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INFORMATION AND COMMUNICATIONS TECHNOLOGY SUPPORT ROLE STUDENTS USING LEARNING TECHNOLOGIES DURING WORK – INTEGRATED LEARNING

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MINOR DISSERTATION

submitted in partial fulfilment of
the requirements for the degree:
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FEBRUARY 14, 2019

DECLARATION

I, **Mpho Ivan Mongake**, declare that the work presented in this minor dissertation is original (except where citations and acknowledgement indicated otherwise).

Signature:

Date: 06/02/2019



DEDICATION

I extend my heartfelt appreciation to my mother Elizabeth Mongake and Rebecca Mongake my sister for their encouragement and support through my academic studies. For their belief in me, they motivated and inspired me to complete my studies.



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ABSTRACT

Information and communication technology (ICT) is increasingly widespread, influencing many aspects of social, educational and work lives. It would seem that implementation of technology in an education program would depend strongly upon support and attitudes of teachers, schools, and principals. ICTs in teaching and learning must, however, be used in a way to promote learner-centered and self-regulated learning. The purpose of this study is to understand how pre-service information and communication technology (ICT) support role students use learning technologies during work-integrated learning (WIL). The Technological Pedagogical Content Knowledge Framework (TPACK) as proposed by Mishra & Koehler (2009) is used to determine the ICT use in this study. This framework builds on three kinds of knowledge, namely, technological, pedagogical and content knowledge (Koehler & Mishra, 2009). A qualitative approach was used to investigate the use of ICTs by pre-service ICT support role teachers who were purposefully invited to participate in the interview sessions. These participants were expected to do their teaching practical / WIL for three weeks during first semester and seven weeks during their second semester at schools that are located in Gauteng. During WIL they are expected to have a subject mentor to guide them. ICTs are expected to be used in curriculum integration, lesson planning and the design of ICTs for assessment in the classroom. Teachers are also supposed to guide the participants by providing feedback and emotional support.

Data from the interviews were analysed using Atlas.ti to identify themes. Themes in this study are supported by direct quotations from the interviews. This study identified two broad categories, namely *success* and *failure* to use ICTs. Each of these categories is supported by a number of themes that explain why participants either succeed or fail to implement ICTs in their teaching activities.

Keywords: *ICTs, Pre-service support role teachers, TPACK, Work-integrated learning.*

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CHAPTER 1. INTRODUCTION

1.1 INTRODUCTION AND BACKGROUND TO THE STUDY

Teacher education programs often fall short in preparing pre-service teachers to integrate technology into their practice (Belland, 2009; Osa & Walker, 2012; Polly, Mims, Shepard & Inan, 2010). According to Lim & Chai (2008) preparing future teachers is a complex task due to the fast changing nature of learning technologies. These changing technologies provided the researcher with an opportunity to investigate how pre-service Information and Communications Technology (ICT) support role teachers integrate technological affordances with pedagogical approaches in their subject matter during work-integrated learning. In the school context, integration of technology is influenced by a host of contextual factors including the use of ICT, school readiness, mentor teacher's attitudes (Lim, et.al, 2008), to list only a few. During practicum or work-integrated learning (WIL), pre-service teachers also face various levels of access to a range of technologies, varying degrees of encouragement, and many technical challenges. Much of what they experience during WIL can also be related to what they learn from their mentors.

Mentor teachers in schools should use technology and their role is to guide the pre-service teacher to integrate ICT into the curricula effectively (Judge & O'Bannon, 2007). Previous research on this topic has focused on the mentor-novice relationship between cooperating teachers and students. One study investigated the influence of cooperating teachers' technology performance and mentoring practice on preparing pre-service teachers for technology integration (Grove, Strudler & Odell, 2004), and another explored professional development options that enhance cooperating mentor teacher's skills and abilities for effective uses of technology in teaching (Brush, Duhaime, Gartner, Stewart, Katz, Hitt, & Venkataraman, 2003; Sun, Strobel & Newby 2017). It is not known, however, how pre-service teachers actually use learning technologies during WIL.

Pre-service ICT support role teachers who are participating in this research study have been exposed to the use of ICTs during the four-year teacher education program. When exposed to the reality of teaching during WIL they are confronted with the lack

of equipment, lack of access to technical support, and limited internet connectivity (Condie & Livingstone, 2007). It is known that pre-service service teachers experience challenges in integrating ICT during practical's since they lack technical skills and knowledge of the curriculum (Angeli & Valanides, 2009). The problem grows when the mentor teachers themselves are unable to teach using ICTs. This affects the development of pre-service teachers during work-integrated learning. It is the case that most of the younger generation are more advanced in using technological tools than the older generation (Dundappa, Mhetre & Surywantshi, 2013). Many of the current cohort of pre-service teachers in the research district have been exposed to technologies in the digital age as compared to their mentor teachers who have only recently been introduced to the world of technologies in teaching and learning. Current pre-service teachers can, therefore, in most cases be regarded as digital natives and are quite capable of incorporating ICTs in their teaching. Many educational researchers have asserted that digital natives have different ways of expressing their learning preferences due to their immersion (Prensky, 2001; Tapscott & Barry, 2009). Pre-service ICT support role teachers are potentially digital natives as they have been born into a society where technology prevails. These digital natives seem to think differently, learn differently, and understand technology better (Prensky, 2001; Tapscott, 2010). Pre-service ICT support role teachers, who are the focus of this research project, have an advantage based on their intentions to use ICTs during teaching and learning.

According to Cavenall (2008) pre-service teachers are net generation individuals who possess a history of experience with digital media. They have essential ICT and pedagogical competencies to enable them integrate technology in their teaching and learning (Lim et.al, 2008). The current generation of students are expected to integrate technologies into teaching and learning programs (Thompson, 2007). This gives pre-service ICT support role teachers an edge (and opportunity) to integrate learning technologies well; they have a good background of theory and practice of ICTs from teacher education programs. During initial teacher education programs, these students should have learnt about authentic tasks and 21st Century skills that are suitable for the classroom context. In other words, they are expected to be proficient in their use of ICT as they go about the task of teaching. However, despite extensive efforts to prepare teachers for technology integration, some pre-service teachers

remain unprepared for technology integration (Brinkerhoff, Ku, Glazewski & Brush, 2002; Brown & Warschauer, 2006). Regardless of the fact that the use of technology in schools is important for creating opportunities for students to learn to operate in an information age (Alharbi, 2012), hindrances to learning using technology abound.

1.2 LEADING TO THE RESEARCH PROBLEM

Technology will continue to have a large impact on the future of education. The use of ICT should, therefore, play a prominent role in teacher education (Watson, 2006). Research states that teacher education programs often fall short in preparing pre-service teachers to integrate technology into their practice (Belland, 2009; Oliver et.al, 2012; Polly et al., 2010). Technology integration in education is a complex process for pre-service teachers involving many factors such as technological competencies, lack of time, technical support, curriculum integration, and design of e-assessment (Belland, 2009). Research also reveals that pre-service teachers do not feel prepared to use technology effectively in their classrooms (Sang, Valcke, Van Braak & Tondeur, 2007). It has already been noted that pre-service teachers experience challenges in integrating ICTs during school practical (otherwise known as work-integrated learning or WIL), and in particular they lack the ability and knowledge to link the curriculum with learning content, and some technical skills are still a challenge (Angeli & Valanides, 2009). School ethos might not be supportive of the use of ICT and the school policy might also be underdeveloped. School culture and context have also repeatedly been reported as obstacles to the integration of ICT in education (Chai, Hong & Teo, 2009; Pelgrum, 2001; Tearie, 2003).

It also seems that most pre-service teachers do not integrate ICTs into their classroom activities effectively due to a lack of pedagogical skills and a definite difficulty in integrating ICTs in their subject specialisation (Bullock, 2004; OECD, 2008; Tezci, 2009; Valcke, Rots, Verbeke & Van Braak, 2007). Despite learning a variety of skills, engaging with numerous technological tools and services in their training, pre-service teachers seem to be largely unable to integrate ICT skills into their subject specialisation (Ottenbreit-Leftwich, Glazewski, Newby & Ertmer, 2010). Of course, pre-service teachers encounter various levels of access to technologies, different levels of encouragement, and varied technical support in their placement schools (during WIL) and this will surely affect individual development and engagement. A

numbers of factors that may lead these students to feel unprepared to use technology in their classrooms include insufficient access to technology (Dawson, 2008; Bartlett, 2002), lack of time (Wepner, Ziomek & Tao, 2003; Eifler, Greene & Carroll, 2005), lack of technological skills (Teo, 2009), negative attitudes and beliefs (Angeli & Valanides, 2009), fear of problems (Doering, Hughes & Huffman, 2003; Bullock, 2004), and a clear lack of understanding how to integrate technology into teaching and learning (Cuban, 2001). Similarly, research findings indicate that teachers have a strong desire to use ICTs for their teaching and learning but they are confronted by various barriers such as confidence, competence and accessibility have been found to be the critical components of technology integration (Alharbi, 2012). Some researchers highlighted that technology skills alone do not prepare pre-service teachers for technology integration. For this reason, three components need to be considered in preparing student teachers for technology integration in skill based courses and technology rich field of placements (Schrum, 1999).

Research has reported that pre-service teachers often fail to integrate technology in WIL due to situational complexity (as mentioned briefly above), but more emphasis should be placed on pedagogical difficulties (Dawson & Dana, 2007). Some pre-service teachers have even stated that technology integration required additional planning and preparation that they had no prior knowledge about, or experience with, regarding the design of ICT-supported learning activities (Polly, Mims, Shepherd & Inan, 2010). The gap that exists between what pre-service teachers are taught in their ICT courses and what they expected to do with ICT in a real classroom (Pope, Hare, & Howard, 2002) is also evident in the artefacts (including lesson planning documents and learning activities) that are produced by these students.

During WIL, mentor teachers are meant to shape and foster ICT pedagogical skills of the pre-services teachers (Chen, 2010). Mentor teachers are also expected to support the pre-service teachers and to address the pressures they experience. This is most helpful in difficult teaching situations (Romano & Schwartz, 2008). However, further problems may arise when the mentor teachers lack training or experience in using technologies themselves. Furthermore, some mentor teachers resist using ICTs; this may result in the perpetuation of existing mental models and traditional methods of teaching that are negatively correlated with the use of technology in the classroom.

Work integrated learning has been viewed as a crucial component in education, and schools should promote the use of ICTs during practicum by providing support and adequate access to resources (Brown & Warschauer, 2006). One of the main issues faced by pre-service teachers regarding ICT integration in the classroom is that they do not have much exposure to appropriate pedagogies when using ICTs. In addition, some studies have identified the lack of resources, negative experiences, and negative attitudes and beliefs as reasons that may account for insufficient ICT integration (Angeli & Valanides, 2005).

Research has shown that in spite of many efforts that researchers and educators have invested over years in preparing teachers in the educational use of technology, teachers still lack the skills and knowledge required to teach effectively using technology (Koehler, Mishra & Yahya, 2007; Rodrigues, Marks & Steel, 2003). Pre-service teachers, as well as inexperienced in-service teachers who are in the first years of the teaching profession, may use ICTs in their classrooms in a limited manner and may have inadequate knowledge about technology integration and utilization (Dawson, 2008; Ertmer, 2005; Ottenbreit-Leftwich, Glazewski, Newby, & Ertmer; Vanderlinde, Van Braak & Tondeur, 2010). Kenny & Motta (2002) claims that the lack of subject-specific focus in many technology preparation programs remains an issue. Indeed, matters of how technology interacts with the content and content-specific pedagogy are not sufficiently explored in the programs. Programs also fail to adequately prepare teachers to establish pedagogical connections between the affordance of technology and teaching of a particular content domain.

1.3 RESEARCH PROBLEM

During WIL pre-service ICT support role teachers are expected to work alongside mentor teachers assigned to them in order to gain insights into teaching and learning. Sadaf, Newby & Ertmer (2012) suggest that today's pre-service teachers have moderately positive attitude concerning the potential of ICTs application for teaching and learning, however, it is a problem when it comes to actually integrating ICTs into their classroom practice where attitude and approaches are more reserved. Lei (2009) claims that pre-service teachers worldwide have limited abilities to see the possible advantages of different ICTs application for teaching and learning. I will be investigating whether or not this claim is true in the context of a developing country.

Developing countries experience many challenges in using technology because most teachers in schools lack technological competence. This is seen as a main barrier to the acceptance and adoption of ICTs (Pelgrum, 2001). ICTs are pervasive in developed countries, but their use and integration into the school curriculum remains significantly underdeveloped in developing countries (Farrell, Isaacs, Trucano, Hamdy, Hare, Tetang, Tchinda, & Fall, 2007). The act of integrating ICTs into teaching and learning is a complex process (Bingimlas, 2009) and one that may encounter a number of difficulties including the lack of teacher confidence, competence, teacher training, technical support, infrastructure, negative attitudes and the resistance to change (Barfi, 2015). The resistance in the classroom is often blamed on the risk of the teacher losing influence over the value and direction of classroom activities (Nathan & Chan, 2007). This resistance to change is, however, an important barrier faced by teachers in using new technologies in education (Bingimlas, 2009).

Apart from the teachers' lack of capacity and their negative attitude toward ICT use, infrastructure also remains an obstacle in many developing countries such as South Africa (Howie, Muller & Paterson, 2005). The South African Department of Education, through its ICT in Education Policy (Doe, 2004) and Guidelines for Teacher Training and Professional Development in ICT (Doe, 2007), has formulated guidelines for the distribution and use of digital resources in schools. Compounding this issue, poorer schools are still struggling to keep up with well-resourced schools when adjusting to teaching and learning with ICTs. The poorer schools are still challenged by limited resources; this limitation of resources prevents most of the teachers from effectively using ICTs for educational purposes (Doe, 2007). Wilson-Strydom, Thomson & Hodgkinson-Williams (2005), argues that "increased access to computers alone does not necessarily mean increased implementation of technology-integrated lessons".

The lack of resources cannot, however, be blamed for all implementation issues. Teachers' attitudes, lack of expertise, autonomy and knowledge to evaluate the use and role of ICTs in teaching are conspicuous factors hindering teacher's readiness and confidence in using ICTs (Hennessy & Deaney, 2004). Most South African teachers, in public schools, have experienced some ICT training where sessions generally included basic computer skills. These basic skills, however, have proved inadequate to equip teachers with the skills they need to infuse ICTs into subject

teaching (Rashid, Camara & Richero, 2013). Summak (2011) supports this claim that initiatives emphasizing basic skills are not enough to prepare teachers to integrate ICTs pedagogically. Nonetheless, whatever the reasons may be for the use of ICTs in schools, or not, this research will focus on the actual experiences of pre-service teachers as they embark on a session of WIL. The idea is to determine exactly what is going on at the schools and how the participants experience the use of ICTs in any format at their schools.

1.4 RESEARCH QUESTION

This research involves fourth year, pre-service ICT support role teachers from the Faculty of Education who are allocated to various schools for their WIL and aims to address issues faced by them during this time. The main research question that guides this inquiry is:

What are the experiences of pre-service ICT support role students regarding the use of ICTs during WIL?

1.5 AIMS AND OBJECTIVES

The main aim of this study is to explore how pre-service ICT Support Specialists experience the use of technology for teaching and learning during their work-integrated learning in the final undergraduate year of study.

Some objectives to help to answer the main research question include:

- a) To explore the positives of integrating ICTs during work-integrated learning.
- b) To explore the negatives of integrating ICTs during work-integrated learning.
- c) To identify how pre-service teachers use ICTs during WIL.
- d) To understand the role of the mentor teachers in the promotion of use of ICTs
- e) To identify pre-service teachers' pedagogical and innovative strategies that can lead to technology integration.
- f) To provide guidelines for future ICT support specialists entering the WIL phase of their undergraduate training.

1.6 RESEARCH DESIGN

Case studies are distinguished from other types of qualitative research in that they are intensive descriptions and analyses of a single unit or bounded system (Creswell, 2007:73). A case study is an exploration of a bounded system or case over time through a detailed, in-depth data collection process involving multiple sources of information and rich-in context (Merriam, 1998). This detailed account will form a thick description of the case that will be incorporated in the study. A descriptive case study is well suited to elaborate on experiences of pre-service ICT support specialist teachers regarding their use of learning technologies during work-integrated learning. The design is suitable for this study as it will allow the researcher to gain rich information on the experience of pre-service ICT support role teachers during final year work -integrated learning. The unit of analysis in this study is the cohort of pre-service ICT Support Specialists experiencing the social phenomenon of using technology for teaching and learning during their work-integrated learning in their final undergraduate year of study.

The research setting is in Gauteng Province. The pre-service teachers range from 23-25 years old and are completing their final year at the University of Johannesburg in the Faculty of Education. These pre-service teachers come from a variety of backgrounds in townships, suburbs, urban, and rural settings. They are required to do their practical in schools provided on a school placement list. These schools range from quintile 1 to quintile 5, or the poorest to the most resourced schools. I chose these participants because they are currently doing an ICT support role module as part of their undergraduate studies. These students are the second cohort doing the ICT support role module, and as such are a largely unknown phenomenon. The specific case under investigation includes these ICT support role students using ICTs during WIL. The students visit their schools for a period of three weeks (first semester) and seven weeks (second semester). During these times, students are expected to fulfil specific tasks and to teach using learning technologies on a daily basis. Students must assist teachers with classroom management and observe learners. The purpose of this observation and teaching is for students to develop their own personal teacher identity. During the visit, the students are provided with mentor teachers for both of their major subjects. They start by observing their mentor teachers and later on, they

are expected to teach. It is assumed that they will be allowed to teach using learning technologies as these students are doing the academic subject named Computer Application Technology (CAT). Pre-service ICT support role teachers are also expected to be evaluated by the head of department (HOD), the mentor teacher, and the lecturer from University of Johannesburg. The interaction between pre-service teacher and mentor teacher is to work together in the process of teaching and learning. The mentor teachers also assist the pre-service teachers by demonstrating how to use lesson planning and how to effectively use ICTs in this process where appropriate.

1.7 SAMPLING, DATA COLLECTION AND ANALYSIS

In this study, purposive sampling was used. Participants will have defining characteristics that make them data sources who can provide information to answer the research question (Creswell, 2007). Participants are fourth year ICT support specialists who will be engaging with authentic issues related to ICT integration and use during their seven week WIL in 2017. Selected participants will be approached on completion of the WIL to take part in a focus group interview.

Focus group interviews refer to a group interview where the topic is defined clearly, where there is a focus on enabling and recording an interactive discussion between participants, where it encompasses the need for interactive discussion amongst participants (Carson, Gilmore, Perry & Grønhaug, 2001). Focus groups normally involve between four and eight participants, but in this case I will use a maximum of four at a time due to the nature of the participants. According to Krueger and Casey (2000:25), such participants are information-rich. In this study participants have a common characteristics: they are all enrolled for School ICT Support role (MOFPIA3) module. They will be encouraged to share their points of view in the focus groups without any undue pressure exerted on them to reach a consensus (Krueger & Casey, 2000). Through focus group interviews, I aim to tell a story about the phenomenon through the use of a single open, guiding question. In this context, the participant is seen as the expert in the research, and I the researcher will not interfere. I will promote the flow of information and limit my own biases and opinions. These interviews will be conducted with new groups until data appear to be saturated. According to Deem (2002, p840), in interviews it is important for the researcher to record much detail; therefore, in this study an audio recording will be used to capture the interviews.

Interviews will be transcribed verbatim and analysis of the qualitative data – the focus group interviews - will be conducted. The data will be analysed using Atlas.ti (Friese, 2012) using simple coding and theme development (Saldaña, 2015). Codes and themes will be supported by direct quotations from the participants (Grbich, 2013).

1.8 TRUSTWORTHINESS OF THE STUDY AND ETHICAL ISSUES

Tashakkori & Teddlie (2010:26) refer to trustworthiness as the extent to which the researcher can convince the readers that the findings are worth paying attention to. I will ensure trustworthiness through a variety of methods. I will ensure credibility (Krefting, 1991) by prolonged and varied engagement in the field — by engaging with participants and allowing them to become accustomed to me. I will be aware of researcher bias by examining situations from various perspectives throughout the study (Kvale, 1992, p189). I will conduct member checks after each focus group to ensure that final presentation of the data is accurate. Good research practices will be implemented guided by my supervisor to build my unique authority as a researcher.

Polit and Beck (2008) claim that every researcher should provide accurate and relevant information to all participants during the research process for them to be able to make informed decisions. The researcher will consider three primary ethical principles when conducting the research with participants, namely, beneficence, respect for human dignity and justice (Polit & Beck, 2008). All ethical procedures as proposed by the Faculty of Education Research Ethics Committee (REC) will be followed in this study. All participants will be duly informed both verbally and in writing about their participation to ensure understanding. Participation was voluntary and participants had the right to withdraw from the study at any time, without penalty. Benefits and Risks in the study are highlighted in the ethical application to the REC.

It is crucial to request permission from the participants and obtain written consent. Ethical research measures are viewed as important in the field of research. The participants should be protected from harm and should be given the opportunity to withdraw from the research at any time without penalty. Their participation must be voluntary and informed consent must be given. Separate signed consent were requested from the participants for audio recording used during the research process.

The result of this study will be made available to the participants should they desire to see the results.

1.9 STRUCTURE OF THE RESEARCH

Chapter 1 Background of the study

This chapter discussed the outline of the study, which entails the introduction, background perspectives, rationale for the study, and the research problem. Also, the aim and objectives and significance of the study are included. The research design, sampling, methods of data collection, data analysis and ethical considerations have been clarified. The trustworthiness of the study has been explained.

Chapter 2: Literature review

This chapter presents an overview of literature relevant to the research question. The aim of this chapter is to demonstrate to the reader that the researcher has read widely in the field of ICTs in education.

Chapter 3: Research methodology

The chapter will shed light on research design and methodology for this study. It will include more on the research paradigm and case study approach. Details on sampling, data collection and data analysis will follow.

Chapter 4: Findings and data analysis

The discussion of the findings of the research will be presented in this section. References will be made to direct quotations from the interviews to support the findings that are proposed.

Chapter 5: Discussions and recommendations

This chapter is an opportunity to make sense of the data and to provide an indication whether the research question has been suitably addressed. In addition, summaries of the main findings will be discussed. A discussion of the potential value of the research and recommendations for further research will be provided. Lastly, a few limitations of the study will be spelt out in this chapter.

CHAPTER 2. LITERATURE REVIEW

2.1 INTRODUCTION

This chapter reviews the literature to better understand the use of ICTs in teaching and learning by pre-service ICT support role teachers. An overview of Computer Application Technology (CAT) is provided as well as an introduction of the Curriculum and Assessment Policy statement (CAPS) in relation to CAT. A brief discussion of the school ICT support role module is also discussed. The chapter contains brief notes on teacher education programs. It will further discuss the purpose of the work-integrated learning. An overview of the student and mentor responsibilities during WIL will be discussed. Technological Pedagogical Content Knowledge (TPACK) as the guiding theoretical framework of the study, Technology Knowledge (TK), Technological Content Knowledge (TCK), and Technological Pedagogical Knowledge (TPK)... Lastly, I discuss the ICT support role module at the university, its aims, and a brief account of the role of mentor teachers in promoting the use of learning technologies.

2.2 COMPUTER APPLICATIONS TECHNOLOGY (CAT): AN OVERVIEW

The DBE (2011, p12) defines CAT as “a study of integrated components of a computer system (Hardware and Software) and practical techniques for their use and application to solve everyday problems”. The solutions to problems in this syllabus are designed, managed and processed via end-user applications and communicated using appropriate ICTs. ICTs are seen as a combination of networks, hardware and software as well as the means of communication, collaboration, and engagement that enable the processing, management and exchange of data, information and knowledge. Computer Applications Technology is responsive for the developmental vision of the country, that all South Africans will be equipped with marketable skills in an information society. The specific aims listed below need to be achieved when teaching CAT.

