
ICT pedagogical integration in a public nursing education college in the Gauteng province, South Africa.

A mini dissertation submitted in fulfilment of the requirements of the degree of Master of Education,
School of Education, University of the Witwatersrand.

Nozuko Refiloe Makhuvha

Supervisors: Dr Nokulunga Sithabile Ndlovu and Ms Mandivavarira Maodzwa-Taruvunga

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NOZUKO REFILOE MAKHUVHA
9408121F

Abstract

The dissertation is focussed on understanding nurse educators' use of Information and Communication Technologies (ICTs) in teaching and learning. It intends to determine the extent to which these technologies are integrated into pedagogy and whether their use enhances effective learning. This analysis was conducted in a nursing education institution where two nursing educators participated in the research. It uses a qualitative methodology and employs a pedagogy * technology framework to analyse the data. The study concludes that although the two educators studied differed in the way they defined ICT integration, they both appeared to be integrating ICTs into their pedagogies in a similar way and were both rated at level 4 of the framework. One of the recommendations is that for students to benefit fully from the use of ICTs in teaching, nurse educators need to make the necessary adjustments to their pedagogical approaches to create active learning environments.

Key words: ICTs, ICT pedagogical integration, enhanced learning

Declaration

I, Nozuko Refiloe Makhuvha, hereby declare that this research report is my own work and unaided work. Wherever other resources have been used, they have been acknowledged. It is being submitted in partial fulfilment of the requirements of the degree of Master of Education in the University of Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at any other institution.

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Chapter 1: The context

Introduction

Nursing and midwifery education's main aim is to produce nursing and midwifery professionals that provide superior healthcare to the communities they serve. These nursing and midwifery students will be able to provide such services if they are exposed to good quality education and training which enables them to be critical thinkers and problem solvers (NDoH, n.d). Hence identifying and solving problems is listed amongst the most critical cross-field outcomes for nurse training (SANC.co.za/pdf/Qualifications/Bachelors) (SANC, 2014).

In the South African context, nursing and midwifery education involves the education and training of nursing and midwifery students to become qualified, capable, highly competent and knowledgeable professionals (Bruce & Klopper, 2017:14). Nursing and midwifery students are trained in Nursing Education Institutions (NEIs), which may be a university, a university of technology, a nursing college or a nursing school (SANC, 2014).

In these NEI's, the students are trained and prepared by nurse educators that are sometimes called nurse tutors. A nurse educator is a registered nurse or midwife who holds an additional qualification in nursing education and is registered with the South African Nursing Council (SANC, 2014). Nurse educators perform many roles; they function as lecturers, clinical educators or preceptors, researchers, specialists and various other related professions (SANC, 2014:1). Amongst their roles, one of them is to inculcate an attitude of enquiry, critical thinking and problem solving in their students which are skills required when caring for their patients. This therefore means problem solving and critical thinking are important skills for nurses and midwives to learn and gain for practice. Critical thinking skills in their contexts are necessary to provide safe and comprehensive nursing care and these are developed through the practice of using active learning environments (Pucer *et al*, 2014:964).

These active learning environments are made possible by the "use of modern information and communication technologies that are simple, fun, time and cost effective" (Pucer *et al*, 2014: 964). Active learning environments can also be easily created in a face-to-face class by using various teaching methods like group work. This topic will be discussed further under the literature review in chapter 2. When these nursing and midwifery students qualify, they work in environments where Information and Communication Technology (ICT) tools are used on a daily basis. They therefore

need to be trained in learning environments where the use of technology is inherent to ensure that they are well prepared for practice in an information age (Button *et al*, 2014). To achieve this, nurse educators need to integrate technology into their curricula and in their daily teaching practices. The focus of this study will therefore be on how ICTs are used in nursing education pedagogy by these nurse educators in one Gauteng public nursing college to enhance learning.

The problem statement

The process for successful and effective integration of ICTs into nursing education involves a lot more than just the technology (Tinio, 2003), it involves the curriculum, the pedagogy, educator competencies and leadership involvement. This obviously complicates the process which relies heavily on educator support since educators play a crucial role in facilitating a successful integration (Yu, 2013; Petit-dit-Dariel *et al*, 2014; McKnight *et al*, 2016; Webb *et al*, 2017; Lloyd, 2005).

Therefore to effectively teach with these technologies educators need to be well trained and well equipped (Jita, 2016) to integrate them into their pedagogy. The majority of the current cohort of nurse educators was trained before these emerging technologies that are a prominent feature in today's teaching and learning environments (Glidewell & Conley, 2014). These educators later practised as nurses and midwives, trained further and qualified as nurse educators before ICTs were an integral part of nursing practice. This is not unique to nursing education only, the speed at which the technological reforms have taken place is such that 'teachers in many countries of the world are working with 'digital natives' who are growing up with technology as a non-remarkable feature of their world in the same way as an earlier generation took radio or television for granted' (Lim *et al*, 2013: 65). Given the factors mentioned above, this study is interested in exploring the extent to which participating nurse educators are integrating ICTs into their pedagogy to enhance learning.

Considering that the use of ICTs in nursing education institutions is increasing, ICTs need to be used effectively and educators are not expected to use them simply to deliver content (transmission). They should use them to promote better understanding of the content and take it further by enabling students to apply what is learnt in real life situations to solve problems (transformation). ICTs therefore need to be a critical component of the teaching-learning environment and the way educators teach has to accommodate these emerging technologies.

The main research question that this study will respond to is:

- To what extent are nurse educators integrating ICTs in their teaching to enhance learning?

The study will also attempt to address the following sub-questions:

- What are nurse educators' perceptions on ICT pedagogical integration?

- How are nurse educators integrating ICTs into their pedagogy?
- To what extent do nurse educators use ICTs to enhance effective learning?

The purpose statement

The purpose of this study is to understand how nurse educators use ICTs in a nursing college in Gauteng, South Africa. It seeks to determine the extent to which these ICTs are integrated into the pedagogy and whether the ICTs are used in a way that enhances learning.

Conclusion

As explained above ICTs are crucial for nursing and midwifery educators to integrate in their pedagogies in order to enhance student learning by developing their critical thinking skills which are key in enhancing problem-solving abilities. These nurse students are not expected to just identify and solve problems but to display that they have taken responsible decisions having employed critical and creative thinking and reasoning skills.

Chapter 2: Literature Review and Conceptual Framework

Research question:

To what extent are nurse educators integrating ICTs in their teaching to enhance learning?

Sub-questions:

- What are nurse educators' perceptions on ICT pedagogical integration?
- How are nurse educators integrating ICTs into their pedagogy?
- To what extent do nurse educators use ICTs to enhance effective learning?

Introduction

This literature review attempts to clarify some of the terminology that pertains to ICT integration and to tease out the various components that play a significant role in the integration. The review further explores the shifts in pedagogies that are required for nurse educators to effectively integrate ICTs in their teaching. The conceptual framework that this study will follow in attempting to respond to the research questions is also discussed.

Defining ICT

The acronym ICT stands for information and communication technology, which implies that computing has been combined with telecommunications (Hugo & Fakude, 2016). In this report, ICTs will refer to emerging digital technologies and Apps that are currently used for instructional purposes in the nursing college where the study was conducted. These are laptops, projectors, mobile devices like tablets & smartphones, DVD's, videos and video recorders, email, *WhatsApp* and any other technology used. The study's main interest is to understand the processes of teaching and learning where these ICTs are used to determine whether these ICTs have been integrated into the pedagogy.

Defining 'pedagogy'

Pedagogy is defined as the science and art of teaching (Bruce & Kloppe, 2017: 360), which comprises all the knowledge, theoretical principles, strategies and efforts the educator puts in, in order to ensure that students learn. Dron, (2012) sees pedagogy as a strategy or a method for teaching. Pedagogy is therefore "the collected practices, processes, strategies, procedures and methods of teaching and learning" (Naidoo, 2010: 15). This means that all the efforts that nurse educators plan consciously and execute in an attempt to enhance learning including the planning

and use of ICTs will be referred to as the pedagogy in this study. Educators have a responsibility to create an environment where ‘understanding is possible’ and students are responsible for taking advantage of the learning environment provided to them (Laurillard, 2002: 1). Pedagogy therefore has everything to do with creating an environment that is conducive to the student’s ‘coming to know or understanding of what is there to be known’ (Laurillard, 2002: 1). It entails all efforts educators engage in to minimise or remove barriers to learning regardless of the context.

Traditional pedagogies also known as transmission pedagogies which have been used by educators over the years are known to be less effective in creating such environments where understanding is possible compared to transformational pedagogies. Transmission pedagogies are known as such because they involve teaching environments where educators simply transmit information to students who are passive participants in their learning (Tinio, 2003).

Nursing and midwifery education requires students to apply the theory they learn into their practice (NDoH, n.d) on a daily basis to become the best possible nurses and midwives. The success of nursing and midwifery students lies in them being able to transform the theory learnt to close the theory-practice gap (Benner *et al*, 2010; Factor *et al*, 2017). This transformation of theory learnt is enhanced with the appropriate use of a combination of pedagogies and ICTs and is the reason these pedagogies are referred as such. It is very important that this gets done well in order to produce highly competent and knowledgeable nurse professionals. More on these transformational pedagogies will be discussed when the data evaluation instrument is discussed.

ICTs need to be integrated into pedagogies for them to be beneficial in learning (Ertmer, 2005; Summak *et al*, 2010). Educators therefore have the responsibility of ensuring that these technologies are used in ways that will help the students learn better by enhancing their pedagogy. We therefore look at what it means when ICTs are integrated into the pedagogy.

ICT pedagogical integration defined

There is a lack of consensus in agreeing on a standard definition of ICT integration due to the differing schools of thought that researchers hold. The term ‘integration’, is used to imply that ICTs are incorporated into the teaching-learning process. Some scholars are quite critical of the use of this term as they feel it is vague and ill-conceived while others embrace the term and see it as critical (Lloyd, 2005:5). Generally the term refers to components that are infused together, meaning they work well as one unit. Some call the process ‘embedding’ the technology. Opponents of the use of the term ‘integration’ feel this term has been ‘reduced to rhetoric’, it is misused and they dismiss it as jargon (Lloyd, 2005:5). In an email to Lloyd (2005) G Washburn expresses his disgust every time he

hears someone mention the term. This is because people make the 'integration' so unreal as if it is a magical process and make the whole notion so ridiculous.

This notion needs to be expressed in simple terms in order to avoid misleading people in thinking that it is a simple process when a lot is involved before there is successful integration. Pierson, (2001: 426) thinks the term technology integration is probably used too freely because institutions are so eager to begin using the technology and they make the mistake of thinking that by simply having computers installed and turning them on they are integrating. This explains the need to investigate the nurse educator actions when they integrate ICTs or what they perceive to be the integration of these technologies to their teaching. ICTs are said to have been successfully integrated in the pedagogy if they form an integral part of the teaching and learning process and are therefore not just add-ons, but are a permanent feature of the learning environment (Newhouse *et al*, 2002). For the purposes of this study Naidoo's (2010: 17) definition of ICT integration will be used: ICT pedagogical integration is described as, "if elements of technology and pedagogy are considered as mutually supportive and interdependent, then it would be possible to construct new meaning" and this "will result in a bridging of the gap between pedagogy, technology and eventually cognition". This is because when ICTs and the pedagogy are seen as separate entities, the possibility of the construction of new meaning is compromised (Naidoo, 2010: 17). In such a case, using ICTs as "add-ons" is not beneficial for learning purposes.

It is also believed that technology use that relates to specific subject areas has a positive impact on student learning and so do uses that focus on the student construction of knowledge (Tondeur *et al*, 2013: 434). Students therefore benefit when they use ICTs that have been customised specifically for a certain subject area. For example, it is more beneficial for them if learning material is developed specifically for their anatomy course as opposed to material that is generic and can be used for any other subject. It is also beneficial when ICTs are used in such a way that they promote the creation of knowledge by students. When students are presented with a learning environment that is conducive to learning it becomes easier for them to create 'new' knowledge. This relates to the constructivist theory of learning which will be discussed later.

Low level ICT use

On the opposite side of ICT integration is 'low level' use which is defined as the use of ICTs for instruction such that they support traditional teacher-centred instruction (Ertmer & Ottenbreit-Leftwich, 2010: 256). For example, when educators use *PowerPoint* presentations to 'transmit' information during their lectures they are merely using *PowerPoint* to support what used to be a traditional lecture with an overhead projector or blackboard or when they simply just add on a video

because it is relevant to the topic they are teaching at the time. In this case, the instructional method has not changed, it remains the same, what has changed is the medium through which the content is delivered.

When students are taught using the traditional methodology they are not given an opportunity to actively participate in a lesson. They are passive and this means they might not have been afforded opportunities to exercise their cognitive skills like their problem solving skills, reasoning skills, critical thinking skills and other skills which they need to thrive in their professional lives. The concern is that even when educators are given adequate technology training in most instances they still do not use ICTs in a manner that benefits their students' learning. This is attributed to what Ertmer (2005) refers to as 'second order' barriers. These barriers are beliefs and attitudes which are intrinsic to educators which hinder them from integrating ICTs into their lessons. 'First order' barriers are those that are external to the educator like lack of resources and lack of technical support that play a role in hindering the effective use of these technologies. Tsai & Chai (2012: 1057) later suggested what they call a 'third-order' barrier which is the lack of design thinking by educators which can also hinder ICT integration into the pedagogy. These barriers hold back nurse educators from taking full advantage of the affordances offered by these ICTs and therefore rob students of enhanced learning opportunities. It is important to understand and recognise these barriers so that one understands why educators sometimes use ICTs the way they do. So, educator's pedagogical practices and approaches determine whether their use of ICTs in class enhances students learning or not. What does it mean when we say learning is enhanced?

