THE USE OF INFORMATION COMMUNICATION TECHNOLOGY IN THE CLASSROOM TO ENHANCE TEACHING AND LEARNING AT SELECTED SECONDARY SCHOOLS IN LIMPOPO PROVINCE

BY

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Abstract

This study explored the use of information communication technology (ICT) to enhance teaching and learning in selected schools in Limpopo Province of South Africa. The study examined how ICT could be used to the advantage of the educator and learners in the classroom. The research is important because of the need to shift from teacher centred to learner centred approaches through using technology in the classroom. In addition, today's learners are different from those of 20 years ago in that they are inquisitive and want to discover knowledge on their own. In the past twenty-five years that the researcher has been a teacher, she has seen a significant change in the learners' attitude towards education. The current learners are energetic, enjoy change and are opposed to traditional teaching approaches that focus on rote learning. This qualitative research implemented the principle of life-long learning to increase a variety of educational mediums and promote the learners' technology literacy. The research also sought to encourage the culture of learning through the development of learning skills. To achieve the study objectives, a case study design which is an aspect of qualitative research, was adopted. This led to a naturalistic inquiry which allowed the researcher to collect data by interacting with selected individuals in their everyday setting. The study exploits the constructive-interpretivist paradigm because this enabled the researcher to critically explore the use of ICT in enhancing teaching and learning at secondary schools. Data was collected through interviews with participants. Subsequently, the data was analysed to gain in-depth understanding about how educators implement and ensure quality teaching and learning through the use of ICT in the classroom. Data was transcribed verbatim and then grouped according to different themes. The research findings indicate that the use of ICT in the classroom promotes teaching and learning. ICT is an innovative tool which also allows diverse perspectives to emerge, enabling learners to develop a group identity.

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Dedication

To:

My late parents, Sadasivan and Jayalutchmi Moodley- thank you for believing in my potential. You will always be remembered

Navin Bejrajh, my beloved husband - you are my best friend, my source of inspiration, my motivator and my everything

My son, Nikhil Bejrajh - thank you for all your valuable advice and making me believe the sky is not the limit

My daughter, Kiara Bejrajh – thank you for always listening, being my confidant

and speaking your mind

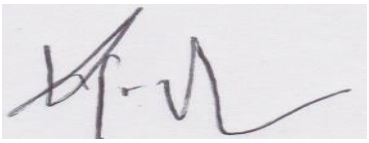
My late furbabies Snowy, Sasha, Tiger and Storme – Forever in my heart

Skye, Kenai and Koda – thank you for always bringing a smile to my face

You fill my heart with a lot of love.

Declaration

I, Mrs. Viloshni Bejrajh, hereby declare that this thesis, submitted for the Doctor of Philosophy in Education at the University of Limpopo, is my own original work and has not been previously submitted at any institution of higher learning. I further declare that all sources cited or quoted are indicated and acknowledged by means of a comprehensive list of references.



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Viloshni Bejrajh (Student)

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Abbreviations and Acronyms

HOD	Head of Department
ICT	Information Communication Technology
ISPA	Internet Service Providers' Association of SA
MIMIC	Multiple Indicators and Multiple Causes Model
NASGB	The National Association of School Governing Bodies
NCES	National Centre for Education Statistics
SAIDE	South African Institute for Distance Education
SMS	Short message service
TPD	Teacher Professional Development
UNESCO	United Nations Education Scientific Cultural Organisation
UNICEF	United Nations International Children's Emergency Fund

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND AND MOTIVATION

Charbonneau-Gowdy (2015) states that teachers are fixated in traditional methods of teaching of chalk and duster. Recently curiosity has been developed on how education can effectively and efficiently be improved by using computers and the internet. Charbonneau-Gowdy (2015) found that teachers who incorporate Information Communication Technology (ICT) as a means of teaching are needed and Charbonneau-Gowdy argues that this will lead to positive social change. However, some teachers are apprehensive about utilising ICT. Fortunately, not all teachers are apprehensive about using ICT in the classroom. Bharti (2014) notes that technologically savvy teachers use technology as teaching tools. Uslu and Bumen (2012) observed that after a professional development programme for teachers, the use of technology in the classrooms increased. The teachers who attended the assessed professional development program were inclined to motivate their students to use information technologies more fully (Brinkerhoff, 2006).

Earle (2001), Zhao and Frank (2003) and McKenzie (2003) found incongruence between the responses of students and teachers, whereby teachers claimed to use ICT as a tool for teaching but students claimed otherwise. The pupils said teachers provided no opportunity for the use of technology in the classroom and admitted that they themselves rarely used it very much. Most teachers, on the other hand, indicated that they used technology in the classroom very frequently for instructional, evaluative, communicative and organizational purposes. This suggests that some teachers are not using ICTs for teaching and learning.

