

8. Indicate your agreement with the following statements:

| | | Strongly disagree | Disagree | Neutral | Agree | Strongly agree | Official use |
|---|---|---|---|---|---|---|---|
| 8.1. | I am confident using the internet | | | | | | |
| 8.2. | I am confident using MS WORD | | | | | | |
| 8.3. | I am able to use the computer to prepare assignments | | | | | | |
| 8.4. | I would like to use computer based training programs in the course of my training to enhance my learning | | | | | | |

9. Select ONE of the following options below that best describes your level of computer competency

| | |
|---|---|
| I am unable to operate any computer package | |
| I am below the level of being able to function adequately, on a computer | |
| I can mange some computer operations, relevant to work demand | |
| I am competent in all packages available | |
| I am highly computer literate enabling functioning at a high level of computer literacy | |

10. Computer-based learning is a growing trend, and can complement teaching and learning practices in the classroom, for nursing students.

For each of the following items, indicate, with a score of 1 to 5 how beneficial the information and communication technologies would be for you as a learner.

**1= Not at all beneficial, 5= Essential**

| | | |
|---|---|---|
| 10.1 | Computers | |
| 10.2. | Internet access | |
| 10.3. | Intranet access | |
| 10.4. | On-line submission of assignments | |
| 10.5. | On-line tests | |

| | |
|---|---|
| | |

11. Indicate your agreement with the following statements regarding teaching methods at your campus:

| | | **Strongly disagree** | **Disagree** | **Neutral** | **Agree** | **Strongly agree** | **Official use** |
|---|---|---|---|---|---|---|---|
| 11.1. | Educators at my campus utilise a variety of teaching methods using information technology systems | | | | | | |
| 11.2. | Educators at my campus utilise Power point presentations in class | | | | | | |
| 11.3. | Educators at my campus utilise simulations in class | | | | | | |
| 11.4 | Educators at my campus utilise DVDs/videos in class | | | | | | |

12. Indicate your agreement with the following statements:

| | | Strongly disagree | Disagree | Neutral | Agree | Strongly agree | Official use |
|---|---|---|---|---|---|---|---|
| 12.1. | As a nursing student I am being adequately prepared for the highly technological clinical environment | | | | | | |
| 12.2. | Nursing students would be better prepared if computer based learning programmes were included into the current curriculum | | | | | | |
| 12.3. | As a nursing student I would feel more confident about using computer based learning programmes, if I had more access to computers, and the internet during the course of my training | | | | | | |

**SECTION C:**

**USE OF THE ICATT SOFTWARE**

**Learners' views on the training**

13. Indicate whether you consider the training components listed below as very useful, useful, somewhat useful, or useless:

| | | Very useful | Useful | Somewhat useful | Useless | Official use |
|---|---|---|---|---|---|---|
| 13.1 | Session on navigation in ICATT (Moving through ICATT) | | | | | |
| 13.2 | Introduction part (About IMCI, IMCI case management process, charts and recording forms) | | | | | |
| 13.3 | Care of the sick child aged 2 months up to 5 years | | | | | |
| 13.4 | Assess and classify | | | | | |
| 13.5 | Identify treatment | | | | | |
| 13.6 | Treat the child | | | | | |
| 13.7 | Counsel the mother | | | | | |
| 13.8 | Follow-up | | | | | |
| 13.9 | Care of young infant aged up to 2 months | | | | | |
| 13.10 | Essential care | | | | | |
| 13.11 | Assess and classify young infant | | | | | |
| 13.12 | Identify treatment, treat and counsel | | | | | |
| 13.13 | Follow-up | | | | | |
| 13.14 | IMCI HIV training course | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 13.15 | Introduction and standard care | | | | | |
| 13.16 | Initiating ART in children | | | | | |
| 13.17 | Providing ART follow up | | | | | |
| 13.18 | ICATT READ sections | | | | | |
| 13.19 | ICATT SEE sections | | | | | |
| 13.20 | ICATT PRACTISE sections | | | | | |
| 13.21 | ICATT TEST sections | | | | | |

14. How did you as a learner consider working through ICATT items listed below as easy, somewhat easy or not easy:

| | | **Easy** | **Somewhat easy** | **Not easy** | **Official use** |
|---|---|---|---|---|---|
| 14.1 | ICATT READ sections | | | | |
| 14.2 | ICATT SEE sections | | | | |
| 14.3 | ICATT PRACTISE sections | | | | |
| 14.4 | ICATT TEST sections | | | | |
| 14.5 | Entire ICATT | | | | |

Please give details about what was not easy:

_____

_____

_____

**THANK YOU FOR YOUR PARTICIPATION**

Ms. UdesvariPillay is a Lecturer in Community Nursing Science at the Addington Campus (KZNCN). She is currently studying with the University of South Africa for the D Littet Phil (Health Studies) Degree.

This study is part of her thesis for the Doctoral Degree titled

**Determinants of the nursing campuses' readiness to use a computerised adaptation training tool**

You have been selected to participate in this study, and your co-operation is highly appreciated.

**ANNEXURE O**

**Semi-structured interview guide for campus principals, nurse educators trained in IMCI and learners trained in IMCI**

## DETERMINANTS OF THE NURSING CAMPUSES' READINESS TO USE A COMPUTERISED ADAPTATION TRAINING TOOL

***INTERVIEW STRUCTURE***

Dear Colleague

I have indicated to you that I am busy with a project on the implementation of the IMCI Computerised Adaptation and Training Tool (ICATT) at nursing colleges in KwaZulu-Natal which forms part of a Doctoral Research project.

The aim of this interview is to obtain your ideas, experiences and opinions regarding the use of the IMCI guidelines for case management training (conventional manner), and computer-based learning for IMCI case management training i.e. ICATT implementation.

The information obtained will only be used for research purposes and will remain confidential and your anonymity will remain protected at all times. Do you have any questions before we start the interview?

May I audio-record the interview, as it would help me to listen to it again later and to make a transcript of the interview for data analysis purposes?

You have already read through the booklet on ICATT

**How do you feel about implementing ICATT at this nursing campus, for IMCI Case Management Training?**

I would like to thank you for your time and participation in this study.

**ANNEXURE P**

**Interview guide for nurse educators**

## DETERMINANTS OF THE NURSING CAMPUSES' READINESS TO USE A COMPUTERISED ADAPTATION TRAINING TOOL

### *INTERVIEW STRUCTURE*

Dear Colleague

I have indicated to you that I am busy with a project on the implementation of the IMCI Computerised Adaptation and Training Tool (ICATT) at nursing colleges in KwaZulu-Natal which forms part of a Doctoral Research project.