Learning enhancement

According to the Oxford Online Dictionary (2011) 'enhance' means 'to intensify or to further improve the quality values or extent'. Enhancing learning therefore means that the extent of learning has been intensified or that the quality value has been improved. This means that students learn more from the experience than they would have learnt in a traditional classroom environment that is educator-centred. So when ICTs are said to enhance learning, their use must have a positive effect on learning. They must intensify or improve the level of the learning experience. Integrating ICTs into pedagogy is believed to lead to the enrichment of the overall learning experience and can lead to development of higher levels of lifelong learning capabilities amongst students (Sangster *et al*, 2010). This is because by integrating ICTs into teaching, lecturers are exposing students to innovative ways of learning (Steketee, 2006: 126). When educators engage students at that appropriate level, they are enhancing learning and by doing so, they are exposing students to a higher level of learning. This therefore increases the chances of students acquiring the skills that

allow them to think critically in a way that results in them coming up with different ways of solving problems. This is the 'new' knowledge that constructivists believe students are able to construct when they are exposed to active learning environments. Even though the focus of this study is on enhancement of what is learnt, it is believed that once the learning is enhanced sufficiently it will lead to the development of critical thinking which will lead to the development of problem solving abilities amongst nursing and midwifery students.

"Effective technology integration does not mean using technologies to teach the same content in the same way; instead it means to use technology to provide opportunities to support new models of learning including opportunities for students to collaborate and construct knowledge" (Protheroe, 2005: 47). The way this is done will determine whether students benefit fully from the experience or not. Benefiting fully means the students use every learning opportunity the adjusted pedagogy together with the integration of the technology affords them. When that happens, the educator is said to have used ICTs in a way that has enhanced learning, meaning ICTs have contributed to the process of making students think or better understand what is being taught and therefore having learnt effectively.

Educators should not simply use ICTs for the sake of using them. When integrating these ICTs into pedagogy the decision to use them should be informed by the learning needs of the students or teaching problems that an educator needs to solve. Jaffer *et al*, (2007: 1) refer to these as educational needs and adds, 'teaching and learning is enhanced when uses of educational technology are driven by educational needs'. This means that effective teaching and learning happens when what needs to be learnt is matched to the correct technology. So, if a nurse educator sees a need to enhance the practical skills for certain procedures in her clinical skills class, she will book time at the simulation laboratory and give her students time to practice the required skills or she might suggest that her students watch certain videos. By so doing she would have implemented the most appropriate strategies to address the learning needs of this particular group of students. This therefore shifts the emphasis from the technology but rather directs the light on the students, their needs and the teaching-learning process as a whole.

The conceptual framework

A conceptual framework helps to frame the work in a study and guides the 'new researcher' on what variables or parameters to set when exploring a particular phenomenon. For this study the conceptual framework will consider pedagogy and technology that influence ICT integration whilst examining the learning environment where the integration takes place. The framework therefore explains the path followed by the study in getting to understand ICT pedagogical integration.

A simplistic illustration of this process is shown below:

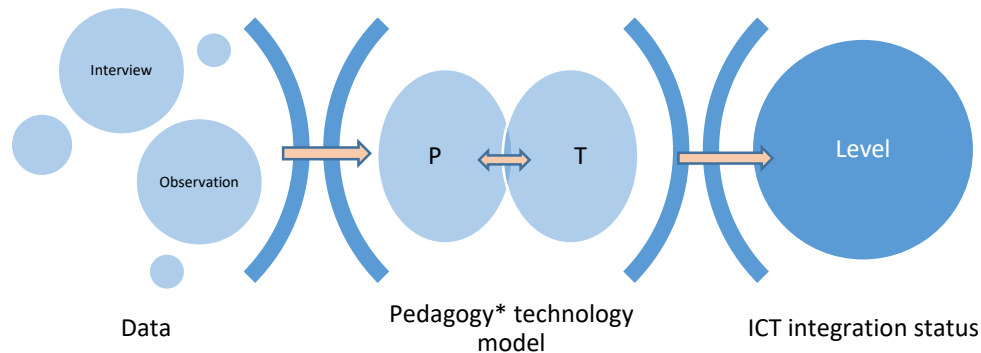


Figure 1: The conceptual framework

The data extracted from the interviews and observations is analysed using the pedagogy*technology model to determine the educator's ICT integration status. In other words, the pedagogy* technology model will be used as a lens to determine the nurse educators' level of ICT integration to enhance teaching and learning.

Attempts to improve the quality of nurse education have led to awareness and a drive to increase access to ICTs in teaching and learning in nursing education institutions. This is because when ICTs are used appropriately for teaching they are believed to provide students with learning environments that promote the development of problem-solving skills, critical thinking skills and other cognitive skills that are necessary to the 21st century professional. Integrating ICTs into pedagogies prepares students for the kind of world they have to learn to navigate in their working lives. By teaching students to think critically, which is "a process of hunting and checking assumptions" they are being taught an important skill which is a crucial process for learning to solve problems (Lovatt, 2014: 670-1). This way, they are being empowered with skills for the future and ICTs play a critical role in teaching such skills. However, research has proven that simply introducing ICTs on their own into the learning environment is not beneficial for the students to learn these necessary skills.

This increased use of these emerging technologies in education has not necessarily translated to improved educational outcomes. There is little evidence available to show significant effectiveness

of ICTs in transforming teaching and learning practice (Ng'ambi, 2013: 652). In fact research has proven time and again that simply introducing such technologies in teaching and learning environments does not automatically translate to better learning (Lim & Chai, 2008; Kim *et al*, 2012). There are various reasons why this is so, one of them being that even though these ICTs are used in teaching, they are not being used in ways that bring about meaningful learning (Ertmer, 2005).

To help students do this, educators need to transform the learning environment from being teacher/educator centred to become learner centred which is a core feature of constructivist learning environments. According to constructivist learning principles such an environment is said to be beneficial and conducive for student's learning because it allows for an easier construction of knowledge. Such environments assist students in meaning making by creating opportunities that lead to them making sense of whatever they are meant to learn. These high expectations have come about due to the perceived transformational potential ICTs have on a number of levels. These utopian views probably stem from the perception that these technologies present multiple educational opportunities to both educators and students (Rambe & Nel, 2015: 632). This misconception has resulted in a dystopian school of thought, which believes in the complete opposite of utopian thinking – where ICTs are seen as ineffective and disruptive. This calls for a clear definition of ICT integration that is acceptable to everyone involved. If defining ICT pedagogical integration is contentious, measuring it will even be more debatable.

Measuring ICT pedagogical integration

ICT pedagogical Integration is an abstract concept because one cannot see or touch it, as a result it is difficult to measure. To further complicate its measurement is the fact that there are several factors that influence ICT integration into pedagogy either positively or negatively. These range from educator beliefs, attitudes, knowledge and skills, the educator's underlying pedagogical philosophy, educator's technical skills, the learning environment, the technologies used, maintenance, student's skills and motivation (Lloyd, 2005). There is much more to ICT integration than educator characteristics and that is why this phenomenon needs to be studied from a system of various factors that influence the integration (Tondeur *et al*, 2013: 434). So, it would be unfair to attribute successful ICT pedagogical integration to just one factor due to its complexity. However, studying the nurse educator's pedagogical approach and technological competency gives researchers a glimpse of what could possibly be taking place.

Certain factors are significant to the success of the integration like the software and so is the pedagogy of the software author and that of the educator (Rogers & Finlayson, 2004: 290). Whether effective integration takes place or not, it would be impossible to attribute it to one single

component. This study will measure ICT integration by assessing two components in the ICT pedagogical integration 'mix' which is the educator's pedagogical competency and their technological competency. It assumes that if a nurse educator is competent pedagogically and their technological knowledge is good, then they are likely to use ICTs appropriately or in a way that benefits students' learning. How the nurse educator plans and designs the learning environment using ICTs affects the availability of opportunities that allow students to make meaning from the content covered and classroom activities assigned to them. In other words, the way the pedagogy is aligned to the ICTs used, allows students to either create 'new' knowledge by thinking deeply and creatively while partaking in the learning activities. This is referred to as enhanced learning or effective learning in this study; or to just receive information and learn how they have always learnt. This is the essence of this study and subsequently the model used to evaluate the data. The rationale for using the model is discussed below.

Rationale for selecting the instrument

The model used for analysing data was selected because first, it recognises the important role played by the various pedagogical perspectives in the integration of ICTs. It is also ideal for this study because it is inclusive and not prescriptive. It also gives equal weight to both the technology and the pedagogy. Educators who use traditional methodologies to teach still get assessed fairly on technology competency. Furthermore, since ICTs are gradually being adopted in the nursing college under observation this model will be useful for individual educators who want to determine where they are technologically. This makes this model suitable because it looks at both the pedagogy and the technology dimensions at the same time and allows for a gentle progression through the levels. So, when educators reflect on their pedagogy practices and search for room to improve, they are likely to see a need to employ innovative ways and take their ICT use a 'step up'.

This model takes into consideration the fact that ICT integration is a personal process. Educators as individuals perceive and experience ICT and the pedagogy differently. Some 'embrace new technologies while they are comfortable with the traditional teacher-centric style of teaching', while 'others may be more enthusiastic about exploring how simple technologies may be used in innovative ways to provide a meaningful learning experience' (Lin *et al*, 2012: 99). This is important for a theory laden field like nursing education as educators can explore other innovative ways of teaching. It is for that reason that educators need to feel comfortable with the technology and know that they are not being pushed in a certain direction but that they are free to explore various teaching methodologies at their own pace. When individuals are allowed the freedom to explore, they tend to be more willing to try various approaches out and usually find out what works best for

themselves quicker. It is also well documented that educators' beliefs about pedagogy and instructional approaches have a direct influence on whether they integrate ICTs or not in their teaching.

When this model was conceptualised, it was tested on a group of teachers who were most resistant to change. That resonates well with the state of the nursing education environment where some of the educators are still traditional and reluctant in changing the way things have always been done. It sets what seems to be attainable goals and educators are able to set their own targets and move up the levels based on their own personal ambitions.

It was important to select a model that evaluates the pedagogy and technology indicators together since these are the two main factors in this study which is why a two-dimensional model is most suitable. Also, it had to be a model that does not just focus on technology but looks at technology use from a pedagogical vantage point. Lin, Wang and Lin (2012) are the developers of this model that is known as the Pedagogy* technology model which is suitable for this study. It can be used to determine the ICT integration status of individual educators and can be used to assess individual educators' progress as they move through either the technology or the pedagogy dimensions (Lin *et al*, 2012).

The levels of integration

This study recognises that educators have their own understanding of how ICTs should be integrated into their teaching based on their own pedagogical experience and beliefs. It is believed that during instructional selection educators use their knowledge of students, ideas, values and beliefs about knowledge together with their pedagogical content knowledge to select approaches and strategies for learning that suit the content (Webb, 2002: 247). So this should be borne in mind whenever ICT pedagogical integration by teachers is analysed. Educators are different as individuals and are likely to be at various levels of development as far as ICT use in the classroom is concerned. It is also important to bear in mind that this ICT integration is just one aspect of teaching for these educators, since there are several factors to consider in a learning environment for learning to take place besides ICTs. As mentioned earlier, the use of ICTs alone does not necessarily lead to improved learning outcomes. How ICTs are used might have some impact on learning – whether positive or negative. The way in which these are integrated into teaching will determine whether learning is enhanced or not.

For this study, educators' actions and behaviours will be evaluated using the model as a lens to determine if the educators' use of ICTs provides support for effective learning. So educators will be

judged on how their use of ICTs is perceived to be creating opportunities that promote the construction of 'new' knowledge by the students themselves. This means what educators do, be it the learning activities that they assign to students or the lectures they deliver, will be judged on where it fits within the model. This would be established through interviews and the observations conducted. The model will be used to evaluate the nurse educators' ICT integration status and at the same time it could be used to document their progress in the integration process.

The Pedagogy* technology model

The model shown below will map out the characteristics for each stage and compare these to the data from the interviews and the observations to determine the level of integration for each participant. This means the level that each nurse educator who participated in the study is at, or has been placed at on the model, will determine the extent at which a particular nurse educator integrates ICTs in their pedagogy. This model is two dimensional as it addresses both the technological and pedagogical concerns (Lin *et al*, 2012). It assumes that if educators have reached a certain level where their pedagogy competency and their technology competency dimensions intersect, they should be integrating ICTs into their pedagogies. The model combines elements of the ICT-oriented micro models together with learning-oriented micro models (Lin *et al*, 2012). It is intended to measure progress of educators as they start using these ICTs until they are fully integrated into their teaching. The technological competency dimension starts from level zero where ICTs are not used at all to level seven where the educator has become an expert in ICT use and is capable of implementing their own instructional systems (Lin *et al*, 2012). From level 4 educators become creators (or producers) of their own multimedia resources. The technological scale ends with level 7 and when an educator has reached this level it means educators employ more advanced computer skills and therefore implement sophisticated instructional systems (Lin *et al*, 2012). The model is designed to inspire educators to transform their pedagogical practice by moving more towards the right where innovative practices reside. However, this is not about the sophistication of the technology or software packages used but should be about whether the information technology tool used allows students to use it to think, to solve problems, to work out solutions, to make the connections and to better understand the content.