To keep up with the changing times and changes, Xu, David and Kim (2018) argues that the fourth industrial revolution, technological changes need to be implemented. Littlejohn, Margaryan and Vojt (2010) also observe that changes in technology affects all spheres of life. Technological communication has rapidly increased since the younger generation used it in many aspects of their life. For example, in Mumbai, India,

Ally (2009) found that with the use of wireless technology, important information and materials for learning can be retrieved by individuals anytime and from anywhere. In addition, O'Bannon, Lubke,Beard and Britt (2017) surveyed 1,121 teachers and found that the mobile phone is frequently used for school-related activities. Preston, Wiebe, Gabriel, McAuley, Campbell and McDonald (2015) also support the view that pupil directed learning can be promoted through mobile smartphones. Cell phones were used to record lessons, take pictures and in presenting projects. Despite this, there is still apprehension about the use of mobile phones for learning and teaching. In South Africa, Ngesi, Landa, Madikiza, Cekiso, Tshotsho and Walters (2018) found that mobile phones are practical tools to supplement the process of education.

The present study focused on the use of cell phones in the class as well as at home for educational purposes. The study insists that cell phones should primarily be used during school hours for learning and teaching purposes. Desai (2010) argues that quality education is a societal basic need and cell phones are an effective way to increase the pupil's knowledge and can enhance the learning experiences of pupils. Cell phones can also help pupils to think independently and communicate creatively.

In the past 10 years, technology assisted learning and teaching has drawn attention but the use of cell phones has not received adequate attention thus far. Thus, this research explored the use of cell phones to enhance the educational process. Most mobile phones have dictionaries, a video camera, and recording capabilities. Therefore, lab sessions can be recorded and later reviewed by pupils. Due to the lack of attention given to smartphones, the World Bank's information Development program secured funding for a 'global survey of the use of mobile phones in education in developing countries. The UNESCO reports that there are approximately 5.9 billion mobile phone subscriptions in a planet of 7 billion people. UNESCO shows that the use of cell phones – by far the most ubiquitous interactive information and communications technology (ICT) on Earth – can be used to deliver and improve education. Trucano, Lui and Iglesias (2012) concluded that ICTs carry a tremendous potential to assist the learning of people everywhere. Ferriter (2010) observes that embracing cell phones in schools is a logical step. In Iran, Sevari (2012) found that social relations are developed with communication through mobile phones. Sevari

concluded that despite the potential of mobile phones to assist the school educational process, they are still not favoured in certain South African schools.

Reviewed literature indicates a lack of studies of how teachers in rural areas adapt to the rapid use of ICTs in learning and teaching. Ngesi et al (2018) found that many teachers discourage the use of cell phones because they believe pupils mainly use them for socialising. Since mobile learning will continue to expand and accelerate, Valk, Rashid, and Elderfuture (2010) recommend that governments should investigate the cost of mobile learning compared to the costs and benefits of other investments in the educational sector. Since cell phones cannot accommodate the traditional contents of language learning due to the screen size, teachers should design new lessons.

Since ICT has numerous aspects, this study sought to address the use of cell phones in the classroom to enhance teaching and learning. ICTs involve the use of white boards, smart boards, cell phones, projectors, televisions and computers. This research examined the utilisation of smart phones as tools for effective learning and teaching. The study examined the utilisation of time when cell phones are used in learning and teaching. Most previous studies have not focused on the use of cell phones as tools for assisting with the syllabus completion. Sung, Chung and Lui (2016) found that the overall effect of using mobile devices in education is better than the use of desktop computers. Sung et al argue that the use of mobile learning programs should be enhanced by longer intervention durations, closer integration of technology and the curriculum. Brown (2013) found that many pupils derived educational benefit from the use of their mobile devices. Brown established that pupils used many features of their mobile devices and often found creative ways to employ these in their schoolwork, both at home and at school. Throughout this study, cell phones are referred to as smart cellular devices.

1.2. Research problem

Although learners use smart phones in their daily lives, teachers are hesitant to utilise smart phones for learning and teaching in their classrooms. Kalpana (2014) observes that a lot of teachers do not use ICT in the learning and teaching process. Thus, teachers should change their attitude towards the use of ICT.