In Computer Applications Technology a learner will:

- ✓ Use end-user software applications competently to produce solutions to problems within a defined scenario;

- ✓ Understand the conceptions of ICTs with regard to the technologies that make up a computing system;
- ✓ Understand the various technologies, standards, and protocols involved in the electronic transmission of data via a computer-based network;
- ✓ Use the Internet, the World Wide Web (WWW) and understand the role that the Internet plays as part of the global information superhighway;
- ✓ Find authentic and relevant information, process the information to draw conclusions, make decisions and communicate the findings in appropriate presentation media; and
- ✓ Recognise the legal, ethical, environmental, social, security and health issues related to the use of ICTs and learn how to use ICTs responsibly (DBE, 2011).

2.3 THE CURRICULUM AND ASSESSMENT POLICY STATEMENT (CAPS)

The Curriculum and Assessment Policy Statement (CAPS) is not a new curriculum, it is an amendment to the National Curriculum Statement (NCS) Grade R-12. It therefore still follows the same process and procedures as the NCS Grade R-12 (Pinnock, 2011). In the general aims of the South African curriculum, the NCS (R-12) gives expression to what is regarded to be knowledge, skills and values worth learning. The document stipulates that all children acquire and apply knowledge in ways that are meaningful to their own lives. The curriculum promotes an idea of grounding knowledge in local context, also considering the sensitivity to global imperatives. Pre-service teachers are expected to use the CAPs curriculum daily during WIL. They are expected to teach using the curriculum to encourage independent critical and creative thinking (DBE, 2012). In this regard, learners are able to identify and solve problems using critical and creative thinking, work effectively as individuals and as a member of a group, and organise and manage themselves responsibly (DBE, 2011). Pre-service teachers are expected to teach using the CAPs document as a guide in classroom. During WIL pre-service teachers are also expected to adhere to the time allocation for CAT which is 4 hours per week for 35 weeks. Table 2.1 sets out the topics and sub-topics in the Computer Applications Technology syllabus (Grade 10-12).

It is significant to note that there will continuously be a degree of overlap between topics. Solution development is facilitated by systems technologies in the form of application software. Systems technologies focus mainly on hardware and software.

Network technologies enable the Internet that is used for various applications which include information dissemination and electronic data interchange. Information management is a key idea and a secondary activity in overlapping concepts in many other areas such as solution development and Internet technologies. Information management is enabled by systems technologies. All ICT activities are primarily driven by human involvement, human need and intervention, which in turn results in social and ethical issues (DBE, 2011).

Topic Area	Sub-Topics	Weighting (Volume)	Resources
Solution Development (page 11)	Word Processing Spreadsheets Databases Fourth Application	60%	Computers Textbook Internet Access <ul style="list-style-type: none"> ▪ Web browser ▪ Search Engine Office Suite <ul style="list-style-type: none"> ▪ Word Processor ▪ Spreadsheet ▪ Presentations ▪ Database HTML editor (notepad) Typing Tutor Security software (anti-virus/internet security)
Systems Technologies (page 12)	Concepts of computing Hardware Software Computer Management	13%	
Network Technologies (page 13)	PANs LANs and WLANs WANs	5%	
Internet Technologies (page 14)	Internet and World Wide Web E-communications	5%	
Information Management (page 15)	Find and Access Data and Information Process Data and Information Present Solution	12%	
Social Implications (page 16)	Impact on Society Legal and Ethical and Security Issues Health and Ergonomic Issues Environmental Issues	5%	

Table 2.1 Topics and Sub-topics of Computer Application Technology (DBE, 2012)

2.4 A BRIEF OVERVIEW OF THE SCHOOL ICT SUPPORT MODULE

All learning activities regarding the university module “School ICT support role” are online, but students also have 14 face-to-face contact sessions per semester where topical issues are dealt with in a lecture setting. One aim of this module at the university is to empower the school ICT support specialist role students to teach the school subject called CAT. It is expected from an ICT support role student to be a multi-skilled teacher and possess superior knowledge of computers, learning technologies and other ICTs device. Pre-service ICT support role teachers are also

expected to demonstrate knowledge about applying these tools to varying contexts. The academic coursework on campus is aimed at preparing them for placement in school, but also affords them the opportunity to reflect on school experience in school, and to enrich these experiences through invoking theoretical perspectives, which in turn will initiate the next cycle in the practice-to-theory to practice approach. This module focuses on the CAT school curriculum in Further Education and Training (FET) with reference to pedagogical content knowledge and assessment. Apart from the aims to introduce students to basic skills required to teach the CAT syllabus, students are expected to provide ICT support in a range of other disciplines.

The ever-changing nature of the field of learning technologies and rapid developments in technological tools and services dictate that we adapt the content. School ICT support is creative, innovative and reflective, deriving ideas and suggestions from real problems, formulating relevant concepts and providing solutions using the most appropriate technologies including apps, tools and services. This module gives the ICT support role students an advantage in using ICTs in higher-order thinking.

The broad purpose of this module is to equip the school ICT support role teachers, with pedagogic content knowledge in their field of specialisation to enable them to become experts in using ICTs for teaching and learning. In other words, the aim of this module is to support the ICT support role students in their teaching and professional competence and to develop them as critically reflective practitioners in 21st Century schools. A practice-to-theory-to-practice approach is followed using an alternation between practical in-school experience, reflection on these experience, relating experience to relevant theoretical perspectives, and bringing these to bear on fresh situations (Korthagen & Kessels, 1999).

At the end of the module the students are expected to demonstrate that they have fulfilled the typical role of an ICT support specialist at the school. This envisaged outcome is slightly different to what the outcomes for other academic disciplines specialist may be. Teachers are appointed at a school to teach a specific subject, however, there is no known job description for school ICT support specialists. Learning outcomes for the School ICT support role include:

- ✓ Describe your identity as an ICT support role specialist;

- ✓ Describe the nature and significance of learning technologies in educational contexts;
- ✓ Describe competencies of 21st Century teacher;
- ✓ Develop, critique and reflect on your personal teaching;
- ✓ Interpret, implement and execute the school curriculum into practice;
- ✓ Development a short term and long term teaching plan based on school curriculum (CAPS);
- ✓ Design, plan, execute, implement and critique lessons;
- ✓ Develop and implement effective record keeping strategies for teachers;
- ✓ Plan practical work, assignments and outing within your field;
- ✓ Integrate creative and effective teaching methods that utilize ICT and other technologies including indigenous technologies into a lesson;
- ✓ Identify development needs and set goals for professional development; and
- ✓ Compile an online teaching profile.

2.5 TEACHER EDUCATION PROGRAMS

Koehler & Mishra (2009) reported that in preparing pre-service teachers for effective technology integration, teacher education programs need to support them to build knowledge and good pedagogical practices, technical skills and content knowledge as well as how these concepts relate to one another. Teacher education programs should not only focus on how to use technology but also focus on how technology can be used effectively for teaching and learning. Teacher education programs should provide pre-service teachers with experiences that permit them to successfully integrate technology into teaching and will increase their self-efficacy for technology integration. These programs are crucial in facilitating the adoption of ICT strategies aimed at helping pre-service teachers shift away from traditional beliefs toward the adoption of more learner-centred beliefs and practices (Lim & Chan, 2007). However, teacher education programs are often criticized for failing to facilitate pre-service teachers' critical re-examination of the connection between the affordances of technology and teaching practice (Angeli & Valanides, 2005; Enochsson & Rizza, 2009; Jang, 2008; Koehler, Mishra & Yahya, 2007; Lim & Chai, 2008; OECD, 2008). Similarly, (Chang, Chien, Chang & Lin, 2012) and Zeichner (1993) also criticized teacher education programs for their failure to provide pre-service teachers with necessary experiences

of how to utilise technology during WIL. The use of technology in teacher education programs has primarily focused on learning about different technologies (Mishra, Koehler & Kereluik, 2009). However, it has been seen that having a strong technical knowledge is not enough for technology integration (Ertmer & Ottenbreit- Leftwich, 2010; Koehler et.al, 2007; Lee & Lee, 2014). In contrast, Enochsson & Rizza (2009) reported that teacher education plays a role in moving pre-service teachers from the role of passive users of technology into active designers of technology.

2.6 PURPOSE OF WORK-INTEGRATED LEARNING

WIL is intended to provide student teachers with the opportunity to be part of a school community and to interact with other educators on a professional level. It also aims to develop their own teaching competencies in practice. This platform provides the pre-service teacher the prospects to engage in a range of teaching and learning environments, in which they can explore the variety of opportunities and challenges that exist in schools. The students are also expected to link what they have learned in their subject methodology to the practical realities of teaching. It also provides opportunities for critical reflection and to develop their own teaching philosophy.

2.7 STUDENT AND MENTOR RESPONSIBILITIES DURING WIL

Another focus of this practicum is to prepare pre-service ICT support role teachers for a more holistic approach to the development of their content knowledge and teaching skills. These pre-service teachers are given an opportunity to teach for at least 60% of their time during WIL. Students can also be placed with Grade 8 and 9 in their fields of studies, but mostly teach Grade 10-12 CAT during WIL. The remaining 40% of the time should be utilised as follows: 30% of doing research in respective methodologies and 10% for administration. During free periods, students are expected to observe classroom management, learn new teaching strategies, practice inclusion, investigate learning support, and prepare lessons. Students are also expected to observe as many mentors as possible in their subject specialisation, one of which is CAT. During WIL, mentor teachers are to provide the student with critical feedback regarding professional development. The mentor teacher is also expected to complete a developmental report on pre-service teachers at the end of every practical completed by the student.

2.8 HISTORY DEBATES ON TPACK

Technological Pedagogical Content Knowledge (TPACK) is an extended view of pedagogical content knowledge (PCK). PCK was originally proposed by Shulman (1986). PCK is about how a given subject or problem is organized and presented in accordance with different interest and skills of learners (Shulman, 1987). Mishra & Koehler's (2006) formulation of TPACK framework is an extension of Shulman's framework which is characterized by the teacher knowledge about technology and how it can play a role in effective teaching. The TPACK framework demonstrates the connection between teacher understanding of content, pedagogy and technology, and how these interact in order to produce effective teaching and learning. TPACK is an emergent form of knowledge that goes beyond knowledge of content, pedagogy and technology and expresses them as a dynamic transactional relationship (Dewey & Bentley, 1949; Koehler & Mishra, 2008; Mishra & Koehler, 2006). The TPACK model can be utilised as a theoretical framework for the professional development of both pre-service and in-service teachers as well as for measuring the knowledge of teacher (Schmidt, Baran, Thompson, Mishra, Koehler & Shin 2009).

Teachers and researchers have used this framework to describe components that teachers should develop in order to deal with technology in 21st Century education and understand to advance teacher's integration of digital technology in their teaching and learning (Kopcha & Alger 2014). This notion refers to the ability of teachers to combine content knowledge in a specific domain with pedagogical approaches to foster student learning (Voogt, Fisser, Pareja Roblin, Tondeur & van Braak, 2013). In the TPACK framework, teachers need to judiciously consider what and how specific technologies might assist students in making sense of complex ideas and phenomena associated with a particular discipline (Maeng, Mulvey, Smetana & Bell, 2013; International Society for Technology in Education - Nets-T-Standards, 2008). Teachers are further required to understand how technology, pedagogy and content interrelate and TPACK provides a flexible framework that explains how rapid-changing technologies can be effectively integrated with a range of pedagogical approaches and content areas (Koehler & Mishra, 2008; Mishra & Koehler, 2006). It must be remembered that good teaching with technology cannot be achieved only by adding a new piece of technology to the existing structure (Koehler & Mishra, 2005).

TPACK can be used as a model for measuring technological knowledge that could have an impact on the types of training and professional development experiences that are designed for both pre-service and in-service teachers (Graham, 2011).

In this study the researcher will be focusing on Technological Pedagogical Knowledge (TPK), Technological Content Knowledge (TCK) and Technological Knowledge (TK) in order to understand how pre-service ICT support role teachers use learning technologies in their teaching and learning during WIL (See *Figure 2.2*). This framework is important for this study as it will assist the researcher to see how the pre-service ICT support role teachers were able to use ICTs during WIL and to classify the challenges that they encountered.

The relationship between the elements of TPACK is illustrated in the *Figure 2.2*:

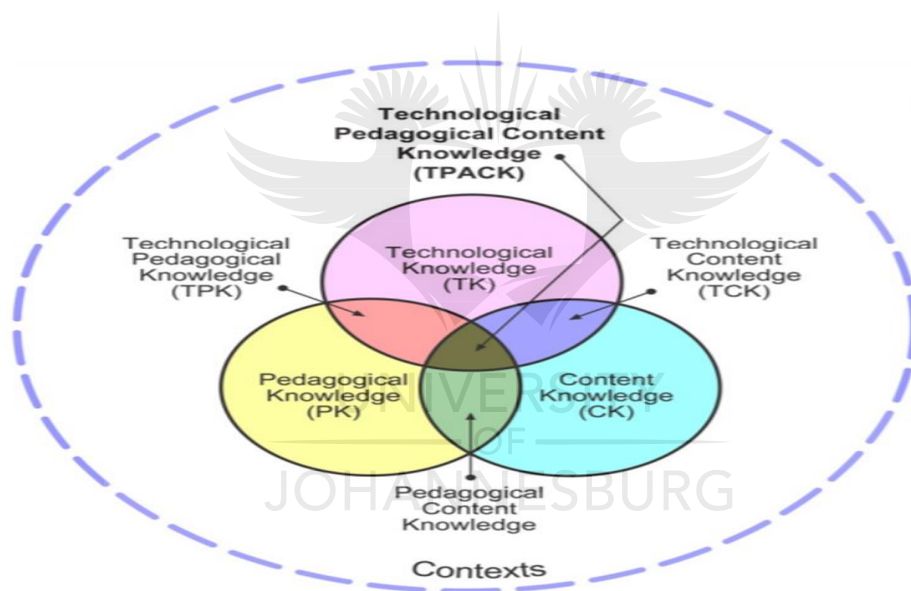


Figure 2.2 TPACK Framework (Mishra & Koehler, 2008)

2.8.1 Technological Knowledge (TK)

This includes knowledge about certain ways of using educational technology in the classroom. This includes understanding educational technology broadly enough to apply it productively at work and in everyday life, being able to recognize when information technology can assist or impede the achievement of a goal, and being able continually adapt to changes in information technology (Koehler & Mishra, 2009).

Rice (2007) observes that pre-service teachers acquire new knowledge of technologies as they interact with the real-world context during work-integrated learning. Also, most pre-service ICT support role teachers are comprised of students that have grown up with ICTs around them and received most current preparation; therefore, they are expected to integrate learning technologies effective for learning and teaching. Pre-service teachers also use ICTs for planning, management, administration and use of ICTs to also enhance teaching and learning (Isaacs, 2007). They also acquire more skills in using technology such as improving administrative and communication tasks (Palak & Walls, 2009).

2.8.2 Technological Content Knowledge (TCK)

This is “*an understanding of the manner in which technology and content influence and constrain one another. Teachers need to master more than the subject matter they teach; they must also have a deep understanding of the manner in which the subject matter (or the kinds of representations that can be constructed) can be changed by the application of particular technologies. Teachers need to understand which specific technologies are best suited for addressing subject-matter learning in their domains and how the content dictates or perhaps even changes the technology—or vice versa*” (Koehler & Mishra, 2009).

Pre-service teachers use ICTs as an educational tool, it assists learners to visualize abstract ideas and make it easy to find reliable information and promote knowledge construction within subject specialization (Li, 2007). Pre-service teachers learn how to use technology within their specific content areas, and can more readily transfer that knowledge to their own classroom (Hughes, 2005; Albion & Ertmer, 2002). In their classroom, they can use technology to increase learner’s motivation and confidence since using technology serves as a cognitive tool (Torff & Tirota, 2010). Pre-service teachers can easily create collaborative activities for learners on the web (Holcomb & Beal, 2010). Some of the positive attitudes towards the use of educational technology can easily provide useful insight about the adoption and integration of ICTs into teaching and learning process. Pre-service teachers use ICT aids to present content, engaging learners, modelling skills and assessing learners’ progress in using learning technologies (Dede, 2008). They also use ICTs in a variety of pedagogies such as promoting active construction of knowledge, collaborative learning, and using ICTs

formative assessment. Pre-service teachers use ICTs tools to support different cognitive skills, including information retrieving such as web search engines and google forms, information analysis and evaluation (spreadsheets, charts, images and video editing tools) and also information construction and communication word processing, mapping tool and educational social networking sites. They use ICTs learned acquired from the teacher education program to teach in the classroom.

The use of ICTs benefits learners to develop life-long skills in using ICTs such as self-regulation and problem-solving (Kozma, 2003). Learners can improve their critical thinking (Alharbi, 2012) higher-order thinking and metacognitive skills required for meaningful learning using learning technologies (Wang, Kinzie, McGuire & Pan, 2010). Pre-service teachers also benefit from using technology; it supports and improve their skills and knowledge in practice (Culp, Honey, & Mandinach 2005)

2.8.3 Technological Pedagogical Knowledge (TPK)

TPK can be defined as *“An understanding of how teaching and learning can transform when particular technologies are used in specific ways. This includes knowing the pedagogical affordances and restraints of a range of technological tools as they relate to disciplinarily and developmentally appropriate pedagogical designs and strategies”* (Koehler & Mishra, 2009).

Pre-service teachers are able to select specific technological applications in line with their selections of other curricular variables and instructional strategies that fit into their educational belief (Tondeur et.al, 2007). The skill of using learning technologies is acquired from teacher education program; it gives them an edge to apply technology in their specific content areas and to use pedagogical approaches (Brush, Duhaime, Gartner, Stewart, Katz, Hitt, & Venkataraman, 2003; Kay, 2006). The positives of using ICTs during WIL is when the pre-service teachers have access to ICT resources that support curriculum delivery, also technology-rich environments and connections to ICTs infrastructure (Langa, Conradie & Roberts, 2006). Zhao, Pugh, Sheldon & Byers (2002) state that in order to integrate technology successfully in a classroom, three knowledge areas associated with digital competence entails technology proficiency, pedagogical compatibility and social awareness.

Pedagogical meaningful use of ICT is about employing appropriate affordance of ICT tools to augment student learning (Sharma, 2008; Lim & Chai, 2008; Loveless, 2007). Pre-service teacher should use ICT meaningfully that involves choosing optimal technology to foster knowledge construction amongst learners. ICTs as a pedagogical tool is regarded as the ICTs facilities in teaching and learning that pre-service teachers use a software application to solve problems, to provoke learner competences, to create e-assessment and share their perspective with the learners (Jonassen, Howland, Marra & Crismond, 2008). They also use ICTs to access information, create solutions, analyses and apply knowledge in teaching and learning processes.

2.8.4 Technological Pedagogical Content Knowledge (TPACK)

“Underlying truly meaningful and deeply skilled teaching with technology, TPACK is different from knowledge of all three concepts individually. TPACK is the basis of effective teaching with technology, requiring an understanding of the representation of concepts using technologies; pedagogical techniques that use technologies in constructive ways to teach content; knowledge of what makes concepts difficult or easy to learn and how technology can help redress some of the problems that students face; knowledge of students’ prior knowledge and theories of epistemology; and knowledge of how technologies can be used to build on existing knowledge to develop new epistemologies or strengthen old ones” (Koehler & Mishra, 2009).

Lambert, Gong & Cuper (2008) showed that pre-service teachers had positive pedagogical beliefs about the importance of computers in education after partaking in educational technology courses. It is thought that these courses enhanced the beliefs of pre-service teachers about the benefit of technology which they were well prepared to use technology effectively. Wu, Hu & Hwang (2008) stated that schools that managed to create a balanced amalgamation between technology and pedagogy were successful in producing a more innovative constructive learning environment. Which, in turn, benefit pre-service teachers to use advanced mediating ICTs tools in teaching and learning. Research studies have shown that pre-service teachers are able to use technology in their teaching in diverse and flexible ways (Bate, 2010). An interactive whiteboard (newer model) allows teachers to move around classrooms and monitor learners during instruction (Robertson & Green, 2012). Therefore, this allows the learner to use iPads and mobile devices during the lesson; these can be

incorporated into classroom lesson to improve learner's academic performance (Cohen, 2012; Haydon, Hawkins, Denune, Kimener, Mccay & Basham, 2012; Sullivan, 2013). The role of pre-service teachers is to assist learners in class to connect the subject matter to ICTs and arouse questions to use technology effective for learning, using variety of learning strategies in solving problems and discovering ideas in learning technologies (Jonassen, 1996; Salomon & Perkins, 1998).

Due to the development of technological pedagogical content knowledge (TPACK) capabilities should be infused into the entire curriculum so that pre-service teachers can experience a positive way to support teaching and learning (Tondeur, van Braak, Sang, Voogt, Fisser, & Ottenbreit-Leftwich, 2012).

2.9 ROLE OF MENTOR TEACHERS IN PROMOTING THE USE OF ICTS

Research has shown that pre-service teachers can attain experience in technology integration by interacting with mentors during practicum (Nilsson & Driel, 2010). Mentors teachers play a role in shaping pre-service teacher beliefs about integrating technology for teaching and also equip them with the required professional skills (Ertmer, 2005). Mentor teachers also foster pre-service teacher's development to learn important ICTs teaching skills such as designing effective authentic learning activities and also how to assess learner's prior knowledge of certain topics related to learning technologies. Mentoring in teacher education is one of the most significant strategies to support pre-service teachers to teach (Wang, 2001). It helps to improve confidence, self-esteem and ability to problem solve when using ICTs (Hobson, Ashby, Malderez & Tomlinson, 2009; Mathur, Gehrke & Kim 2013). Taver (1998) observes that both mentors and pre-service teachers mentioned many benefits of the mentoring process, including professional growth, personal growth, as well as reinforcement of existing beliefs and practices. Stanulis & Floden (2009) reported that pre-service teachers who were exposed to an intense level of structured mentoring experience, demonstrate higher levels of student engagement than those who were not mentored.

During WIL, it is expected of mentor teachers to provide pre-service teachers with a clear understanding about pedagogically meaningful technology integration (Kay, 2006; Liu, Macintyre & Ferguson 2012; Singer & Maher, 2007; Tondeur, van Braak, Sang, Voogt, Fisser, & Ottenbreit-Leftwich, 2012). It is also important that they are

being mentored to understand ICTs in relation to their pedagogical use and also how they can be integrated into subject specialization during their teaching. The purpose of doing WIL is also to develop a pre-service teachers' body of knowledge - which is termed ICT-related Pedagogical content knowledge (PCK). It is acquired from the collaboration with mentors (Angeli & Valanides, 2005).

Mentors beliefs influence how the pre-service ICT support role teachers perceive the use of ICTs in the learning context. Kajder (2005) says that the mentor's pedagogical beliefs, as perceived by pre-service teachers, markedly influence the pre-service teacher's beliefs about technologies during teaching practice. Mentor teachers should model the use of ICTs in their teaching and learning as modelling addresses the problems of a pre-service teacher's inability to envision how ICT may be used in the classroom. Modelling may foster deep changes in pre-service teacher's beliefs (Dexter & Riedel, 2003; Steketee, 2006). Jimoyiannis (2010) claimed that mentors who still cling to traditional methods of teaching have an unfavourable influence on the pre-service teachers in integrating ICTs.

Mentor teachers need to promote ICTs by providing support and adequate access to ICTs to pre-service teachers (Dexter & Riedel, 2003; Brown & Warschauer, 2006). Additionally, mentor teachers are expected to promote pre-service teachers' competencies for educational technology use in an integrated and cross-curricular manner which is a complex process that demands multiple skills to be applied when using learning technologies (Kay, 2006; Mouza, Karchmer-Klein, Nandakumar, Ozden & Hu, 2014; Polly et.al, 2010). Mentor teachers need to assist pre-service teachers not to only use technology competencies, but to use them in ways that effectively connect with practice and employ critical thinking to support effective learning experience in real-world contexts (Kimmons, 2013). It also appears that mentor teachers in schools that engage in ICT lesson planning are more likely to apply ICTs in an innovative way in their teaching (Kozma, 2003). If exposed to such mentors, students will also learn to do lesson planning, deliver lessons, and use various instructional strategies while using technology.