This model allows for the educators to experiment freely with technology and to move through the various phases willingly and at their own pace. It is simple and can be used by the two nursing educators to track or determine their level of development in their integration journey. The model together with the descriptions of the various levels is shown below:

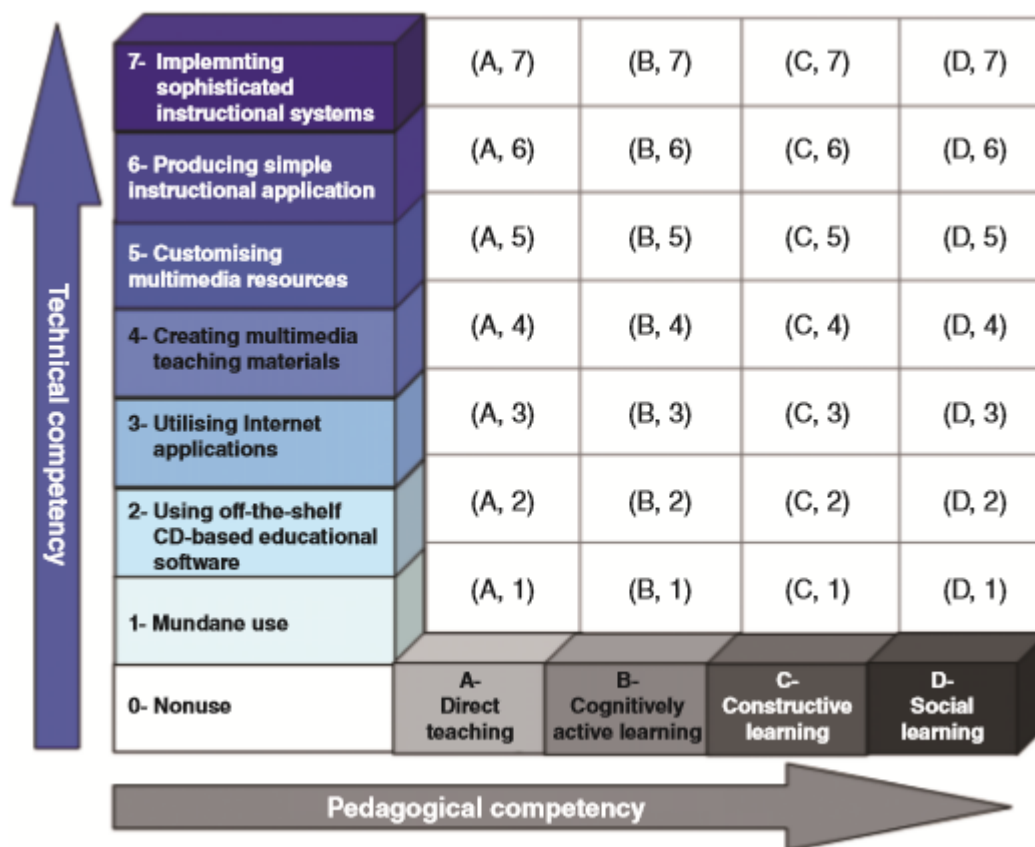


Figure 1: The pedagogy * technology model for information and communications technology integration in education (Lin *et al*, 2012: 100).

Pedagogy dimensions

Based on the discussion above, it is clear that for ICTs to be integrated effectively into pedagogy there needs to be a shift in thinking in the way educators teach. This shift is meant to be made from (or away from) the traditional teaching methodology to ensure that students benefit fully from the use of the ICTs. Since this study's focus is on educators' ICT integration into their pedagogy, it is important to zoom into some pedagogical aspects of the learning environment in order to set parameters for the measurement of this integration. The movement along this pedagogy dimension is influenced by increased use of innovative and diverse teaching resources (Lin *et al*, 2012) This means the more the educator uses more diverse resources and the more the educator uses these resources in innovative ways – the further right she'll move (Lin *et al*, 2012: 102). So the effectiveness of these pedagogical dimensions is evaluated based on the diversity and innovativeness of the learning activities or resources. The following pedagogy perspectives will be used to assess and determine the pedagogical competency level of each educator, meaning where they are at in their integration journeys. This dimension ranges from Level A (direct learning) to level

D (social learning). These levels are based on the following factors which are factors that were considered during the lesson observations:

- teacher pedagogical beliefs (Ertmer, 2005)
- instructional strategies used
- teacher-student interactions
- the types of tasks (learning activities) students are expected to carry out

(Level A) Direct teaching

This is the first level for most educators. It is the traditional way of teaching that is referred to as transmission because educators transmit knowledge to students who passively receive it when they use this methodology (Lin *et al*, 2012). It is the conventional form of teaching where a lecturer plans and delivers a lecture to students who are passively listening or receiving the delivery. All class activities are directed by the educator and the students are passive participants in their own learning.

Communication is mainly one-way in the sense that the educator relays information to students about the topic under discussion, explains concepts, instructs them on the activities that will take place and then assesses them on how much knowledge they have grasped from the interaction. This conventional way of teaching has always emphasised the acquisition of content (Oliver, 2002), lectures who take this approach try and cover as much content as possible in each lesson and their success is mainly judged by how much content the students can recall during exams at the end of the semester or how much “transmitted” content have the students acquired or retained. The problem with transmission model is that because students are “spoon-fed”, they are deprived of their ability to think independently and practice problem-solving skills. Therefore by transmitting content to the students the educator takes away the students’ cognitive ability or takes away the student’s ability to exercise their own thinking and problem-solving skills. So in a way student voices and thinking are suppressed because the educator is talking and thinking for them.

This methodology is however helpful for other purposes for an example in theory laden subjects like anatomy and physiology, where important information is critical for the success of the students and for the safety of the patients. In some cases where student nurses have to grasp as much content as possible to master a specific skill or procedure or in the case where they need to learn and understand the anatomy and physiology of the various systems which are critical for them to understand in order to take care of patients. Since this is a traditional teaching strategy, most educators are comfortable with it and tend to heavily rely on it which is understandable. Although

the traditional methodology is believed not to offer the best opportunities for students to learn, hence the use of ICT tools and other educational technology like models to enhance the learning it is still used widely. As mentioned above when integrating these ICTs into their teaching, educators should know that it means re-evaluating their pedagogies as they cannot continue teaching in the same traditional way.

These new models of learning mean new models of teaching, which means moving away from the traditional way of doing things towards the more transformative ways of teaching. Having said all this it should be recognised that some educators feel comfortable continuing with this traditional educator centred strategy which they have always relied on over the years while experimenting with a few basic ICT tools and they should be given the space to do so (Lin *et al*, 2012). However, they should be aware that to benefit optimally from the technology, they need to alter the way they teach. Ideally students need to be active and participate in the learning environment in order to learn instead of just listening to lectures and being passive.

(Level B) Cognitively active learning

Students are believed to learn better when they are active cognitively whilst learning. They are believed to learn more than just the content being taught, but they learn other skills as well. An educator at this level believes that learners should be active participants unlike in the traditional classroom where they are passive recipients of information (Lin *et al*, 2012: 102). Such an educator will therefore ensure that the learning environment becomes learner-centred. Which means the students' role in class gets shifted from being just recipients or consumers of knowledge which is delivered by the educator and become active participants in the creation of that knowledge – they need to think for themselves. This is the main difference between a traditional pedagogy and an active one. This means students are processing information as they are actively participating in class activities and that leads to their learning. As a learning facilitator the educator observes and provides adaptive feedback to students to help them achieve a richer, deeper understanding of content (Lin *et al*, 2012: 102). The educator goes to great lengths using everyday language to explain certain concepts to students. Because the educator's role has shifted and become the facilitator for students' information processing, the students are encouraged to think for themselves and gain a deeper understanding of the content. Learning activities commonly used for this kind of pedagogy are concept-maps, case studies, group projects, think-pair-share, peer teaching, advance organisers, audio clips and visual aids (Lin *et al*, 2012).

ICTs are therefore believed to offer numerous opportunities for this kind of a shift to play out. It is for that reason that ICT-supported education is said to lead to the acquisition of knowledge and skills

which empower students for lifelong learning (Tinio, 2003). If an exercise gets assigned to them as a group, then they gain even more skills and attitudes from their fellow group members. This is because apart from thinking on their own about the subject matter at hand, they also learn how their fellow group members think so ideas are shared. Although the educator in this case takes a step back and facilitates the learning so she also gains more than if she had just given a traditional lecture on the subject. This kind of learning resonates more with the learning theory of constructivism that is discussed below.

(Level C) Constructive learning

Constructivism is said to be an epistemology, which means it is a theory that attempts to make explicit the nature of human knowledge (Carreño, 2014: 110) or how students learn. The main idea being that students do not acquire knowledge but construct new knowledge from their prior knowledge and experience (Powell & Kalina, 2009). So what they get from educators during lessons, or when reading textbooks or when watching videos interacts (or gets incorporated) with what they already know (their prior knowledge) to make sense to them, this gets transformed and becomes new ideas or 'new' knowledge. This is contrary to the belief in the traditional way of teaching that knowledge is transmitted to students by their lecturers or teachers. Learning is therefore a continuous process where every piece of information that a student learns, is incorporated into their previous experiences and mental structures to become new knowledge (Carreño, 2014: 110). Constructivism therefore supports the idea that learning is active (Carreño, 2014: 110). There are two main streams of constructivism that are relevant for the classroom and to this study, one is what is referred to as Cognitive or individual constructivism and originated from Piaget's theory and the other one is known as social constructivism and originated from Vygotsky's thinking (Powell & Kalina, 2009: 241). This is also known as situated constructivism. These two share similarities that include what is mentioned above regarding students building on existing knowledge and the inquiry or what is referred to as the discovery teaching method (Powell & Kalina, 2009: 241). The differences lie in the fact that in cognitive constructivism students create their own knowledge within their own schemas through the processes of assimilation and accommodation (Powell & Kalina, 2009: 246) whereas in social constructivism learning extends to the social context, meaning a student makes meaning through social interactions (Carreño, 2014: 110). So they learn together with each other and from each other. This means social interactions and culturally organised activities are necessary in the classroom for students to develop well psychologically (Powell & Kalina, 2009: 246).

At this level educators establish learning environments that support and challenge student's thinking (Lin *et al*, 2012: 102). This pedagogy perspective encourages students to interpret concepts in their

own way and thereby creating their own 'new' knowledge. The constructivist learning environment encourages students to interpret concepts and new information the way they understand it in order to allow them to create their own knowledge. Educators will also be expected to involve students in activities that require them to interact with their peers like group projects where they build relationships and where they express themselves (Powell & Kalina, 2009). For this kind of pedagogy, students are responsible for devising and implementing their own problem-solving strategies, educators are there to guide them and make suggestions (Lin *et al*, 2012: 102). So this means in this learning environment, the educators' teaching role is reduced to that of a facilitator and the students have a much bigger role to play which is that of figuring out what they need to learn. Therefore they need to make use of all the available resources they can get to help them make sense of the tasks at hand.

Amongst those resources are ICTs, this shifts the role of ICTs from being teaching tools to becoming a cognitive tool or a learning partner because the student relies on them to make sense or to transform information to new knowledge. This is what is referred to as 'high-level' integration, where ICTs are critical for learning to take place. By getting to this level, it means the students have acquired rich organically-grown learning practices which will stand them in-good stead in the era of the knowledge society. They will know how to recognise what is of importance, how to link new knowledge to the real-world, how to link solutions to real-life problems, how to think critically and how to solve authentic problems. These skills are the ones needed to navigate 21st century learning and to become life-long learners (Pimmer *et al*, 2014).

ICT integration is said to benefit learning more if the integration takes place in a constructivist learning environment. This is because "constructivist learning environments are learner-centred, knowledge-centred, assessment-centred and community-centred" (Newhouse *et al*, 2002: 14), so teachers have to understand the constructivist teaching strategies in order for them to use these effectively in class. So for an example to support a constructivist learning environment, students should be given inquiry-based assignments and problem-based explorations (Lin *et al*, 2012). ICT should be used to connect with students' existing knowledge, skills and values while extending and challenging current ways of thinking and acting (Newhouse *et al*, 2002: 14). Such an environment would be learner-centred in a sense that it would be focusing on getting learners to learn the most out of. Or in the case of community-centredness for an example, ICT is used to encourage students to learn both independently and from and with others (Newhouse *et al*, 2002: 14). This means learning becomes a social interaction.

(Level D) Social learning

The social learning theory is known as the bridge theory because it connects elements of Skinner's behaviourist and cognitive learning theories since it involves memory and motivation (Tinio, 2003). It originated from Bandura who believed that learning occurs within a social context and that not enough attention is given to the social influences on learning (Bruce & Klopper, 2016:102). Students do not just learn by observing and imitating others but there are other complex patterns of behaviour that are involved like vicarious reinforcement where learning when one observes another person who is being reinforced for another behaviour (Bruce & Klopper, 2016: 103). For nursing education this theory is appropriate for teaching clinical skills where educators have to demonstrate to the students how a procedure is performed (Bruce & Klopper, 2016) and when educators model behaviour for students to learn from. Educators at this level emphasise the importance of learning through social relationships, so they encourage students to socialise, interact and learn with context, peers or communities (Lin *et al*, 2012: 102). Students are also encouraged to think and share their thinking with the group, they are encouraged to challenge and critique other people's thinking and therefore the emphasis on the face-to-face or online debates. Other activities take the form of online or class debates, team-based projects and online conversations (Lin *et al*, 2012).

Conclusion

These various teaching and learning approaches have been discussed in a way that reflects how the role played by the educator in the learning environment can enhance or hinder learning. The move towards pedagogies that are transformational is important as it allows for the alignment of the pedagogy to the ICTs and the enhancement of learning which includes the development of cognition. This is clearly illustrated below.