The study assumed that in low socio-economic areas, teachers are not adapting ICT, especially cell phones for teaching. But, in South Africa, no study has looked at this option, especially in rural schools where most learners have smart phones as a possibility for improving learning and teaching. Recent studies indicate that 84.2% of South African children obtain Internet access through mobile phones (Global Kids Online, 2016). Furthermore, more than 75% of the people in low income groups, in the age group of 15 years or older, have mobile phones. Czerniewicz and Brown (2014) indicate that there are high levels of poverty, school dropout, youth unemployment and youth crime in the Eastern Cape, Limpopo and Mpumalanga provinces. Notably, MyBroadband (2013) shows that these provinces also have the highest percentages of mobile phone usage in South Africa. It is possible that with such high ownership of mobile phones it can be predominant in rural schools. The use of cell phones is prohibited in some schools. This study explored the possible use of cell phones to compensate for lack of advanced technology in classrooms.

1.3. Literature Review

1.3.1 Introduction

In recent years, there is interest in the use of ICT for learning and teaching. This research evaluated the implementation of ICT in secondary schools in the Limpopo

Province. Below are the key terms of this study:

a) Information Communication Technology
b) Teaching and learning

1.3.2 Defining Key Concepts

1.3.2.1 Defining the concept Information Communication Technology

ICTs are types of technology used for communication. In education, ITC refers to the technologies exclusively used for the process of teaching and learning (Young, 2003).

1.3.2.2 Defining the concept Teaching and Learning

Change is a key factor for learning and this is permanent change which involves acquiring skills and a change in attitude. The purpose of this change is to achieve learning. Teaching, on the other hand, occurs to support the learning process (Sequeira, 2012).

1.3.3 Models used in Technology

The Multiple Indicators and Multiple Causes Model (MIMIC) is used to verify the teachers' ICT competencies model. The complexity of the relationship between competence and use is shown. There is a symbiotic relationship between competencies in technology and competencies in pedagogy. This prototype of the link between ICT facilitator's abilities and scholastic means assists individuals to understand the complexity of the integration process of ICT into classrooms. Therefore, Suárez-Rodríguez, Almerich, Orellana, (2018) argues that teachers should be trained to effectively use ICT for learning and teaching

1.3.4 History of the use of ICT

Daniels (2002) observes that as ICTs have proliferated, many countries have adopted them as a core aspect in education. Many people assume that ICT only refers to the use of computers. Yusuf, (2005) notes that teaching and learning has been affected by ICT since computers have been used to teach programming as early as 1970. Al Ansari (2006) notes that since then, there has been a drastic increase in the positive use of ICT. The use of ICT is innovative, enriching and a huge motivator for the learners.

Wang and Woo (2007) indicate that the classroom integration of ICT is not a contemporary phenomenon, since it is as classical as radios or televisions. Woo et al elaborates that integrating ICT in teaching adds the last step to the completed task by providing wholeness. The digital classroom begins with the teacher whose role is that of a coordinator with certain competencies rather than simply imparting information to learners. This has made the teaching profession more challenging.

1.3.5 Methodological Review

The methodological review investigates the role of ICT in teaching and learning. The use of ICT in the classrooms can have a positive impact on the teaching and learning process. ICT can affect the deliverance of education as well as accessing a broader platform of knowledge since ICT does not have geographical restrictions. The use of ICT can improve performance and foster a better working environment.

1.4. Theoretical Framework

McMahon and Raphael(1997) states that social constructivism emphasizes the cultural aspect and tries to understand what transpires in society and suggests that understanding is the basis of the construction of knowledge. Gredler (1997) notes that social constructivists believe that knowledge is developed according to how socially and culturally oriented we are and that knowledge is a human product.

Through cell phones, learners can learn from each other's shared experiences and knowledge. Social constructivism is a useful theoretical framework for this study because learning is part of a social activity which allows the learners to interact and discover knowledge on their own.

The social constructivist theory as articulated by Piaget guides this study. Piaget indicates that learners play an active role in examining the information and putting it into perspective. Learners are at the focal point and take charge of their own learning by organising and synthesizing the information. Under social constructivism, learners are not passive recipients of knowledge but active role-players. Social constructivists emphasize the psychological and social aspects of the learning process. For example,

Piaget strongly believed that through the process of transforming, organising, reorganising previous knowledge, learners use this process to develop information.

Kalpana (2014) states that social constructivists' such as Vygotsky argue that learners acquire knowledge through socialising which is crucial in developing new information and creating meaning of it. This is the latter view that will be adopted for the study. Since the development of cognition is fundamentally influenced by social interaction this study adopted Vygotsky's theory of learning. Vygotsky (1978, p.35) states: "Every function in the child's cultural development appears twice: first, on the social level, and later, on the individual level; first, between people (inter-psychological) and then inside the child (intra-psychological). This applies equally to voluntary attention, to logical memory, and to the formation of concepts. All the higher functions originate as actual relationships between individuals".