One aim of mentoring is to transform pre-service teachers from passive users of technology into active designers in the classroom. Benefits of mentoring include emotional support and learning the mechanics of the job from mentor teachers. A

collaborative approach between pre-service teachers and mentors using a combination of technical, instructional and emotional support has been found effective for pre-service teachers (Feiman-Nemser, 1998). However, studies have also shown that mentor teachers lack competencies in the use of ICTs as a pedagogical tool (Nihuka & Voogt, 2011; Alharbi, 2012), or are reluctant or unwilling to explore ICTs (Eteokleous, 2008). The majority of mentor teachers in recent studies could not use ICTs effectively as a pedagogical tool (Tapscott, 2010; Knight, Knight & Teghe, 2006). According to Condie & Livingston (2007) some mentors continue to display a reluctance to engage new technology, while others remain fearful of trying new approaches to teaching using ICTs.

Lou, Abrami & Apollonia, (2001) suggested that teachers may not be using computers to their potential as a cognitive tool due to their lack of experience in the “craft” of computer integration. Some researchers suggested that more teacher training is needed for integrating technology into the classroom in order to move teachers through stages toward integration (Hew & Brush, 2007; McGrail, 2005). If mentor teachers lack exposure to how to use ICTs, it may be problematic for them to be influential to the pre-service teachers regarding technology use. Such issues related to the mentor teacher need to be addressed during teacher training to ensure that students are aware of the possibility of being placed with such a mentor.

Mentor teachers who play a positive role in ICT integration also benefit from a supportive school leadership who promote change as a key factor when it comes to merging ICTs and instruction (Anderson & Dexter, 2000). (Baylor, 2002) also describe school leadership as a critical predictor of ICT integration, since it focuses on promoting the use of ICTs at strategic and activity level.

2.10 SUMMARY

This chapter looked at pre-service ICT support role teachers using learning technologies during work-integrated learning. Pre-service teachers stand a better position to use ICTs since they have acquired all skills and capabilities from teacher education programs. The chapter started with defining “CAT, CAPS document, a brief overview of school ICT support role module, what the pre-service teachers are expected to during WIL. The TPACK framework was explained, and how it will be used

to analyse the data later. The role of mentors promoting the use of ICTs was also discussed which can either be positive or negatives, and was reviewed in the literature. Lastly, teacher education programs were discussed on how they played a role in influencing the use of ICTs by pre-service teachers and also how it assisted them in transferring skills and knowledge in bridging the gap between theory and practice. The next chapter will discuss the research methodology that was employed in this study.



CHAPTER 3. RESEARCH DESIGN AND METHODOLOGY

3.1 INTRODUCTION

This chapter presents the research design that was employed to investigate the experiences of pre-service ICT support role teachers regarding the use of learning technologies during work-integrated learning. The research project is a qualitative research approach. A case study will be used as the specific route to gather data (Research method) using focus-group interviews.

3.2 RESEARCH METHODOLOGY

Research methodology is the approach that the researcher uses to find answers to the research problem (Locke, Silverman & Spirduso, 2009). According to Christensen, Johnson & Vaupel, (2006) research methodology is the general approach the researcher takes in carrying out the research project. The purpose of the research project determines the methodology to be applied (Lundgren, Amodeo, Cohen, Chassler & Horowitz, 2011). For this study, the most suitable approach is qualitative research. The richly descriptive nature of qualitative research is suitable as it is a broad approach to the study of a social phenomenon (Creswell, 2012). It assumes that humans can see, hear and feel to make meaning of social phenomena (Riley & Love 2000). Qualitative research is fundamentally interpretive and naturalist (Flick, Kardorff & Steinke, 2000). It also focuses on description, analysis and interpretation. In qualitative research, the data are rich and tell a whole story about the phenomenon explored. It is conducted in a natural setting rather than a controlled one. Furthermore, it engages the researcher in interviews, conversation, recording and memos which makes the world visible since it involves studying objects in their natural setting (Denzin & Lincoln, 2008). Qualitative research embraces two tensions at the same time as it is drawn to a broad, interpretive and post-experimental, postmodern and critical sensibility (Denzin et.al, 2008). It also implies an emphasis on the qualities of entities, on processes and meaning that are not experimentally examined.

Qualitative researchers stress the socially constructed nature of reality, the intimate relationship between the researcher and what is studied, and situational constraints that shape inquiry (Denzin et.al, 2008). Researchers using a qualitative approach seek

answers to questions that stress how social experiences are created and given meaning. According to Schurink, (2010) qualitative research is explorative and descriptive, it accepts the value of the context and setting and searches for deeper understanding of participant's experience of the phenomenon under scrutiny. In this study, it involves interpreting experiences of pre-service ICT support role teachers using learning technologies during work-integrated learning. Qualitative research is relevant to this study as it is an approach that allows for different views of the research theme; participants have a more open-ended way of demonstrating their actions (Henning, Van Ransburg & Smit, 2004).

This research employs an inductive research strategy, which builds abstractions, concepts, hypotheses or theories rather than testing existing theory. In addition, it also focuses on meaning-making and understanding. It is richly descriptive. Qualitative research is based on the view that reality is constructed by individuals interacting with their social worlds and is also interested in understanding, meaning people have constructed. In this inquiry, pre-service ICT support role teachers are regarded as a direct concern with experience as they have "lived or felt or undergone" the use of learning technologies during work-integrated learning. Therefore, the researcher assumes that meaning is embedded in the participants' experiences (Patton, 1985). Qualitative data will provide detailed insights of pre-service ICT support teachers stance towards ICTs after their work-integrated learning.

3.3 DATA COLLECTION

Data gathering is crucial for research, as it is meant to contribute to a better understanding of a theoretical framework (Bernard, Wutich & Ryan, 2016). Data conveyed through words have been labelled qualitative. Qualitative data consist of "direct quotations from people about their experiences, opinions, feelings and knowledge" which is obtained through interviews (Patton, 1985:10). Data were collected by means of focus-group interviews to bring to our attention what individuals think, feel and do (Henning et.al, 2004:52). Elo and Kyngäs (2008) stated that collecting data always involves selecting data and techniques of data collection will affect what finally constitute "data" for the purpose of research.

Data was gathered from pre-service ICT support role teachers doing final year undergraduate using focus-group interviews (Terre 'Blanche, Durrheim & Painters, 2007). Focus-group interviews refer to those group interviews where the topic is defined clearly and precisely; the focus is on enabling and recording interactive discussion among participants (Carson, Gilmore, Perry & Grønhaug, 2001). A workable number suitable for focus-group interview involved a maximum of four at a time. Participants during the interview process were under the direction of a moderator who promoted interaction and ensured that discussions were well facilitated. Focus-group interviews allow the researcher to interact directly with participants (Cooper, Schindler & Sun, 2006). This provides opportunities for the clarification of responses, for follow-up questions and for probing of responses. It also provides the researcher with rich data in participants own words (Rabiee, 2004).

Brinkmann (2014) reported that an interview guide is nothing more than a list of questions intended to ask in an interview process. An interviews guide will be used in this study to gain information on experiences of pre-service ICT support role teachers using learning technologies during work-integrated learning (See *Figure 3.1*). It contains very specific questions listed in a particular order and contains open-ended questions that were followed up with probes and a list of some areas or topics related to the study (Turner, 2010). Interview guides cover the main topic of the study (Taylor, 2005). It offered a focused structure for discussion during the interview. (Holloway & Galvin, 2016) report that the idea is to explore the research area collecting similar types of information from each participant by providing participants with guidance on what to talk about (Gill, Stewart, Treasure & Chadwick, 2008). The interview guide was used in the study as a guide for the researcher to engage the participants in the study (See *Figure 3.1*)

Interviews are commonly used in data collection (Taylor, 2005) and the semi-structured format is the most frequently used interview technique in qualitative research (DiCicco-Bloom & Crabtree, 2006). One of the advantages is that the semi-structured interview method has been found to be successful in enabling reciprocity (Topp, Hartley, Cook, Etemadmoghadam, Galleta, Moss & Kaufmann, 2012), enabling the interviewer to improvise follow-up question based on participants' response (Rubin & Rubin, 2005; Polit & Beck, 2008) and it also allows space for the participant's individual verbal expression.

The interview guide:

4th year ICT support role students

Research Question- What are the experiences of pre-service ICT support role teachers regarding the use of ICTs during WL?

Possible interview questions topics.

- ✓ Technology integration in education
- ✓ Challenges during WL
- ✓ Positive during WL
- ✓ Linking curriculum with ICTs
- ✓ School ethos
- ✓ Levels of access to ICTs
- ✓ Level of encouragement
- ✓ Varied technical support
- ✓ Pedagogical implications of integrating ICTs
- ✓ Role of mentors

Some of the interview possible questions will be drawn from the objective of the study.

- ✓ Individual use of ICTs
- ✓ Pedagogical strategies
- ✓ Innovative strategies

General broad question- Would you please tell me about your experiences with the use of ICTs during WL? or How did you experience (the use of) ICTs during work-integrated learning or How were they used?

- ✓ So that was how you used it personally ... but what did you see happening with other people?
- ✓ Did you experience ICT use by others in the school? (Who... and what did they do?)
- ✓ How did you personally use ICTs in the school?

Probing for more...

- ✓ Could you tell me a little more about that?
- ✓ That is interesting. Please tell me more.
- ✓ How did you feel when that happened?
- ✓ What do you mean when you say?
- ✓ What do you think about that?

Reflecting back

- ✓ "So it seems that... and you were conscious of..."
- ✓ You mentioned xoo. Can you go back to that?

Summarize what they say if necessary to check understanding/ Meaning

- ✓ So what you actually said now was... Did I get that correctly?
- ✓ What do you mean when you say ...?

Intervening to get back on topic

- ✓ "that is very interesting, can we come back to this later after we have finished the rest of the interview?"

Figure 3.1 Interview Guide

According to Glesne and Peshkin (1992), "probes may take numerous forms, they range from silence to sounds, to a single word to complete sentences". Furthermore,

the best way to increase skills at probing is to practice. The more you become and the better you can pursue potentially fruitful lines of inquiry (Price, 2002). The researcher will introduce the process of the interview before they proceed to respond to the questions presented. An audio recording will be used during an interview in order to capture all data (Guest, Bunce & Johnson, 2006). The advantage of using audio recording is to capture detailed and accurate information which could not be captured by memory or note taking (Rossouw, 2003). The researcher sought permission from the participants; he provide them with the forms to indicate consent to be audio recorded.

The researcher posed single open questions which was utilized in addressing the phenomenon under investigation. The main aim was to obtain information around the single open question (Carson et.al, 2001). During the interview, the researcher did not interfere with the participant's provision of knowledge, as this would have hampered the trustworthiness of the empirical data. The researcher promoted the flow of information, and did not interfere with it. In this study, the researcher was more interested in the viewpoints and opinions of the pre-service ICT support role students. In the focus-group interview, the participants interacted with each other. Participants enjoyed the opportunity to take part in the discussion, the quality and quantity of information gathered (Carson et.al, 2001). In this context, the researcher avoided focus-groups where participants felt comfortable with one another.

3.4 SAMPLING AND RESEARCH SETTING

One of the most important components in the research setting is the availability of participants. From the larger population, a "smaller group" called the sample may be selected, (Heckathorn, 2002). Sample size depends on the nature of the population and the purpose of the study. Purposive sampling was used in this study as it included participants with the richest data. Participants selected had a defining characteristic that made them suitable participants of the data needed in the study (Creswell, Klassen, Plano Clark & Smith, 2011). The sample size of the study is about 12 students. Purposive sampling also known as judgment sampling is the deliberate choice of a participant due to the qualities of the informant processes. Patton (1985) argues that logic and power of purposeful sampling lies in selecting information-rich cases for study in depth. Information-rich cases are those from which one can learn a

great deal about issues of control importance purpose of the research thus the term purposive sampling. The final year ICT support role students were selected for inclusion as they meet the minimum requirements regarding the use of learning technologies during WIL. These participants represented a particular group of individuals I presumed to be suitable to provide an understanding of the experiences of pre-service ICT support role teachers, who use learning technologies during work-integrated learning. Sampling was continued until data saturation was reached.

3.5 A CASE STUDY DESIGN

A case study design is employed to gain an in-depth understanding of a situation and meaning gathered from participants (Merriam, 1998). Berg, Lune and Lune (2004) state that case study involves systematically gathering of information about a particular person, social setting and events. Case studies are employed in projects where an individual's behaviour toward a social science phenomenon within a specific time and space is being investigated (Cohen, 2012). Case study is defined by interest in individual cases, not by the methods of inquiry it is based on (Stake, 1998). The researcher collected extensive data based on experiences by pre-service ICT support role teacher using learning technologies during work-integrated learning. Creswell (2007:73) says that case study is a qualitative approach in which the investigator explores a bounded system or multiple bounded system over time, through detailed, in-depth data collection involving multiple sources of information (observation, interviews and documents) and reports a case description and case-based systems.

Case studies are differentiated from other types of qualitative research in that they are intensive descriptions and analyse a single or bound system, such as an individual, program, events and community (Smith, 1978). In this case the individuals were final year ICT support role students. A case study as an empirical inquiry investigates a current phenomenon in real-life context. Pre-service teachers involved in the school placement is an example of a real-life context. It is interesting when the boundaries between the phenomenon being researched and the context are not clearly evident.

According (Shaw, 1978:2), case studies focus on a particular situation, program or phenomenon. Pre-service ICT support role teachers will be involved in schools in Gauteng which are indicated in the school placement list provided by the school

experience coordinator. In these schools they vary according to the availability of the ICTs resources. The case itself is important for what it reveals about the phenomenon and for what it might represent. Its focus makes it an especially good design for practical problems such as questions, situations arising from everyday practice. The case study focus on ICT Support role teachers on how they use ICTs during WIL. The school placements are bounded system and practical problems encountered in schools prohibit the pre-service ICT support role teachers to use ICTs for teaching and learning. The end product of a case study is a rich, thick description of the phenomenon under study. Thick description means the complete, literal description of entity being investigated. Case studies include as many variables as possible and portray their interaction, often over a period of time (Van de Ven, 2007) “It brings about discovery of new meaning, extends the readers experience or confirms what is known” (Stake, 1998:47). In this case study, pre-service teachers showed they could learn on their own how to use ICTs in teaching and learning through the agency of planning lessons and preparing for their learners during WIL. The detailed case is discussed below.

The Bachelor of Education Further Education and Training students from the University of Johannesburg, Faculty of Education come from various provinces in South Africa. They are enrolled to complete their final year with a focus on the ICT Support Role. Students come from a range of subject backgrounds and are exposed to different school placements during WIL including quintile 1 to quintile 4 schools. Indeed, some of the schools are well equipped, while others are not as privileged. Most of the students are second language English speakers. The classes that they teach are very diverse containing learners from different cultural groupings. The students are expected to complete three weeks of practical’s during the first semester where the students choose their own schools (See *Appendix B*). In semester two they complete seven weeks of WIL (See *Appendix C*). For the seven weeks, participants are expected to choose their schools from the placement list provided by the school experience coordinator. All the schools on the placement list are in Gauteng. During the second semester, they do more extensive teaching practice. During WIL, the students are expected to have an academic mentor who provides them with guidance. Mentor teachers have the opportunity to assist in the development of pre-service ICT support role teachers. They act as guardians in terms of pre-service teacher’s subject related development. They also acquaint them with school policies and procedures.

Mentors explain and demonstrate the use of the school equipment such as interactive whiteboard, internet access, data projectors, computers and other equipment that is used during their visit. Mentors ensure the students are in line with the CAPS curriculum, receive the teaching materials, daily schedule and school timetable.

Pre-service ICT support role teachers are involved in classroom observation, classroom management and teaching. They learn from their mentors by observing how to use technology, develop pedagogical skills and classroom management techniques from observation and practice. The interest is the process rather than outcomes, in context rather than a specific variable, in discovery rather than confirmation (Yin, 2009). This creates prospects for pre-service ICT support role teachers to learn from experienced teachers and others in the school. These students are expected to be well-prepared for their teaching, and plan their lesson integrating ICTs. They should also be able to handle duties in the school in a professional manner and to contribute positively to the quality of their classrooms and use ICTs in most of their lessons. They are expected to follow the school policy, rules and procedures of using technology provided by the school principal and academic mentor.

During the official WIL (August-September) the students are expected to be assessed by UJ lecturers, academic mentor and Head of the Department (HOD). The student will have three assessment opportunities per subject methodology. The students get some constructive feedback on how they taught and also at the end of the lesson the students are expected to write a reflection based on how they taught in the class. Pre-service teachers receive both written and verbal feedback with regard to their presentation in these assessments by the assessors. All the student teaching assessment rubric (See *Appendix D*) are correctly completed by all the assessors and should have the official school stamp. Pre-service teachers are expected to do an assignment based on the practical's that are graded by the methodology lecturers, and also submit a file with lesson plans used during WIL.

3.6 DATA ANALYSIS

According to Henning et. al. (2004:127) qualitative data analysis is an ongoing, emerging and iterative or non-linear process. Using qualitative analysis means to explain or make sense of the inquiry. The meaning is elicited from the data in a

systematic, comprehensive and rigorous manner. Data analysis is the process of bringing order, structure and interpretation to the mass of collected data. Qualitative data analysis is a search for a general statement among categories of data (Strauss & Corbin, 1998). The researcher prefigures the analysis before data collection begins or waits until all data have been gathered (Crabtree & Miller, 1992). In qualitative studies, data collection and analysis typically go hand-in-hand to build a coherent, interpretation of the data. In this study, the researcher was guided by initial concepts and developing understanding but accommodated shifts or modifications during the collection and analyses of the data on pre-service ICT support role teachers. Data analysis is one of the facets, perhaps the only facet, of coding qualitative research in which there is a right and wrong way. The right way to analyse data in the qualitative study is to do it simultaneously with data collection (Sim, 1998). Data analysis begins when the first data sets collected (Burns & Grove, 2005). The researcher analysed the qualitative data collected using Atlas.ti (Friese, 2012).

According to Lincoln, Lynham and Guba (2011), a unit of data can be as small as a word a participant uses to describe a feeling or phenomena of the field of notes. Also, a unit must meet two criteria. First, it should be heuristic i.e. the unit should reveal information relevant to the study and stimulate the reader to think beyond the particular bit of information. Secondly, the unit should be “the smallest piece of information about something that can stand by itself and must be interpretable in any additional information. Raw data was obtained from interviews. The analysis was aimed at identifying units of meaning (themes). The final product was shaped by the data that were collected and analysed throughout the entire process. The researcher planned ahead for the colour coding of notes to keep track of dates, names, and titles, defining categories for data analysis, planning further data collection and especially for writing the final product of the research. The number of categories a researcher constructs depends on the data and focus of the research (Lincoln et.al, 2011).

The following steps were followed in transcribing verbal data into transcripts. Interviews were transcribed to text and analysed using open-coding techniques in order to identify patterns and themes (Henning et.al, 2004). Open-coding is an inductive process where codes are selected according to what the data mean and researcher needs to have an overview of as much contextual data as possible (Thomas, 2006).

The coding process was followed by reviewing codes for themes and patterns. The process of category generation involved noting patterns evident in the setting and expressed by participants. As categories of meaning emerged, the researcher sought those categories that had internal convergence and external convergence (Guba, 1978). Categories should be internally consistent, but distinct from one another. Coding data is a formal representation of analytic thinking. Graneheim and Lundman (2004) describe the processes of inductive analysis where the salient categories emerge from the data

Categories and subcategories are most commonly constructed through the constant comparative method of data analysis. Therefore, categories should reflect the purpose of the research and they should also answer my research question. In this study, the researcher used units of data - a bit of information - are literally sorted into groupings that have something in common (Cho & Lee, 2014). By units of data, it is meant any meaningful or (potentially meaningful) segment of data. At the beginning, the researcher is uncertain of what is the ultimate meaning. Using simple coding and theme development. Categories contribute to the creation of themes and themes suggest further categories. The analysis is aimed at identifying units of meaning (themes). This was done by reading the data set sentence-by-sentence to create a picture, that is, to identify the storyline made of central themes identified as well as categories and subcategories that supported the central theme. Direct quotations from raw data used to support the storyline (Grbich, 2013).

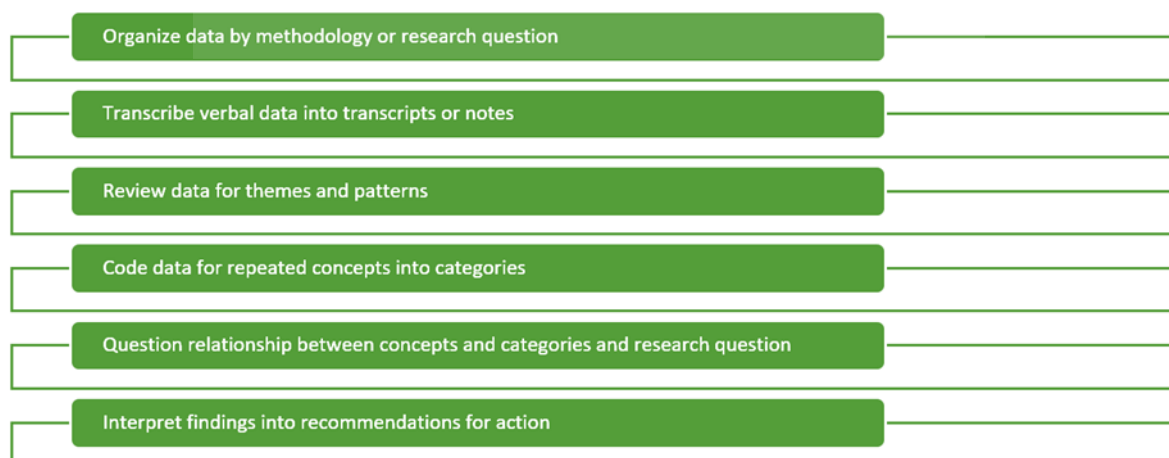


Figure 3.2 Data Analysis Steps

3.7 MEASURES TO ENSURE TRUSTWORTHINESS

Several authors (Rolfe, 2006; Morrow, 2005; Creswell, 2007; Shenton, 2004; Agostinho, 2005) have recommended Guba and Lincoln's trustworthiness framework of 1985 among other propositions to measure the quality of qualitative studies. It is the same framework that I used to achieve trustworthiness. Qualitative research is judged by using the criterion of trustworthiness. To ensure qualitative data is trustworthy, it is the responsibility of the researcher to provide findings as they emerge from the data generated. The researcher used triangulation to increase the credibility of the findings. Triangulation means the use of different methods to ensure the credibility of the study (Tashakkori & Teddlie, 2010). In qualitative research the trustworthiness of the study can be measured by considering four terms namely credibility, transferability, dependability and conformability (Guba, 1978).

3.7.1 Credibility

Credibility refers to accountability for the entire research process and it also entails actions in preparation of the field of research. Credibility is when the findings of the study is a reflection of reality and the context of where the study is conducted. Polit and Beck (2008) point out that credibility is the confidence in the truth of data and the interpretation thereof. According to (Culpepper & Aguinis, 2011), the credibility is truth of the findings. This study triangulated and used member checks technique to achieve credibility. Member checks also involved going back to the participants as a source of information to check both data and interpretation. The researcher in this study presented the transcribed data to the participants that partake in the study and asked them if the data recorded was what they experienced during WIL.

3.7.2 Transferability

Transferability refers to the extent to which the results of the research can be applied in similar contexts. In this study, the researcher provides a description of the demographics of the participants and a rich description of the findings supported by direct quotations from the participants. Culpepper and Aguinis (2011) observed that transferability shows that the findings have applicability in other contexts. This research project provides a rich thick description of the research process and the experiences of pre-service ICT support role teachers in using learning technologies

during WIL to ensure that the research findings could be applicable to other situations, times and contexts.

3.7.3 Dependability

The researcher described the entire research process carefully so that other researchers can follow the logic of the steps. A study cannot be credible without being dependable (Speziale & Carpenter, 2003). In addition, Hollowen (2005) argues that qualitative research report should provide a clear path of decision-making process so that trustworthiness thereof can be established. Dependability shows that the findings are consistent and could be repeated. In this study, inquiry audit techniques were employed to ensure the dependability of the study (Culpepper & Aguinis, 2011). The researcher established dependability by following the guidance of his supervisor to finally improve his distinctive authority as a researcher.