The aim of this interview is to obtain your ideas, experiences and opinions regarding the use of the IMCI guidelines for case management training (conventional manner), and computer-based learning for IMCI case management training i.e. ICATT implementation.

The information obtained will only be used for research purposes and will remain confidential and your anonymity will remain protected at all times. Do you have any questions before we start the interview?

May I audio-record the interview, as it would help me to listen to it again later and to make a transcript of the interview for data analysis purposes?

You have already read through the booklet on ICATT and listened to my presentation on ICATT. You have also had the opportunity to use ICATT.

1. How do you feel about using the computerised IMCI guidelines (ICATT)?

    a. Do you feel that you will be able to use the computerised guidelines (ICATT) with ease?

    b. Were the directions clear?

    c. Were you able to negotiate the different sections with ease?

    d. How did you find using the keyboard?

    e. Was the computer set up so that the application came up automatically when you turned the computer on? If not, was this a problem for you?

2. What problems have you experienced using the computerised guidelines (ICATT)?
3. Would the use of the computerised guidelines (ICATT) be useful in your setting? Please tell me why you say ... no or yes
4. What have you identified as advantageous regarding ICATT implementation for you as an educator?
5. What role can the computerised guidelines (ICATT) play in teaching and learning at your nursing college?
6. What would you prefer for future training:

The usual way/conventional way of teaching or using a computer program (ICATT). Why?

7. What do you foresee as challenges to ICATT implementation at your nursing college?

8. What do you think would be the advantages of ICATT implementation at your nursing college?

9. Would you like to make any recommendations pertaining to ICATT implementation at your college?

I would like to thank you for your time and participation in this study.

**ANNEXURE Q**

**Interview guide for learners**

## DETERMINANTS OF THE NURSING CAMPUSES' READINESS TO USE A COMPUTERISED ADAPTATION TRAINING TOOL

### *INTERVIEW STRUCTURE*

Dear Colleague

I have indicated to you that I am busy with a project on the implementation of the IMCI Computerised Adaptation and Training Tool (ICATT) at nursing colleges in KwaZulu-Natal which forms part of a Doctoral Research project.

The aim of this interview is to obtain your ideas, experiences and opinions regarding the use of the IMCI guidelines for case management training (conventional manner), and computer-based learning for IMCI case management training i.e. ICATT implementation.

The information obtained will only be used for research purposes and will remain confidential and your anonymity will remain protected at all times. Do you have any questions before we start the interview?

May I audio-record the interview, as it would help me to listen to it again later and to make a transcript of the interview for data analysis purposes?

You have already read through the booklet on ICATT and listened to my presentation on ICATT. You have also had the opportunity to use ICATT.

1. How did you find moving through ICATT (navigation)?
    a. Do you feel that you will be able to use the computerised guidelines (ICATT) with ease?
    b. Were the directions clear?
    c. Were you able to negotiate the different sections with ease?
    d. How did you find using the keyboard?
    e. Was the computer set up so that the application came up automatically when you turned the computer on? If not, was this a problem for you?

2. Was the use of the computerised guidelines (ICATT) useful in your setting? Please tell me why you say ...no or yes

3. What problems have you experienced using the computerised guidelines (ICATT)?
   What was difficult and needs to be changed?

4. What have you identified as advantageous regarding ICATT implementation for you as a learner?

   What was good and should remain?

5. What would you prefer for future training:

   Computer learning (ICATT) Conventional/Usual way

6. Are there any recommendations you would like to make pertaining to ICATT and ICATT implementation at your nursing college?

I would like to thank you for your time and participation in this study.

**ANNEXURE R**

**CVI Campus principals**

| Q | Item | Expert 1 | Expert 2 | Expert 3 | Expert 4 | Number in agreement | Item CVI |
|---|---|---|---|---|---|---|---|
| 1 | 1 | X | X | X | X | 4 | 1.00 |
| 2 | 2 | - | X | X | X | 3 | 0.75 |
| 3 | 3 | X | X | X | X | 4 | 1.00 |
| 4 | 4 | X | X | X | X | 4 | 1.00 |
| 5 | 5 | X | X | X | X | 4 | 1.00 |
| 6 | 6 | X | X | X | X | 4 | 1.00 |
| 7 | 7 | X | X | X | X | 4 | 1.00 |
| 7.2 | 8 | X | X | X | X | 4 | 1.00 |
| 8.1 | 9 | X | X | X | X | 4 | 1.00 |
| 8.2 | 10 | X | X | X | X | 4 | 1.00 |
| 9.1 | 11 | X | X | X | X | 4 | 1.00 |
| 9.2 | 12 | X | X | X | X | 4 | 1.00 |
| 9.3 | 13 | X | X | X | X | 4 | 1.00 |
| 10 | 14 | X | X | X | X | 4 | 1.00 |
| 11 | 15 | X | X | X | X | 4 | 1.00 |
| 12 | 16 | X | X | X | X | 4 | 1.00 |
| 13 | 17 | X | X | X | X | 4 | 1.00 |
| 14 | 18 | X | X | X | X | 4 | 1.00 |
| 15 | 19 | X | X | X | X | 4 | 1.00 |
| 16 | 20 | X | X | X | X | 4 | 1.00 |
| 17 | 21 | X | X | X | X | 4 | 1.00 |
| 18 | 22 | X | X | X | X | 4 | 1.00 |
| 19 | 23 | X | X | X | X | 4 | 1.00 |
| 20 | 24 | X | X | X | X | 4 | 1.00 |
| 21.1.1 | 25 | X | X | X | X | 4 | 1.00 |
| 21.1.2 | 26 | X | X | X | X | 4 | 1.00 |
| 21.2.1 | 27 | X | X | X | X | 4 | 1.00 |
| 21.2.2 | 28 | X | X | X | X | 4 | 1.00 |
| 21.2.3 | 29 | X | X | X | X | 4 | 1.00 |
| 21.2.4 | 30 | X | X | X | X | 4 | 1.00 |
| 21.3.1 | 31 | X | X | X | X | 4 | 1.00 |
| 21.3.2 | 32 | X | X | X | X | 4 | 1.00 |
| 21.4.1 | 33 | X | X | X | X | 4 | 1.00 |
| 21.4.2 | 34 | X | X | X | X | 4 | 1.00 |
| 21.4.3 | 35 | X | X | X | X | 4 | 1.00 |
| 22.1.1 | 36 | X | X | X | X | 4 | 1.00 |
| 22.1.2 | 37 | X | X | X | X | 4 | 1.00 |
| 22.2.1 | 38 | X | X | X | X | 4 | 1.00 |