1.5. Purpose of the study and the Research Questions

This study investigated the use of ICT, specifically smartphones, in schools as a strategy of improving the educational process. The aim was to develop a model for enhancing the utilisation of mobile phones in the classroom.

1.6. Research Questions

The study evaluated the impact of the use of ICT in secondary schools in the Limpopo Province of South Africa towards the enhancement of teaching and learning.

The specific question formulated to answer the research problem is:

What is the impact of the use of smart cell phones in selected secondary schools of the Limpopo Province of South Africa?

The following sub-questions were also answered:

1.6.1 What are the experiences of teachers in integrating cell phones in their teaching?

1.6.2 What are the reasons for teachers being reluctant to use cell phones in their teaching?

1.6.3 How do teachers manage the use of cell phones in the classroom?

1.7 Research Methodology

1.7.1 Research Design

Qualitative design was adopted in this study where the researcher collected data in natural settings. This qualitative research emerged from an interpretivist paradigm. Teachers were observed in their social milieu, the place where teaching and learning takes place. Thus, the researcher could understand teachers' use or non-use thereof of ICT in their teaching. The experiences of educators were explored in real teaching situations. This helped in understanding the meanings that teachers attach to their teaching activities.

1.7.2 Sampling

Participants were purposively sampled and six educators who teach English Home Language were chosen, two from each secondary school. Other subjects are easily adaptable to being taught through ICT but there are challenges when it comes to English Home language. Therefore, this subject was chosen for study. Participants were selected based on their age, teaching experience and exposure to the use of ICT. Purposive sampling was cost effective, easy to administer and less time consuming. Using purposive sampling also allowed the researcher to select cases that were likely to have rich and relevant information (Gall, Gall, and Borg, 2007). Braun and Clarke (2013) also argue that purposive sampling generates insight and obtains an in-depth understanding of the topic of interest. All participating schools allowed the use of cell phones during learning hours.

1.7.3 Data collection

1.7.3.1 Interviews

Partially-structured interviews were used as the method for data collection. Interviewees responded to questions and commented on their viewpoints and personal encounters. This technique was helpful for investigating participant's theoretical and practical understanding of information as well as personal encounters. This assisted in understanding the thought processes of participants.

1.7.3.2 Observation of actual lessons in classrooms

In this study, educators were observed in their social settings, sites where teaching and learning takes place. Thus the researcher could understand participants' options and measures that they put in place in their teaching.

1.7.3.3 Classroom instrument sheet [Check list]

Prior to entering the research field, the researcher devised an instrument classroom sheet or a checklist. The researcher decided what aspects were required or what was to be observed. In the classrooms, the researcher observed the lesson and ticked against the checklist according to the various observable aspects.

1.7.3.4 Reflective journal

On completion of the interview session, the researcher engaged the reflective journal by noting personal views and perceptions about the interview.

1.7.4 Data analysis

The constant comparison analysis assisted the researcher to integrate the research questions as a guide for the discussions. The constant comparison data analysis method was developed by Strauss and Corbin (1998), which involves three steps followed. Step one is called 'open coding'. During this step, the data gathered was broken into tiny parts and encoded. Step 2 - axial coding – included like codes being grouped into similar groups. In the final step - selective coding – the investigator developed one or more topics, out of the categories. After coding the responses, the researcher developed themes from the documentation obtained from the interviews with the participants.

1.7.5 Quality Criteria

The researcher complied with the guidelines of trustworthiness. The study and quality criterion were used to minimise the occurrence of mistakes.

1.7.5.1. Transferability

This form of data quality criteria in a qualitative study refers to the generalisation of the results obtained in another situation and natural setting.

1.7.5.2. Dependability

Dependability means that the same results would be obtained if the study was to be replicated.

1.7.5.3. Conformability

This form of analysis involved confirming with others about the research results.

1.7.5.4. Credibility

Credibility was established by ensuring that findings were trustworthy from the participants' point of view.

1.8 Significance of the study

Dynamic changes are taking place in society due to the use of ICT. All aspects of lives including learning and teaching are being transformed by the adoption of ICT.

This study will be significant in three ways. Firstly, it will encourage teachers to effectively use ICT to add variety to their lessons and prevent learners from being bored. Secondly, it will help policy makers who are hesitant on enforcing useful aspects of the fourth Industrial Revolution. Rapid technological advancement means that both pupils and teachers need to be technological savvy. This research will assist schools to develop ICT policies. Schools would be encouraged to plan training programmes for teachers so that teachers can be knowledgeable and adaptable to the latest technology. Constant training for teachers will broaden their knowledge and contribute to a sense of professionalism.