3.7.4 Confirmability

Confirmability refers to the degree to which the findings are the result of the participants' responses and condition of research only, not biases, motivation and perceptions of the research (De vos, Strydom & Fouche, 2012). Confirmability is a chain of evidence provided in the whole research process so that an audit can be conducted. The researcher ensured confirmability by conducting member checks after each focus group interview was conducted to confirm that the final presentation of the data was precise.

3.8 ETHICAL CONSIDERATIONS

It is a professional responsibility that the researcher must adhere to ethical principles throughout the research process. The Ethics Committee of the Faculty of Education at the University of Johannesburg evaluated and approved the proposal (See *Appendix A*). The study considered the following research principles: permission to conduct the study, informed consent, confidentiality, privacy, deception of participants and protection from harm. The research sought permission from the ICT support role students participating in the study before collecting data. Participants were provided with a consent form which was completed as a formal request to participate in the study. Sarantakos (2005) says that this form accepts that the participants' rights will

be protected at all cost during data collection. Polit and Beck (2008) state that participants should be treated with respect and the researcher should adhere to ethical principles: beneficence, respect for human dignity and justice. In interviewing participants in highly structured with pre-determined questions or semi-structured and open-ended carries with its both risks and benefits to the informants. Respondents may feel their privacy is invaded; they may be embarrassed by certain questions; and they may tell things they had never intended to reveal (Brinkmann, 2014).

3.8.1 Informed consent

Consent refers in particular to informed consent. This means that research subjects have the right to know that they are being researched, the right to be informed about the nature of the research and the right to withdraw. Polit and Beck (2008) maintain that every researcher should give correct/true and relevant information to all participants about the research process for them to be able to make informed consent. This implies that participation must be voluntary and informal, consent must be given. In this study, participants were told that they were free to withdraw from the research process any time, even after they have signed the consent form. All participants signed the consent forms to grant permission to partake in the research.

3.8.2 Confidentiality

The participant must be assured of anonymity, confidentiality and benefits for the participant must be clearly stated and also obliged to protect the participants' identity, place and location of the research (Rudolph, Young, & Havens, 2017). Polit and Beck (2008) reported that a guarantee of confidentiality, voluntary consent, the right to voluntary and contact information must be discussed before the data collection commenced. Confidentiality is commonly understood as akin to the principles of privacy and respect for autonomy (Oliver & Conole, 2003; Gregory, 2003). It is taken to mean that information given to another will not be repeated without permission. It also means that identifiable information about individuals collected during the research process will not be disclosed. The participants in this research were promised that the ***information collected will be kept confidential to protect their identity.***

3.8.3 Privacy

Participants should be treated with respect and dignity. Peu, Van Wyk and Botha (2008) stated that participants should be given an opportunity to make an informed voluntary decision. All participants were allowed to respond to interview questions without interference. Pseudonyms were used throughout the interview and research process to ensure anonymity. According to Polit and Beck (2008), the wishes, interests and rights of participants should always be considered at all costs. All tapes will be kept safe and will be destroyed after analysis of the data.

3.8.4 Deception of Participants

Deception involves withholding information or offering to ensure participation of subjects who otherwise might have refused (Strydom & Strydom, 2006: 66-67). In this research project, the aim of the research and whole research process to the study was explained well to all the participants. I said that the study was based on pre-service ICT support role teacher using learning technologies during WIL. Eventually, all participants voluntarily engaged in the research process without any coercion. In the study, no information pertaining to the study was deliberately withheld from the participants in order to obtain data.

3.9 SUMMARY

This chapter focused on the research design and layout of the study. It outlined the research methodology, sampling, measure of trustworthiness in qualitative data and ethical consideration. A qualitative approach was used to gather and analyses of data in the study. Pre-service ICT support role teachers were investigated using a case study as a method to describe the situation. A case study allowed the researcher an in-depth investigation as a participant will provide full descriptive responses regarding the use of learning technologies during WIL. Participants that took part in this project are currently doing fourth year ICT support role teachers studying at the University of Johannesburg. They were involved in a focus-group interview which was completed after their practicum session at schools.

CHAPTER 4. FINDINGS OF THE INQUIRY

4.1 INTRODUCTION

The aim of the study was to develop an in-depth understanding of how pre-service ICT support role teachers use learning technologies during WIL. In this study, data were collected and analysed using qualitative methods. Qualitative research involves the collection, analysis and interpretation of data that are not easily reduced to numbers (Bloomberg & Volpe, 2012). Qualitative data analysis focuses more on the use of a theoretical lens to interpret *narrative data* by assigning codes to a specific protocol. Tashakkori and Teddlie (2010) report that qualitative data analysis is characterized by reasoning from a specific point to arrive at a general theme. Focus-group interviews were used to collect data from the participants in this study. Appropriate data analysis processes involved organizing and preparing the data for analysis, reading through all data, and coding and categorizing the data which lead to the themes presented in this chapter. Themes were not pre-empted in advance but “grounded” from the gathered data. The process of analysis in the qualitative approach was a back and forth interaction between data collection and data analysis. The data were already presented and analysed by qualitative methods that are described in Chapter 3.

4.2 DISCUSSION OF THEMES

The experiences of pre-service ICT support role teachers during WIL were categorized into themes that were identified by finding repetitive patterns within the codes derived from basic content analysis of the focus-group interview and supported by direct quotations from the interview. This study has identified two broad categories related to the use of ICTs during WIL, namely **Success** and **Failure**. These categories each include a number of themes that emerged from the data.

Reason why pre-service ICT support role teachers succeed with ICTs during WIL include the themes *engaging learners, mentor teachers, technical support, access to ICTs, technical ability, technological knowledge, technological content knowledge, and technological pedagogical knowledge*. Reasons why pre-service support role teachers fail to use ICTs at the schools include the themes *lack of support, lack of access, physical challenges, and emotional challenges*).

Each of the two main categories and supporting themes will now be discussed in detail with direct quotes from the focus-group interview to support findings. Main themes that were identified as repetitive patterns are described individually in this section and presented with examples drawn directly out of the interviews conducted in the study.

4.3 SUCCESS

Successful implementation of ICTs during WIL seems to be as a result of a number of themes that emerged from the data.

4.3.1 Engaging learners

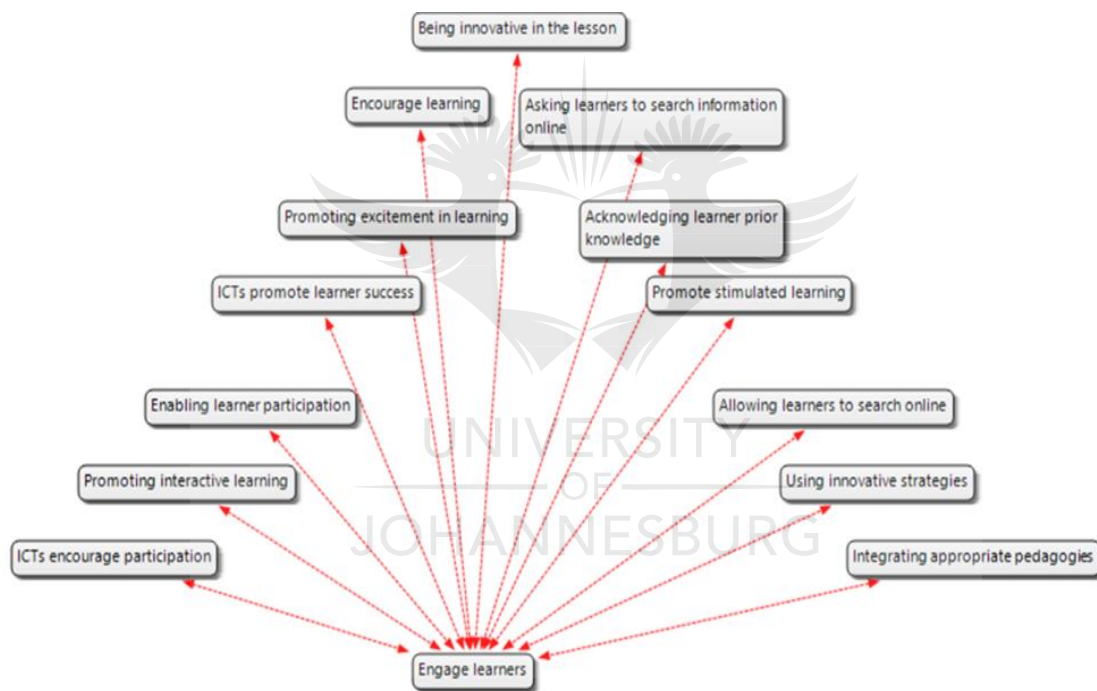


Figure 4.1 Codes for Engaging Learners

The first theme that emerged from analysis of the data is the notion of engaging learners. The most successful pre-service ICT support role teachers came up with creative ideas in engaging learners in the lesson. They demonstrated innovative pedagogical strategies to combine the ICTs into their activities. They reported that they used various ICTs in their actual teaching to mediate learning. Some participants reported on how they used ICTs in seemingly simple tasks to promote 21st Century skills and authentic learning:

“I had a lesson in history about the freedom charter... the learners... had to present the lesson using their PowerPoint slides with images and videos. In this lesson, I asked learners to be as creative as possible on how they can politicize their freedom charter”.

The participants were also able to prepare lessons that involved the use of ICTs that led to a better engagement. They were able to access information using ICTs:

“I provided them with a website that they can use to obtain reputable information for their studies”, create solutions, and analyse and apply knowledge in the teaching and learning process to keep the learners busy: ***“I was able to design ICT-integrated lessons and integrated the content that I will be teaching in class with the assistance from searching online and also involving the learners in this lesson”*** and ***“I used innovative pedagogies that relate to 21st Century skills that promote the authentic learning”***

Another participant reported on how they used their awareness of 21st Century skills as a guide to keep learners engaged ***“In my lesson learners were engaged because they are 21st Century kids and understand ICTs more than teachers, I was trying hard to integrate content that includes 21st Century skills”.***

Pre-service ICT support role teachers also reported they were able to engage learners by preparing them to develop high-order thinking skills in using ICTs in a variety of subjects. The first comment about subject specific engagement was: ***“Using ICTs make learners think in an advanced way as they get access to a lot of information and the latest trending information in a subject”.*** Examples from various subjects include accounting: ***“My learners were able to discover more information in Accounting which is the new information that was not included in their textbook, I was impressed”***, and in Business Studies: ***“I was able to use PowerPoint slides and other ICTs tools in Business Studies; my learners were interested in learning”***

Increasing learner participation through ICTs was a dominant theme: ***“My learners were able to explore new ways of learning new information using learning technologies”.*** Different technologies contributed much to the learning: ***“I used Edmodo in engaging the learners in completing their activity. Most of them, were***

excited [by] this new technology introduced to them". Pre-service ICT support role teachers were able to flourish using ICTs effectively in different areas of their teaching. They were able to promote learner engagement. Using various technologies, they promoted the desire to learn amongst the learners and increase the level of understanding: **"I find it easy to use multiple technologies, it has made my lesson a better as the learners were able to understand abstract concepts in physical science"**. In fact, pre-service ICT support role teachers pointed out that using ICTs has a vital role in improving learners' motivation and enthusiasm toward learning **"Using technology was exciting. My learners enjoyed playing kahoot in my subject and they were willing to read more so that they can be winners"**.

A second theme that arose from the data related to success was the notion that Mentor teachers play an important role in promoting the use of ICTs in mentoring the pre-service ICT support role teachers to successful teach using technology.

4.3.2 Mentor Teachers

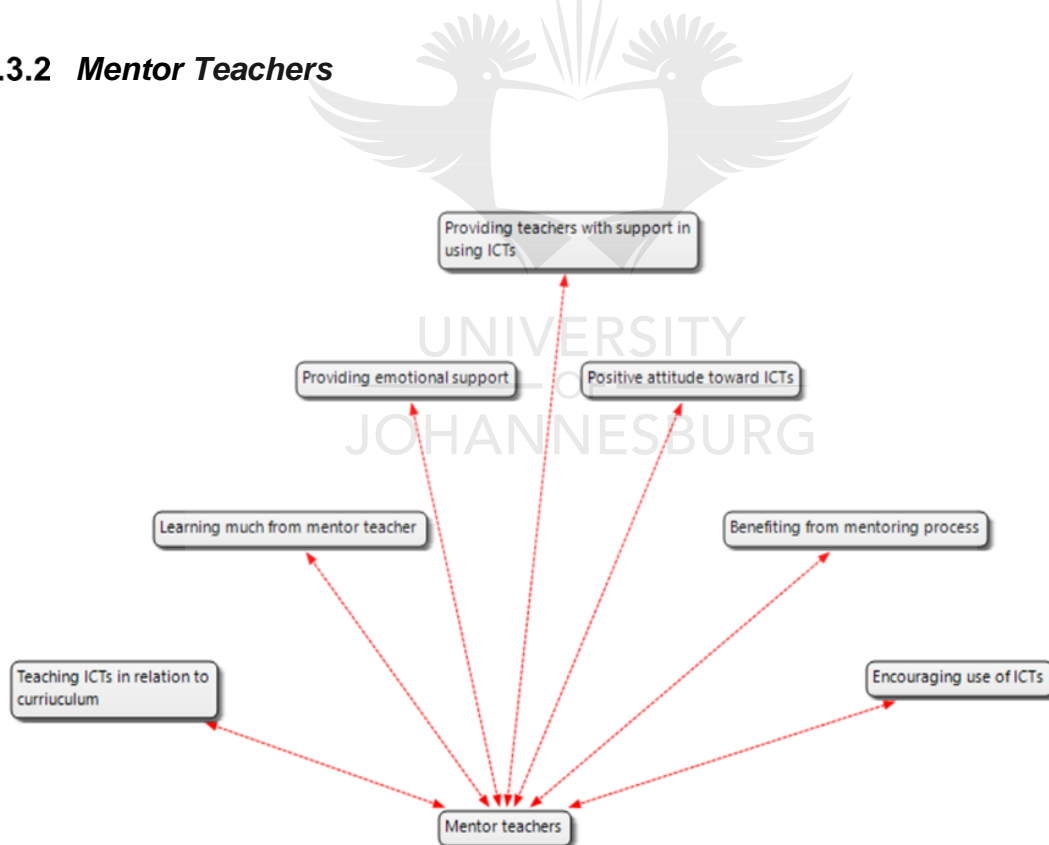


Figure 4.2 Codes Used for the Role of Mentor Teachers

In fact, one participant even made the link between engagement and good mentorship: ***“I felt empowered by the involvement of my mentor in assisting me to with some of the new technologies to use, I learned so much during school experience”***

Mentors with good skills of using ICTs enhance pre-service ICT support role teachers and teach them to use ICTs in many ways: ***“I have learnt a lot of teaching strategies that I can apply when using ICTs from my mentor teacher”***. Mentors with good ICT skills play a role in shaping and equipping pre-service ICT support role teachers with ICT skills of their own: ***“My mentor teacher was very skilled in using ICTs and showed me how I can teach mathematics using ICTs... and the lesson was very interesting”*** Another participant reported ***“I have grown so much from guides I have received from my mentor in using ICTs and also how I can prepare my lesson using ICTs”***. Mentors are seen as role model in fostering the use of ICTs and preparing pre-service ICT support role teachers for better teaching in their classroom.

Supportive mentor teachers equip the pre-service teachers with pedagogically sound teaching methods for effectively implementing ICTs in their classroom. Some of the pre-service ICT support role teachers reported that they felt empowered through mentoring: ***“I was able to understand how I can use new technologies to teach life science and that contributed very well toward my lesson”***. Supportive mentors empowered pre-service ICT support role teachers in other ways too:

“I was able to use technologies in geography with a good understanding in linking ICT because my mentor was very supportive... showing me the ropes to effectively use ICT in geography”.

“My mentor was very helpful, she taught me how I can get information related to geography and showed exciting videos that I can play for attention focusing”.

Another participant reported: ***“My mentor was very good with ICTs. He taught me so much and I learned how to share information with the learners... via their emails”***.

Mentors with good ICT pedagogical skills and confidence in using ICTs also impact on pre-service ICT support role teacher confidence ***“I was able to gain confidence because of my mentor teacher...”*** Mentor teachers also seem to have played an invaluable role regarding knowledge and understanding of the curriculum: ***“I learnt on***

how to use ICTs in accordance to the life science CAPs curriculum and that was amazing indeed” and “I never felt neglected in my teaching. I have grown from the mentorship I have received from my mentor. He showed how I can integrate ICTs in the curriculum”.

Mentors also assist the participants with technical support *“My mentor always supervised me during my lesson and assisted me with the technical issues. That has made my lesson a success because I never wasted time during my lesson”.*

In general, there was an overall realisation that good mentorship leads to success: *“I learned some of new methods that I can use from my mentor I think I’m well prepared to use ICTs in my subject specialisation next year, when I start teaching”.*

4.3.3 Technical Support

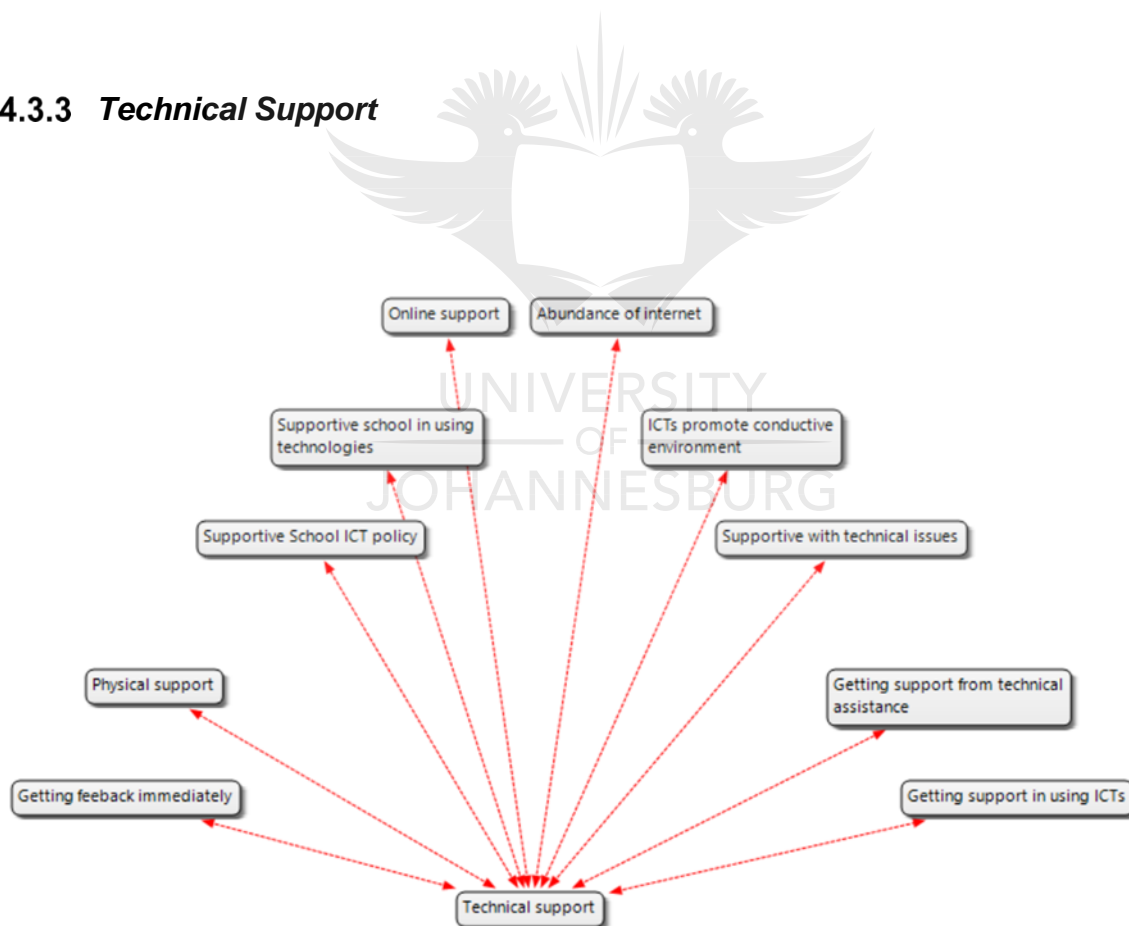


Figure 4.3 Codes Used for Technical Support

Technical support is a common theme that leads to successful implementation of ICTs during WIL. *“I was able to learn from the technical assistant, how to connect*

some of the ICT resources. My lesson went well with the support from the technical assistant". School ICT policy seems to play a major role in influencing the use of ICTs in the school: **"In my school, they have as strong school ICT policy that was powerful and it encourage teachers to teach using ICTs"**. Supportive technical assistance promotes successful implementation of ICTs tools in teaching. When the school ICT policy is backed by school leaders who are technologically advanced it seems to change the school culture: **"I was able to access the resources that were available in the school... I was able to use the interactive whiteboard in the classroom to prepare digital presentations... I found that the school culture was influencing the use of learning technologies"**.

Sometimes the support was overwhelming and unexpected: **"In my school the technical support was really strong we had six guys assisting with technical support... it was awesome because they also had a workshop every Friday... which was really amazing"**. Where the school ICT policy was implemented, technical support seemed to be available: **"In my school teachers were receiving on-going training in using ICTs provided by the school management. It was easier for me to teach using technologies because of the support that I have received in the school"**. The physical support and a strong ICT infrastructure led to better teaching and confidence: **"The ICTs resources in my school was working properly. I was able to teach very well in my lessons"** and **"In my school most of the resources were new technologies and all the learners have access to internet and tablets, I was able to teach effectively"**.

Access to ICTs is vital for successful teaching: **"I was able to teach as the school had the most advance ICTs resources that I can be able to use"**. Reliable internet access along with the previously mentioned technical support plays a role in enabling quality teaching and learning **"The Internet was working properly. I was able to access a lot of information for my lesson"**. With suitable access, pre-service teachers used technology extensively in their lessons: **"I used to plan the lesson and link the information gathered from the internet with the lesson plan"**. It was handy to have access to various things that made the preparation much easier: **"I use it to access the relevant YouTube videos that I will be using for the lesson."**

4.3.4 Access to ICTs

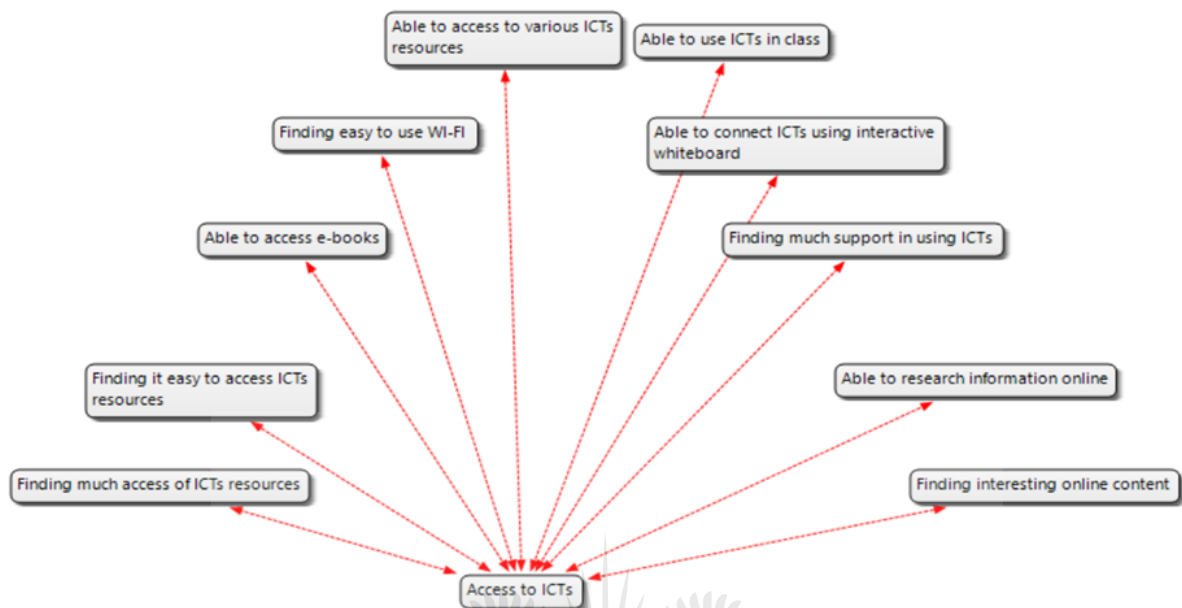


Figure 4.4 Codes used for access to ICTs

The participants also identified the opportunities in using other technologies in their teaching practice and some express that they felt empowered and comfortable due to the availability of the ICTs resources: ***The school have a vast of access to ICTs such tablets, teachers have laptops and have been preloaded with the necessary apps***". In some cases, students expected the high level of access to technologies and were not disappointed: ***Level of access in the school was adequate such smartboard, internet connectivity and some of the ICTs resources***". Participants in other cases were amazed that technologies were accessible in schools especially when they were encouraged to use them for teaching ***Teachers have computer rooms which are also connected to the internet in the school... they also did allow us to use this computer for doing research which enabled us to search teaching resources***".