This means the less content is transmitted or given to students by the educator, the more thinking skills need to be exercised by students and the more students rely on themselves and other resources for learning rather than the educator. This then means the blue area gets bigger and the grey area which represents the educator's directing and control diminishes and is replaced by the developing student's thinking skills, problem solving skills, putting students in charge of their own learning. It should be noted though that the educator is a very important component of these active learning environments so they will always be interventions from the educator. This can be simplified by the diagram below:

Level A (Direct teaching)	Level B (Cognitively active learning)	Level C (Constructive learning)	Level D (Social learning)

Table 2. The diminishing educators' role when transformational pedagogies are adopted

Grey shading = educators' role in students' learning

Blue shading = students' responsibility for their own learning (and / or students cognitive development)

The table below illustrates the shift from traditional way of teaching to more innovative way of teaching as one moves further away from Level A, so the more the nurse educator adapts her pedagogy the more diverse and innovative her classroom activities become. The diagram below shows a summary of the pedagogical levels and corresponding learner activities. This will be used to evaluate the class activities from the interviews and during the observation to decide on the level of pedagogical competency on which to place the nurse educator.

Table 3. The evolving nurse educator's role

Pedagogy dimension	Learning activities	Nurse educator's role
Direct teaching (A)	Passive listening, note-taking, retention of information	Director
Cognitive active learning (B)	Concept maps, videos to clarify concepts, audio clips, peer teaching, case studies, think-pair-share	Facilitator
Constructive learning (C)	Case studies, simulations, inquiry-based projects, discovery based activities, problem based exercises	Facilitator
Social learning (D)	Think-pair-share, class debates, group projects	Peer

The technology dimension (Lin *et al*, 2012: 100-3)

The range starts from level 0 to level 7 and these levels are based on three factors:

- whether an educator is a passive consumer or an active producer of ICT-based resources
- the sophistication of the ICT tools that an educator uses (this will be ignored as it is irrelevant in this study).
- and richness of functionality of an ICT-based product developed by the educator

The level descriptors are as follows:

- **Level 0 (non-use):** educators on this level are not interested in using ICTs for instructional purposes and are not using them at all.
- **Level 1 (mundane use):** educator just starting using ICT for teaching and is a **beginner**. She uses the technology for mainly representational purposes and administration like presenting lectures in PowerPoint, emails, calculating marks and making class lists
- **Level 2 (passive consumer)** (using off-the-shelf educational resources): they start using the resources that are supplied with textbooks or other resources like DVD's supplied by the librarian. The nurse educators start using the available videos and DVDs that they find relevant to illustrate certain processes or to simply re-inforce what has been taught. Educators usually use a laptop, a projector and a screen to display the resources in class.
- **Level 3 (active consumer)** (utilising Internet applications): educators start searching for useful videos and animations on the internet. Educator investigates social media and other Web applications like the email and WhatsApp to facilitate group chats to encourage questions and provide feedback to students.
- **Level 4 (beginner producer)** (creating multimedia teaching materials): The shift from consumer to producer of teaching resources begins. For example the educator may start creating their own PowerPoint presentations with graphics, animations and audio. They may start recording their own videos.
- **Level 5 (active producer)** (customising multimedia resources): The educator is able to edit readily available or self-made images, audio and video clips to suit their instructional purposes, preferably with the help of their students. They learn to use an animation software programme and create animations or use screen capture to produce an online learning tutorial. All this they do in collaboration with their students.
- **Level 6 (master producer)** (producing simple instructional applications): an educator at this level is able to produce a simple instructional application by herself or himself and involving students. For example, the educator may create a class website that posts announcements and displays students' work or she may implement interactive exercises to help students master materials at their own pace
- **Level 7 (innovative producer)** (implementing sophisticated instructional systems): this is the ultimate level in the technology dimension that requires more advanced computer skills. The educator might create a website that includes a discussion forum to encourage student/educator and student/student interactions. The educator may create an online

course on a learning management platform such as Sakai or Moodle and be able to utilise its standard features as well as create plug-ins for specific new functionality.

Conclusion

This chapter has clarified the terminology used in ICT integration and has engaged with the debates around the definition of ICT integration. Some of the challenges associated with the complex nature of ICT integration have been highlighted. A detailed discussion on the data evaluation instrument has been covered together with the complexity of measuring integration. Since educators are the main implementers, the integration is measured by assessing the educator's ICT and pedagogical competencies. These are used to determine the likelihood of them integrating ICTs into their pedagogies to enhance learning. Learning is enhanced when educators integrate ICTs in their pedagogical practices to create learning activities that promote the construction of 'new' knowledge by the students. This comes about when an educator reaches an appropriate ICT level that intersects with transformational pedagogies.

Chapter 3: Research Methodology

Introduction

This chapter outlines the process followed in seeking answers to the research questions. The study's main purpose is to explore if and how ICTs are integrated into the nursing education pedagogy. Since the study is investigating ICT pedagogical integration, the ideal methodology would be to observe the practice of educators on site and that calls for the qualitative research method. The study follows a qualitative research design since it is an exploration of the phenomenon of ICT integration as it occurs in a nursing education context.

Research approach

The main purpose of this study was to explore how educators in a public nursing college integrated ICTs into their pedagogy. A qualitative research approach was adopted as it is the most appropriate to use when exploring a phenomenon of such a complex nature as ICT integration. Qualitative research refers to an "in-depth study using face-to-face or observation techniques to collect data from people in their natural setting" (McMillan & Schumacher, 2014: 5). The study followed an in-depth exploration and face-to-face interactions with educators in their classrooms. In so doing the opportunities of getting as close as possible to the reality of how educators integrate ICTs when they teach were increased. The context in which the integration takes place was important for the researcher to understand and interpret nurse educator behaviour as it unfolded to promote ICT integration in the context of teaching and learning. Such a qualitative research design facilitated entry into an actual site to observe and interview research participants. This made it possible to address a number of important questions, for an example what ICT integration means to the participants and how the use of ICT has made a difference to their teaching. The answers to these questions will provide insights for future studies.

This study has taken into consideration the existing body of knowledge in studies that were conducted locally and abroad on similar topics. For example, a study undertaken by Pimmer *et al.* (2014), *Informal mobile learning in nurse education and practice in remote areas*, provided some insights for this study. This helped me appreciate some of the challenges faced by nurse educators in acquiring resources for teaching and learning.

Qualitative research

Qualitative research designs vary, resulting in different definitions of what qualitative research really is (McMillan & Schumacher, 2014:5). According to Cresswell (2007: 37) qualitative research “starts with assumptions, a worldview that is seen through a theoretical lens and the collection of data in natural settings that are sensitive to the people and places being studied”. This research design has nine key characteristics that are present to some extent in qualitative studies (McMillan & Schumacher, 2014). Some of these characteristics which are featured in this study include assumptions that ICTs are widely used by nurse educators in South African colleges and that there was a data collection process that involved interviews and observations. This allowed me to capture the practices and direct perspectives of the participants and the reasons or criteria that motivated certain practices or choice of practices. For example in this study it was possible to ask each individual educator what their understanding of ICT integration was, and from their responses, one could then understand their reasons for using the technology the way they did. So for an example if an educator expresses their understanding of ICT integration to be “using technology in class”, one then understands why their perception is that they integrate ICTs every day. To them, each time they present their lectures in PowerPoint they have fully integrated the technology. So as mentioned above, qualitative research starts with assumptions of what could be the answers to the research questions.

Research assumptions

Qualitative research studies begin with assumptions of what might be the case as this is usually what would have triggered an interest on the topic in the first place. Some of these assumptions come from everyday generalisations, or from research articles, whereas others are a result of the researchers’ own beliefs, perceptions and biases. For an example, if it is reported in the literature that nurse educators who were never formally trained in using ICT in teaching will most likely use the technology for presentational purposes only, then one would assume that an educator who has not had formal training on ICTs will not be able to integrate ICTs successfully when teaching. But this is therefore an assumption and remains an assumption until it is proven by empirical evidence. Since most of the nurse educators did not receive formal training on ICT integration into the pedagogy, there was an assumption that they were finding it difficult to integrate or that they were simply using ICTs for representational purposes. By adopting this qualitative, exploratory approach such assumptions were either confirmed or dismissed and a clearer picture of what really happens emerged during the analysis.

Qualitative research uses a variety of approaches such as phenomenology, ethnography and others. This study used a case study design approach.

Case study design

When the purpose of a study is to explore or to learn as much as possible about a phenomenon, the case study design is usually preferable because it allows for room to gather as much information as possible. Amongst the most commonly used qualitative research designs, the case study approach is preferred since this is an in-depth exploration of a phenomenon over time (Leedy & Ormond, 2015). This was evident in this study because when collecting data I had to go back to the participant several times to ask further questions. This study made effective use of the interview, which is an instrument suitable for collecting data in a case study as it facilitates the gathering of as much information as possible. To exploit the learning opportunities provided by the case study design, this study explored the practices of two educators within the nurse education context.

According to Baxter and Jack (2008) the selection of a specific type of a case study design is guided by the overall study purpose. This case according to Yin is categorised as exploratory (Baxter & Jack, 2008) since its main purpose would be to explore or to learn more about a particular phenomenon, the phenomenon being ICT integration by nurse educators. Since the phenomenon of ICT integration is complex in the sense that it means different things to different people, it was best to follow the qualitative case study methodology which is known to provide tools for researchers to study complex phenomena within their contexts (Baxter & Jack, 2008). Also according to Yin (2003, in Baxter & Jack, 2008), one of the conditions when a case study design is considered, is when the focus of the study is to answer 'how' and 'why' questions. Since the aim of this study was to understand the 'how' of ICT integration it fitted well with this design.

Researchers sometimes focus on a single case because they want to know as much as possible about that single phenomenon or they might want to look at two or more cases to make comparisons, or to build theory or to propose generalisation. The latter approach is known as a multiple or collective case study (Leedy & Ormond, 2015). The original plan for this study was to explore multiple cases but due to teaching block constraints preventing the researcher from observing some of the educators who she had interviewed, the plan fell through. The design was revised and only two cases were explored in depth in one public nursing college. The phenomenon of ICT integration was studied in one college and a detailed description of the location follows.

Location of the study

A public nursing college was selected over a private college because public nursing colleges offer an accurate representation of the real nursing education issues faced in South Africa since they are government funded and tend to have higher student enrolments. The results obtained from such a location are considered more representative of how ICT integration actually takes place in nursing

colleges generally. This means data collected is as close to generalisable reality as possible. There are about six public nursing colleges in Gauteng and this research study could have taken place in any of them. The college that became the research site was the first one to grant approval for data collection to the researcher, so it was selected for convenience.

This particular nursing college will be referred to as College 1 for purposes of anonymity. College 1 is located in an urban area and, it is a well-established college as it has been operating as a nursing college for many years. It has better infrastructure compared to some of the colleges, for example, all educators have computers and the library or resource centre is well stocked and fully functional. There were five computers connected to the Internet all linked to a printer in the library. However, it was revealed that the internet connection can be erratic on some days. There was a plan to have wireless local area networking (WiFi) installed in 2017 so optic fibre cables were being laid during the data collection visits. This was in preparation for a tablet roll out for first year students. The plan was to have each student issued with a tablet with prescribed content loaded. This means first year students would have easy access to their study material and WiFi access would ensure students have unlimited access to the internet while on campus. There was an additional 25 computers in the computer laboratory but these were only used for English language skills training. On the year of data collection, College 1 had a staff complement of about 84 nurse educators. These nurse educators are the focus of this study with a few of them actually participating in the study.

Research participants and data sampling

The research participants were nurse educators in a public nursing college who use ICTs in their teaching. The study followed a snowball sampling approach since the purpose was to interview educators who were using ICTs in their teaching to ensure that the most reliable data is obtained. It would have been pointless collecting data from educators who do not use ICT in their teaching. The snowball sampling approach is the most common one for qualitative studies and its advantage is that the researcher gets referred to the relevant participants (McMillan & Schumacher, 2014). So the researcher requested an informant to supply her with the names of educators who were using ICTs in their teaching. Purposive sampling is also beneficial for a study of this nature because the researcher gets many insights on the topic being studied from the few cases that are being studied in-depth (McMillan & Schumacher, 2014) as data is collected directly from selected participants. In this case study, data collection from selected participants utilised a number of methods.

Data collection methods

The researcher spent as much time as possible with research participants in classroom settings that were studied. The researcher became part of the data collection instrument as she had to ask the questions and was an observer as well. The researcher observed full lessons in the subjects offered where the various ICTs were used and care was taken to allow the participants to respond as naturally and as honestly as possible during the interviews. She had a complete insider role as she became established in the setting where the data was collected. This made it easier for her to engage in genuine and natural participation (McMillan & Schumacher, 2014). The following data collection instruments were used.

Interviews

Interviews were used to collect data as they tend to have a higher response rate than questionnaires and they yield in-depth responses (Nieswiadomy & Bailey, 2018: 214). Also, since the concept of ICT integration might mean different things to different educators, it was best to use exploratory in-depth interviews to collect data. These in-depth interviews are long, extensive, probing interviews where open-response questions are used to obtain data (McMillan & Schumacher, 2014: 381). This ensured that the researcher can extract as much information as possible from the participants. This kind of an interview also allowed the researcher the flexibility to change the wording in some of the questions, where necessary to ensure that the questions were clearly understood. The researcher used an instrument that served as a guide during the interviews so the interviews were semi structured. A copy of the questionnaire used during the interviews is available in the appendices at the back of this report. Two of the additional strategies to improve credibility of the study were the interviews were audio recorded and the researcher kept a notebook for the fieldwork notes. . All the interviews were conducted in the educator's own offices for privacy and because it is their own comfortable space. Lessons were observed in auditoriums. The data was transcribed and is available as transcripts of conversations and comments which are essentially word based qualitative data (Cohen *et. al.*, 2000:270). The seven stages of the interview investigation were followed as a plan for this research study.