1.9. Ethical considerations

Researchers should show respect for the anonymity and privacy of participants. During research, all stakeholders should be respected and any form of violation pertaining to research integrity and public reporting should be avoided. The intention of the research should be outlined to all stakeholders and there must be honest working relationships (McMillan and Schumacher, 2010). This is to ensure there is no harm or negative consequence resulting from the research activities. Prior to going out to the field and conducting the research, the researcher applied for ethical clearance from the Ethics Committee at Limpopo University. Written consent was requested from the Limpopo Department of Education. The researcher displayed immense integrity, utmost honesty and did not distort any of the research findings and did not include any false information or plagiarize. The researcher was transparent and all purposes and intentions of the research disclosed. Participation in the research was totally voluntary, and participants were not forced in any way into participating. Rather, participants consented after being given a detailed explanation of the research and participants were informed that they could withdraw their participation at any time without suffering any penalties. Since schools are public institutions, questions posed were structured so as not to compromise the integrity of staff members. Thus, controversial questions that could leave participants in awkward situations were avoided. The privacy of the participants was protected throughout the research process by ensuring that all information regarding the identity of the participants was only known by the researcher. The researcher never allowed any of the participants to suffer any discomfort, harm or to feel uncomfortable in any way.

CHAPTER 2

LITERATURE REVIEW

2.1. INTRODUCTION

The previous chapter discussed the formulation of the research problem and research questions, the conceptual framework and provided a brief outline of this study. This chapter presents a literature review. A literature review provides a background to a study and assists the researcher to identify what has been established and to find out whether there are any gaps that might still exist. This ensures the relevance, importance and usefulness of a proposed study. This chapter also analyses issues surrounding the conceptual framework that underpins this study.

First, the chapter discusses the conceptualisation of educational technology. Secondly, it discusses the integration of educational technology into teaching. Thirdly, the chapter reviews the professional development of educators by determining their use of technology in teaching and learning. Fourthly, the chapter discusses barriers preventing teachers from using educational technology and examines enablers that may promote the adoption of ICT. Fifthly, different models and theories of integrating technology into teaching are discussed. Lastly, the chapter addresses existing gaps in the use of educational technology for teaching.

2.2 CONCEPTUALISATION OF EDUCATIONAL TECHNOLOGY

Brückner (2015) views educational technology as the effective use of technological tools in learning and teaching. However, Richey (2008, p. 24) defines it as “the study and ethical practice of facilitating learning and improving performance by creating, using and managing appropriate technological processes and resources”. Both views advocate the use of educational technology in teaching and learning which will enhance performance. This allows the use of various resources which will in turn stimulate the teaching and learning process.

Educational technology has evolved in the facilitation of human learning through the utilisation of a full range of learning resources and the management of these processes (Ely, 2002). However, educational technology is a term used to describe a wide array of teaching-and-learning–related software and hardware that is increasingly being used in educational institutions. Brückner (2015) notes that accepting technology in education has given rise to the concept of educational technology. Agyei and Voogt (2012) state that educational technology facilitates collaboration in an active learning environment. This area of study is gaining interest from various stakeholders around the world as the current technologically advanced and the technologically advancing nations of the world have included ICT in their teaching and learning processes at schools (Agyei and Voogt, 2012). By contrast, Ferguson (2005) argues that technology hinders learning because in his study teenagers with the most access to the internet had the lowest scores in reading. However, Means (2010) found that technology was a tool for positive change. He thus argues that the use of technology in teaching and learning is an effective tool provided it is used effectively. To obtain productive results, learners should be guided on how to use technology in the learning process.

Becker (2000) observes that since technological tools, especially personal computers, cell phones and Internet access, have become part of students' everyday lives, using these tools is often no longer motivational in itself. Technology constantly advances and "new and improved" tools will always be a factor. Technology can help facilitate the knowledge-constructed in classrooms. Many researchers acknowledge the positive influence of ICT on the teaching and learning processes. For example, Becker (2000) and Means (2010), believe that schools can become more student- centred and offer more individualised learning than ever before with the use of technology in the classroom.

As the foregoing discussion clearly illustrates, the concept of educational technology is not monolithic. It has different meanings in different contexts to different people. This diversity of meanings could be due to the vast amount of educational technology that is readily available, such as: smart boards, computers, projectors, iPad, tablets and many more. This study only focuses on the use of cell phones in teaching and learning. Cell phones are readily available and almost all learners have them. Learners utilise mobile phones with internet services in their learning as they are intrinsically motivated

(Project Tomorrow, 2010). Manzo (2020) found that 89% of learners positively use cell phones for learning purposes, while 96% of students exhibited a great improvement by integrating technology into the curriculum.