One emerging theme that supports student success when implementing ICT is technical ability. Some pre-service ICT support role teachers demonstrated a high level of technical ability in the classroom ***I was able to search for slides related to World War I for my subject specialisation history. I got this from slideshare***".

another participant report ***“I encourage my learners to search more information based on what we were learning in the classroom by influencing them to get this information from Pinterest.”*** Pre-service ICT support role teachers were able to use other technologies in the classroom ***“I was using Socratic method in my classroom. Most of the learners enjoyed being involved in the lesson”*** Another participant claimed ***“In my class we had an online discussion in business studies about gambling, I was using Padlet...”*** This showed the ability to use more than one tool to promote learning through the technical skills that they possess. Some reported that they were able to use emerging technologies in the classroom to promote high quality teaching and learning using diverse technologies ***“Using Kahoot made the learners excited and thrilled. This one of my best lesson I have taught”*** Another participant pointed ***“I gave my student a challenge to create an e-book in their groups giving them various sub-topics under macro-environment”***. Some find the technological side of things very easy: ***“It was easy to connect interactive whiteboard; I also discover that I can be able to use this tool to teach a lot of things”***.

4.3.5 Technical Ability

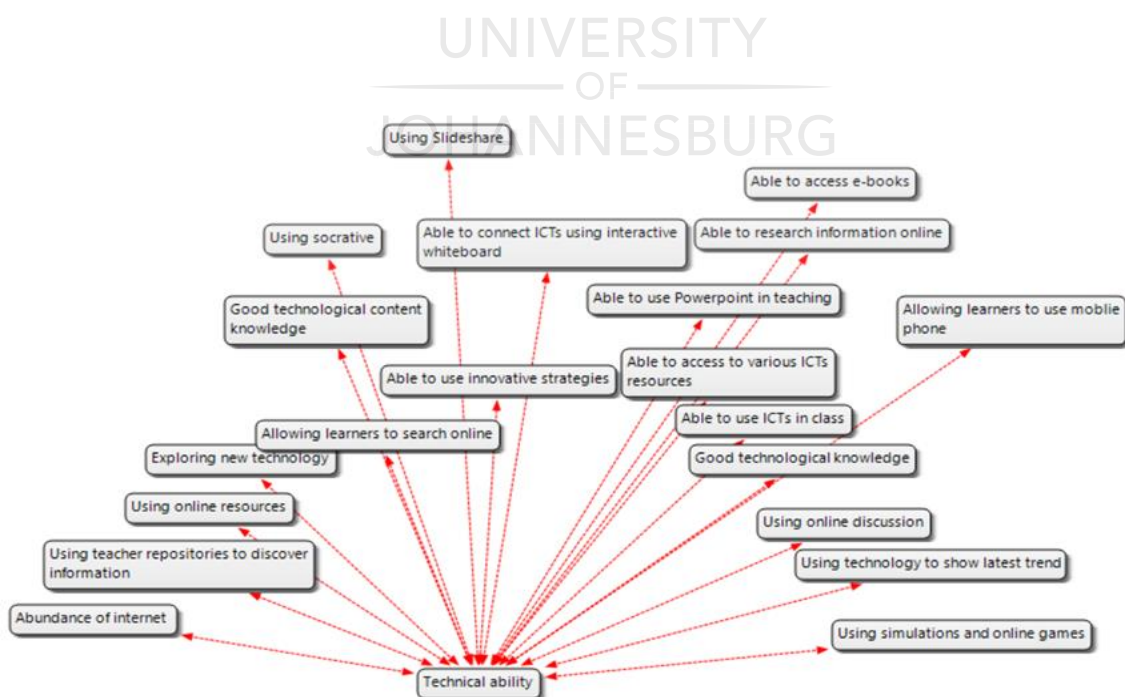


Figure 4.5 Codes Used for Technical Ability

University preparation was mentioned as a major factor in advancing technological skills *“I learned most of this skills from ICT support role module on how to do technical aspects of ICTs and I always advanced myself by watching videos to enhance my skills”* but others claimed to have learned things along the way” *I was able to discover some of this software online which assisted me to teach in my subject specialization.”* Nonetheless, technical ability is essential to ensure success in the learning process.

4.3.6 Technological Knowledge

The codes used to determine the understanding of technology knowledge by the pre-service ICT support role teachers during WIL are shown in *Figures 4-6*:

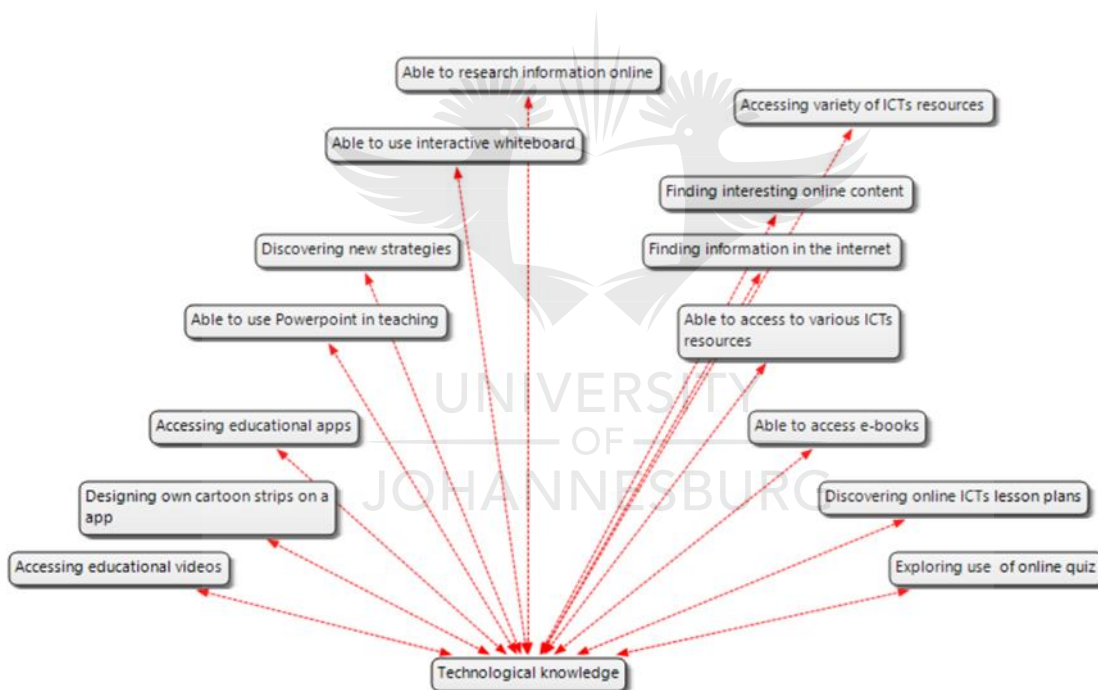


Figure 4.6 Codes Used for Technological Knowledge

Technological knowledge was found to be essential for student success in implementing ICTs during WIL. Pre-service teachers who were able to use various technologies were more able, and more likely, to discover the most appropriate Apps and tools available. There is an indication that these pre-service ICT support role teachers, with good technological knowledge, were very successful in implementing

their skills. Some show that they are able to use this knowledge in educational contexts to enhance learning **“I used PowerPoint as one of a tool for teaching in my lesson”** and **“I used an interactive whiteboard to show the learners the difference between rural and urban settlement in Geography.”** Others were able to use their technological knowledge to further enhance their own learning **“As a teacher, I was able to discover some of the tools that I can use to teach my lesson”**. This is an indication that these students have technological knowledge they can use to promote learning. **“I found the most of the information from google scholar that related to my subject in CAT”** and **“I found the most interesting slides from slideshare that related to my lesson which was on development of self in the society”**.

Lastly, due to their technological knowledge, some pre-service ICT support role teachers were able to creatively incorporate social media into their teaching: **“I found that Facebook is an effective learning tool to use when teaching. It enables learners to post the URL and other related information on Facebook created based on the topic chosen”**.

4.3.7 Technological Content Knowledge

Pre-service teachers had to be aware of how to link specific content with the use of technologies... and to be able to make learning more meaningful using ICTs.

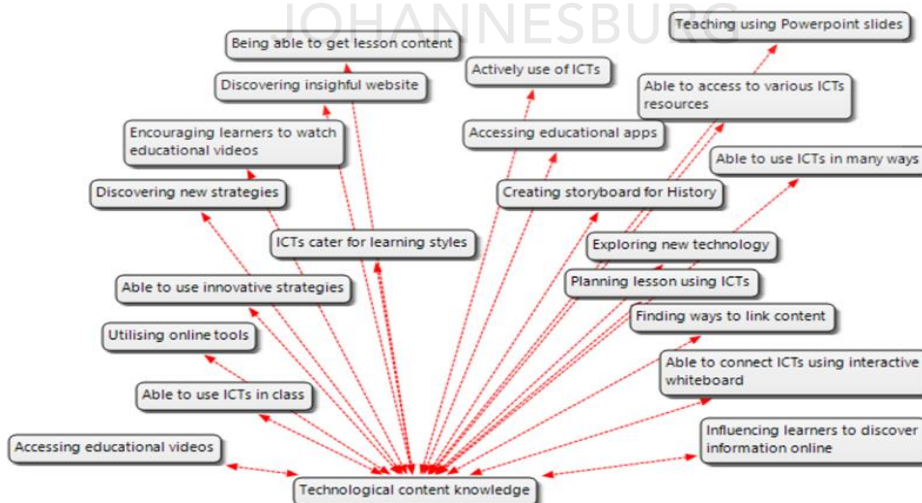


Figure 4.7 Codes used for Technological Content Knowledge

ICT has a considerable impact on the development of new and existing concepts in various subject specialization. Participants with suitable technological content knowledge are able to link technologies with the content provided in the curriculum document (CAPS). ***“I was able to link the periodic table with the information that I found from the internet and educational videos that clarify more in this lesson”*** and ***“I was able to find information about defining and measuring meteoric features in my subject”*** as well as ***“I was able to search for content online that benefited my learners”***.

Blending ICTs with subject content in creative ways that arouses the interest of the learners is one of the spinoffs of a good TCK. At the most basic level a participant mentioned. ***“I googled the related pictures in life science on cell division mitosis”*** while another claimed ***“I gave my learners an activity on World War 2 using Edmodo”***. Another one reported, ***“I found that Kahoot is a powerful educational game to link both content and technology”***.

More TCK is evident in the statements: ***“The learners in my class were able to participate when I ask them to search for information in life science using their mobile phones to search what is meant by cell structure and functional role of organelles”*** and ***“I gave my learners an opportunity to search for poems and gave them a task to analysis the poems found online using the guideline that I have provided”***. Further complexity involving TCK is seen in ***“I developed a quiz online which my students needed to complete ... it was related to content they learnt on growth and development in Economics.”***

4.3.8 Technological Pedagogical Knowledge

For a good understanding of technological pedagogical knowledge, and how it leads to successful implementation of ICTs during WIL, the following can be noted. The pre-service teacher has to be aware of how to use appropriate pedagogical skills in teaching effectively using ICTs. The codes representing the theme technological pedagogical knowledge are depicted in *Figures 4-8*.

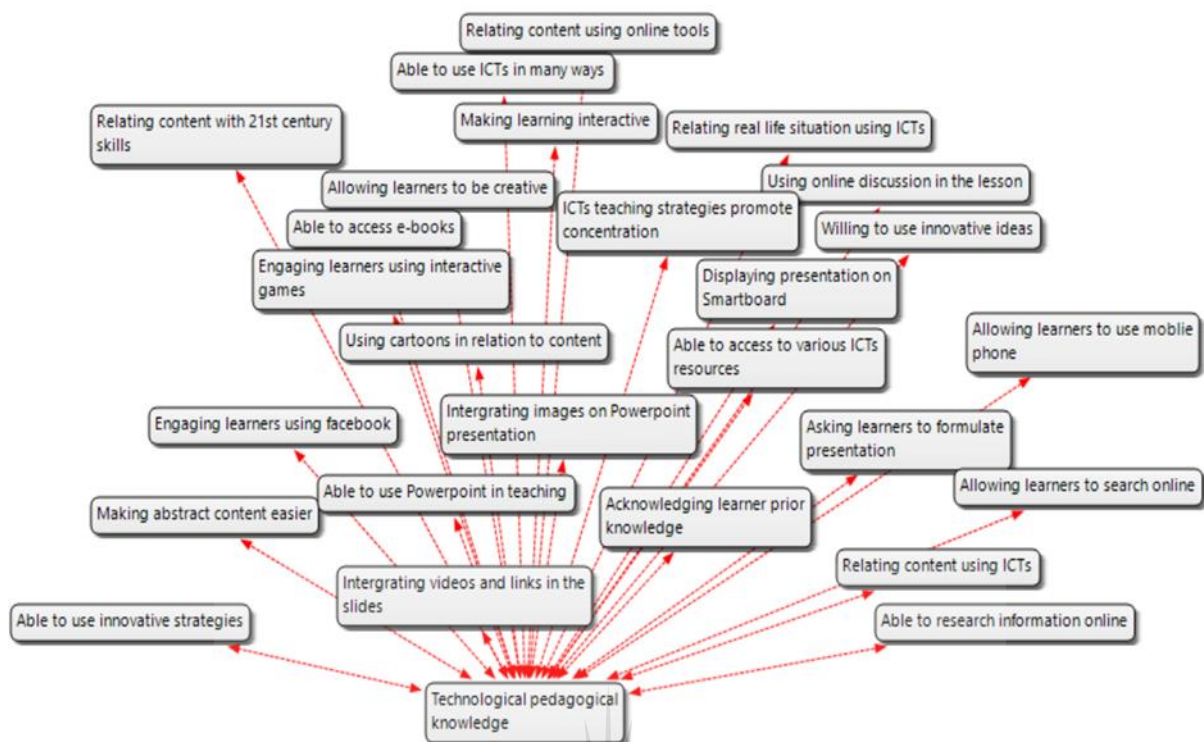


Figure 4.8 Codes used for Technological Pedagogical Knowledge

Some pre-service ICT support role teachers displayed a strong TPK in that they were able to accommodate learner’s preferential style of learning: ***“In my lesson, I used various teaching methods using ICTs tools to accommodate all tastes”***. A more specific example is evident here: ***“I used various ICTs tools to teach Business studies in a topic — macro environment. That made the learners to understand the different components that are involved under macro environment”***.

Participants demonstrated success in selecting the best ICTs tools that they could use for instructional practices. ***“I provided my learners with an activity in which they work in groups. I gave them various topics in Economics under the main topic factors of production. Learners were to use any form of presentation using an ICT tool of their choice”***. They were able to infuse ICTs and appropriate pedagogies into their teaching. These participants showed the ability to use various digital tools and teaching strategies to support their teaching and learning. ***“I discover valuable information online that I used in Geography on the topic climate and vegetation around the world... the learners will understand how climate varies across the world”***. Some gave learners an opportunity to be involved in their own learning which

is learner-centred ***“I gave my learners a group activity in which they have to develop a systematic plan in which they are required to solve a mathematical problem. I gave them a platform to use any form of presentation using technology”***. Such activities demand engagement and develop an imaginative thinking process. Another example: ***“I gave my learners an activity in business studies and asked them to do research about different of forms of ownership and find some examples of the companies and business that can fall under the forms of ownership”***.

4.4 FAILURE

Failure to implement ICTs during WIL seems to be as a result of a number of themes that emerged from the data.

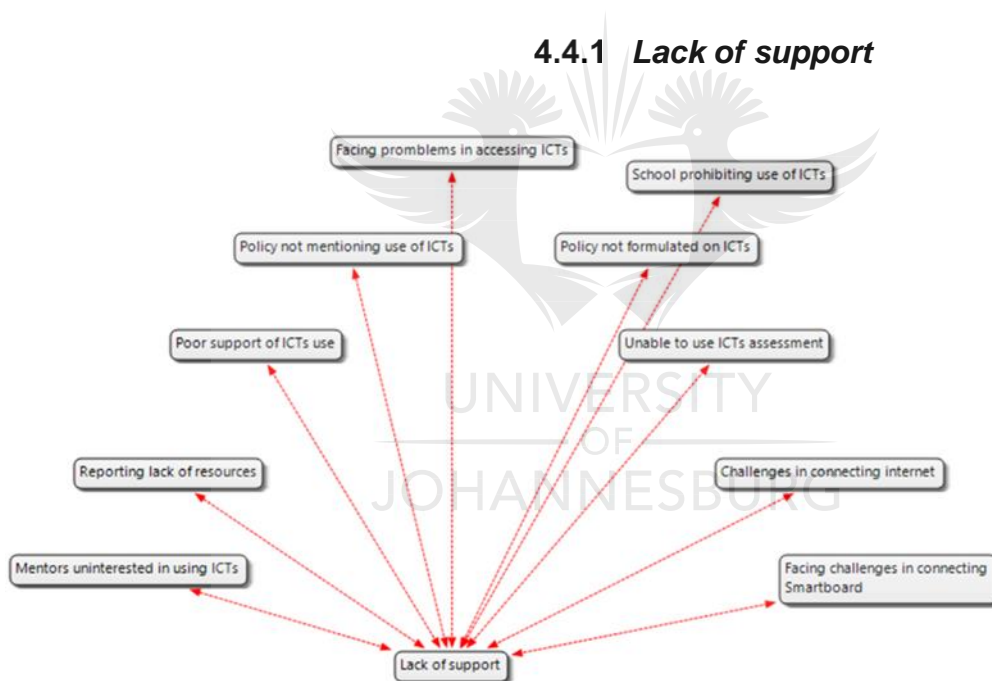


Figure 4.9 Codes used for Lack of Support

When blocked by any figure of authority at a school, participants reported that the lack of support was an inhibiting factor. ***“Okay, it was a discouragement. I asked my mentor teacher to use the computer labs for a short assessment in ICTs... she refused”***. At times, they were confronted with mentor teachers’ who were still teaching in an “old-fashioned” and rigid frame of mind: ***“Mentors were always encouraging the use of the textbook rather than ICTs”*** and ***“The level of encouragement in the school was quite poor because my mentor encouraged me to use traditional***

methods of teaching". A number of participants also experienced mentor teachers who are resistant to change **"My mentor teacher did not encourage me to use technology, she influenced me to teach using textbook only"**. Many mentor teachers also lack technological knowledge and were not using ICTs in their teaching **"My life science mentor told me that she cannot use ICTs, and she encouraged me to use only the textbook"** and **"My mentor teacher was unwilling to use technology... she said that she has never used technology in the learning environment. She still leans on the old traditional method of teaching using textbook, chalk and chalkboard that make her comfortable in her class"**. Many participants echoed the fact that their mentors were not fully familiar with technology in general and how it can be integrated into teaching: **"My mentor hardly uses ICTs for teaching"**. **"My mentor teacher discourages the use of ICTs because it is a waste of time... I should focus on using a textbook"**. Some mentors show active resistance to using ICTs and in some cases are very misinformed to the detriment of the participants: **"In my school I was encourage to use textbook. My mentor was very reluctant in using ICTs. She told me ICTs can be very distracting in the classroom"** and **"in my school ICTs was not used. My mentor told me it will distract the learners"**. It is worrying that the number of mentors who lack knowledge and skills in using technology is so high: **"My mentor was unable to assist me with using ICTs and she was unskilled in utilizing technologies"**.

Some pre-service ICT support role teachers failed to use ICTs in teaching as a result of a lack of technical assistance **"In my school there was no technical assistant. I had to learn to make my lesson work using technology. Luckily in my school I had one fellow student from university... we worked to assist each other"**. Some seemed to give up hope without technical assistance: **"I was unable to connect some of the ICTs equipment for teaching, that's the reason I was unable to teach effectively using ICTs tools"**. Some pre-service ICT support role teachers even felt neglected by their mentors and reported that teaching without technical support was a challenge and time consuming: **"I gave up on using ICTs for my lesson due to struggle to get assistance from the school. In my school, I they did not have a single technical assistant."**

4.4.2 Lack of access

ICTs is seen a powerful tool to facilitate teaching and learning. In this theme, I discuss how a lack of access to ICTs can lead to failure to use learning technologies during WIL.

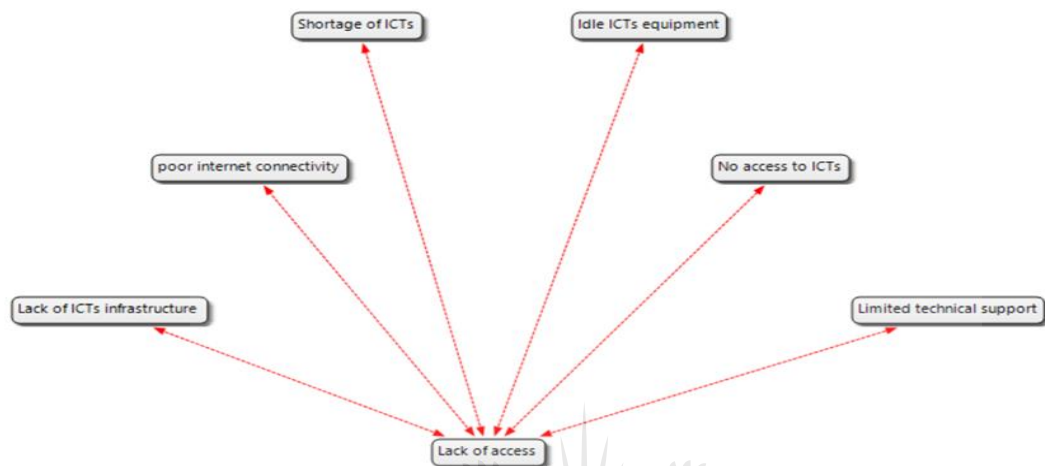


Figure 4.10 Codes used for Lack of Access

Some participants reported that they were unable to teach using ICTs due to poor access in general: ***“As much as I was prepared to teach in my school, I was unable to teach using ICTs due to lack of access to ICT resources”***, In some cases the resources were available but restricted: ***“It was completely impossible to use ICT in my school because most of the ICTs resources were locked away”***. Access to ICTs remained an issue in many schools and includes infrastructure constraints and poor internet connectivity: ***“In my school the internet was not working and there was no ICTs equipment that I can use, I was disappointed”*** and ***“Internet was a major problem that prevented me to search information for my lesson and I was demotivated by the situation.”*** Outdated tools are also an issue: ***“Some of the ICTs resources in my school were completely outdated which make it difficult to use them for teaching”*** and ***“Most of the computers in my school software are so old and they are not updated”***. In some cases, participants were not prepared for the older technologies that were still in use at the schools: ***“At my school the ICT equipment was the old one, which make it hard to teach using”***.

Some reported that schools have the resources but failed to use them due to school policy restrictions and undeveloped ICT policies. One participant noted, ***“In my class, I only taught using the textbook due to unavailability of the ICTs resources”***. A

last issue that restricted the use of ICTs in schools was the phenomenon of only having a certain number of working computers: ***It was impossible to use computer labs for teaching because out of thirty computers only ten computers were working***". In many cases, this is due to poor or non-existent maintenance, as well as theft. Neglect of donated technologies is commonplace.

4.4.3 Physical Challenge

Physical challenges that arose to prevent the implementation of ICTs into the teaching during WIL were identified from the qualitative analysis of the data. The main ideas making up this theme are illustrated in the figure below.