Consent

The first part of the interview session was used to get the participant to read through and sign the consent form. They were then asked if they were comfortable with audio-recording the session and informed of their right to terminate the session should they feel uncomfortable with any of the questions asked. Then the interview began with a few questions on a few personal details for example their names, their designation etc. to get to know the educator. Apart from interviews, the

study required the use of another important qualitative data collection method namely, observations.

Observations

The researcher arranged to observe the participants in class after they had been interviewed. Scheduled observations allowed the researcher to gather data from the 'live' situation. This helped in understanding the context and practice of ICT integration in an actual physical classroom setting (Cohen *et. al.*, 2000). In addition, it helped to verify most of the responses given during the interviews and also to test if educator beliefs were real. For example, if an educator said their teaching style was student centred, then as an observer you would expect to experience evidence of student centred-ness playing out during the lesson. Observation is therefore exciting because it makes vivid a key feature of qualitative research: behaviour is observed as it occurs naturally. The problem the researcher experienced with being an observer was that one could not ask questions in cases where clarification was required on certain actions taken.

An observation schedule was compiled and has been included with the appendices at the back. This schedule is made up of statements that yielded the data that answers the research question (Cohen *et al.*, 2000). These are based on the theory of behaviourism where the observer observes which responses are triggered by which stimuli. The researcher kept field notes of all the observational data. Also see the appendices for the observation guide. Only two observation sessions were attended because by the time approval was granted, some of the educators were already finished with their teaching commitments and therefore it was not possible to observe their lectures. . Therefore, only two lessons were observed due to delays experienced in gaining access to research site.

Ethics

Ethical clearance for the study was obtained from the university's ethics board and from the Gauteng provincial department of Health. Further permission was obtained from the nursing college principal. Then permission had to be obtained from the heads of department of the respective disciplines where participants to be interviewed belonged. All the participants were informed of the purpose of the study and the researcher made an effort to ensure that the participants understood what this study was all about without giving away information that might have influenced the responses. They were requested to complete and sign a consent form. They were also assured that their identities were never to be disclosed and any information disclosed to the researcher was to be kept private and confidential at all times. They were given an option regarding the audio recording, where a participant felt uncomfortable the session was not recorded.

Trustworthiness of the research design

There are several ways in which researchers can assess rigor in qualitative studies. One of these is done using a framework for trustworthiness that was developed by Lincoln and Guba in 1985 (Nieswiadomy & Bailey, 2018). Trustworthiness is said to be an alternative construct to validity and reliability in qualitative research (Botma *et al.*, 2010: 232). It is expressed as four epistemological standards (Botma *et al.*, 2010: 232), credibility or truth value, transferability (applicability), dependability (consistency) and confirmability (neutrality) (Nieswiadomy & Bailey, 2018: 71). A fifth standard, authenticity (faithful) was included at a later stage. (Botma *et al.*, 2010: 232). This study's credibility has been maintained by collecting sufficient rich data from both lecture observations and the in-depth interviews that were conducted. The findings are also transferable as they can be used to provide insights in other contexts. The researcher has ensured that the participants' authentic views are maintained in the way in which the results are reported.

Limitations of the study

Although this research methodology was well considered and well planned it still had shortcomings. After critically evaluating this study, the small sample size was identified as a shortcoming by the researcher. Although a number of interviews were conducted, the researcher could not observe most of the lessons and this resulted in having to use data from only two participants. However, although the sample size might appear small this is normal for a qualitative study. The sample sizes are usually small in qualitative research, and given the depth of these studies, sample sizes of more than six might generate more data than the researcher can reasonably analyse (Nieswiadomy & Bailey, 2018: 69). So although this sample size appears small it is quite reasonable as far as qualitative research standards are concerned.

Conclusion

This research design and processes discussed in this chapter highlight the research experiences, challenges as well as limitations encountered in this study. Some suggestions have been made in how such limitations could be ameliorated. The next chapter presents data and insights that emerged from the research procedures and data gathering processes described.

Chapter 4: Data presentation, analysis and discussion

Introduction

This chapter presents the analysis of data, the findings and the discussion for the data which was collected from the participants. The data will be analysed using the deductive approach which involves using a predetermined framework, which in this case is the pedagogy* technology model. The intention is to use the Pedagogy* technology model to evaluate the data collected so as to determine the level of integration each educator is at. Each dimension of the model, either the technological or pedagogical element will be evaluated separately before deciding on the final score for each educator. The table below represents a summary profile of the two educators who participated in the study.

Educator profile

The two participants are both educators in nursing college. For anonymity purposes, they'll be known as Educator 1A and Educator 1B. Educator 1A is in her 50s, while Educator 1B is in her 30s.

Table 4: Background information of the sample of nurse educators

Participant	Educator 1A	Educator 1B
Age	50s	30s
Teaching experience	24 years	4 months
Disciplines/ Fields taught	General Nursing Science (Nursing Management)	Biological & Natural Sciences (Anatomy & Physiology)
Year level taught	3 rd Years	2 nd years+
Data collection tool/s	Interview + observation	Interview + observation
Computer access	Yes	Yes
ICT tools used	PowerPoint, DVD & You Tube videos	Tubidy videos, YouTube, PowerPoint & Chat groups
Gender	Female	Female

Technical dimension

The scoring of each educator is determined by the highest levels he or she reaches. The technical competency and descriptions of the educator skills are derived from the theory this study is using as its lens to try and determine the level of ICT usage in nurse educator classrooms. The nurse educators' descriptions based on their responses to interviews and what was observed will accordingly be matched with the theory descriptions.

Table 5: Educator 1A – Technological competency

Technical competency	Educator ICT skills	Interview	Observation
7: Implementing sophisticated instructional systems	- Educator has more advanced computer skills - May create a class website with a discussion forum to encourage educator/ student and student/ student interactions - May create a Web 2.0 mash-up system API - May open an online course on an LMS platform like Moodle and be able to utilise its standard features as well as create plug-ins for specific new functionalities		
6: Producing simple instructional applications	- Educator is able to produce a simple instructional application on their own or by involving students in a co-creation process - May create a class website and post announcements or showcase students' works - May implement an interactive drill-and-practice App to help students master content at their own pace		
5: Customising multimedia resources	- Educator is able to edit readily available or self-made images, audio and video clips to suit their instructional requirements preferably with the help of their students - Create animations using animation software - Able to use screen capture software to produce an online tutorial		
4: Creating multimedia teaching materials	- Educator turns from consumer to producer of ICT based instructional resources - Capable of digitising teaching material like word processing, presentation and spreadsheets - Creates PowerPoint presentations with graphics, animations and sound - Involves students or peers in the co-construction of knowledge to generate content	Creates PowerPoint presentations	Creates PowerPoint presentations
3: Utilising Internet applications	- Searches the internet for useful resources - Uses Web applications to provide feedback to students - Find and organise resources including available wikis for teaching and learning		
2: Using off the shelf educational software	- Using educational software supplied by the school - Uses resources supplied with textbooks - Educator selects a relevant CD to what they are teaching and use it in class	Q6. Makes use of videos & DVD's sourced online through the librarian Q6. Finds relevant DVD's and uses them in class	Used a relevant video sourced from <i>YouTube</i> to link theory to a real- life problem
1: Mundane use	- Uses ICTs only for menial tasks e.g. communicating with students; posting announcements, calculating marks - Uses ICTs for administration purposes	Q7. PowerPoint used all the time for presentational purposes.	

0: Non-use	No using ICTs and not interested		
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Lin *et al*, 2012: 100

Educator 1A

Based on the data presented above, Educator 1A is on level 4 of the technical competency dimension. She has been placed on this level because she has made the shift from consumer to beginner producer. She has been placed on level 4 because she creates her own *PowerPoint* presentations. She also confirmed this during the interviews when asked which ICT resources she uses in class she said:

I basically use PowerPoint and also make use of DVDs, I also use videos that I download from YouTube but we struggle to do this because it has to be done via the librarian. I use PowerPoint presentations every time I go to class. The DVDs and the videos that I show depend on which study unit I am using it for. Because not all study units I am teaching require DVDs I use them to enhance the learning. It depends on the content.

She does not use any Web applications to give feedback to the students nor does she find and organise resources including the wikis for teaching and learning (Level 3). This relates to the extent with which the technology is used, in this case the technology is used every time the educator goes to the classroom. The DVD's and videos are played to enhance the content, this relates to the third research question which seeks to understand how these ICTs are used.

Table 6: Educator 1B – technical competency

Level of progression	Educator ICT skills	Interview	Observation
7: Implementing sophisticated instructional systems	• Educator has more advanced computer skills • May create a class website with a discussion forum to encourage educator/ student and student/ student interactions • May create a Web 2.0 mash-up system API • May open an online course on an LMS platform like Moodle and be able to utilise it standard features as well as create plug-ins for specific new functionalities		
6: Producing simple instructional applications	• Educator is able to produce a simple instructional application on their own or by involving students in a co-creation process • May create a class website and post announcements or showcase students' works • May implement an interactive drill-and-practice App to help students master content at their own pace		
5: Customising multimedia resources	• Educator is able to edit readily available or self-made images, audio and video clips		

	to suit their instructional requirements preferably with the help of their students • Create animations using animation software • Able to use screen capture software to produce an online tutorial		
4: Creating multimedia teaching materials	• Educator turns from consumer to producer of ICT based instructional resources • Capable of digitising teaching material like word processing, presentation and spreadsheets • Creates PowerPoint presentations with graphics, animations and sound • Involves students or peers in the co-construction of knowledge to generate content	• Q8. Educator involves students in the selection content • Creates PowerPoint presentations with animations	• Creates PowerPoint presentations with animations • The animations were shown in class to explain some of the physiological processes
3: Utilising Internet applications	• Searches the internet for useful resources • Uses Web applications to provide feedback to students • Find and organise resources including available wikis for teaching and learning	Q7 & Q8. Searches the internet for relevant videos and other resources Uses <i>Tubidy</i> , a web based application Q11. Uses WhatsApp group to communicate and provide feedback	• Educator linked to various Websites during class to illustrate anatomical structures & physiological processes
2: Using off the shelf educational software	• Using educational software supplied by the school • Uses resources supplied with textbooks • Educator selects a relevant CD to what they are teaching and use it in class	Q6, Q7 & Q8. Educators uses relevant videos and DVD's in class	• Some of these videos were shown in class
1: Mundane use	• Uses ICTs only for menial tasks e.g communicating with students; posting announcements, calculating marks • Uses ICTs for administration purposes	Q6. Uses PowerPoint to present lectures all the time Q9. Uses ICTs for progress reports (APC's) but prints them out for reporting purposes	Used PowerPoint during her lesson presentation Uses ICTs for assessment tools
0: Non-use	• No using ICTs and not interested		

Lin *et al*, 2012: 100

Educator 1B

Based on the model, Educator 1B is on Level 4 of the technical competency dimension. Based on the interview data and the classroom observations she is on Level 4 (she is already approaching Level 5 by customising resources). This is because she creates her own PowerPoint presentations with multimedia teaching materials like videos and animations, she also collaborates with students in the selection of those videos. She is currently using sourced videos and animations. When asked what her understanding of ICT pedagogical integration is she said:

to simplify learning, students google stuff, YouTube stuff. It makes it easier so that if they do not understand stuff I can go to the media and search and find more information on the topic I am teaching. As an educator the first thing that comes to mind when thinking about ICT

integration into the pedagogy is PowerPoint presentations, we also do videos for them and we also allow the students to google their own videos. They are also given opportunities to do their own research.

The above response indicates that ICT integration into the pedagogy is understood differently. Therefore it is important to understand where each educator is coming from with ICTs in order to understand why they teach the way they do with ICT. For an example for Educator 1B thinks integrating ICTs means the simplification of learning, her focus is mainly in making sure content is clearly explained so that it is well understood by her students. When talking about the *WhatsApp* group she uses to communicate with her students, this is what she had to say:

It helps me to assess the students' lack of understanding and which areas they are struggling with. Learning is made effective, the technology simplifies learning

From the above quote it is obvious that this educator's main objective for using the App is to ensure that she reaches out to her students and wants to ensure that they follow what is going on in class.

Educator 1B has already voiced her frustrations with using ready-made videos during the interviews. She said she finds some of the videos "too broad" and others do not show the exact physiological processes she wants students to see and learn from. This might be an indication that she is ready to move to the next level.

Although she is still fairly new to teaching, she seems to be the most open to new ideas. She seems to collaborate a lot with her students in classroom activities and she gives her students space to interact and to bring their own resources to class. This is what she said about the resources selected by her students:

Sometimes you find that students have their own videos that they want to show. So you find that their videos are not focusing at what they are studying at the time so I have to explain its relevance to the students.

Although this is a frustration for her, it is also the reality and richness that comes with an active learning environment. Since students are active participants, they will bring their own resources which they think are relevant. As an educator in this kind of environment, you are no longer a director but a facilitator so the lesson will not be as structured and organised as when it is educator centred. She therefore has to explain the relevance of some of the videos because students might be understanding them in a different way.

She is welcoming of all ideas that will make it easier for her students to understand her subject. This educator encourages students to think for themselves, this was obvious with the group assignment, she assigned the work to the students but did not specify how they should approach it. This is probably because she wants her students to be free to present it the way they see fit, or how it makes sense to them. In this case the model will be used as a guide towards this educator's path to higher levels of ICT integration.