In Nigeria, Fakokunde (2017) found that students are aware of the educational use of mobile phones but do not always use them to enhance their learning. This led to a ban on the use of mobile phones in schools because the school did not enforce rules, regulations and disciplinary measures to guide the use of mobile phones in school.

Over the past few decades, educational technology has become very important in education as well as in the professional growth of teachers. However, Amarilla (2009) notes that technology has brought several challenges such as lack of training or pressure to use them. Since the concept of educational technology means different things to different people, the following section is the integration of technology in education.

2.3 INTEGRATING ICT IN TEACHING AND LEARNING

The traditional approaches to learning involved the teacher merely disseminating knowledge, however, with the advance in technology, approaches have changed. Technology should be integrated in the curriculum to ensure meaningful learning takes place. Agyei and Voogt (2012) argue that the concept of educational technology facilitates an active learning environment and that through adequate planning the integration of ICT in learning can be a smooth process.

Figure 1 below indicates why ICT should be integrated in education

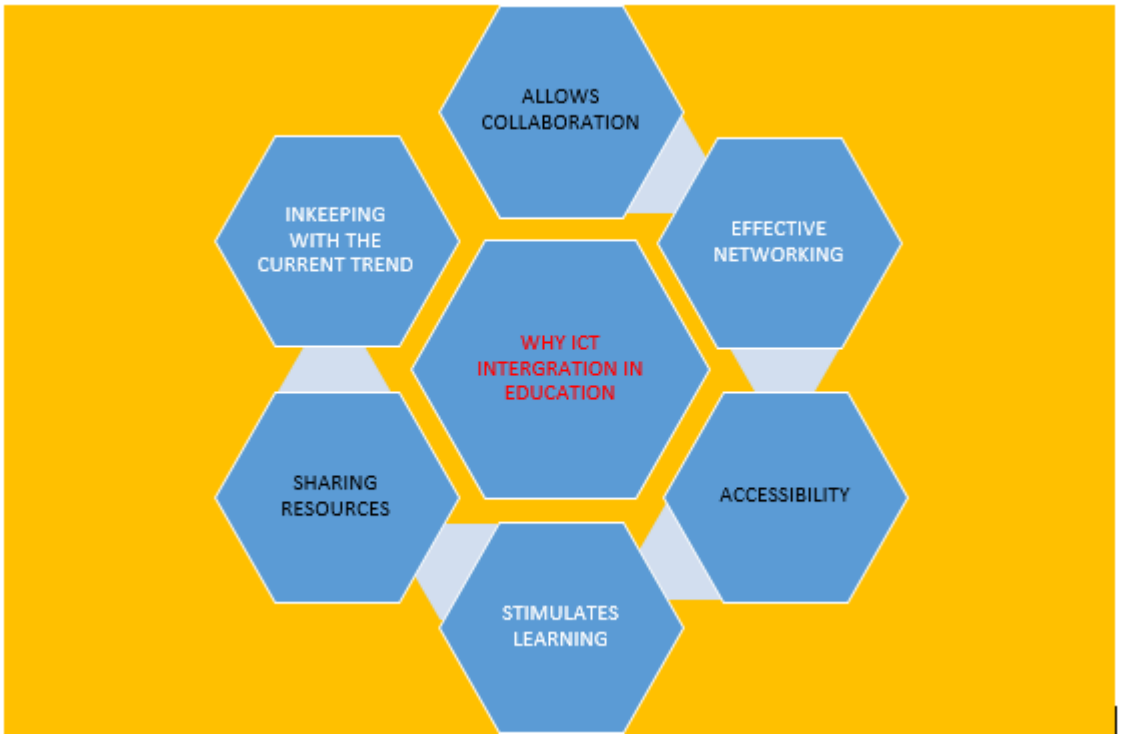


Figure 1 Reasons why ICT should be integrated in education

The fourth Industrial revolution has brought a dynamic shift from the traditional methods of teaching to the use of technology in teaching. Cell phones are now used extensively for learning and learning and teaching purposes. Charbonneau-Gowdy (2015) notes that there has been a growing use of technology in teaching and learning which indicates that there are changes in teaching practices. Charbonneau-Gowdy's (2015), notes that a lot of participants were using technology supported games, interactive videos and cell phones as technological tools.