| Q | Item | Expert 1 | Expert 2 | Expert 3 | Expert 4 | Number in agreement | Item CVI |
|---|---|---|---|---|---|---|---|
| 22.2.2 | 39 | X | X | X | X | 4 | 1.00 |
| 22.3.1 | 40 | X | X | X | X | 4 | 1.00 |
| 22.3.2. | 41 | X | X | X | X | 4 | 1.00 |
| 22.3.3 | 42 | X | X | X | X | 4 | 1.00 |
| 23.1.1 | 43 | X | X | X | X | 4 | 1.00 |
| 23.1.2 | 44 | X | X | X | X | 4 | 1.00 |
| 23.1.3 | 45 | X | X | X | X | 4 | 1.00 |
| 23.2.1 | 46 | X | X | X | X | 4 | 1.00 |
| 23.2.2 | 47 | X | X | X | X | 4 | 1.00 |
| 23.2.3 | 48 | X | X | X | X | 4 | 1.00 |
| | | 0.98 | 1.00 | 1.00 | 1.00 | S-CVI/Av | 0.994 |

**CVI Nurse educators**

| Q | Item | Expert 1 | Expert 2 | Expert 3 | Expert 4 | Number in agreement | Item CVI |
|---|---|---|---|---|---|---|---|
| 1 | 1 | X | X | X | X | 4 | 1.00 |
| 2 | 2 | - | X | X | X | 3 | 0.75 |
| 3 | 3 | X | X | X | X | 4 | 1.00 |
| 4 | 4 | X | X | X | X | 4 | 1.00 |
| 5 | 5 | X | X | X | X | 4 | 1.00 |
| 6 | 6 | X | X | X | X | 4 | 1.00 |
| 7.1 | 7 | X | X | X | X | 4 | 1.00 |
| 7.2 | 8 | X | X | X | X | 4 | 1.00 |
| 8.1 | 9 | X | X | X | X | 4 | 1.00 |
| 8.2 | 10 | X | X | X | X | 4 | 1.00 |
| 9.1 | 11 | X | X | X | X | 4 | 1.00 |
| 9.2 | 12 | X | X | X | X | 4 | 1.00 |
| 9.3 | 13 | X | X | X | X | 4 | 1.00 |
| 10 | 14 | X | X | X | X | 4 | 1.00 |
| 11 | 15 | X | X | X | X | 4 | 1.00 |
| 12 | 16 | X | X | X | X | 4 | 1.00 |
| 13.1 | 17 | X | X | X | X | 4 | 1.00 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 13.2 | 18 | X | X | X | X | 4 | 1.00 |
| 13.3 | 19 | X | X | X | X | 4 | 1.00 |
| 13.4 | 20 | X | X | X | X | 4 | 1.00 |
| 14 | 21 | X | X | X | X | 4 | 1.00 |
| 15 | 22 | X | X | X | X | 4 | 1.00 |
| 16.1.1 | 23 | - | X | X | X | 3 | 0.75 |
| 16.1.2 | 24 | X | X | X | X | 4 | 1.00 |
| 16.2.1 | 25 | X | X | X | X | 4 | 1.00 |
| 16.2.2 | 26 | X | X | X | X | 4 | 1.00 |
| 16.2.3 | 27 | X | X | X | X | 4 | 1.00 |
| 16.2.4 | 28 | X | X | X | X | 4 | 1.00 |
| 16.3.1 | 29 | X | X | X | X | 4 | 1.00 |
| 16.3.2 | 30 | X | X | X | X | 4 | 1.00 |
| 16.4.1 | 31 | X | X | X | X | 4 | 1.00 |
| 16.4.2 | 32 | X | X | X | X | 4 | 1.00 |
| 16.4.3 | 33 | X | X | X | X | 4 | 1.00 |
| 17.1.1 | 34 | X | X | X | X | 4 | 1.00 |
| 17.1.2 | 35 | X | X | X | X | 4 | 1.00 |
| 17.2.1 | 36 | X | X | X | X | 4 | 1.00 |
| 17.2.2 | 37 | X | X | X | X | 4 | 1.00 |
| 17.3.1 | 38 | X | X | X | X | 4 | 1.00 |
| 17.3.2 | 39 | X | X | X | X | 4 | 1.00 |
| 17.3.3 | 40 | X | X | X | X | 4 | 1.00 |
| 18.1.1 | 41 | X | X | X | X | 4 | 1.00 |
| 18.1.2 | 42 | X | X | X | X | 4 | 1.00 |
| 18.1.3 | 43 | X | X | X | X | 4 | 1.00 |
| 18.2.1 | 44 | X | X | X | X | 4 | 1.00 |
| 18.2.2 | 45 | X | X | X | X | 4 | 1.00 |
| 18.2.3 | 46 | X | X | X | X | 4 | 1.00 |
| 19.1 | 47 | X | X | X | X | 4 | 1.00 |
| 19.2 | 48 | X | X | X | X | 4 | 1.00 |

| Q | Item | Expert 1 | Expert 2 | Expert 3 | Expert 4 | Number in agreement | Item CVI |
|---|---|---|---|---|---|---|---|
| 19.3 | 49 | X | X | X | X | 4 | 1.00 |
| 19.3.1 | 50 | X | X | X | X | 4 | 1.00 |
| 19.3.2 | 51 | X | X | X | X | 4 | 1.00 |
| 19.3.3 | 52 | X | X | X | X | 4 | 1.00 |
| 19.3.4 | 53 | X | X | X | X | 4 | 1.00 |
| 19.3.5 | 54 | X | X | X | X | 4 | 1.00 |
| 19.4 | 55 | X | X | X | X | 4 | 1.00 |
| 19.4.1 | 56 | X | X | X | X | 4 | 1.00 |
| 19.4.2 | 57 | X | X | X | X | 4 | 1.00 |
| 19.4.3 | 58 | X | X | X | X | 4 | 1.00 |
| 19.4.4 | 59 | X | X | X | X | 4 | 1.00 |
| 19.5 | 60 | X | X | X | X | 4 | 1.00 |
| 19.5.1 | 61 | X | X | X | X | 4 | 1.00 |
| 19.5.2 | 62 | X | X | X | X | 4 | 1.00 |
| 19.5.3 | 63 | X | X | X | X | 4 | 1.00 |
| 19.6 | 64 | X | X | X | X | 4 | 1.00 |
| 19.7 | 65 | X | X | X | X | 4 | 1.00 |
| 19.8 | 66 | X | X | X | X | 4 | 1.00 |
| 19.9 | 67 | X | X | X | X | 4 | 1.00 |
| 20 | 68 | X | X | X | X | 4 | 1.00 |
| 21 | 69 | X | X | X | X | 4 | 1.00 |
|  |  | 0.971 | 1.00 | 1.00 | 1.00 | S-CVI/Av | 0.99 |