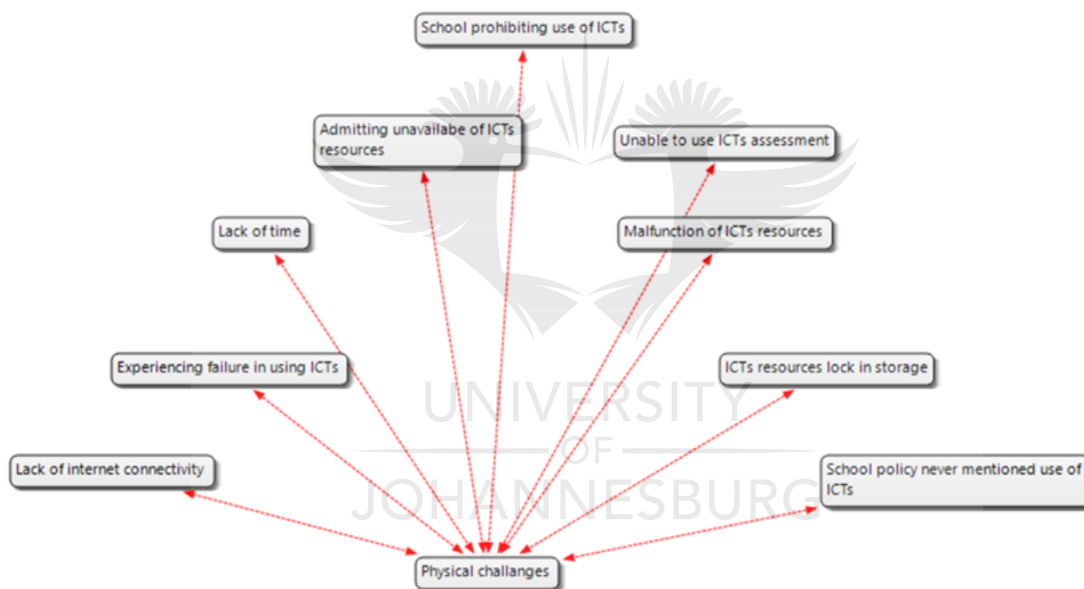


Figure 4.11 Codes used for Physical Challenge

Although seemingly similar to the section above, the first issue mentioned here are in fact physical barriers that presented themselves to participants who were trying to implement ICTs into the daily activities at the schools. The physical reality of resources that are not working can be very demotivating: ***“Some of the resources were not working properly and not suitable to be used for teaching”*** and ***“I went to school where internet connectivity was a problem and lack of resources for using ICTs which make it more challenging to integrate the lesson into ICTs”***. Another

lamented: ***“I find it hard to make use of technologies in my school. I encountered a problem of ICTs resources not working”***. Internet connectivity remains an issue especially if the connectivity is inconsistent: ***“During the lesson at times the internet also was a problem”***. This is all compounded when the school actually prohibits the use of ICTs in general for any reason.

Pre-service ICT support role teachers were challenged to use ICTs due to lack of support and maintenance difficulties to fix the malfunctioning of ICTs equipment's (computers and projectors) ***“In my school, most of the resources were not working properly which made it hard to teach using ICTs”***. One participant complained about technical faults faced when using ICTs equipment for teaching and learning ***“In my class, the projector was not working that was a failure for me to teach using ICTs”*** Physical challenge was experienced by most of the participants in various ways. Other obstacles faced during WIL was obsolete hardware and software; this was hampering ICTs integration. ***“Most of the software and hardware in my school were out of date to be used for teaching”***. Others reported old ICTs equipment's in their schools ***“The computers in my school were very old to be used for lessons”***. They acknowledged that during WIL that he had no technical assistance in using ICTs ***“My mentor teacher was unable to help me use interactive whiteboard”***. Another participant, ***“I asked for assistance to connect the internet in my school they were not supportive”***. Due to insufficient technical support, it limits the participants to use technologies in their lesson. Lack of time was identified by pre-service ICT support role teachers as it was time-consuming to connect the ICTs equipment without technical assistance ***“Some of my lessons were wasted by trying to connect some of the computers and that was disappointing”***.

A lot of obstacles occurred during Wil, such internet connection problem which prevented the smooth delivery of the lessons. ***“The internet connection in my school was always down which made it hard to use online assessment”*** Some of the participants were failing to connect the internet and in some school there was no internet. ***“In my school they did not have internet completely”***. Failure of integrating ICTs in to the online assessment remained as the most challenge. ***“My mentor was unskilled in showing me on how I can use online assessment for teaching Accounting”***. Other participants were unable to integrate ICTs in their teaching subjects as their mentors lack skills in teaching using ICTs in their subjects

“I wanted to teach most of the content using ICTs but my mentor was reluctant to teach me due to lacking ICTs skills”.

4.4.4 Emotional Challenge

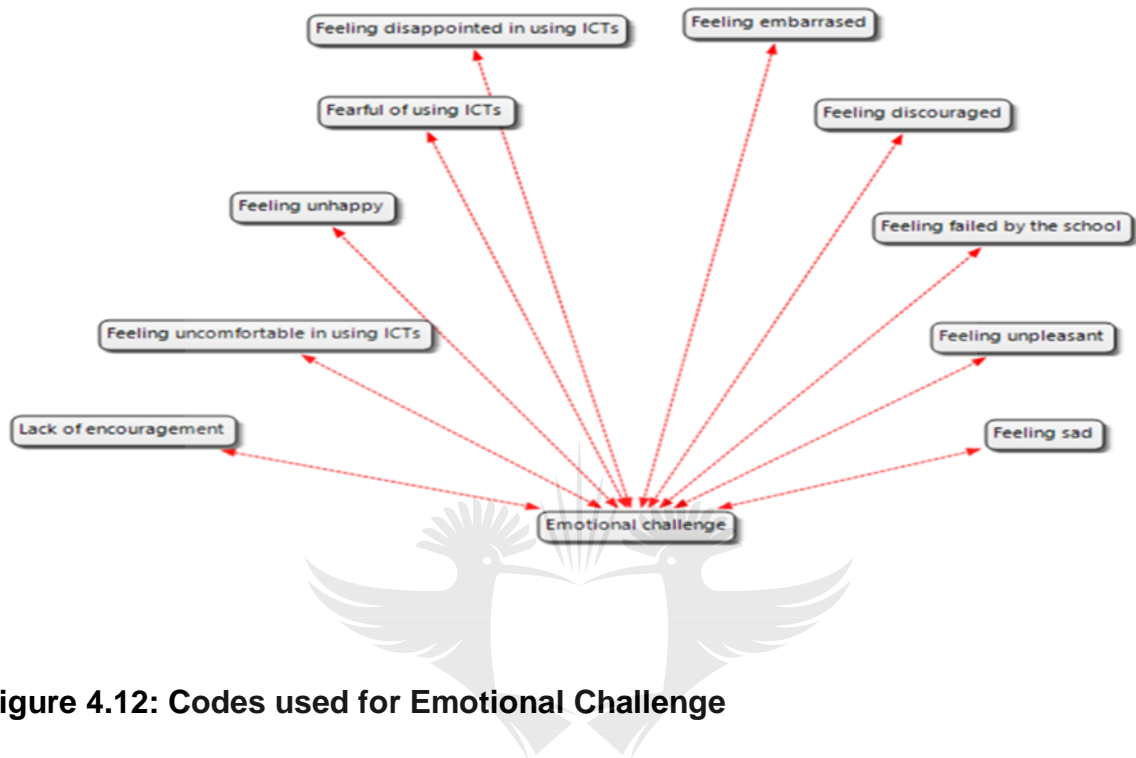


Figure 4.12: Codes used for Emotional Challenge

One of the emerging themes is *emotional challenges* that led participants to fail when trying to implement ICTs into their WIL practice. During WIL participants were confronted with issues such as lack of encouragement to use ICTs from their mentors and that discourage them to use ICTs for teaching. ***“I feel like my school failed me to use ICTs, they wanted me to teach using a textbook only”.*** Another participant states: ***“I was discouraged by the poor connectivity of the internet as much as I wanted to use ICTs it was difficult”.*** The school environment itself contributes to the potential to use technologies during WIL but can also be demotivating if things are not conducive to good teaching: ***“I was unhappy coming with that energy to teach using technologies and found that the school does not have ICT resources”.*** Another participant reports ***“I was hopeless in using ICTs because of the poor infrastructure in the school”.*** Fear of using ICTs was also experienced by other participants in these study. ***“I was scared to use some of the ICTs thinking that some of the learners will point out mistakes”.*** Some of the participants felt sad due

the lacking of the ICTs resources. ***“I was forced to use traditional method of teaching because of the situation in my school”***. Some mentor teachers were not giving students the necessary support to use technologies and instead instilled the traditional approach: ***“I felt so disappointed at how teachers were not willing to promote teaching using ICTs”***. There were many reports of pre-service ICT support role teachers who indicated that they were discourage from using ICTs due to technical faults ***“During my teaching I experienced a lot of technical issues and I was so embarrassed to continue using ICTs”***.

Some pre-service ICT support role teachers pointed out that they were less confident in using ICTs due to unreliable ICTs tools and technical glitches ***“I was disappointed in using ICTs because the resources in my schools were not working properly”***. Some participants reported that they were feeling ashamed and less confident in using ICTs new devices for teaching ***“My school had the latest devices, I was scared to teach using these resources to avoid embarrassment”***. Others showed reluctance in using new technologies in their teaching and learning ***“I was scared to try the new technologies for my teaching, I felt like I was not well developed in teaching using this new technologies”***. Some of the pre-service ICT support role teachers reported anxiety especially in integrating ICTs due to lack of technical skills and lack of practical experience in using ICTs resources ***“I felt sad because I was prepared to use technologies but in my school, I was hoping my mentor teacher would assist me with practical part of using ICTs”***. Some pre-service ICT support role teachers were not using ICTs in their teaching due to lack of support from their mentors. ***“I experienced problems with support to teach using ICTs from mentor teacher”***. Most of the school placement failed to provide the pre-service ICT support role with the necessary support structure. ***“I was disappointed that I had to follow the traditional method approach in teaching geography”***.

4.5 SUMMARY

This chapter presented the findings of the study. Chapter five will be used for the overview of the study. The final conclusions will be drawn and deficiencies in the research and recommendations for further research will be discussed.

CHAPTER 5. SUMMARY, DISCUSSION, CONCLUSIONS RECOMMENDATIONS, AND A FINAL WORD

5.1 INTRODUCTION

The aim of the study was to determine how pre-service ICT support role teachers use learning technologies during WIL. In the first section of this final chapter, I recap the background and methodology as in chapters 1, 2 and 3. The next section consists of my main findings (Which I consider to be the practical and methodological contribution of my research study). The next section contains the discussion of the theoretical contribution of my research. In the fourth and fifth sections respectively I will outline limitations of this research and recommendations for further research.

5.2 OVERVIEW OF THE CHAPTERS ONCE AGAIN

Chapter one described the context of the study. It included the research problem, research questions and aims and objectives of the study. The guiding question that drove the study was “*What are the experiences of pre-service ICT support specialists regarding the use of ICTs during WIL?*”

Chapter two presented an overview of literature relevant to the research question. The aim of this chapter was to demonstrate to the reader that the researcher has read widely in the field of ICTs in education and has a good theoretical grounding as well.

Chapter three reported on the processes of the study and describes the research design (qualitative research) that was followed in order to gather, record and analyse data. A case study was used to gather data (research method) using focus-group interview.

Chapter four discussed the findings of the research. References were made to direct quotations from the interviews to support the findings that are proposed.

5.3 BRIEF SUMMARY OF THE STUDY

A qualitative descriptive case study was used to investigate how pre-service ICT support role teachers use learning technologies during work-integrated learning. All final year students at the University of Johannesburg enrolled in the ICT Support Role

Methodology module took part in the study. These pre-service teachers reflected on aspects of using learning technologies during WIL in a focus group interview. The researcher was able to get more information by using the interview guide as a tool during the interview process (See *Figure 3.1*) to understand the experiences that were faced by pre-service ICT support role teachers during WIL. The focus-group interview was used as the source of collecting data for this study. The data were primarily analysed using the Atlas. ti software package. At the end of data analysis codes were sorted into themes which best described the use of ICTs by the pre-service –ICT support role teachers during WIL.

5.4 DISCUSSION OF THE FINDINGS

This section presents the main findings of the research project and also attempts to respond to the research question: ***What are the experiences of pre-service ICT support specialist regarding the use of ICTs during WIL?***

The answer is divided into two broad categories, namely **success** and **failure**. Reasons why participants either succeed or fail when trying to implement ICTs during WIL are provided below:

5.4.1 Why pre-service ICT support role teachers succeed with ICTs during WIL

Pre-service ICT support role teachers who were able to successfully integrate technologies for learning and teaching showed in the study that they have the ability to use ICTs to engage learners. They were able to use ICTs to support learner-centred and independent learning. They were able to engage learners using various ICTs. Pre-service ICT support role teachers were able to use this variety of ICTs to promote learner understanding and enabled learners to be independent thinkers. Participation along with the use of ICTs stimulated interest during the lessons and enhanced engagement once again. Pre-service ICT support role teachers showed a positive attitude toward using ICTs and also mentioned that it plays a role in benefiting the learners in learning (**Compare paragraph 4.3.1**)

Mentor teachers in this study play a supportive role to the pre-service ICT support role teachers by enriching them with the skills of using ICTs in their teaching and learning. This led to the successful implementation of ICTs where the mentor role was

paramount. Mentors provided them with emotional support and professional development in the use of ICTs. They equipped them with pedagogical knowledge to integrate appropriate ICTs into their subject matter. Most of the mentors showed confidence and competence in utilizing ICTs for teaching and learning. Therefore, it was an advantage for the pre-service ICT support role teachers to benefit from the expert mentors to acquire effective skills of using ICTs. In other words, the mentoring process during WIL was useful and insightful for most of the participants. They reported that their mentors were able to show them how to link ICTs with existing curriculum by providing relevant websites that they can use in their teaching. The participants who had a positive experience interacting with their mentors during WIL claimed that this provided them with the necessary practical experience to succeed. Mentor teachers were not only able to provide support to the pre-service ICT support role teachers, but helped them to embrace innovation in teaching and learning. In summary, mentor teachers were able to prepare pre-service ICT support role teachers for good pedagogical use of ICTs in very specific contexts and came away with solid guidelines from their mentors on how they can effectively implement ICTs in their daily instruction (**Compare paragraph 4.3.2**).

Access to a variety of ICTs led to student success. Reliable internet and a proper ICT infrastructure supported the pre-service ICT support role teachers the most. In fact, simple access to the Internet was a limiting factor in many schools. Some participants, on the other hand, were exposed to a wide range of digital technologies that enabled them to teach in various ways. Some of the participants found it easy to use the latest ICTs software and hardware to facilitate teaching and learning (**Compare paragraph 4.3.4**).

It showed in the analysis that pre-service ICT support role teachers have the ability to use ICTs planning the learning content. They have shown great development in linking ICTs with their subject specialisation. One of the reasons they gave that to explain how they were able to use technologies effectively is that they have a good content knowledge. Combined with appropriate pedagogical strategies, they were able to use technologies creatively to share the subject knowledge with their learners (**Compare paragraph 4.3.7**). Some pre-service ICT support role teachers demonstrated technical knowledge of using ICTs in their classroom and have also shown the capacity to use innovative strategies along with ICTs (**Compare paragraph 4.3.6**).

Some showed strong pedagogical skills and were able to select tools to make their teaching a success. They were able to enrich learning by using various teaching strategies to promote effective learning. Using ICTs tools was important to improve the learner's skills. In the study, it showed that some pre-service teachers have sound pedagogical skills which they can use to apply ICTs in various ways. During WIL they were able to fruitfully utilise these strategies to benefit the learners in their teaching. Through using various teaching strategies, they were able to cater for learners with different learning styles. It's evident from the study that pre-service ICT support role teachers have the capabilities to integrate new pedagogies which improved and increased learners learning. It showed that to be successful they must have strong technological pedagogical knowledge (**Compare paragraph 4.3.8**).

Technical support is seen as a key driver for successful use of ICTs in the classroom. This study demonstrated the importance of technical support and how it develops the ICTs capabilities of pre-service ICT support role teachers. In the analysis, we found that if they receive sufficient support to explore ICTs, they are more likely to succeed with ICT integration. They reported that to be successful they must receive support from the school leaders and mentor teachers in using ICTs. They also mentioned that in order to succeed with technology, the schools must have a strong school ICT policy to provide guidelines. A supportive school environment enables pre-service ICT support role teachers to feel comfortable to use ICTs in their teaching. This boosts their confidence in using ICTs and their ability to successfully integrate ICTs in their teaching (**Compare paragraph 4.3.3**).

Physical support was a strong theme that emerged from the data. Some reported that they were able to boost their skills by reading information online to gain some of the teaching strategies that they can use in teaching using ICTs. This would have been impossible without the physical support. Participants who were able to succeed with the use of ICTs stated that it was because of the school being supportive and providing them with the necessary technical assistance. It also appears that a strong technical ability enables them to use alternative and new technologies in their teaching (**Compare paragraph 4.3.5**).

5.4.2 Reason why pre-service ICT support teachers failed with ICTs during WIL

Problems that led to the failure to implement ICTs included a lack of school leadership and poor management. Of course, this affected the participants who were involved in those schools during WIL in a negative way. Regarding the support, pre-service ICT support role teachers reported that they were “failed” by their mentor teachers. Poor mentors could not prepare them to develop skills and appropriate knowledge in using ICTs for teaching and learning. The mentors’ lack of technical skills affected their development - they were unable to face challenges without the assistance and technical support of their mentors. Some of their mentors were resistant to change and had a negative attitude in using ICTs. Lack of technical support is an obstacle to teaching and learning. Even simple technical obstacles like failing to connect to the school Wi-Fi and encountering malfunctioning equipment prevents meaningful engagement and ultimately impacts on teaching and learning (**Compare paragraph 4.4.1**).

In this study, a general challenge that faced many is the poor internet connection. The findings indicate that in most of the school placements where there was no reliable internet connectivity there was a corresponding inability of participants to succeed in their efforts to implement ICTs. It was also difficult for pre-service ICT support role teachers to obtain information related to their subject specialisation. The actual shortage of technological resources was mentioned by the many of the pre-service ICT support role teachers who did not succeed. They stated that the limitations had impacted negatively on their teaching even though they were actually willing to use technologies in their subject specialisations. Sadly, some also mentioned that the ICTs resources that were available in their schools were very old and outdated. In general, findings show that lack of access brings a lot of challenges for pre-service ICT support role teachers in utilising ICTs in their actual teaching (**Compare paragraph 4.4.2**). A dominant physical challenge that participants mentioned in the study is the lack of time to master ICTs. Some ICTs took long to operate while others took long to learn. Some mentioned poor quality of hardware and inappropriate software as factors that prevented them from succeeding. Infrastructure barriers like internet access have already been mentioned but other physical challenges that led to failure in schools also included the lack of computers and insufficient ICTs resources in general. Some

of the participants discussed that they were unable to use integrate ICTs in their subject specialisation due to lack of support from their mentors. Others experienced a lack of time to use technologies in their classroom because they lack assistance from their mentors which was an obstacle (**Compare paragraph 4.4.3**).

Pre-service ICT support role teachers who failed to implement ICTs during WIL reported that they felt a lack of confidence and that they also had fear of failure. They also showed other emotions like despair and helplessness that led them to fail to use ICTs which also caused by the various school contexts that led to technical problems. This led them to be resistant to teaching using ICTs. Some of the pre-service ICT support role teachers were doubtful of their ICT knowledge which made them to feel anxious about teaching possibly once again due to simple lack of support. Some of them reported that they do not consider themselves capable of using ICTs in front of the class of the learners who are more advanced than them. Some were discourage to teach due to repetitive technical faults in their lesson and with no technical support. Pre-service ICT support role teachers indicated that are fearful to teach using equipment (**Compare paragraph 4.4.4**)

These are only some of the reasons that characterised their failure to use ICTs during WIL. Further studies will surely uncover the complexities of this topic in more detail.

5.5 RECOMMENDATIONS

The study makes the following recommendations.

5.5.1 *Recommendation for future research*

Future research needs to focus on:

- ✓ how pre-service ICT support role teacher collaborate with their mentor teachers in using emerging technology in education
- ✓ how new technology will continue to impact learners learning in the future.
- ✓ How mentor teachers can be involved in the professional development of pre-service ICT support role teachers.
- ✓ how a mixed method study including quantitative elements - less subjective and more scientific (more objective than qualitative methods) – can be used to

elaborate on various possible relationships between variables raised in this qualitative study.

- ✓ a need to determine the extent to which pre-service ICT support role teachers can improve their ICTs skills and develop innovative pedagogies in their teacher education programs.

5.6 LIMITATIONS

Patton (1985) noted that limitations of a study demonstrate that the researcher understands the reality that the researcher can make overwhelming claims about generalizability or conclusiveness relative to what the researcher has learned. Also, limitations derive from the conceptual framework and study design. It was quite challenging to organize the participants in the study but a suitable cohort was selected and agreed to take part. One limitation of the study is thus the small number of participants who may not be representative of the entire group. This qualitative study is not, however, making any claims of generalisability and is simply evidence of novice research in a particular field. Another limitation is that the study did not consider responses from mentor teachers who were involved in the integration of learning technologies with these students.

Focus-group interviews make summarized and interpretation of results difficult. During the interpretation of the data, I was aware of differences in the dynamics of different groups and of identifying the opinions and views of individual members. Data generated using the qualitative method is voluminous and it is important to note that the findings generated in this study are the opinion of the researcher alone.

A challenging part of the interview process is that the participants were feeling uncomfortable once I mentioned that I will be using an audio-tape recording. This makes me aware of getting adequately rich data through the interview process. This may have had an impact on their responses regarding their experience of using ICTs during WIL but I did do my best to assure them of the ethical use of their opinions.

5.7 A FINAL WORD

Learning technologies can change the landscape of teaching and learning in schools as it shifts them from the traditional approach of teaching to 21st century skills. In this

study, pre-service ICT support teachers demonstrated various ways in which they harness ICTs in their teaching and learning. They are information-rich and are able to utilise technology effectively within an educational setting if various factors allow them to succeed. There will always be factors that force them to fail in this endeavour but with suitable support and guidance, along with a good measure of technical support and access to various tools this issue can be resolved. If given the opportunities, they are capable of using ICTs to enrich teaching and learning in many ways. School placement plays an important role in shaping the pre-service teachers in teaching using technology and this is influenced by the availability of ICT resources and the support of mentor teachers at the schools. The choice of good schools who are receptive to pre-service ICT support role teachers is essential. Schools must have adequate access to ICTs and must provide technical and emotional support to the students. Mentors must be good role models and must be proponents of the use of ICTs in education or else we will be wasting our time and demotivating a whole cohort of teachers who have the potential to change the lives of a new generation of learners. We can only hope for more evidence of successful implementation of ICTs during WIL in the future.