Conclusion

These two educators even though their approaches to integrating ICTs in their pedagogy might be slightly different, they seem to have embraced the technology and are making it work for their teaching needs. In their progression to higher levels of integration they need to consider their pedagogical practices as their pedagogical practices need to support the use of technology for the students to benefit maximally from the ICT use.

Pedagogy dimension

Table 7: This table shows the activities from both the interviews and the observation that support Educator 1A's pedagogical competency level.

Level of progression	Educator's pedagogical perspective	Learning activities	Interview	Observation
Level B (Cognitively active learning)	Learners should be active participants rather than passive recipients	• Emphasis is on understanding and application • Students are encouraged to actively organise information items on their own • Cognitively active learning exercises are provided for students to engage in	Q6. She does emphasise understanding and application, she said 'technology makes information more realistic' Q11.(f) Level B Cognitively active learning	• (Used a DVD effectively in class & learners participated fully in the discussion that followed afterwards) but she was directing the activities throughout.
Level A (Direct teaching)	Educator adopts traditional teaching methodology	• Educator relies primarily on lectures, note taking, prescribed content and regurgitation of facts on tests • Teaching style is strongly educator-directed • Educator delivers knowledge, provides modelling and demonstrations and gives direction for students to follow • Strong emphasis on providing explicit organisation of information and maximal guidance • Teaching process is mainly one-way communication with students	Q6. Educator relies on lectures which she presents using PowerPoint Q6. Emphasis on content acquisition (technology helps students remember content better) Q8. Uses different textbook to ensure students get all the content they need Q7. Educator sources additional content from the librarian Q10. She uses MCQ's so she can cover 'a lot of content'	• She relies heavily on PowerPoint presentation, textbooks and supplementary content from the Librarian (Q6, Q7 & Q8). • Classroom is educator-centred • She directs all activities in class • Communication is one-way except when she asks questions • She was in control of all activities during the whole lesson

Educator 1A's main concern is content, she wants to ensure that she covers as much content as possible which is typical of a traditional teaching methodology. The following statements from the interviews clearly show where her focus lies:

*I use them to enhance the learning, it depends on the **content**. I use different textbooks because they do not all have the **content** they need in one textbook, not all students have access to e-books, that is why I use textbooks*

In the statement above, Educator 1A is referring to the other resources she uses. She states clearly why she has to use different textbooks. She wants her students to have as much access to as much content as possible. This is typical of an educator in Level A. According to Lin *et al* (2012: 102), "a teacher at this level adopts traditional teaching methodology, which relies primarily on lectures, note taking, chapter reviews and regurgitation of facts on tests".

*I realised that technology helps students to remember **content** better, especially when they answer test or exam questions they use some of the examples they saw. It makes the **information** more realistic than just reading from a book or on a slide.*

In a way this explains why Educator 1A uses ICTs, she sees value in them because they help students retain content. This is typical of a transmission orientated educator, she would like to see students retaining as much of the "acquired" content as possible which gets regurgitated in tests and exams.

*I use multiple choice questions in the study unit for Nursing research because I can cover a lot of **content** in a few questions and for each test exam paper it is a 10 mark question and I can also assess low cognitive and higher cognitive skills with those questions. It saves the students a lot of writing time and it saves me a lot of marking time. It is quick to mark and to see that the student understand the **content**.*

According to the model there is "a strong emphasis on providing explicit organisation of information and maximal guidance of the learning process at this level" (Lin *et al*, 2012: 102). This is the impression that Educator 1A gave about her pedagogical approach, both during the interview and during observation. Using data collected from both from the interview and the observation, **Educator 1A** is placed under direct teaching (Level A) level in the pedagogical competency dimension because she follows a very traditional teaching methodology. This was established during the interview and her focus was clear, throughout her teaching career her objective has been to deliver content to her students. Her teaching strategy is linear and content driven. Her use of traditional

teaching methodologies was confirmed during the observation lesson too. She makes plans on how best to deliver information to her students and she provides maximum guidance.

During the observed lesson, she took full control of her class from the beginning of the double lecture session to the end, it was very clear that she was in charge. This is typical of educators who make use of transmission pedagogical approaches, the educator is the 'sage-on-the-stage' (Tarling & Ng'ambi: 2016). Her class was clearly educator centred, she was the central focus throughout, she stood in front of the class, spoke to the students who were listening attentively to her and took notes, some took photos of the slides as she presented them. Communication was mostly one-way, she did most of the talking and directed students on what needs to be done, students only responded to questions when they were asked. This is a pity because her use of that DVD could have easily placed her on Level B because she used a cognitively active learning exercise for that section of the class time. Which was brilliant as the activity helped the students achieve a richer, deeper understanding of the content and they were actively engaged for that time but she was still very much in control. It is for this reason that this educator will remain on Level A. So the use of ICT here was supportive of her traditional approach to teaching.

Her response for question 11(f) this educator said she frequently gives students short class activities but she qualified this by saying she does it to prevent them from falling asleep. So her reason is not to engage them cognitively but to keep them awake. Until this educator realises that students 'need to be active participants in learning' and until the educator stops 'to be a one-way provider of information' she cannot be moved to Level B. This is according to the pedagogy dimension. In fact it could be that the students fall asleep in class because they are not engaged cognitively, they are passive recipients and therefore it is easy for them to disengage. Although this educator used "a simple technology in an innovative way to provide a meaningful learning experience" (Lin *et al*, 2012: 99) in the form of that DVD she showed, her pedagogical approach is still very traditional.

Students benefit more when they are in control of their own learning. So in this case the small adjustments she is likely to make while using ICTs in her pedagogy without altering her traditional teaching strategies do not give students the maximum benefit. She needs to move away from the traditional teaching and adopt a methodology that supports the use of ICTs like constructivism. Until educators realise that using ICT to simply support 'lecture-based instruction falls far short of recommended best practice' (Lawless & Pellergrino, 2007 in Ertmer & Ottenbreit-Leftwich, 2010: 256) there will be very little progress made in teaching with ICTs. This educator might not be aware that her efforts of "doing things a little differently" do not contribute much in developing the necessary skills because her focus is on disseminating content instead of directing her efforts

towards developing higher cognitive abilities and giving students opportunities to discover their own knowledge.

Changing from transmission to transformative pedagogical practices is a complicated process and requires fundamental altering of the educator's pedagogy (Naidoo, 2010) and not just small adjustments as this educator seems to think. She is perhaps unaware of the extent of the required changes that need to be made. During the interview she said that:

I really try every year to do something a little bit different because I can see for this group maybe this did not work as well as I thought it would.

This shows that she probably feels there is some 'disconnect' in her delivery which necessitates some changes to be made to her pedagogy to integrate the ICTs which is why she tries different approaches every now and again. This educator could have been moved one level up to Level B, which is cognitively active learning level because of the DVD she showed to her students during her lesson and for the class discussion that followed afterwards. But even during that lesson, she was directing all the processes and she still maintained maximal control throughout that activity.

This unfortunately limits the students' cognitive abilities as their voices get suppressed when the educator's voice dominates the lesson. She did not relinquish control in order to allow students to exercise their thinking skills. The class discussion that followed, after the students had watched the DVD was interesting. In this discussion students were required to critique the hospital evacuation plan followed and point out errors that the staff in the unit which caught fire committed. This exercise of analysing the procedure followed could also be perceived as an assessment exercise for the educator, Educator 1A, to see how much of the theory she had taught earlier have the students grasped and whether they can apply that knowledge to a real-life situation. This makes the exercise a cognitively active learning activity as students have to engage actively with the situation on a much deeper level and think critically about the events that took place. Even though they were critiquing the staff, they were also learning from the case study.

Having said all this, Educator 1A has very good pedagogical reasoning skills in a sense that she knows what works or doesn't work for her students to grasp certain concepts and which approaches to take for presenting certain topics. She had this to say about her students:

During the lesson evaluations, the feedback I got from students is that they need more DVD's shown during class.

She is very confident as an educator, as she has been doing this for almost a quarter of a century which is understandable. This should put her in a much better position in her journey towards more progressive methodologies. In order to take full advantage of the affordances offered by the ICT she needs to make a fundamental shift. She needs to move towards the right of the model and allow students to direct their own learning. This is because students are said to trust knowledge that they have discovered on their own far better than knowledge that has been presented to them (Naidoo, 2010).

Table 8: This table shows the activities from both interviews and the observation that support Educator 1B's pedagogical competency level

Level of progression	Educator's pedagogical perspective	Learning activities	Interview	Observation
Level D (Social learning)	Learning occurs when students are engaged in social activities	- The focus is extended to collaborative and social dimensions of learning - Educator is a facilitator of students' learning through social relationships and interaction with the outside environment - Students are encouraged to interact with context, peers or communities to socially construct knowledge	Q11. Students are encouraged to interact with peers and ask questions on the WhatsApp group. Q.11(a) Encourage students to collaborate on course work through internet discussion Q.11© Design classes to be highly interactive using social media & technology Q.11(e) Expect students to teach back what they have learnt Q.11(g) Introduce new or experimental teaching strategies in class	Group assignment – peers to socially construct knowledge
Level C (Constructive learning)	Learners construct their own knowledge	- Educator establishes a constructivist learning environment (CLE) to support and challenge students' thinking - Educator facilitates student's sense-making of new knowledge and creates connections between new knowledge and the real-life world - Learning activities mainly real problem-centred and student driven - Educator frequently assigns problem-based exploration and inquiry-based projects - Students are primarily responsible for their own learning, the educator merely facilitates the process	Q8 & Q9. Educator encourages students to source their own educational resources (videos) and to learn by themselves Q11(d). Students are encouraged to have discussions and ask questions in the chat group (Constructive learning) Q.11 (g). Introduce new or experimental teaching strategies in class (Diversity)	Q.11(e) Expect students to teach back what they have learnt

Level B (Cognitively active learning)	Learners should be active participants rather than passive recipients	• Emphasis is on understanding and application • Students are encouraged to actively organise information items on their own • Cognitively active learning exercises are provided for students to engage in	Q6 & Q9. Emphasises understanding and application with the use of videos & anatomical models Q11. Encourages students to participate in class, they create scenarios & act them out	
Level A (Direct teaching)	Educator adopts traditional teaching methodology	• Educator relies primarily on lectures, note taking, prescribed content and regurgitation of facts on tests • Teaching style is strongly educator-directed • Educator delivers knowledge, provides modelling and demonstrations and gives direction for students to follow • Strong emphasis on providing explicit organisation of information and maximal guidance • Teaching process is mainly one-way communication with students	Q6. She uses traditional teaching methodology, she uses PowerPoint presentations	To some extent the class is educator centred

Lin *et al*, 2012: 100

Educator 1B is the simplifier of knowledge, her mission is to simplify concepts so that learning is easier for students and make it easier for students to understand. Although she also seems to use predominantly traditional methodology in her teaching, she also tries out various approaches in her quest to make learning simpler for her students. Her general approach to teaching seems open and experimental. She seems aware of having to play a different role in class, that of being a facilitator rather than a director. Her belief seems to be that of giving students skills that will enable them to take responsibility of their own learning. According to this educator ICT integration into the pedagogy means

to simplify learning, students google stuff, YouTube stuff, it makes it easier so that if they do not understand stuff she can go to the media and search and find more information on the topic I am teaching.

So she encourages students to go and search for information so they are not dependent on her but are responsible for their own learning. She sees students as thinkers. This will assist students in acquiring skills that will help create linkages between new knowledge items and the real-life world (Lin *et al*, 2012: 102). She also seems to have embraced the unpredictability and the challenges that come with these methodologies, for instance, when students search for their own videos which they show in class. She mentioned that their videos are usually broad, meaning they are not focussed on the specific topic being covered. This is the nature of learning, it is not linear. This problem is one of the reasons why educators then decide to customise or create their own material. That therefore moves an educator to a higher level in the technical pedagogy dimension of the model.

This educator's teaching style although it is predominantly direct in some cases shows some innovation in her interactions with her students and in the various approaches she tries out in simplifying knowledge for them. This shows the mediator role that this educator also fulfils, she goes to great lengths using everyday language to explain certain concepts in her quest to simplify knowledge. The educator needs to create an environment that is conducive for students to make meaning and the meaning-making process is ultimately the students' responsibility.

She employs some innovative teaching strategies that correlate with the pedagogical dimensions of the model. From her responses to the interview questions, for example she indicated that she frequently allows students to guide discussions and activities for the majority of class time and she encourages students to collaborate in *WhatsApp* discussions. She also seems to collaborate often with the students in deciding on the videos they use in class to illustrate various processes. For the pedagogy score, this educator has been placed on **Level D (Social learning)** because based on the model she encourages students to interact with context, peers and communities to socially

construct knowledge together (Lin *et al*, 2012: 102). She also can be placed at **Level C** because she uses active learning strategies as well as constructivist strategies like giving students and opportunity to create scenarios of various physiological processes. By doing this, she is encouraging students to interpret concepts on their own way thereby encouraging them to think creatively. This results in deep meaningful active learning.

Educators who mainly exhibit a constructivist-oriented approach are likely to be open to using tools and activities that allow students to create their own learning and understanding (Burke *et al.*, 2017: 4). Apart from creating constructivist learning environments that support quality learning she also encourages social learning by giving students activities that require group work. Confidence in her pedagogical reasoning will improve as she gains more pedagogical content knowledge over time. Educators who have constructivist approaches to teaching are said to be likely to integrate ICTs in their pedagogy.