**CVI Learners**

| Q | Item | Expert 1 | Expert 2 | Expert 3 | Expert 4 | Number in agreement | Item CVI |
|---|---|---|---|---|---|---|---|
| 1 | 1 | X | X | X | X | 4 | 1.00 |
| 2 | 2 | - | X | X | X | 3 | 0.75 |
| 3 | 3 | X | X | X | X | 4 | 1.00 |
| 4 | 4 | X | X | X | X | 4 | 1.00 |
| 5.1 | 5 | X | X | X | X | 4 | 1.00 |
| 5.2 | 6 | X | X | X | X | 4 | 1.00 |
| 6.1 | 7 | X | X | X | X | 4 | 1.00 |
| 6.2 | 8 | X | X | X | X | 4 | 1.00 |
| 6.3 | 9 | X | X | X | X | 4 | 1.00 |
| 7 | 10 | X | X | X | X | 4 | 1.00 |
| 8.1 | 11 | X | X | X | X | 4 | 1.00 |
| 8.2 | 12 | X | X | X | X | 4 | 1.00 |
| 8.3 | 13 | X | X | X | X | 4 | 1.00 |
| 8.4 | 14 | X | X | X | X | 4 | 1.00 |
| 9 | 15 | X | X | X | X | 4 | 1.00 |
| 10 | 16 | X | X | X | X | 4 | 1.00 |
| 11.1 | 17 | X | X | X | X | 4 | 1.00 |
| 11.2 | 18 | X | X | X | X | 4 | 1.00 |
| 11.3 | 19 | X | X | X | X | 4 | 1.00 |
| 11.4 | 20 | X | X | X | X | 4 | 1.00 |
| 12.1 | 21 | X | X | X | X | 4 | 1.00 |
| 12.2 | 22 | X | X | X | X | 4 | 1.00 |
| 12.3 | 23 | X | X | X | X | 4 | 1.00 |
| 13.1 | 24 | X | X | X | X | 4 | 1.00 |
| 13.2 | 25 | X | X | X | X | 4 | 1.00 |
| 13.3 | 26 | X | X | X | X | 4 | 1.00 |
| 13.4 | 27 | X | X | X | X | 4 | 1.00 |
| 13.5 | 28 | X | X | X | X | 4 | 1.00 |
| 13.6 | 29 | X | X | X | X | 4 | 1.00 |
| 13.7 | 30 | X | X | X | X | 4 | 1.00 |
| 13.8 | 31 | X | X | X | X | 4 | 1.00 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 13.9 | 32 | X | X | X | X | 4 | 1.00 |
| 13.10 | 33 | X | X | X | X | 4 | 1.00 |
| 13.11 | 34 | X | X | X | X | 4 | 1.00 |
| 13.12 | 35 | X | X | X | X | 4 | 1.00 |
| 13.13 | 36 | X | X | X | X | 4 | 1.00 |
| 13.14 | 37 | X | X | X | X | 4 | 1.00 |
| 13.15 | 38 | X | X | X | X | 4 | 1.00 |
| 13.16 | 39 | X | X | X | X | 4 | 1.00 |
| 13.17 | 40 | X | X | X | X | 4 | 1.00 |
| 13.18 | 41 | X | X | X | X | 4 | 1.00 |
| 13.19 | 42 | X | X | X | X | 4 | 1.00 |
| 13.20 | 43 | X | X | X | X | 4 | 1.00 |
| 13.21 | 44 | X | X | X | X | 4 | 1.00 |
| 14 | 45 | X | X | X | X | 4 | 1.00 |
| 15 | 46 | X | X | X | X | 4 | 1.00 |
| | | 0.978 | 1.00 | 1.00 | 1.00 | S-CVI/Av | 0.99 |

**ANNEXURE S**

**Delphi consent**

**Consent to Participate in the Research Study**

- I hereby confirm that I have been informed by the researcher, **Ms Udesvari Pillay (Naidoo),** about the nature, conduct and benefits of this study – Research Ethics Clearance Number: HSHDC/259/2013.
- I have also received, read and understood the above written information (Delphi Study Information Sheet) regarding the study.
- I am aware that the results of the study, including personal details regarding my sex, age, date of birth and initials will be anonymously processed into a study report.
- In view of the requirements of research, I agree that the data collected during this study can be processed in a computerised system by the researcher.
- I may, at any stage, without prejudice, withdraw my consent and participation in the study.
- I have had sufficient opportunity to ask questions and (of my own free will) declare myself prepared to participate in the study.
- I understand that significant new findings developed during the course of this research which may relate to my participation will be made available to me.

| ..... | ……. | ……. |
|---|---|---|
| **Full name of participant** | **Date** | **Signature** |

I, **Udesvari Pillay (Naidoo)** hereby confirm that the above participant has been fully informed about the nature, conduct and benefits of the above study.

| **Udesvari Pillay (Naidoo)** | …….. | ……. |
|---|---|---|
| **Full name of Researcher** | **Date** | **Signature** |

| ……. | ……. | ……. |
|---|---|---|
| **Full name of Witness** | **Date** | **Signature** |

Adapted from: Ethics form (www.dut.ac.za/research/ethics-forms/)

**ANNEXURE T**

**Delphi study information sheet**

**Study title: DETERMINANTS OF THE NURSING CAMPUSES' READINESS TO USE A COMPUTERISED ADAPTATION TRAINING TOOL**

I would like to invite you to take part in a Delphi consensus study. Before you decide whether you would like to take part, it is important for you to consider why the research is being done and what it will involve. Please read this information sheet carefully.