REFERENCES

- Agostinho, S. (2005). Naturalistic inquiry in e-learning research. *International Journal of Qualitative Methods*, 4(1), 13-26.
- Albion, P. R., & Ertmer, P. A. (2002). Beyond the foundations: The role of vision and belief in teachers' preparation for integration of technology. *TechTrends*, 46(5), 34-38.
- Anderson, R. E., & Dexter, S. L. (2000). School Technology Leadership: Incidence and Impact. Teaching, Learning, and Computing: 1998 National Survey, Report# 6.
- Alharbi, N. N. A. (2012). *Pre-service science teachers' understanding of the concepts relating to diffusion, osmosis, and the particulate nature of matter and their attitudes towards science*. (Doctoral dissertation, Curtin University).
- Angeli, C., & Valanides, N. (2005). Preservice elementary teachers as information and communication technology designers: An instructional systems design model based on an expanded view of pedagogical content knowledge. *Journal of Computer Assisted Learning*, 21(4), 292-302.
- Angeli, C., & Valanides, N. (2009). Epistemological and methodological issues for the conceptualization, development, and assessment of ICT-TPCK: Advances in technological pedagogical content knowledge (TPCK). *Computers & education*, 52(1), 154-168.
- Bate, F. (2010). A bridge too far? Explaining beginning teachers' use of ICT in Australian schools. *Australasian Journal of Educational Technology*, 26(7).
- Bartlett, A. (2002). Preparing preservice teachers to implement performance assessment and technology through electronic portfolios. *Action in Teacher Education*, 24(1), 90-97.
- Barfi, K. (2015). *The attitude and competence level of basic school teachers in the teaching of ICT in Cape Coast Metropolis* (Doctoral dissertation, University of Cape Coast).
- Baylor, A. L. (2002). Expanding preservice teachers' metacognitive awareness of instructional planning through pedagogical agents. *Educational Technology Research and Development*, 50(2), 5-22.
- Belland, B. R. (2009). Using the theory of habitus to move beyond the study of barriers to technology integration. *Computers & Education*, 52(2), 353-364.
- Bernard, H. R., Wutich, A., & Ryan, G. W. (2016). *Analysing qualitative data: Systematic approaches*. SAGE publications.
- Berg, B. L., Lune, H., & Lune, H. (2004). *Qualitative research methods for the social sciences* (Vol. 5). Boston, MA: Pearson.
- Bingimlas, K. A. (2009). Barriers to the successful integration of ICT in teaching and learning environments: A review of the literature. *Eurasia Journal of Mathematics, Science & Technology Education*, 5(3).
- Bloomberg, L. D., & Volpe, M. (2012). *Completing your qualitative dissertation: a road map from beginning to end: a road map from beginning to end*. Sage.

- Brown, D., & Warschauer, M. (2006). From the university to the elementary classroom: Students' experiences in learning to integrate technology in instruction. *Journal of Technology and Teacher Education*, 14(3), 599-621.
- Brinkerhoff, J. D., Ku, H., Glazewski, K., & Brush, T. (2002). Development, results and validation of technology integration surveys for preservice and practicing teachers. In *annual meeting for the Association of Educational Communications and Technology, Atlanta, GA*. Accessed 9 Sept 2018 from http://pt3.ed.asu.edu/docs/AECT2001_technology_survey.doc.
- Brinkmann, S. (2014). Interview. In *Encyclopaedia of Critical Psychology* (pp. 1008-1010). Springer New York.
- Brush, C. G., Duhaime, I. M., Gartner, W. B., Stewart, A., Katz, J. A., Hitt, M. A., & Venkataraman, S. (2003). Doctoral education in the field of entrepreneurship. *Journal of management*, 29(3), 309-331.
- Bullock, D. (2004). Moving from theory to practice: An examination of the factors that preservice teachers encounter as the attempt to gain experience teaching with technology during field placement experiences. *Journal of Technology and Teacher Education*, 12(2), 211-237.
- Burns, N., & Grove, S. K. (2005). Using statistics to examine relationships. Burns N, Grove SK, eds *The Practice of nursing research: Conduct, Critique and Utilization 5th ed St Louis, MO: Elsevier*, 486-700.
- Carson, D., Gilmore, A., Perry, C., & Gronhaug, K. (2001). *Qualitative marketing research*. Sage.
- Carroll, D. (2005). Learning through interactive talk: A school-based mentor teacher study group as a context for professional learning. *Teaching and Teacher Education*, 21(5), 457-473.
- Cavenall, P. E. R. (2008). *Preparing prospective teacher education students at two-year post-secondary institutions: an assessment of proficiency in technology usage*. Texas A&M University.
- Chang, C. Y., Chien, Y. T., Chang, Y. H., & Lin, C. Y. (2012). MAGDAIRE: A model to foster pre-service teachers' ability in integrating ICT and teaching in Taiwan. *Australasian Journal of Educational Technology*, 28(6).
- Condie, R., & Livingston, K. (2007). Blending online learning with traditional approaches: changing practices. *British Journal of Educational Technology*, 38(2), 337-348.
- Chai, C. S., Koh, J. H. L., & Tsai, C. C. (2010). Facilitating preservice teachers' development of technological, pedagogical, and content knowledge (TPACK). *Educational Technology & Society*, 13(4), 63-73.
- Chai, C. S., Hong, H. Y., & Teo, T. K. G. (2009). Singaporean and Taiwanese pre-service teachers' beliefs and their attitude towards ICT use: A comparative study.
- Chen, R. J. (2010). Investigating models for preservice teachers' use of technology to support student-centered learning. *Computers & Education*, 55(1), 32-42.

- Cho, J. Y., & Lee, E. H. (2014). Reducing confusion about grounded theory and qualitative content analysis: Similarities and differences. *The qualitative report*, 19(32), 1-20.
- Christensen, K., Johnson, T. E., & Vaupel, J. W. (2006). The quest for genetic determinants of human longevity: challenges and insights. *Nature Reviews Genetics*, 7(6), 436.
- Cooper, D. R., Schindler, P. S., & Sun, J. (2006). *Business research methods* (Vol. 9). New York: McGraw-Hill Irwin.
- Cohen, S. (2012). Apps meet the common core state standards in writing. *Teacher Librarian*, 40(2), 32.
- Crabtree, B. F., & Miller, W. L. (1992). Doing qualitative research. In *Annual North American Primary Care Research Group Meeting, 19th, May, 1989, Quebec, PQ, Canada*. Sage Publications, Inc.
- Creswell, J. W. (2007). Five qualitative approaches to inquiry. *Qualitative inquiry and research design: Choosing among five approaches*, 2, 53-80.
- Creswell, J. W., Klassen, A. C., Plano Clark, V. L., & Smith, K. C. (2011). Best practices for mixed methods research in the health sciences. *Bethesda (Maryland): National Institutes of Health*, 2013, 541-545.
- Creswell, J. W. (2012). Educational research. *Planning, conducting, and evaluating quantitative and qualitative research*.
- Cuban, L. (2001). Oversold and underused: computers in the classroom. -Harvard College. 250 p.
- Culp, K. M., Honey, M., & Mandinach, E. (2005). A retrospective on twenty years of education technology policy. *Journal of Educational Computing Research*, 32(3), 279-307.
- Culpepper, S. A., & Aguinis, H. (2011). Using analysis of covariance (ANCOVA) with fallible covariates. *Psychological Methods*, 16(2), 166.
- Dawson, V. (2008). Use of information communication technology by early career science teachers in Western Australia. *International Journal of Science Education*, 30(2), 203-219.
- Dawson, K., & Dana, N. F. (2007). When curriculum-based, technology-enhanced field experiences and teacher inquiry coalesce: An opportunity for conceptual change. *British Journal of Educational Technology*, 38(4), p656-667.
- Dede, C. (2008). Theoretical perspectives influencing the use of information technology in teaching and learning. In *International handbook of information technology in primary and secondary education* (pp. 43-62). Springer, Boston, MA.
- Deem, R. (2002). Talking to manager-academics: Methodological dilemmas and feminist research strategies. *Sociology*, 36(4), 835-855.
- Department of Basic Education (2011). Curriculum and Assessment Policy Statement. Computer Application technology. Pretoria: Department of Basic Education. Available <http://www.education.gov.za/LinkClick.aspx?fileticket=ze6JhhFYdCg%3D&tabid=572&mid=1564>. Accessed 22 February 2016. Department of

- Education (Doe). (2004b). *White paper on e-education: transforming learning and teaching through information and communication technologies*. Pretoria.
- Department of Education (Doe). (2007a) *Guidelines for teacher training and professional development in ICT*. Pretoria.
- Department of Basic Education (DBE). (2011). *Department of Basic Education annual report*. Pretoria.
- Department of Basic Education (DBE). (2012). *Report on the annual national assessments 2012*. Pretoria.
- Denzin, N. K., & Lincoln, Y. S. (2008). *Strategies of qualitative inquiry* (Vol. 2). Sage.
- Dewey, J., & Bentley, A. (1949). The knower and the known. *The Later Works of John Dewey*, 16.
- De Vos A.A., Strydom. H., Fouche, C.B (2012). *Research at grass roots: for the social sciences and human professions*. Cape Town: Van Shaik.
- Dexter, S., & Riedel, E. (2003). Why improving preservice teacher educational technology preparation must go beyond the college's walls. *Journal of teacher education*, 54(4), 334-346.
- Doering, A., Hughes, J., & Huffman, D. (2003). Preservice teachers: Are we thinking with technology? *Journal of Research on Technology in Education*, 35(3), 342-361.
- DiCicco-Bloom, B., & Crabtree, B. F. (2006). The qualitative research interview. *Medical education*, 40(4), 314-321.
- Dundappa Mhetre, D., & Surywantshi, S. (2013). Primary school teachers' views and towards ICT in rural area (a case of South Solapur). *Researcher's world: Journal of art science & Commerce*, 4(1).
- Elo, S., & Kyngäs, H. (2008). The qualitative content analysis process. *Journal of advanced nursing*, 62(1), 107-115.
- Enochsson, A. B., & Rizza, C. (2009). ICT in initial teacher training: Research review.
- Ertmer, P. A. (2005). Teacher pedagogical beliefs: The final frontier in our quest for technology integration? *Educational technology research and development*, 53(4), 25-39.
- Ertmer, P. A., & Ottenbreit-Leftwich, A. T. (2010). Teacher technology change: How knowledge, confidence, beliefs, and culture intersect. *Journal of research on Technology in Education*, 42(3), 255-284.
- Eteokleous, N. (2008). Evaluating computer technology integration in a centralized school system. *Computers & Education*, 51(2), 669-686.
- Farrell, G., Isaacs, S., Trucano, M., Hamdy, A., Hare, H., Tetang Tchinda, J., ... & Fall, B. (2007). Survey of ICT in Education in Africa, Volume 2: 53 Country Reports.
- Feiman-Nemser, S. (1998). Teachers as teacher educators. *European journal of teacher education*, 21(1), 63-74.
- Flick, U., Kardorff, E. V., & Steinke, I. (2000). Qualitative research. *Handbook*, 5.
- Friese, S. (2012). Atlas. ti 7 user guide and reference. In.: Berlin: Atlas Scientific Software Development.

- Gill, P., Stewart, K., Treasure, E., & Chadwick, B. (2008). Methods of data collection in qualitative research: interviews and focus groups. *British dental journal*, 204(6), 291.
- Glesne, C., & Peshkin, A. (1992). Being there: Developing understanding through participant observation. *Becoming Qualitative Researchers: An Introduction*. White Plains, NY: Longman, 39-61.
- Graham, C. R. (2011). Theoretical considerations for understanding technological pedagogical content knowledge (TPACK). *Computers & Education*, 57(3), 1953-1960.
- Graneheim, U. H., & Lundman, B. (2004). Qualitative content analysis in nursing research: concepts, procedures and measures to achieve trustworthiness. *Nurse education today*, 24(2), 105-112.
- Grbich, C. (2013). Integrated methods in health research. *Research methods in health: Foundations for evidence-based practice*, 312-322.
- Gregory, I. (2003). *Ethics in research*. A&C Black.
- Grove, K., Strudler, N., & Odell, S. (2004). Mentoring toward technology use: Cooperating teacher practice in supporting student teachers. *Journal of Research on Technology in Education*, 37(1), 85-109.
- Guba, E. G. (1978). Toward a Methodology of Naturalistic Inquiry in Educational Evaluation. CSE Monograph Series in Evaluation, 8.
- Guest, G., Bunce, A., & Johnson, L. (2006). How many interviews are enough? An experiment with data saturation and variability. *Field methods*, 18(1), 59-82.
- Haydon, T., Hawkins, R., Denune, H., Kimener, L., McCoy, D., & Basham, J. (2012). A comparison of iPads and worksheets on math skills of high school students with emotional disturbance. *Behavioral Disorders*, 37(4), 232-243.
- Henning, E., Van Ransburg, W. & Smit, B. (2004). *Finding your way in qualitative research*. 1st edition. Pretoria, South Africa: Van Schaik Publishers.
- Heckathorn, D. D. (2002). Respondent-driven sampling II: deriving valid population estimates from chain-referral samples of hidden populations. *Social problems*, 49(1), 11-34.
- Hennessy, S., & Deaney, R. (2004). Sustainability and evolution of ICT-supported classroom practice. *Final Report, (Coventry: Becta)*.
- Hew, K. F., & Brush, T. (2007). Integrating technology into K-12 teaching and learning: Current knowledge gaps and recommendations for future research. *Educational technology research and development*, 55(3), 223-252.
- Hobson, A. J., Ashby, P., Malderez, A., & Tomlinson, P. D. (2009). Mentoring beginning teachers: What we know and what we don't. *Teaching and teacher education*, 25(1), 207-216.
- Holcomb, L. B., & Beal, C. M. (2010). Capitalizing on Web 2.0 in the social studies context. *TechTrends*, 54(4), 28-33.
- Holloway, I., & Galvin, K. (2016). *Qualitative research in nursing and healthcare*. John Wiley & Sons.

- Howie, S. J., Muller, A., & Paterson, A. (2005). *Information and communication technologies in South African secondary schools*. HSRC Press.
- Hughes, J. (2005). The role of teacher knowledge and learning experiences in forming technology-integrated pedagogy. *Journal of technology and teacher education*, 13(2), 277-302.
- Isaacs, S. (2007). ICT in education in South Africa. *Survey of ICT and Education in Africa: South Africa Country Report*, (10659).
- Jang, S. J. (2008). The effects of integrating technology, observation and writing into a teacher education method course. *Computers & Education*, 50(3), 853-865.
- Jimoyiannis, A. (2010). Designing and implementing an integrated technological pedagogical science knowledge framework for science teacher's professional development. *Computers & Education*, 55(3), 1259-1269.
- Jonassen, D., Howland, J., Marra, R., & Crismond, D. (2008). *Meaningful learning with technology (3rd Ed.)*. Upper Saddle River, NJ: Pearson.
- Jonassen, D. H. (1996). Learning with technology: Using computers as cognitive tools. *Handbook of research for educational communications and technology*.
- Judge, S., & O'Bannon, B. (2007). Integrating technology into field-based experiences: A model that fosters change. *Computers in Human Behaviour*, 23(1), 286-302.
- Kenny, C., & Motta, M. (2002). The ICT Framework in Chile. *World Bank, Washington DC Processed*.
- Knight, C., Knight, B., & Teghe, D. (2006). Releasing the pedagogical power of information and communication technology for learners: A case study. *International Journal of Education and Development using ICT*, 2(2), 27-34.
- Kopcha, T. J., & Alger, C. (2014). Student teacher communication and performance during a clinical experience supported by a technology-enhanced cognitive apprenticeship. *Computers & Education*, 72, 48-58.
- Krefting, L. (1991). Rigor in qualitative research: The assessment of trustworthiness. *American journal of occupational therapy*, 45(3), 214-222.
- Kvale, S. (1992). Ten Standard Responses to Qualitative Research Interviews.
- Kajder, S. B. (2005). *Preservice English/language arts teachers' beliefs and practices in teaching with technology during the student teaching placement* (Unpublished doctoral dissertation). University of Virginia, Charlottesville, VA.
- Kay, R. H. (2006). Evaluating strategies used to incorporate technology into preservice education: A review of the literature. *Journal of research on technology in education*, 38(4), 383-408.
- Kimmons, R. (2013). Scholars and faculty members' lived experiences in online social networks. *The Internet and Higher Education*, 16, 43-50.
- Kozma, R. B. (2003). Technology and classroom practices: An international study. *Journal of research on technology in education*, 36(1), 1-14.
- Koehler, M. J., & Mishra, P. (2005). What happens when teachers design educational technology? The development of technological pedagogical content knowledge. *Journal of educational computing research*, 32(2), 131-152.

- Koehler, M. J., Mishra, P., & Yahya, K. (2007). Tracing the development of teacher knowledge in a design seminar: Integrating content, pedagogy and technology. *Computers & Education, 49*(3), 740-762.
- Koehler, M. J., & Mishra, P. (2008). Introducing TPCK. AACTE Committee on Innovation and Technology (Ed.), *The handbook of technological pedagogical content knowledge (TPCK) for educators* (pp. 3-29). Mahwah, NJ: Lawrence Erlbaum Associates.
- Koehler, M., & Mishra, P. (2009). What is technological pedagogical content knowledge (TPACK)? *Contemporary issues in technology and teacher education, 9*(1), 60-70.
- Korthagen, F. A., Kessels, J., Koster, B., Lagerwerf, B., & Wubbels, T. (2001). *Linking practice and theory: The pedagogy of realistic teacher education*. Routledge.
- Korthagen, F. A., & Kessels, J. P. (1999). Linking theory and practice: Changing the pedagogy of teacher education. *Educational researcher, 28*(4), 4-17.
- Krueger, R., & Casey, M. A. (2000). *Focus Groups: A Practical Guide for Applied Research* 3rd edition Sage Publications London.
- Langa, Z., Conradie, P., & Roberts, B. (2006). Slipping through the Net: Digital and other communication divides within South Africa. *South African social attitudes. Changing times, diverse voices, 131-149*.
- Lambert, J., Gong, Y., & Cuper, P. (2008). Technology, transfer and teaching: The impact of a single technology course on preservice teachers' computer attitudes and ability. *Journal of technology and teacher education, 16*(4), 385-410.
- Lee, Y., & Lee, J. (2014). Enhancing pre-service teachers' self-efficacy beliefs for technology integration through lesson planning practice. *Computers & Education, 73*, 121-128.
- Lei, J. (2009). Digital natives as preservice teachers: What technology preparation is needed? *Journal of Computing in Teacher Education, 25*(3), 87-97.
- Li, Q. (2007). Student and teacher views about technology: A tale of two cities? *Journal of research on Technology in Education, 39*(4), 377-397.
- Lim, C. P., & Chan, B. C. (2007). Micro lessons in teacher education: Examining pre-service teachers' pedagogical beliefs. *Computers & Education, 48*(3), 474-494.
- Lim, C. P., & Chai, C. S. (2008). Rethinking classroom-oriented instructional development models to mediate instructional planning in technology-enhanced learning environments. *Teaching and Teacher Education, 24*(8), 2002-2013.
- Lincoln, Y. S., Lynham, S. A., & Guba, E. G. (2011). Paradigmatic controversies, contradictions, and emerging confluences, revisited. *The Sage handbook of qualitative research, 4*, 97-128.
- Liu, H., Macintyre, R., & Ferguson, R. (2012, April). Exploring qualitative analytics for e-mentoring relationships building in an online social learning environment. In *Proceedings of the 2nd International Conference on Learning Analytics and Knowledge* (pp. 179-183). ACM.
- Loveless, A. (2007). Preparing to teach with ICT: subject knowledge, Didactic and improvisation. *The Curriculum Journal, 18*(4), 509-522.

- Locke, L. F., Silverman, S. J., & Spirduso, W. W. (2009). *Reading and understanding research*. Sage Publications.
- Lou, Y., Abrami, P. C., & d'Apollonia, S. (2001). Small group and individual learning with technology: A meta-analysis. *Review of educational research*, 71(3), 449-521.
- Lundgren, L., Amodeo, M., Cohen, A., Chassler, D., & Horowitz, A. (2011). Modifications of evidence-based practices in community-based addiction treatment organizations: a qualitative research study. *Addictive Behaviours*, 36(6), 630-635.
- Maeng, J. L., Mulvey, B. K., Smetana, L. K., & Bell, R. L. (2013). Preservice teachers' TPACK: Using technology to support inquiry instruction. *Journal of Science Education and Technology*, 22(6), 838-857.
- Mathur, S. R., Gehrke, R., & Kim, S. H. (2013). Impact of a teacher mentorship program on mentors' and mentees' perceptions of classroom practices and the mentoring experience. *Assessment for Effective Intervention*, 38(3), 154-162.
- McGrail, E. (2005). Teachers, technology, and change: English teachers' perspectives. *Journal of Technology and Teacher Education*, 13(1), 5-24.
- Merriam, S. B. (1998). *Qualitative Research and Case Study Applications in Education. Revised and Expanded from "Case Study Research in Education."* Jossey-Bass Publishers, 350 Sansome St, San Francisco, CA 94104.
- Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers college record*, 108(6), 1017.
- Mishra, P., & Koehler, M. J. (2008, March). Introducing technological pedagogical content knowledge. In *annual meeting of the American Educational Research Association* (pp. 1-16).
- Mishra, P., Koehler, M. J., & Kereluik, K. (2009). Looking back to the future of educational technology. *TechTrends*, 53(5), 49.
- Morrow, S. L. (2005). Quality and trustworthiness in qualitative research in counselling psychology. *Journal of counselling psychology*, 52(2), 250.
- Mouza, C., Karchmer-Klein, R., Nandakumar, R., Ozden, S. Y., & Hu, L. (2014). Investigating the impact of an integrated approach to the development of preservice teachers' technological pedagogical content knowledge (TPACK). *Computers & Education*, 71, 206-221.
- Nathan, P., & Chan, A. (2007). Engaging undergraduates with podcasting in a business subject. In *ICT: Providing choices for learners and learning. Proceedings escalate Singapore 2007*(pp. 747-751).
- Nets-T-Standards.(2008). *National Educational Technology Standards for Teachers*. Access 9 September 2018 from <https://people.umass.edu/pelliott/reflections/netst.html>
- Nihuka, K. A., & Voogt, J. (2011). Instructors and students competences, perceptions and access to e-learning technologies: Implications for e-learning implementation at the open university of Tanzania. *International Journal on E-learning*, 10(1), 63-85.

- Nilsson, P., & Van Driel, J. (2010). Teaching together and learning together—Primary science student teachers' and their mentors' joint teaching and learning in the primary classroom. *Teaching and Teacher Education*, 26(6), 1309-1318.
- OECD -Organisation for Economic Co-operation and Development. (2004). *Completing the foundation for lifelong learning: an OECD survey of upper secondary schools*. Paris: OECD.
- OECD-Organization for Economic Co-operation and Development (2008). *New millennium learners: Initial findings on the effects of digital technologies on school-age learners*. OECD Publishing.
- Oliver, M., & Conole, G. (2003). Evidence-based practice and e-learning in Higher Education: can we and should we? *Research papers in education*, 18(4), 385-397.
- OSA, J. O., & Walker, T. M. (2012). Using Instructional Technologies to Enhance Teaching and Learning for the 21st Century PreK-12 Students: The case of a professional education programs unit. *International Journal of Instructional Media*, 39(4).
- Ottenbreit-Leftwich, A. T., Glazewski, K. D., Newby, T. J., & Ertmer, P. A. (2010). Teacher value beliefs associated with using technology: Addressing professional and student needs. *Computers & education*, 55(3), 1321-1335.
- Palak, D., & Walls, R. T. (2009). Teachers' beliefs and technology practices: A mixed-methods approach. *Journal of Research on Technology in Education*, 41(4), 417-441.
- Patton, M. Q. (1985). Quality in qualitative research: Methodological principles and recent developments. *Invited address to Division J of the American Educational Research Association, Chicago*.
- Pelgrum, W. J. (2001). Obstacles to the integration of ICT in education: results from a worldwide educational assessment. *Computers & education*, 37(2), 163-178.
- Peu, M. D., Van Wyk, N. C., & Botha, A. D. (2008). Health promotion needs of Hamman kraal families with adolescents orphaned by HIV/AIDS. *Health SA Gesondheit (Online)*, 13(1), 14-28.
- Pinnock, A. J. E. (2011). A practical guide to implementing CAPS: A toolkit for teachers, schools' managers and education officials to use to assist in managing the implementation of a new curriculum. *National Professional Teachers' Organisation of South Africa (NAPTOSA). Pretoria*.
- Polit, D. F., & Beck, C. T. (2008). *Nursing research: Generating and assessing evidence for nursing practice*. Lippincott Williams & Wilkins.
- Polly, D., Mims, C., Shepherd, C. E., & Inan, F. (2010). Evidence of impact: Transforming teacher education with preparing tomorrow's teachers to teach with technology (PT3) grants. *Teaching and Teacher Education*, 26(4), 863-870.
- Polly, D., Mims, C., Shepherd, C. & Inan, F. (2006). Examining PT3 projects designed to improve preservice education. *TechTrends*, 50(3), 16-24.