In order to do that, they need to transform the learning environment from being teacher/ educator centred to become learner centred which is a core feature of constructivist learning environments. According to constructivist learning principles such an environment is said to be beneficial and conducive for student's learning, because it allows for an easier construction of knowledge and therefore assists students in meaning making by creating opportunities that lead to them making sense of whatever they are meant to learn. The question will be whether an educator who has taught in this traditional way for several decades will be willing to change her teaching style to accommodate this new way?

Another interesting teaching strategy that this educator uses is the social media (*WhatsApp*) group which she seems to be utilising well with her class. Since the college did not have Learning Management System (LMS) at the time of data collection, the class *WhatsApp* group seemed to be serving that purpose well especially the communication element of it. Students post questions, the peers respond and sometimes the educator also responds especially when she sees that they need assistance. She said the group also helps her in identifying the students who are left behind in class and that students who are usually too shy to ask questions in class feel more comfortable asking questions via the *WhatsApp* group.

Although *WhatsApp* is used mainly to communicate and interact with them outside the classroom, the educator sees value in using the *WhatsApp* group as students get to ask questions on the group. The educator then gets a sense of what the students struggle with, this means learning is extended outside the classroom in an informal setting. She mentioned that even the quiet students who never ask questions in class participate in *WhatsApp* group discussions because they feel comfortable

enough to express themselves in this medium without being judged, unlike in a face-to-face classroom setting. This is confirmed in a study by McKnight *et al* (2016: 203), they observed that students who were shy and those that had special needs were more engaging and found it easier to communicate with the teachers and peers through the online chat rooms and discussions. This means this kind of technology allows for inclusivity. During these message exchanges knowledge creation becomes shared and is collaborative. This is encouraged in social learning and also shows the benefits of integrating ICTs into the learning space. This helps the educator reach out to those students who might be at risk of being left behind because they are perhaps scared of being judged. This provides yet another great opportunity for students to learn in a non-conventional way which according to the framework is learner centred.

The fact that students are more comfortable asking questions via the chat group might be a clear illustration of how transmission pedagogies fail to provide opportunities for all students to have their voices heard (Rambe & Bere, 2013). This is confirmed in a study by Rambe and Bere (2013), where *WhatsApp* was adopted “to heighten lecturer-student and peer-based participation and to enhance pedagogical delivery and inclusive learning in formal and informal spaces” (Rambe & Bere, 2013: 544). This illustrates one of the many innovative ways in which ICTs could be used to enhance learning.

ICT integration status for Educator 1A & Educator 1B

Having identified the levels of the pedagogy and the technological dimensions that these two educators fall under, this table below shows the ICT integration status for both Educator 1A and 1B.

Table 9. Nurse educator integration status

7: Implementing sophisticated instructional systems	(A, 7)	(B, 7)	(C, 7)	(D, 7)
6: Producing simple instructional applications	(A, 6)	(B, 6)	(C, 6)	(D, 6)
5: Customising multimedia resources	(A, 5)	(B, 5)	(C, 5)	(D, 5)
4: Creating multimedia teaching materials	(A, 4) Educator 1A	(B, 4)	(C, 4)	(D, 4) Educator 1B
3: Utilising Internet applications	(A, 3)	(B, 3)	(C, 3)	(D, 3)
2: Using off the shelf educational software	(A, 2)	(B, 2)	(C, 2)	(D, 2)
1: Mundane use	(A, 1)	(B, 1)	(C, 1)	(D, 1)
0: Non-use	A Direct teaching	B: Cognitively active learning	C: Constructive learning	D: Social learning

Assessment practices

The two educators were asked about assessment. This is important to know in order to understand whether ICTs are integrated into their assessment. The assessment tools will strengthen the researcher's understanding of the educator's pedagogical approach and therefore help support where each educator is placed under the pedagogy competency dimension.

Educator 1A

I use multiple choice questions in the study unit for Nursing research because I can cover a lot of content in a few questions and for each test exam paper it is a 10mark question and I can also assess low cognitive and higher cognitive skills with those questions. It saves the students a lot of writing time and it saves me a lot of marking time. It is quick to mark and see that the student understands the content.

Regarding the written exam papers **Educator 1A** continues,

At this college everything is written, written tests and written exams. It is a convenient and cost effective way of assessment. We don't have enough computers for every student to sit with a computer. We do not have the technology to, if it is a multiple choice test to feed it into the computer, we are not that advanced yet.

This educator wants to cover as much content as possible. She explained that she uses multiple choice questions for assessment, because she can cover a lot of content in a few questions. Which is justified and a very real issue with nurse educators in general as they have a set curriculum that they must cover for each of the courses they teach. But this is the problem with traditional pedagogies, they are restrictive. She also mentioned that this saves the students a lot of writing time while at the same time it saves her marking time. So it is a convenience issue and it is cost effective as well. This is one of the problems with assessment in traditional or direct teaching environments, emphasis is placed on how much content the students have grasped or acquired as opposed to emphasising the ability of students in sense-making or in thinking logically and critically such that they gain a deeper and more meaningful understanding of the content. This is crucial in nursing because the profession does not need students to just master content that relates to the various physiological processes and systems like the digestive system or the renal system. What the nursing profession really needs are professionals who understand these systems so well that when they are presented with real cases in the clinical setting, they are able to piece together the connections between the different systems because of their deep understanding of how the various systems of the body work. These connections will be a result of clinical reasoning and these will result in competent nursing professionals who are of a great benefit to their patients.

In order to take full advantage of the benefits offered by the ICTs, it is important that nurse educators use their pedagogy to enhance and harness those very important thinking skills. Once students master such skills, they'll be able to access the content information they need wherever or whenever it is required. But to do that they have to have the correct cognitive abilities in place which are acquired over time due to students being exposed to learning environments and situations that offer them opportunities to think and solve problems. Those opportunities easily come by when nurse educators cease to think for their students, hand over the learning responsibility to the students and employ pedagogic strategies that promote the acquisition of such skills.

Educator 1B

When asked about assessment, this educator said:

I use paper-based multiple choice questions and paper based written exams.

She also uses innovative ways of assessment, she stated during the interviews that she frequently engages students in discussions and activities and also makes them teach back what they have learnt. This is in line with constructivist assessment as the emphasis shifts from content to whether students have a deeper understanding of the big concepts. During the *WhatsApp* discussion groups students are given the additional platform to ask questions. The discussions that follow when questions are asked on the group chat are valuable because Educator 1B said she uses these to assess whether students understood what was covered in class. She said she also uses this to assess who is following her in terms of whether they understand the topic under discussion and who has been left behind.

Towards the end of the observation lesson, students were given an assignment where each group had to study closely a specific process or subsection of the urinary system which they will have to present to the class as a group. This peer teaching group assignment is typical of a constructivist based learning activity since it is an inquiry-based and student driven assignment. Students are expected to use this assignment "to make meaningful interpretations of new knowledge items to create linkages between new knowledge items and the real-life world" (Lin *et al*, 2012: 102).

There is a lot that each group will have to consider while preparing. Firstly they'll have to select the content they want to present and then decide how they want to present it. Secondly they will have to negotiate amongst themselves which process or subsection of the renal system to choose. Thirdly, they'll have to read up on the process they have chosen to ensure that they understand it well before they even decide on the mode of presentation. To do this they'll need to exercise their

inquiry skills and problem-solving strategies. This in a way will encourage them to have a much deeper understanding of the content in order to interpret the concept in their own way, but if there are five of them in a group then whose interpretation does the group go with? They'll have to negotiate with each other throughout.

Through this assessment method this educator has given her students the space to be creative, she'll get to experience the benefits of this on the day of the presentations. She'll also get surprises on how different the interpretations might be. Also by not prescribing the format to the class of how this assignment should be tackled, she is obviously exercising their creative thinking skills. Students will have to think very creatively on how best to present this assignment. The fact that there was very little content given on this assignment, the more thinking and discovery skills will be required by the students. So the less content is given by the educator, the more thinking skills are exercised by the students. Lastly because this is a group assignment, there is plenty of learning that will take place as part of the collaboration from the interactions amongst the peers during the preparation for this assignment leading up to the day of the presentation. So the group will have shared knowledge. Also during this collaboration process, the students will be full participants in their own learning. This educator's role will be that of a facilitator who will provide suggestions for improvement and help the students whenever they need assistance. There will be a lot of thinking and problem solving that these groups embarking on this assignment will have to do and the skills they learn from here will be useful in their next assignment or project. This is a good example of how students should be assessed when using transformation pedagogies.

Although the two educators use similar assessment methods by using written exams and multiple choice questions, educator 1B's approach shows a more transformative way to assessing cognition in her class. This has been useful as it responds to the fourth research question of the extent to which the use of ICTs enhance the kind of learning that is required for the nursing profession which includes the development of cognitive skills. This exercise has illustrated how this could be done in classrooms with the most basic ICT.

Observations

The lessons were observed after the interviews to relate the educators' responses to what they do in class when they teach.

The observation schedule (Appendix 2) can be found in the appendices and it is labelled as such. This schedule is based on the factors listed in the model which are teacher pedagogical beliefs, instructional strategies used, teacher-student interactions and lastly the types of tasks students are expected to carry out or what is referred to as learning activities (Lin *et al*, 2012: 102).

Educator 1A's observed lesson

The lesson was presented in an auditorium with a data projector, a laptop and a white pull out screen which was placed in front of the blackboard. During the first session of the lecture, the educator greeted the students, switched on the data projector. She introduced the topic, which was *Risk Management in the Healthcare Unit*; this was displayed as the first slide of the presentation.

Types of ICTs in use – data projector, laptop, screen, PowerPoint presentation and video

The educator moved onto explaining the lesson objectives, then carried on with the lecture describing what risk is. She defined risk management and why it is important for the students to know about it. The important points were bulleted for each slide and as the educator was teaching she would expand on each of the bullets. Interesting facts were also highlighted as she went along, she paused occasionally to expand on points and to give them examples of what she was talking about. She kept asking them if they understood what she was talking about and would sometimes ask them questions to establish if they followed. She was comfortable, confident and kept control of the class like any experienced educator would. For some of the points students were referred to the prescribed book. The educator carried on with the *PowerPoint* presentation, while the students listened to the lecturer's explanation. Some were taking notes, others taking photos, others were just staring at her while others were falling asleep. After a while, she gave the students a five minutes body break.

After the break, when the students got back, she recapped what was discussed earlier before the short break, then she moved on to Disaster Risk Management, types and causes of disasters, disaster risk planning.

Educator activities – lecturing and directing

While discussing the internal disaster plan for the healthcare service division, the students were requested to watch a 22 minute *YouTube* video entitled '*Hospitals Don't Burn Down*'. It is a 'real-life' depiction of a fire that breaks out in the hospital linen room. The fire was caused by a male patient who went and hid in the linen room, lit a cigarette so he could smoke, when he heard one of the nurses coming, he threw the burning cigarette into the industrial washing machine & this caused the

fire. The fire spread very quickly. The nursing staff had to think on their feet while trying to recall their training on evacuation procedures. They worked hard to evacuate the patients but the fire spread too quickly and there were some judgement errors committed along the way as a result some patients and staff perished in the fire. The authenticity of the video elicited a huge reaction from the students and caused a lot of them to panic, the students screamed as they watched, shouted out instructions on what the nurses in the clip should do, gasped and really lived the experience as if they were involved in the whole situation at that hospital. The video focused on the role played by the nursing staff in evacuating the patients, what they did or did not do and how their decisions impacted on the safety of others.

Learning activities – listening and watching the video

Once the video finished playing, the educator switched the lights back on, debriefed the students and then began asking them questions based on what they saw. The questions were mainly on how the nursing staff performed during the evacuation, what was done well, what was not done well? The questions were followed by a class discussion on what they learnt from the video. The lecturer then wrapped up the lesson and the class dispersed. The video had such a real impact on the students that after the lecture they were standing outside the auditorium, still discussing some of the issues that came up during the fire.

Monitoring of learning and assessment activities – questions related to the video

Conclusion: Observation lesson by Educator 1A

Educator 1A's lecture showed an example of how traditional pedagogies rob students of opportunities to be active. The bulk of the lecture time was spent with students listening passively and bored. However, the latter part of the lecture displayed a good example of how simple technology can be used effectively to provide a meaningful experience. Even though the educator was directing the proceedings from start to finish, which means the students' cognitive opportunities were stifled. According to Lin (2012: 99) none of these two contrasting experiences should be considered improper since there is no ideal style of teaching and learning. Also, the impact of the video showed very clearly how effective ICTs can be when it is relevant.

The second lecture/ lesson observed was that of Educator 1B.

Educator 1B's observed lesson:

The lecture took place in a big auditorium with a laptop connected to a data projector projected on a white screen. She presented a *PowerPoint* slide show; the first slides had the learning outcomes

clearly displayed on the screen. The lesson was on the urinary system and began with an introduction to the urinary system, the functions of the urinary system, the importance of kidneys and the vital role they play in ensuring fluids in the body are well regulated. The slides were loaded with information and the lecturer kept reading through them as she progressed with the lecture. The lecture hall was full.