**1. What is a Delphi study?**

The Delphi technique uses a series of questionnaires to obtain consensus on the opinions of experts from a specific field. The design is characterised by a procedure that takes place over a number of rounds, and provides a summarised feedback to the participants of the results from previous rounds. It is thus stated that the Delphi uses multiple iterations to reach a consensus of opinion concerning a specific topic.

**2. What is the purpose of this study?**

ICATT has been identified as an innovative technology that has the potential to strengthen IMCI pre-service training and increase training coverage. The implementation of ICATT at nursing colleges can play a role in reducing both the financial and human resource burden of training. It further provides an innovative way of teaching and learning using technology. Computer based learning has never been implemented at nursing colleges in South Africa, and KwaZulu-Natal in particular. The researcher believes that in order for ICATT( a form of computer based learning) to be implemented successfully at nursing colleges, it was necessary to investigate whether nursing colleges, nurse educators and learners were ready to use this technology.

The purpose of the study was to investigate the use of the IMCI computerised adaptation and training tool (ICATT) at nursing colleges in KwaZulu-Natal and develop guidelines that may be used by stakeholders to successfully implement ICATT for IMCI case management training at nursing colleges.

**3. Why have I been asked to participate?**

You have been asked to take part as you have been identified as an established expert in this field. Specifically, the researcher would like your views in developing guidelines for the implementation of ICATT for IMCI case management training at nursing colleges in KwaZulu-Natal. The researcher plans to recruit between 9-11 participants consisting of experts in the fields of nursing education, training and IMCI.

**4. Do I have to participate?**

It is up to you to decide whether you want to participate and there is no obligation. If you decide to take part you will be given this information sheet to keep, and you will be asked to sign a consent form. If you decide to take part and then withdraw, you are free to do so at any time without giving a reason. A decision to withdraw at any time or a decision not to take part will not impact you personally or professionally.

**5. What will happen to me if I take part?**

If you agree to take part in the study you will be asked in the first instance to complete and return a consent form. The guidelines will be e-mailed to you and you will be asked to comment on its applicability or suitability for ICATT implementation at the nursing colleges. You will be asked to reformulate the guidelines should you find it necessary to do so. The comments will be collated for use in refining the guidelines. The process will continue until a consensus is reached or three Delphi rounds have been completed. In order to allow timely conclusion of the study we would respectfully request a response time of two weeks for completion of each round.

**The following points are important for you to remember:**

- Your participation is entirely voluntary.
- You may decline to withdraw from the study at any time.
- You will remain anonymous to the other participants (or experts) throughout this study and only the researcher will be able to identify your specific answers.
- All records are confidential. Your name will only be recorded on the consent form; it will not be recorded on the questionnaire. All information will be handled, and

stored in accordance with the rules of the University of South Africa. This information will only be available to members of the research team. All information will be destroyed five years after the research is completed.

- Any information that you provide will be confidential and when the results of the study are reported, you will not be identified in the findings.
- Following the study, an article outlining the findings will be sent for publication in a professional journal and will also be presented at conferences. All details about people who take part in the study will be kept anonymous.
- You will only have to complete the consent form once; and return of completed Delphi rounds implies your consent to participate.

**6. What if something goes wrong?**

We are not aware of any complications or risks that could arise from you taking part in this study. However, if you decide to take part in the study you will be given written information detailing the names and telephone numbers of the relevant individuals to contact should you have any complaints or difficulties with any aspect of the study.

**7. Will my taking part in this study be kept confidential?**

If you consent to take part in this study, your name will not be disclosed and would not be revealed in any reports or publications resulting from the study. Apart from your consent form, your name will not be recorded on Delphi rounds. Each participant will be allocated a unique code. You will remain anonymous to the other participants (or experts) throughout this Delphi study and only the researcher will be able to identify your specific answers. All information will be handled, and stored in accordance with the rules of the University of South Africa. All information will be destroyed five years after the research is completed.

**8. What happens when the research study stops?**

The results of the study will be used to guide the implementation of ICATT for IMCI case management training at nursing colleges in KwaZulu-Natal and South Africa. The findings will be included in a research article that may be submitted for publication in a professional journal and or may be presented at conferences.

**9. Who is organising and funding the research?**

The researcher is using her own funds and resources to conduct this study.

**10. What are the possible benefits of taking part?**

I cannot promise that the study will help you as an individual, but the information I obtain may help the nursing colleges in the implementation of computer based learning as a teaching and learning strategy.

**11. Who has reviewed the study?**

The study has been approved by the UNISA Research Ethics Committee.

**12. Further information**

If you wish to contact someone for further information regarding this study you can contact:

The researcher: Ms Udesvari Pillay (Naidoo)
Telephone number: Work no: 031 3272056/67
Cell no: 0845544405

Supervisor: Prof J Roos (Roosjh@unisa.ac.za)

Co-supervisor: Prof P Sandy (sandypt@unisa.ac.za)

Thank you for taking time to read this information.

(Adapted from: Keeney, Hasson & McKenna 2011:59)

**ANNEXURE U**

**Delphi study invitation letter**

Dear Participant

I am writing to invite you to participate in a Delphi study to support the implementation of ICATT for IMCI case management training at nursing colleges in KwaZulu-Natal.

The purpose of the study was to investigate the use of the IMCI computerised adaptation and training tool (ICATT) at nursing colleges in KwaZulu-Natal and develop guidelines that may be used by stakeholders to successfully implement ICATT for IMCI case management training at nursing colleges**.**

As an established expert in the field of nursing education and training, and IMCI case management training, I am keen to get your views on guideline development for the implementation of ICATT for IMCI case management training. This will be undertaken through the use of the Delphi technique to reach a consensus of opinion. Further details are provided in the attached information sheet.

I feel that your expertise would be extremely beneficial in the development of the guidelines, and would be grateful if you would consider participating in this Delphi study. If you would like to contribute, please inform me by email and I will forward the Delphi information sheet and the consent form.

Please do not hesitate to contact me if you require further information.

Yours sincerely

Ms. Udesvari Pillay (Naidoo)

Telephone number: Work no: 031 3272056/67

Cell no: 0845544405

Email: udee.naidoo@kznhealth.gov.za

(Adapted from: Keeney, Hasson & McKenna 2011:57)

## ANNEXURE V
## Questionnaire for Delphi

**QUESTIONNAIRE – PROFESSIONAL QUALIFICATIONS**

**FOR DELPHI GROUP**

| Number of questionnaire | 1 | 2 | 3 |
|---|---|---|---|
| | | | |

Date: ……../…../……

Background: The IMCI Computerised Adaptation and Training Tool (ICATT) is an electronic learning tool with a computerized software application which allows for the adaptation of the generic guidelines of the IMCI strategy. South Africa has adopted ICATT as an additional training methodology to scale up IMCI saturation.