- Pope, M., Hare, D., & Howard, E. (2002). Technology integration: Closing the gap between what preservice teachers are taught to do and what they can do. *Journal of Technology and Teacher Education*, 10(2), 191-204.
- Prensky, M. (2001). Digital natives, digital immigrants part 1. *On the horizon*, 9(5), 1-6.
- Price, B. (2002). Laddered questions and qualitative data research interviews. *Journal of advanced nursing*, 37(3), 273-281.
- Rabiee, F. (2004). Focus-group interview and data analysis. *Proceedings of the nutrition society*, 63(4), 655-660.
- Rashid, A. T., Camara, A., Ng, M., & Richero, A. (2013). Making the grade: The role of ICTs in providing access to knowledge. *Connecting ICTs to Development*, 197.
- Rice, J. (2007). Assessing higher order thinking in video games. *Journal of Technology and Teacher Education*, 15(1), 87-100.
- Riley, R. W., & Love, L. L. (2000). The state of qualitative tourism research. *Annals of tourism research*, 27(1), 164-187.
- Robertson, C., & Green, T. (2012). Interactive Whiteboards on the Move! *TechTrends*, 56(6), 15-17.
- Rodrigues, S., Marks, A., & Steel, P. (2003). Developing science and ICT pedagogical content knowledge: A model of continuing professional development. *Innovations in Education and Teaching International*, 40(4), 386-394.
- Romano, M., & Schwartz, J. (2005). Exploring technology as a tool for eliciting and encouraging beginning teacher reflection. *Contemporary Issues in Technology and Teacher Education*, 5(2), 149-168.
- Rubin, H. J., & Rubin, I. S. (2011). *Qualitative interviewing: The art of hearing data*. Sage.
- Rudolph, A. E., Young, A. M., & Havens, J. R. (2017). A rural/urban comparison of privacy and confidentiality concerns associated with providing sensitive location information in epidemiologic research involving persons who use drugs. *Addictive behaviours*, 74, 106-111.
- Rossouw, D. (2003). Intellectual tools: Skills for the human sciences. *Pretoria: Van*.
- Rolfe, G. (2006). Validity, trustworthiness and rigour: quality and the idea of qualitative research. *Journal of advanced nursing*, 53(3), 304-310.
- Sang, G., Valcke, M., Van Braak, J., & Tondeur, J. (2010). Student teachers' thinking processes and ICT integration: Predictors of prospective teaching behaviours with educational technology. *Computers & Education*, 54(1), 103-112.
- Sadaf, A., Newby, T. J., & Ertmer, P. A. (2012). Exploring pre-service teachers' beliefs about using Web 2.0 technologies in K-12 classroom. *Computers & Education*, 59(3), 937-945.
- Saldaña, J. (2015). *The coding manual for qualitative researchers*. Sage.
- Salomon, G., & Perkins, D. N. (1998). Chapter 1: Individual and social aspects of learning. *Review of research in education*, 23(1), 1-24.

- Sarantakos, S. (2005). *Social Research*. 3rd. Hampshire: Palgrave Macmillan.
- Schmidt, D. A., Baran, E., Thompson, A. D., Mishra, P., Koehler, M. J., & Shin, T. S. (2009). Technological pedagogical content knowledge (TPACK) the development and validation of an assessment instrument for preservice teachers. *Journal of research on Technology in Education*, 42(2), 123-149.
- Schurink, W. (2010). The importance of theorising in proposal writing. *Journal of Public Administration*, 45(3), 420-434.
- Schrum, L. (1999). Technology professional development for teachers. *Educational technology research and development*, 47(4), 83-90.
- Sharma, A. N. (2008). ICT in teacher education: The USP experience. *Pacific education: Issues and perspectives*, 165-179.
- Shenton, A. K. (2004). Strategies for ensuring trustworthiness in qualitative research projects. *Education for information*, 22(2), 63-75.
- Shulman, L. S. (1986). Those who understand: Knowledge growth in teaching. *Educational researcher*, 15(2), 4-14.
- Shulman, L. (1987). Knowledge and teaching: Foundations of the new reform. *Harvard educational review*, 57(1), 1-23.
- Shaw, K. E. (1978). Understanding the curriculum: The approach through case studies. *Journal of Curriculum Studies*, 10(1), 1-17.
- Sim, J. (1998). Collecting and analysing qualitative data: issues raised by the focus group. *Journal of advanced nursing*, 28(2), 345-352.
- Singer, J., & Maher, M. A. (2007). Preservice teachers and technology integration: Rethinking traditional roles. *Journal of Science Teacher Education*, 18(6), 955-984.
- Smith, L. M. (1978). 8: An Evolving Logic of Participant Observation, Educational Ethnography, and Other Case Studies. *Review of research in education*, 6(1), 316-377.
- Stake, R. (1998). *Case study methods in educational research, in complementary methods for research in education* edited by RM Jaeger. Washington DC: American Educational Research Association 251-279.
- Steketee, C. (2006). Modelling ICT integration in teacher education courses using distributed cognition as a framework. *Australasian Journal of Educational Technology*, 22(1).
- Strauss, A. L., & Corbin, J. (1998). *Basics of Qualitative Research: Grounded Theory Procedures And Techniques.*(ed.) Sage Publications. Newbury Park CA.
- Speziale, H. J. S., & Carpenter, D. R. (2003). *Qualitative research in nursing* third edition.
- Strydom, H., & Strydom, C. (2006). The attitude, level of knowledge and perceptions of learners regarding crime in society: The Thusa Bana Study. *Acta Criminological: Southern African Journal of Criminology*, 19(1), 19-32.
- Sullivan, R. M. (2013). The tablet inscribed: Inclusive writing instruction with the iPad. *College Teaching*, 61(1), 1-2.

- Sun, Y., Strobel, J., & Newby, T. J. (2017). The impact of student teaching experience on pre-service teachers' readiness for technology integration: A mixed methods study with growth curve modelling. *Educational Technology Research and Development*, 65(3), 597-629.
- Stanulis, R., & Flodden, R. E. (2009). Intensive mentoring as a way to help beginning teachers develop balanced instruction. *Journal of Teacher Education*, 60(2), 112-122.
- Summak, M. (2011). Assessment of technology integration in vocational education and training schools. *International Journal of Education and Development using ICT*, 7(1), 68-85.
- Sharma, A. N. (2008). ICT in teacher education: The USP experience. *Pacific education: Issues and perspectives*, 165-179.
- Tashakkori, A., & Teddlie, C. (Eds.). (2010). *Sage handbook of mixed methods in social & Behavioural research*. Sage.
- Tapscott, D., & Barry, B. (2009). *Grown up digital: How the net generation is changing your world* (Vol. 200). New York: McGraw-Hill.
- Tapscott, D. (2010). Grown Up Digital. How the Net Generation Is Changing Your World? *International Journal of Market Research*, 52(1), 139.
- Taylor, H. (2005). A critical decision interview approach to capturing tacit knowledge: Principles and application. *International Journal of Knowledge Management (IJKM)*, 1(3), 25-39.
- Tearie, R. K. (2003). Educating for innovation. *Thinking skills and creativity*, 1(1), 41-48.
- Teo, T. (2009). Modelling technology acceptance in education: A study of pre-service teachers. *Computers & Education*, 52(2), 302-312.
- Terre 'Blanche, M., Durrheim, K., & Painter, D. (2007). Research in Practice: Applied methods for the Social Sciences, 3rd Impression. *Juta, Cape Town*.
- Tezci, E. (2009). Teachers' effect on ICT use in education: The Turkey sample. *Procedia-Social and Behavioural Sciences*, 1(1), 1285-1294.
- Thompson, S. (2007). Jamaica: implementing the national ICT strategy through policy and initiatives. *AMCIS 2007 Proceedings*, 169.
- Thomas, D. R. (2006). A general inductive approach for analysing qualitative evaluation data. *American journal of evaluation*, 27(2), 237-246.
- Tondeur, J., van Braak, J., Sang, G., Voogt, J., Fisser, P., & Ottenbreit-Leftwich, A. (2012). Preparing pre-service teachers to integrate technology in education: A synthesis of qualitative evidence. *Computers & Education*, 59(1), 134-144.
- Torff, B., & Tirota, R. (2010). Interactive whiteboards produce small gains in elementary students' self-reported motivation in mathematics. *Computers & Education*, 54(2), 379-383.
- Topp, M., Hartley, L., Cook, M., Etemadmoghadam, D., Galleta, L., Moss, P., ... & Kaufmann, S. (2012). A novel in vivo xenograft mouse model of human high-grade serous ovarian cancer, with clinical, molecular and functional annotation relevant for pre-clinical analysis.

- Turner III, D. W. (2010). Qualitative interview design: A practical guide for novice investigators. *The qualitative report*, 15(3), 754-760.
- Valcke, M., Rots, I., Verbeke, M., & Van Braak, J. (2007). ICT teacher training: Evaluation of the curriculum and training approach in Flanders. *Teaching and teacher Education*, 23(6), 795-808.
- Van de Ven, A. H. (2007). *Engaged scholarship: A guide for organizational and social research*. Oxford University Press on Demand.
- Vanderlinde, R., Van Braak, J., & Tondeur, J. (2010). Using an online tool to support school-based ICT policy planning in primary education. *Journal of Computer Assisted Learning*, 26(5), 434-447.
- Voogt, J., Fisser, P., Pareja Roblin, N., Tondeur, J., & van Braak, J. (2013). Technological pedagogical content knowledge—a review of the literature. *Journal of computer assisted learning*, 29(2), 109-121.
- Wang, J. (2001). Contexts of mentoring and opportunities for learning to teach: A comparative study of mentoring practice. *Teaching and teacher education*, 17(1), 51-73.
- Wang, Y. M. (2002). When technology meets beliefs: Preservice teachers' perception of the teacher's role in the classroom with computers. *Journal of Research on Technology in Education*, 35(1), 150-161.
- Wang, F., Kinzie, M. B., McGuire, P., & Pan, E. (2010). Applying technology to inquiry-based learning in early childhood education. *Early Childhood Education Journal*, 37(5), 381-389.
- Watson, D. (2006). Understanding the relationship between ICT and education means exploring innovation and change. *Education and Information Technologies*, 11(3-4), 199-216.
- Wepner, S. B., Ziomek, N., & Tao, L. (2003). Three teacher educators' perspectives about the shifting responsibilities of infusing technology into the curriculum. *Action in Teacher Education*, 24(4), 53-63.
- Wilson-Strydom, M., Thomson, J., & Hodgkinson-Williams, C. (2005). Understanding ICT integration in South African classrooms: research: information and communication technologies. *Perspectives in education*, 23(1), 71-85.
- Wu, H. K., Hsu, Y. S., & Hwang, F. K. (2008). Factors affecting teachers' adoption of technology in classrooms: Does school size matter?. *International Journal of Science and Mathematics Education*, 6(1), 63-85.
- Yin, R. K. (2009). *Case study research: Design and methods (applied social research methods)*. London and Singapore: Sage.
- Zhao, Y., Pugh, K., Sheldon, S., & Byers, J. L. (2002). Conditions for classroom technology innovations. *Teachers college record*, 104(3), 482-515.
- Zeichner, K. M. (1993). Traditions of practice in US preservice teacher education programs. *Teaching and Teacher Education*, 9(1), 1-13.

APPENDIX A: ETHICS CLEARANCE CERTIFICATE

NHREC Registration Number REC-110613-036



ETHICS CLEARANCE

Dear MI Mongake

Ethical Clearance Number: 2017-071

Pre-service Information and Communications Technology Support Specialists regarding use of learning technologies during final year work-integrated learning

Ethical clearance for this study is granted subject to the following conditions:

- If there are major revisions to the research proposal based on recommendations from the Faculty Higher Degrees Committee, a new application for ethical clearance must be submitted.
- If the research question changes significantly so as to alter the nature of the study, it remains the duty of the student to submit a new application.
- It remains the student's responsibility to ensure that all ethical forms and documents related to the research are kept in a safe and secure facility and are available on demand.
- Please quote the reference number above in all future communications and documents.

The Faculty of Education Research Ethics Committee has decided to

- Grant ethical clearance for the proposed research.
- Provisionally grant ethical clearance for the proposed research
- Recommend revision and resubmission of the ethical clearance documents

Sincerely,



Prof Geoffrey Lautenbach

Chair: FACULTY OF EDUCATION RESEARCH ETHICS COMMITTEE

8 September 2017

APPENDIX B: WIL DOCUMENTS FOR FIRST SEMESTER



Faculty of Education

February 2018
Reference Number SE2018010402

BEd Work-Integrated Learning: 10-26 April 2018

Dear Principal

Thank you for accepting the University of Johannesburg's BEd students at your school for their work-integrated learning. The contributions that you and your staff make to the training and mentoring of future teachers are invaluable and of great importance to the development of future teachers. Your unstinting support is highly appreciated and extensively recognised by the students as well as the academics of the Faculty of Education.

The focus of this practicum is to prepare UJ students for a more holistic approach to the development of their content knowledge, teaching skills, reflection, assessment and their personal teaching philosophy, which are important components of learning to teach.

Students are expected to complete a minimum of twelve weeks of Work-integrated Learning (WIL) in their 4th year of the BEd programme. Work-integrated Learning is divided into three blocks. The first block started on 22 January to 2 February 2018, the second block commences on 10 April to 26 April 2018, and the third block takes place from 6 August to 21 September 2018.

This communique is particularly pertinent to the second block of Work-integrated Learning from 10 April to 26 April 2018.

Student responsibilities

These are BEd students and they should be afforded an opportunity to teach for at least 60% of their time. (Students can also be placed with Grades 8 and 9 in their fields of studies). The remaining 40% of the time should be utilised as follows: 30% for research and 10% for administration. During non-teaching times, students should observe classroom management, teaching strategies, practices of inclusion, learning support, preparation and presentation of lessons and assessment practices. Students should also observe as many mentors as possible.

While students are 'guests' at your school, they are expected to be treated as staff members of your school in terms of normal work distribution and attendance requirements as expected in your organisation. We request that you will use their experiences to also acquaint them with other duties outside the classroom teaching, such as administration and participation in extracurricular and extramural activities at the school for the duration of their stay at your school.

Mentor-Teacher Responsibilities

The Faculty of Education recognises and acknowledges that the Mentor-Teacher plays a significant role in the professional development of student teachers and we thank you for allowing UJ students an opportunity to work with you to experience the realities of the classroom. We have noted from previous students that student

teachers tend to adopt the practice of the Mentor-Teacher, sometimes without questions, assuming they have no choice. We encourage you, however, to enlighten the student teacher regarding your practices and also provide the student with critical feedback regarding the student's professional development. It is in this regard that we kindly request that the mentor teacher complete a developmental report on the student, at the end of Week 3.

Assessment for students

Students will be expected to complete the following assessments during their second block of Work-Integrated Learning:

- Students must submit six lesson plans per methodology (FET phase) with reflections on lesson presentations to their methodology lecturers. **This does not** imply that students must only teach six lessons, students must teach for 60% of the day, which could also be in Grade 8 and 9 in their respective subjects.
- Students must design an assessment form, and tool, and do an analysis of learners' results (FET phase).
- Students are also expected to complete a reflection report on learner engagement and classroom management for Teaching Studies as well as collect data for their research.

Substitution class

We would like to suggest that the students be allowed to do substitution teaching only if they have been provided with the necessary lesson preparations. Student teachers should continue with regular teaching, while maintaining the standard of learning and classroom management.

N.B Mentor teachers are responsible for their learners and should always be present when student teachers are teaching. Student teachers should not be left unsupervised.

Documentation to the school

The following documents will be provided by the Faculty of Education to the students in an envelope:

- Two professional developmental reports (1 per methodology)
- Agreement forms
- Attendance register

Should you have any queries, please do not hesitate to contact me personally.

We appreciate your willingness to collaborate with us in preparing excellent teachers for the future.

Yours sincerely

M. Mahomed

Work-Integrated Learning Coordinator

Tel: 011 559 2296

Fax: 011 559 2292

Email: mmahomed@uj.ac.za

Office no: B Ring 429 (UJ APK Campus)



This is an agreement

between

(School) _____

The University of Johannesburg

and

(Student) _____

with regard to work-integrated learning 10-26 April 2018.

The undersigned confirm their commitment to the education and training of professional teachers. The student agrees to function as part of the school staff, and to abide by all the school's policies and practices. The work-integrated learning is regarded as a partnership between three parties. Any disputes experienced during work-integrated learning will be dealt with in positive and professional manner. _____

UNIVERSITY OF JOHANNESBURG

School principal: _____ Date: _____

Student Surname and Name _____

Student No _____ Date: _____

The University of Johannesburg Date: _____



University of Johannesburg
Work- integrated learning Attendance Register for April/ 2018

Name of School			
Surname and of student name		Student Number	

At the end WIL, please submit the signed register to the student or fax 011-559-2296 or email mmahomed@uj.ac.za

Time	10	11	12	13	16	17	18	19	20	23	24	25	26
	April	April	April	April	April	April	April	April	April	April	April	April	April
Time in													
Signature													
Time out													
signature													

Signature of Principal/ Deputy Principal: _____

School Stamp

APPENDIX C: WIL DOCUMENTS FOR SECOND SEMESTER

Faculty of Education Fakulteit Opvoedkunde

Code of Professional Practice for Student Teachers on Work-Integrated Learning (WIL)

The following **professional characteristics** describe the values, beliefs and behaviours which inform the decisions and actions student teachers will make in their day-to-day work while on Work integrated learning. **It is essential that student teachers unfailingly display the following professional qualities:**

1. Ethics

Student teachers must act in accordance with the core values and professional commitments, set out in the South African Council for Educators' (SACE) Code of Professional Ethics. Student teachers must respect the rights of others by acting with consistency, impartiality and confidentiality, especially in relation to school and learner information. They must respect the ethos, norms and formal processes of the school while on WIL. They must dress in an appropriate professional manner and maintain a professional standard of appearance and personal hygiene. Students must not be under the influence of any substance which impairs their ability or medical fitness while on WIL.

2. Commitment

Student teachers must demonstrate dedication to their studies and uphold standards of professional practice during WIL. Students must be punctual, responsible and well-organised while on WIL and recognise the importance of detailed and comprehensive preparation. They must be committed to the educational, personal, social, moral and cultural development of their learners and motivated to act in learners' best interests. They must recognise that, while on WIL, they have an obligation to fulfil their role as educator to the best of their ability. They must be aware that they are a 'guest' in the school while on WIL and that the classroom teacher has primary responsibility for the learners.

3. Pedagogic Content Knowledge

Student teachers must provide learning experiences that engage learner interest and enhance learning. Their practice must be underpinned by knowledge and understanding of the Curriculum Assessment Programme Statement (CAPS) principles. It must be grounded in appropriate pedagogical, content knowledge. It is obligatory on student teachers to be knowledgeable on relevant school policies while on WIL.

4. Teamwork

Teaching is accepted as a collaborative effort. Student teachers must demonstrate good communication, interpersonal skills, and share knowledge, ideas and experience with others and must be willing to work collaboratively and cooperatively with peers, school personnel, mentor teachers and lecturers. They must constantly seek assistance from school personnel and mentor teachers and must be keen to consider and act upon advice offered. They must be careful and conscientious about the use of school resources and discuss the protocols regarding use of



**University of Johannesburg
Work- integrated learning Attendance Register for August/ September 2018**

Name of School			
Surname and name of student		Student Number	

At the end WIL, please submit the signed register to the student or fax to 011-559-2296 or email mmahomed@uj.ac.za

Time	06 Aug	07 Aug	08 Aug	10 Aug	13 Aug	14 Aug	14 Aug	15 Aug	16 Aug	17 Aug	20 Aug	21 Aug	22 Aug
Time in													
Signature													
Time out													
Signature													
Time	23 Aug	24 Aug	27 Aug	28 Aug	29 Aug	30 Aug	31 Aug	03 Sept	04 Sept	05 Sept	06 Sept	07 Sept	10 Sept
Time in													
Signature													
Time out													
Signature													

UNIVERSITY OF JOHANNESBURG

Time	11 Sept	12 Sept	13 Sept	14 Sept	17 Sept	18 Sept	19 Sept	20 Sept	21 Sept
Time in									
Signature									
Time out									
Signature									

Signature of Principal/ Deputy Principal: _____

School stamp



Professional Developmental Report

(To be completed by the Principal in consultation with the Academic Mentor)

The Faculty of Education at the University of Johannesburg requires a developmental report on every student teacher on Work-Integrated Learning at your school. The aim of the report is to get your views and impressions of the student's professionalism. This report contributes considerably to the final evaluation of the students.

Enquiries should be made to:

Ms. M. Mahomed.

Telephone 011 559 2296

B-Ring 429

Email: mmahomed@uj.ac.za

Please return the Professional Developmental Report and Attendance Register in a sealed envelope with the student directly to:

Ms. M Mahomed

University of Johannesburg

Auckland Park Campus

We thank you for your cooperation.

M. MAHOMED

Work-Integrated Learning Coordinator





Professional Teacher Developmental Report

Work-integrated Learning B Ed and PGCE 2018

Name and surname of Student: _____

Date of Evaluation: _____

Student No. _____

Learning/Subject Area: _____

Dear Sir/ Madam

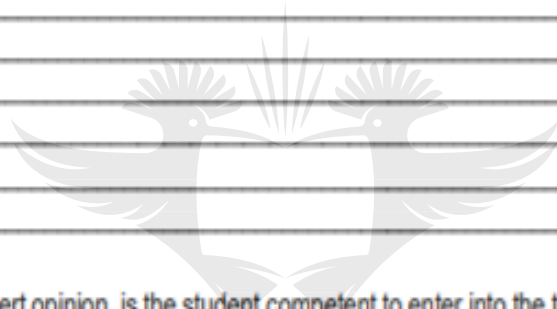
Thank you for agreeing to evaluate this student. In your report below please comment on the student's knowledge, skills and disposition as observed by you during the Work-integrated Learning period.

1. Knowledge of the subject. Please comment on both the student's capabilities and areas in which improvement is suggested.

2. Proficiency of teaching skills. Please comment on both the student's capabilities and areas in which improvement is suggested.

3. Disposition towards the profession. Please comment on both the student's capabilities and areas in which improvement is suggested.

Additional comments



4. In your expert opinion, is the student competent to enter into the teaching profession? If not, please say why.

Academic Mentor: _____

Signature: _____

Date: _____

School Stamp:

APPENDIX D: STUDENT TEACHING ASSESSMENT RUBRIC



Student Teaching Assessment Rubric

Student Name:		Student No:		Assessor:	
Student Surname:		Subject:		Total Mark:	
School:		Grade:			

Section A: Written Lesson Design Criteria


A1. The lesson design includes all aspects and are in alignment.	Mark possible	Mark allocated	Comments
	20		

Section B: Lesson Presentation Criteria

B1. Introduction: Learner interest captured, elicit reflection on own experiences, activate previous knowledge of subject.	Mark possible	Mark allocated	Comments
	5		

B2. Presentation Style: The student is dynamic, creative, interesting and engages learners. Learners respond positively to the student. Innovation is displayed.	Mark possible	Mark allocated	Comments
	10		

B3. PCK: The student has a good grasp of the subject matter. Correct terminology is used. Exemplifies "to be" (e.g. as a biologist, mathematician). The teaching methods are appropriate for the content. Active teaching observed not simply reading from texts.	Mark possible	Mark allocated	Comments
	30		



B4. Resources: A variety of resources are used creatively and appropriately applied. The use of resources contributes to learning and understanding.	Mark possible	Mark allocated	Comments
	5		

B5. Classroom Management and Professionalism: The student manages learner behaviour effectively. The student communicates clearly and effectively. The interactions between learners and the student are positive. The student accommodates diversity. Good time management.	Mark possible	Mark allocated	Comments
	10		



B6. Assessment: A variety of assessment strategies are used, both formative and summative. Assessment aligns with lesson outcomes and curriculum expectations. Feedback on learner questions are effective and accurate. The assessment is meaningful and will support student learning.	Mark possible	Mark allocated	Comments
	10		

B7. Conclusion: The student summarises and concludes effectively. Important aspects of the lesson are highlighted. The student engages the learners during the conclusion phase.	Mark possible	Mark allocated	Comments
	5		

Section C: Student Reflection

Ask the student to reflect on the following: What went well, what did not, what changes are necessary? Explain with evidence responses to the above	Mark possible	Mark allocated	Comments
	5		



Assessor's overall comments	
Signature	Date