In recent years, the virtual world has become an inseparable part of the physical world of children and teens. A lot of children and teens use the internet to obtain information, for interpersonal communication and for entertainment and social needs. Scholars define the integration of technology in teaching and learning in different ways. For example, Mahmud,Ismail, Ali, Nawawi,and Luan (2008),define ICT integration as the process of determining where and how technology fits in the teaching and learning scenario on the other hand, Trinidad, Clarkson and Newhouse (2004) view the integration of technology in teaching and learning as a progression

of transformation into a planning and analytical framework for schools. Tasios and Solomonidou (2002) hold the view that the integration of ICT with essential gaps and encounters multifold difficulties. However, with the ever changing developments made in technology ICT needs to be integrated in education to stimulate the teaching and learning process.

2.3.1 Technology as a growing force

Technology has been a growing force in education, business and private life. Most people use email instead of writing letters and e-cards are sent for birthdays and other special occasions instead of paper greeting cards. Ghavifekr and Rosdy (2015) note that students use My Space, an international site that offers email, social networking, communities, videos and web logging on the Internet to communicate with friends, virtually design and maintain their own website. In addition, most homes, schools, and business offices have Internet access.

A decade ago, access to technology was limited, and wiring schools was one of the nation's education priorities. Ten years of substantial investments and government interventions have vastly improved this picture. Quoting from the Secretary's Fourth Annual Report on Teacher Quality, Clopton (1997, p. 98) indicates that 90% of schools have Internet access compared with the 35% of schools in 1994. Many schools across the country use technology to enhance student learning: tools such as Internet access, digital cameras, email, interactive whiteboards, laptop computers, LCD projectors, and course specific software that support the curriculum. Most teachers have a basic understanding of how to use word processing software, such as Microsoft Word, which is available on all school computers. Many teachers allow students to use the Internet to get information for research projects and assignments.

Honey, Culp and Spielvogel (2005) states that public schools have made consistent progress in expanding Internet access in instructional rooms. However, the technological tools themselves should not be the focus. Technology is not the teacher; it is a tool the teacher uses to widen the student's reach and should complement and enhance what a teacher does. Hoffman (2017, p. 28) advises teachers to use technology with learning objectives. Hoffman observes that

“although students use their devices on their own, they could benefit more if their instructors would find deliberate uses for these powerful technologies” (p. 28). With proper implementation, educators can help students avoid the potential distraction of mobile devices, empower and guide them in the use of their mobile devices. This will help students to gain media literacy skills.

The traditional approach to teaching and learning involved the teacher merely disseminating knowledge. However, Christie and Afzaal (2005) believe that traditional learning styles do not use modern assessments contributing to low quality of education. In recent years, there have been numerous technological advancements. Since learners have become technologically savvy, teaching and learning approaches should be revised. Integrating ICT in the classroom allows learners to associate ICT with their technological ability. The learners become motivated by the use of technology in teaching and learning motivates them and contributes to making them responsible for knowledge acquisition.

Hoffman (2017, p. 18) indicates that although students use devices in class to read, reference, or search materials, such use is basic, “just touching the surface of the capabilities of technology”. In other words, instructors use mobile devices as “just another way of doing what they have already been doing” (Hoffman, 2017). Hoffman argues that focusing only on the device rather than the pedagogy of its use hinders the educational capabilities of the mobile devices. Ertmer and Otternbreit-Leftwich (2010) concur and say that teachers should include pedagogy in the use of technology. Ertmer and Otternbreit-Leftwich also claim that a lack of teacher collaboration and pedagogical support, as well as a lack of experience among cooperating teachers pose learning obstacles. Plymale (2007, p. 87) argues that new technologies allow instructors “to explore new means of student collaboration, to provide complex modelling and virtual experience opportunities, to study simulated and informal learning techniques, and to enhance students’ research capabilities”.

Ledbetter and Finn (2013) also found that in-class technology access may enhance student satisfaction with their degree program, equip students with Internet research skills, and facilitate continued online learning outside the classroom. Terras and Ramsay (2012, p. 820) point out that “mobile devices have a number of unique characteristics such as portability, connectivity, convenience, expediency,

immediacy, accessibility, individuality and interactivity and hence offer the potential of educational applications above and beyond those of traditional information and communication technology". Instructors also must inform students about the learning goals of technology. Terras and Ramsay (2012, p. 822) recommend that "students need to understand the pedagogical purpose of technology for an application to be successful". Clearly, the use of technology for learning and teaching has a lot of benefits but the worrying trend is that only a few researchers have offered tested ideas or positive outcomes about this matter. Olufadi (2015) advises that instructors should find creative ways and guidelines for integrating phones for class use.