Purpose: The purpose of the study was to investigate the use of the IMCI computerised adaptation and training tool (ICATT) at nursing colleges in KwaZulu-Natal and develop guidelines that may be used by stakeholders to successfully implement ICATT for IMCI case management training at nursing colleges**.**

***All information herewith provided will be treated confidentially. It is not necessary to indicate your name in this questionnaire.***

**INSTRUCTIONS**

1. **Please answer all questions by marking a "X" in the corresponding box**
2. **Please answer all the questions as honestly and objectively as possible**
3. **The questionnaire should take you approximately 30 minutes to complete**

**SECTION A: DEMOGRAPHIC DATA**

1. Age range

| Age | Answer |
|---|---|
| 1.1. 31-40 years | |
| 1.2. 41-50 years | |
| 1.3. 51-60 years | |
| 1.4. 60-65 years | |

*Office use*

| | |
|---|---|
| | |

2. Gender*Office use*

| | |
|---|---|
| 2.1. Female | |
| 2.2. Male | |

3. Indicate your years of experience in nursing education

| Years of experience in nursing education | |
|---|---|
| 3.1. 5 -10 years | |
| 3.2. 10- 15 years | |
| 3.3. 15-20 years | |
| 3.4. 20 years and more | |

4. Indicate what educational qualifications you possess?

| Educational qualifications | |
|---|---|
| 4.1. Diploma | |
| 4.2. Post basic diploma | |
| 4.3. Bachelor's degree | |
| 4.4. Honours degree | |
| 4.5. Master's degree | |
| 4.6. Doctoral degree | |

5. Elaborate on your educational qualifications

……
……
……
……
……
……

6. Indicate what your current position or job title is?

……..

7. Give a brief outline of your experience in nursing and nursing education

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**THANK YOU FOR YOUR PARTICIPATION**

Ms.Udesvari Pillay is a Lecturer in Community Nursing Science at the Addington Campus (KZNCN). She is currently studying with the University of South Africa for the D Litt et Phil (Health Studies) Degree.

This study is part of her thesis for the Doctoral Degree titled

**"The Implementation of the IMCI Computerised Adaptation and Training Tool (ICATT) at Nursing Colleges in KwaZulu-Natal – A Mixed Method Study"**

You have been selected to participate in this study, and your co-operation is highly appreciated.

**ANNEXURE W**

**Guidelines for the implementation of ICATT at the Nursing Campuses of the KwaZulu-Natal College of Nursing**

| | **Round 1**<br>**Comments from the experts**<br><br>*Re-arrange the order of all the guidelines except guideline 1 remains as guideline 1* | **Round 2**<br>**Comments from the experts**<br><br>Nil |
|---|---|---|
| | **Comments from the experts** | **Comments from the experts** |
| **Aim:** To produce guidelines on best practice for implementing ICATT for IMCI case management training at nursing colleges | *Rephrase to read "to produce best practice guidelines"*<br>*Replace colleges with campuses* | Nil |

| **Guideline 1: Re-engineer nursing colleges to adopt electronic teaching and learning (ICATT) and become e-learning centres** | **Round 1**<br>**Comments from the experts**<br>*Replace colleges with campuses* | **Round 2**<br>**Comments from the experts**<br>Nil |
|---|---|---|

**Rationale**

Globally, IT-empowered learning is a reality especially with the younger generation of learners (Frenk et al 2010:[18]). Educational institutions must therefore be re-engineered to adopt new forms of learning that has been made possible by information technology (Frenk et al 2010:[24]). This can facilitate ICATT implementation and other e-learning methods, in order to meet the changing educational needs from a teaching and learning perspective.

| Actions | Round 1<br>Comments from experts<br>*Replace actions with recommendations* | Round 2<br>Comments from the experts |
|---|---|---|
| | | Nil |
| • The educational policymakers and other relevant stakeholders (the management of the KZN College of Nursing, the campus principals and lecturers) should develop appropriate and enabling strategies, policies and standards with regards to the use of e-learning at nursing colleges, in particular ICATT for IMCI case management training | *Replace campus principals with principals, and lecturers with nurse educators*<br>*Remove "should develop" and rephrase to read as "to work together to develop"*<br><br>*Replace colleges with campuses*<br>*Remove "must play" and replace with "can play"*<br>*Replace campus principals with principals* | |
| • Campus principals at nursing colleges must play an active role in promoting sustainable e-learning through partnership or collaboration between nursing colleges that are resource constrained, and nursing colleges that are resource rich, which allows for sharing of resources and mutual advancement | *Replace colleges with campuses*<br>*Replace campus principals with principals*<br>*Replace "should implement" with "can implement"*<br>*Replace lecturers with nurse educators* | |
| • Campus principals as leaders of nursing colleges should implement technology plans and share a common vision with lecturers, to motivate them to use technology for teaching purposes | *Replace campus principals with principals*<br>*Replace colleges with campuses*<br>*Replace "should encourage" with "can encourage"*<br>*Replace lecturers with nurse educators* | |
| • Campus principals at nursing colleges should encourage innovation in teaching and learning by supporting the education of the lecturers and developing learner support systems | *Replace campus principals with principals*<br>*Replace lecturers with nurse educators*<br>*Remove "must identify" and rephrase to read as "can work together to identify"* | |
| • Campus principals and lecturers must identify the institutional capacity by conducting a needs and readiness assessment to ensure that what is being considered is advisable, feasible and sustainable | *Replace campus principals with principals*<br>*Replace lecturers with nurse educators*<br>*Remove "should work" and rephrase to read as "can work"*<br>*Replace colleges with campuses* | |

| | Round 1<br>Comments from experts | Round 2<br>Comments from the experts |
|---|---|---|
| • The educational policymakers together with other stakeholders (the management of the KZN College of Nursing, the campus principals and lecturers) should work towards harmonizing the use of e-learning across all nursing colleges to ensure standardization of practice for teaching and learning | *Replace campus principals with principals*<br>*Replace lecturers with nurse educators*<br>*Remove "should" and rephrase to read as "can advocate"* | Nil |
| • Campus principals and lecturers should advocate for computer literacy, particularly for learners, and that it should be a high priority competency in all training programmes | *Replace campus principals with principals*<br>*Replace lecturers with nurse educators* | |
| • Campus principals should prioritize the training of lecturers and learners in the use of e-learning platforms, with particular reference to ICATT | *Remove "should" and rephrase to read as "can prioritize"* | |

| **Guideline 2: Support and enable the development of lecturers in the use of ICATT** | **Round 1**<br>**Comments from experts**<br>*Guideline 2 will be re-numbered as guideline 4*<br>*Replace lecturers with nurse educators* | **Round 2**<br>**Comments from the experts**<br>Nil |
|---|---|---|