Types of ICTs in use – data projector, laptop, screen, PowerPoint presentation, animations and video

The bulk of the lecture covered the four functions of the urinary system in detail. She had to show a number of illustrations for example, the anatomy of the kidney, the microscopic structure of kidneys with nephrons, the glomerulus and the glomerular capsule. These were displayed and physiological processes were demonstrated as the lecture progressed. For some of the key illustrations and details, students were referred to the prescribed textbook, so they would flip through their books until they found the illustrations they were being referred to. They became noisy when doing this and in some places it felt as though the educator felt unsure of what to do. Some of the various physiological processes that take place in the kidney were discussed, like the formation of urine. For some of these processes the lecturer would go into *YouTube* and play a video clip to illustrate what actually takes place during that particular process. These were useful and made it easier for the audience to understand what she was talking about. In some cases she used everyday examples to illustrate her point for an example when she demonstrated how regulation takes place and how the afferent and efferent arterioles function. For this they were shown a video illustrating these processes using a hosepipe which simplified the process. This was a clear and meaningful illustration and cleverly made a complex process readily understandable

Educator activities – lecturing, demonstrating and clarifying difficult processes

Towards the end of the session the students were given a group assignment, where each group had to study closely a specific process or subsection of the urinary system which they then would present to the class. Students were also given an opportunity to ask questions.

Learner activities – listening actively in some parts, flipping through the textbook and group assignment as homework

Conclusion: Observation lesson by Educator 1B

This educator had a lot of content to deliver and most of it very important for students to grasp and understand, she tried to keep the students active by breaking the monotony of a lecture with getting students to search for diagrams, watch videos and animations. What was striking with this lecture was that the students were interacting with each other and in some cases with the lecturer so there

was a considerable level of collaboration in class. The lecturer although she might have seemed unsure in the beginning and the proceedings got quite chaotic in some parts presented better active learning environments. The educator also became quite comfortable in her role during the lecture and interacted well with her students. The best part of this lecture was the group assignment at the end where the students are given an opportunity to explore a system and to present it to the class as a group. This exercise will teach them a lot of skills which they'll need in order to learn and later on in their professional lives. This assignment came as a surprise to the researcher as during the interviews the educator did not mention this. Her response when asked about her assessment practices was "I use paper-based multiple choice questions and written exams". It is possible she meant she uses these for formal assessments. Although in her response to question 11(e), she mentioned that she frequently expects her students to teach back what they have learnt. She could have meant that students frequently get opportunities to present in class and therefore share their understanding of concepts with the group.

Conclusion

Data from the two participants interviewed was analysed using the pedagogical * technology model to determine the ICT status of the educators. Although the two educators differed slightly in their definition ICT integration into the pedagogy, they seem to be using ICTs in a similar way when teaching. Also of interest is that they both use mainly PowerPoint to present lectures but their pedagogical approaches differ as a result one is on Level A while the other one is on Level D. It is also interesting to see that despite the differences in their pedagogical approaches the two educators ended up on the same technological Level 4, when their use of technology was analysed. Also the data from the interviews correlated with the observations lessons. There were a few surprises during the observation lessons, the reaction from the students during Educator 1A's lesson and the assignment given by Educator 1B. An interesting fact was to see how similar the two learning environments were and at the same time how different they were once analysed.

Chapter 5: Summary and Conclusion

Introduction

This chapter presents a synthesis of the research study while also making sense of the knowledge gained from the exercise. The problem and research questions asked at the beginning of the study have been addressed. The four research questions are on the nurse educators' perceptions on ICT pedagogical integration, whether nurse educators integrate ICTs into their pedagogy and how that is done and whether learning is enhanced when ICTs are integrated?

What are nurse educators' perceptions on ICT pedagogical integration?

The perceptions of the educators with regards to ICT integration were that the pedagogical integration of ICTs means using technology to teach, or using technology to simplify learning. These responses confirm what has been mentioned in literature that when educators think of ICTs they usually think of the technology first. Both educators see value in using ICTs and they alluded to the fact that students were enthusiastic and responsive when technology was used in class. In fact Educator 1B's students source videos for lessons and in Educator 1A's lesson the researcher experienced first-hand the excitement and engagement that was displayed by the students when technology was used. Some of the students were passive and bored for more than half of the lesson time and only 'woke up' when the video was played.

How are nurse educators integrating ICTs into their pedagogy?

This question came about out of concern that most nurse educators came across these technologies long after their nurse educator training. The main reason this question was asked was to establish first if ICTs are used and of course see how they are used. This question was also conceptualised on an assumption that technology infrastructure in public colleges was less than desirable. It was therefore interesting to see that despite the lack of resources the educators were making progress on their own integration journeys. The interview questions delved deeper to establish how these technologies are used, whether they were just being used as instructional delivery tools or whether they are aimed at transforming learning? Meaning they are used to just deliver the curriculum or they enable more creative student centred and peer based ways of knowing (Livingstone, 2012: 21). From the interviews and observations we got a glimpse of how these technologies are used. The two educators who participated in the study integrate ICTs in their pedagogies in a meaningful way. However, their pedagogies are predominantly direct teaching. This means they use these ICTs to support their transmission practices, one less so than the other. This is in line with most studies reviewed which suggest that educators use ICTs to support their educator-centred transmission

pedagogical practices (Tarling & Ng'ambi, 2016; McKnight *et al*, 2016). But it was encouraging to see that despite the dominance in employing direct teaching methodologies educators do explore other transformative pedagogical practices. Educator 1B seems to be trying different ways and this showed in her lesson. When she was observed, the lesson was not as orderly as in Educator 1A and that is because she was not in control throughout the lesson. That is the nature of active learning environments, they can be chaotic because students take ownership of their learning. These transformational pedagogies promote the use of cognitive skills which need to be enhanced. Also interesting to note was that amongst the two educators, there were many similarities in how they engaged with the technology even though only one of them has had formal training on using ICTs for Education.

Both educators prepare their own *PowerPoint* slideshows to present during their lectures and this puts both of them on Level 4 of the framework which means they have shifted from being active consumers to beginning producers since they now create their own multimedia teaching materials. The *PowerPoint* presentations contained mainly text with links to *YouTube* and some animations. This they do to deepen the students understanding of difficult or abstract concepts. Both educators mentioned using the internet to search for videos, which students are finding helpful. Students apparently find the videos useful and request that more of them are shown by the educators. Educator 1B involves students in sourcing the videos that are relevant for instructional purposes. This means the students collaborate in their own learning and take responsibility of their own learning.

The use of videos and the value they bring came up several times during the interviews, nurse educators are always looking out for ways of closing the theory practice gap. The reasons for these videos, DVD's, *YouTube* and other resources like *Tubidy*, is to apply theoretical concepts into real-life situations. This is very important for nursing students, the practice exercises they get from these tools help in preparing them for clinical practice. They help students in gaining a richer, deeper understanding of the content (Lin *et al*, 2012: 102). Better resourced institutions use simulations as well which are usually housed in skills laboratories. These tools do not merely replace a lesson but extend teaching to way beyond the classroom. This indicates that students really see value in viewing the videos. This was confirmed in a study by Nel (2017) where about 86% of the students surveyed ranked the use of videos as very effective.

Also of interest with these two educators was how similar they were using these ICTs. It was as if the way they have been taught to use them in a certain way? They both use *PowerPoint* presentations when conducting lectures and then use videos and DVD's to demonstrate processes and procedures.

Could this mean the culture of the institution has dictated how these should be used? Or it could be that traditionally educators are more comfortable with presenting lectures the way they do?

To what extent are nurse educators integrating ICTs in their teaching?

Both educators have been rated at about Level 4 out of Level 7 in the technical competency dimension. Meaning they are left with 3 levels before they get to the top score. Their overall ICT status is therefore also good they are A4 & D4 respectively. This is commendable given the lack of ICT resources in their college and the fact that Educator 1A never received any formal training in ICT integration. In fact it is encouraging to see that these educators have at least taken the step forward by exploring these ICTs on their own. They search websites like *YouTube* and *Tubidy* to source videos because they can see how these benefit their students. This study will hopefully encourage both educators to progress further along to higher more innovative levels of integration.

To be able to pedagogically integrate ICTs, educators need to be well trained and well equipped (Jita, 2016). This is the ideal situation but the reality on the ground is that there are not enough resources. The government can barely afford to purchase hardware for students in the colleges, it will be a while before funding is available for educators to be trained specifically on ICT integration. In the meantime educators need to teach themselves and perhaps rely on trial and error until they can figure out what works best for their students. Technically oriented educators are more inclined to learn fast, improve their ICT skills and then assist their colleagues (Lin *et al*, 2016). Educators are also able to learn from their students if they are willing to be taught. Some of the educators mentioned during the interviews that they are shown by the students what to do.

From this study, it has been interesting to see the emphasis on the shifting of the roles from the transmission pedagogies to transformative pedagogies in order to benefit students' learning. The educators' role also shifts from director to facilitator, the technology also shifts from being a tool to learn with to being a learning partner to learn through and lastly the students have to move from being passive receivers to being active and thinking participants and take responsibility for their learning. This is obviously a big adjustment that educators have to make. Then lastly it is interesting to see how cognition develops when the educators controlling role diminishes due to the shift to transformative pedagogies.

ICT pedagogical integration and learning enhancement

This study has shown how when transforming pedagogies are integrated with ICTs bring about meaningful learning and further result in 'thinking' nurse professionals. This is however not a straightforward process as it is mentioned here. It is complicated and it needs thinking nurse educators to create those cognitively active learning environments that support and challenge

student thinking. For learning to result in permanent high level cognitive development, active learning should become a primary mode of instruction in nurse education classrooms rather than just a supplement to the lecture (Naidoo, 2010). For this to happen, a shift in the educators' pedagogical approaches is required first. Educators need to relinquish their 'sage-on-the-stage' roles for 'guide-on-the-side' roles to allow students to own their learning and cognition. This is the fundamental difference between teaching in the 20th century and teaching for the 21st century.

Recommendations

As discussed above, nurse educators play a critical role in the integration of ICTs in teaching and the process of integration is a complex one even for those nurse educators who have been trained in using ICT for teaching. So it would be highly recommended that the nurse educators re-examine and re-evaluate their pedagogies using this model to see whether they have shifted from transmission to transformation. This should be their starting point if they are serious about using ICTs to enhance learning and therefore develop critical thinking and problem solving skills.

The second recommendation would be that these nurse educators who are already teaching with these ICTs are given maximum support. It can be in the form of training, mentorship or professional development for educators to grasp the issues behind the changing pedagogies and development of higher order thinking skills for the students. This will create an enabling learning environment for educators to exploit such technologies to enhance their teaching such that they create active learning environments that are conducive to successful learning for their students.

Then for the study, it is recommended that this study is extended to include more participants from other nursing colleges to see if they are integrating ICTs and developing cognitive skills in a similar way or whether they experience different challenges.

Conclusion

The study has definitely enlightened the researcher on how ICTs are integrated into the nursing education pedagogy and what it means to teach for cognition. Although the data analysed is from a single college it would be very beneficial to expand the study as this one has just scratched the surface on ICT integration in nursing and midwifery education.

From the data, we know that although ICTs are used in nursing education, the educators might not be exploiting them fully. This is because they seem to be using ICT to support their traditional way of teaching which might not be beneficial for the students. It would be interesting to know why these educators use ICT the way they do which was beyond the scope of this study. What is encouraging though is establishing that some of the educators are integrating the ICTs to their teaching and are

approaching a stage where they will be transforming the learning environments in accordance with the pedagogy * technology model for ICT integration in education.

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Appendix A

**Wits School of Education**

27 St Andrews Road, Parktown, Johannesburg, 2193 Private Bag 3, Wits 2050, South Africa. Tel: +27 11 717-3064 Fax: +27 11 717-3100 E-mail: enquiries@educ.wits.ac.za Website: www.wits.ac.za

01 July 2015

Student Number: 9408121F

Protocol Number: 2015ECE009M

Dear Nozuko Makhuvha

Application for ethics clearance: Master of Education

Thank you very much for your ethics application. The Ethics Committee in Education of the Faculty of Humanities, acting on behalf of the Senate, has considered your application for ethics clearance for your proposal entitled:

ICT integration in nursing education pedagogy: a focus on selected public institutions in the Gauteng province.

The committee recently met and I am pleased to inform you that **clearance was granted**.

Please use the above protocol number in all correspondence to the relevant research parties (schools, parents, learners etc.) and include it in your research report or project on the title page.

The Protocol Number above should be submitted to the Graduate Studies in Education Committee upon submission of your final research report.

All the best with your research project.

Yours sincerely,

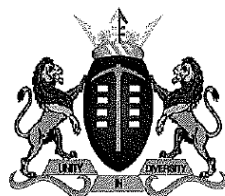
A handwritten signature in black ink, appearing to read 'M Makhuvha'.

Wits School of Education

011 717-3416

cc Supervisor - Ms. M Taruvunga and Ms N Ndlovu

Appendix B

**GAUTENG PROVINCE**HEALTH
REPUBLIC OF SOUTH AFRICA**OUTCOME OF PROVINCIAL PROTOCOL REVIEW COMMITTEE (PPRC)**

Researcher's Name (Principal investigator)	Mrs Nozuko Makhuvha
Organization / Institution	University of Witwatersrand
Research Title	Information and Communication Technology (ICT) integration in nursing education pedagogy: A focus on selected public institutions in the Gauteng province.
Contact number	Contact no: 0114663991 Cell: 0824460444 Email: Nozukom@live.co.za
Protocol number	GP2015RP55 54
Date submitted	30/07/2015
Date reviewed	27 August 2015
Outcome	APPROVED

It is a pleasure to inform that the Gauteng Health Department has approved your research on "Protocol Title: Information and Communication Technology (ICT) integration in nursing education pedagogy: A focus on selected public institutions in the Gauteng province.

The Provincial Protocol Review Committee kindly requests that you to submit a report after completion of your study and present your findings to the Gauteng Health Department.

Recommended

Dr B Ikafeng (on behalf of PPRC)

Date 03/09/2015

Approves / not approves

Dr LRR Ebeeth
Acting DDG: Hospital ServicesDate 21 09 2015