## Rationale

Offering support to and training teachers can influence their adoption and integration of technologies in the classroom (Andoh 2012:147). Andoh (2012:147) further states that teachers' professional development is vital for the successful integration of computers into classroom teaching. Developing the technical competence of nurse educators, and encouraging innovative teaching methods is essential for the successful implementation of ICATT.

| Actions | Round 1<br>**Comments from experts**<br>*Replace actions with recommendations* | Round 2<br>**Comments from experts**<br>Nil |
|---|---|---|
| • Develop the Information Communication and Technologies (ICT) skills of lecturers by ensuring that lecturers attend computer training courses to enhance skill and confidence when using ICATT and other e-learning programmes | *Rephrase to read as "… skills of nurse educators by encouraging them to attend …."* | |
| • Ensure that all lecturers facilitating IMCI case management training are sent for ICATT training | *Replace lecturers with nurse educators*<br>*Replace "are" with "to be"* | |
| • Ensure that all lecturers learn facilitator techniques used in the ICATT based part of the training | *Rephrase to read as "Nurse educators to be competent in the facilitator techniques that are required when using ICATT for IMCI training"* | |
| • ICATT facilitators (lecturers) must have unrestricted access to a computer during the whole training period | *Rephrase to read as "Nurse educators who are ICATT facilitators to have unrestricted access to computers during the training period"* | |
| • Ensure that all lecturers facilitating IMCI case management training using ICATT are comfortable with the software and accompanying IMCI materials prior to training learners | *Rephrase to read as "All nurse educators facilitating IMCI case management training using ICATT to be given the opportunity to strengthen their skills in the use of the software and …."* | |
| • Identify ICATT champions at every nursing college who offer support and address challenges experienced by lecturers facilitating IMCI using ICATT | *Replace college with campus*<br>*Replace lecturers with nurse educators* | |
| • Offer incentives to lecturers who work together with Information Communication and Technologies (ICT) technical experts in creating an enabling e-learning environment which supports the implementation of ICATT | *Remove "Offer incentives to lecturers" and replace with "Acknowledge the role of nurse educators…"* | |
| | | |

| Actions | Round 1<br>Comments from experts | Round 2<br>Comments from experts |
|---|---|---|
| | | Nil |
| • Support lecturers in incorporating electronic learning, in particular ICATT, into the existing curriculum. This should include the adoption of classroom-based trainings with individual computers for IMCI case management training using ICATT | *Remove "Support lecturers" and replace with "Nurse educators to play a focal role in..."* | |
| • Support lecturers in adopting the new approach to facilitation which is limited when using ICATT for IMCI case management training. A facilitator: participant ratio 1:10-15 is sufficient for ICATT work | *Replace lecturers with nurse educators* | |
| • Support lecturers as they use and further develop monitoring and evaluation tools on the ICATT software for assessing the progress of learners | *Replace lecturers with nurse educators* | |

| **Guideline 3: Prepare learners for the use of ICATT (e-learning)** | **Round 1**<br>**Comments from experts**<br>*Guideline 3 will be re-numbered as guideline 5* | **Round 2**<br>**Comments from experts**<br>Nil |
|---|---|---|

## Rationale

Numerous studies indicate that learner characteristics such as computer self- efficacy, computer experience and attitude towards e-learning may influence e-learning adoption (Bhuasiri et al 2012:846). Learners' technical competency and perceptions about electronic learning (e-learning) are critical success factors for the implementation of ICATT

| | **Round 1**<br>**Comments from experts** | **Round 2**<br>**Comments from experts** |
|---|---|---|
| **Actions** | *Replace actions with recommendations* | Nil |
| • Develop the technical skills of learners so that they are able to fully participate in e-learning | *Rephrase to read as "All learners to have unlimited access to…"* | |

| | | |
|---|---|---|
| • Give learners free access to computers and the ICATT software<br><br>• Allow learners unlimited access to computer laboratories and libraries that encourages self-directed learning whenever time and opportunity permits<br><br>• Give learners instructions and provide accompanying guidelines that allow them to understand that they control their own learning when using ICATT<br>• Encourage leaners to work independently, at their own pace (within time limits) when using the ICATT guidelines<br>• Encourage learners to take responsibility for monitoring their own progress (progress bar) using the ICATT software | *Rephrase to read as "All learners to have unlimited …"*<br><br>*Rephrase to read as "All learners to receive instructions and …"*<br><br>*Add "Make provision for ICATT to be downloaded on to learners personal computers to accommodate after hours learning"* | |

| **Guideline 4: Provide adequate infrastructure to support ICATT use** | **Round 1**<br>**Comments from experts**<br>*Guideline 4 will be re-numbered as guideline 3* | **Round 2**<br>**Comments from experts**<br>Nil |
|---|---|---|
| **Rationale**<br>The infrastructure that supports an e-learning programme must be in place prior to implementation (Frehywot et al 2013:[12]). Infrastructure includes hardware needs such as a network and computers and software (Frehywot et al 2013:[12]). The ICATT software runs off computers and the training approach adopted by nursing colleges is classroom training with individual computers | **Round 1**<br>**Comments from experts**<br>*Replace colleges with campuses* | **Round 2**<br>**Comments from experts**<br>Nil |

| Actions | Round 1<br><br>**Comments from experts**<br>*Replace actions with recommendations* | Round 2<br><br>**Comments from experts**<br>Nil |
|---|---|---|
| • Build computer laboratories or convert classrooms into computer laboratories<br><br>• Provide network connections to support e-learning<br><br>• Provide an adequate number of computers for students with a one-to-one ratio being the ideal for the use of ICATT for IMCI case management training<br><br>• Download the ICATT software to all computer terminals<br><br>• Engage with the National Department of Health, regarding the copyright and licensing of the ICATT software | *Rephrase to read as "support the development of computer laboratories…"*<br><br>*Rephrase to read as "network connections to be in place to support…"*<br><br>*Rephrase to read as "An adequate number of computers to be made available for students…."*<br><br>*Add the following after the word software "for teaching and learning purposes."* | |

| **Guideline 5: Employ Information Communication and Technologies (ICT) technical expertise at nursing colleges for ICATT implementation** | **Round 1**<br><br>**Comments from experts**<br>*Guideline 5 will be re-numbered as guideline 6*<br>*Replace colleges with campuses* | **Round 2**<br><br>**Comments from experts**<br>Nil |
|---|---|---|

## Rationale

The provision of adequate information and communication technology (ICT) facilities as well as technical support is important to encourage involvement in e-learning (Chong et al 2016:2). Andoh (2012:144) cites Yilmaz (2011) who states that the repair and maintenance of hardware and internet connections is crucial for the continued use of information and communication technology (ICT). Accessibility to Information

Communication and Technologies (ICT) technical expertise will ensure the maintenance of e-learning infrastructure and support the implementation of ICATT and other e-learning programmes at the nursing campuses.

| **Actions** | **Round 1**<br>**Comments from experts**<br>*Replace actions with recommendations*<br><br>*Replace college with campus*<br><br>*Replace colleges with campuses* | **Round 2**<br>**Comments from experts**<br>Nil |
|---|---|---|
| • Appoint ICT technical experts at every nursing college<br><br>• Identify the roles and responsibilities of the ICT technical experts in the implementation of ICATT at the nursing colleges<br><br>• Facilitate the development of a relationship between the ICATT champions and the ICT technical experts in working together to create an e-learning environment, that is suitable for ICATT implementation and the development of other e-learning programmes<br><br>• Offer incentives to ICT technical experts for creating and maintaining an enabling e-learning environment which supports the implementation of ICATT and other e-learning programmes<br><br>• ICT technical experts must make available a Helpdesk that will assist users who are impeded by computer viruses and/or out-dated hardware or unlicensed software when using the ICATT | | |

| | **Round 1**<br>**Comments from experts** | **Round 2**<br>**Comments from experts** |
|---|---|---|
| **Guideline 6: Allocate a budget and resources that will support the implementation of ICATT at nursing colleges** | *Guideline 6 will be re-numbered as guideline 2*<br>*Replace colleges with campuses* | Nil |

| Rationale | Round 1<br>Comments from experts | Round 2<br>Comments from experts |
|---|---|---|
| Educators and institutions must develop financial models to ensure the sustainability of e-learning (Frehywot et al 2013:[13]). This will allow for the implementation of ICATT and other e-learning programmes to be realised at nursing colleges. Additionally, understanding the feasibility and true costs of e-learning tools can lead to positive outcomes (Frehywot et al 2013:[13]). | *Replace colleges with campuses* | **Nil** |

| | Round 1<br><br>Comments from experts | Round 2<br><br>Comments from experts |
|---|---|---|
| **Actions** | *Replace actions with recommendations* | Nil |
| • The management of the KZN College of Nursing must develop partnerships or collaborate with the Department of Health (national, provincial, district) for financial support and resources to implement and sustain implementation of ICATT at nursing colleges for IMCI case management training | *Replace colleges with campuses* | |
| • Nursing colleges should develop financial models and annual budgetary plans to ensure the sustainability of e-learning | *Replace colleges with campuses* | |
| • Nursing colleges should explore innovative ways to secure funding including collaboration with NGOs and other interested partners in education | *Replace colleges with campuses* | |
| • Nursing colleges to explore and locate local champions for advocacy and mobilization of resources used in ICATT training | *Replace colleges with campuses*<br>*Rephrase to read as "Explore and locate local…."* | |

## Guideline 7: Establish benchmarking criteria for ICATT implementation

### Rationale

It is important to evaluate an e-learning programme so improvements or amendments can be undertaken (Ruggeri et al 2013:8). The data may take the form of participant or stakeholder feedback, information technology reports or results from an audit (Ruggeri et al 2013:8). Identifying success criteria, assessing progress and communicating direction and accomplishments will ensure that ICATT remains a priority and that support is sustained

| | **Round 1**<br><br>**Comments from experts** | **Round 2**<br><br>**Comments from experts** |
|---|---|---|
| **Actions**<br><br>• Early involvement of principals, heads of department, lecturers, learners and other stakeholders in the use and implementation of ICATT is key to success<br><br>• Regular and critical review of progress of ICATT implementation, reassessment of needs and refocusing of learning needs and learning plans as required<br><br>• Provide the department of health (national and local) and donors with evidence that the investments made for ICATT implementation have produced | *Replace actions with recommendations*<br><br>*Add "Engage other education institutions with current e-learning programmes to evaluate ICATT implementation at nursing campuses against set criteria, as part of the bench-marking process."* | Nil |

(Adapted from Chilemba 2013:127-135)

**ANNEXURE X**

**Letter from the statistician**


**DEEPAK SINGH**

*Database and Statistical Analysis*

P. O. Box 24002
Hillary
4024

(cell): 083-775-9239
singhd@telkomsa.net


27 November 2017

To Whom It May Concern

**Analysis of Data:** **Mrs. Udesvari Naidoo (Pillay)**
Student number 7594380
UNISA; Department: Health Studies

This is to certify that I assisted Ms Naidoo with her statistical analysis in the following manner:

- sample size determination
- data analysis of the three cohorts (Campus principals, nurse educators and learners) using appropriate statistical methods as indicated in the thesis

Do not hesitate to call upon me for further assistance.

Sincerely

Deepak Singh

**ANNEXURE Y**

**Letter from the editor**

Write On Q

EDUCATE • EDIT • EXCEL

Dr Q Dawood (PhD) quraishad@gmail.com

Specialising in Research Writing, Thesis Editing, Language Editing, English Tuition, Transcribing & Proofreading

**This is to confirm that the PhD thesis entitled:**

DETERMINANTS OF THE NURSING CAMPUSES' READINESS TO USE A COMPUTERISED ADAPTATION TRAINING TOOL

**By:**

Mrs U Naidoo

**Has been language edited by:**

Dr Quraisha Dawood (PhD, Director of Write on Q, Certified by the SA Writers College)
13 December 2017.

Q. Dawood