In Malaysia, Dewitt and Siraj (2010) found that students did not perceive mobile phones as useful for learning. Similarly, Nordin, Hamzah, Yunus, and Embi (2010) found that student teachers were not interested in mobile learning (m-learning) to be part of schools' curriculum. Moreover, participants were sceptical about allowing students to bring mobile phones to schools. The Malaysian Ministry of Education [MMOE], (2009) restricted Malaysian students from bringing mobile phones to school. The use of mobile phones in school by students is an offense according to the MMOE.

Tessier (2013, p. 28) found that "students felt that mobile phones helped their learning, encouraged their enjoyment of the class, improved their success in the course, marginally increased their attendance, and were not an important distraction". These findings suggest that mobile phones are a tool for learning and a means to help students access and take ownership of knowledge. In contrast, some researchers report negative effects of unregulated mobile phone use in the classroom. Kuznekoff and Titsworth (2013) found that when mobile phones are used during class, less information is written down, students recall less information, and perform worse on a multiple-choice test than those learners who do not use mobile phones in class.

2.3.2 Mobile phones in schools

Mobile technology is rapidly evolving not only for affluent schools but also for poor resourced rural settings where education systems cannot meet societal demands. Mobile technology is providing new opportunities for learning. Mcnulty (2017) states

that South Africa has been embracing these devices to expand educational curricula, to increase efficiency and quality alike. Van Weert (2005) also claims that mobile technology represents an important avenue of reducing the gap between the poor and the rich in contemporary society where access to knowledge and information is increasingly vital.

Godwin-Jones (2017) argues that mobile learning is expanding the learning environment and that mobile phones are not 'going away anytime in the foreseeable future'. Mobile phone use has gone beyond expectations, with 89% of South Africans owning a mobile phone. South Africa is also the continent's leader in app downloads, usually an indication of higher smartphone adoption, with 34% of phone users making downloads from app stores (World Economic Forum 2017). Clearly, the education potential of mobile phone technology is very high.

Recently, the US-based television channel CNN declared that mobile technology had 'immense' potential to transform Africa's 'dysfunctional educational system … as mobile phones – cheaper to own and easier to run than PCs – gain ground as tools for delivering teaching content' (Godwin-Jones, 2017, p.16).

Significantly, mobile phones are still disliked and outlawed in South African schools despite the clear benefits of using mobile phones in teaching and learning. This has been attributed to two major issues: the likelihood that they will be disruptive in classrooms and misused by learners (Fried, 2008). Collectively, all major stakeholders in the education sector believe that the use of mobile phones has negative consequences. Instances of misuse have been reported in some schools in South Africa (Bosch, 2008; Ford and Batchelor, 2007). More specifically, some researchers argue that the source of mistrust of mobile phone technology in the classroom stems from its potential contribution to the deterioration of grammar, poor language use, bad spelling and a lack of good writing by learners, mostly of the English language (Chaka and Govender, 2017; Tagliamonte and Denis, 2008; Vosloo, 2009; Wood, jackson, Plester and Wilde, 2009). However, with the correct training and application of these tools in the classroom it can have a positive outcome.

Researchers in a SAIDE study established that learners could effectively use mobile phones to collaborate with their counterparts, using a communal style of learning that is most compatible with South African culture. Students also can communicate with

scholars through SMSs, sending images and even making phone calls to renowned experts (SAIDE 2008). A project called Dr Math, for example, connected 30 000 high school students with undergraduates at the University of Pretoria's Faculty of Engineering for homework help. About this project, UNESCO (2017) quotes Steve Vosloo, a mobile learning specialist saying: 'For many children in South Africa, this is the most qualified tutor that they will have access to'.

More recently, several scholars have concluded that mobile phones improve the performance of learners when properly integrated into the teaching and learning processes (Haruna, Aisha, Yunusa and Hadiza, 2016; Jairus, Christian, Ogwuche, Thomas, Tyavlum and Ode, 2017; Kimura, 2007). Chaka and Ngesi (2017) found that students are ready to embrace mobile learning while Sharples, Taylor and Vavoula (2005) revealed that using mobile devices provides efficient and inventive methods for knowledge-centred learning with understanding. Student's understanding of a specific subject can be deepened if they do not merely memorise large chunks of information.

Similarly, Laurillard (2007) and Palalas, (2011) claim that the ability to create and share content through mobile phones and the online apps that come with them, empowers learners in their learning and gives them a sense of pride and responsibility. There is a limit, however, to what students and instructors can do using mobile phones. The impediments to doing certain types of academic activities exclusively on a mobile device challenge even the most creative school. Although elements of courses may be taught on a mobile device, the entire course is not something that could be effectively conducted on a mobile device. Written assignments are especially problematic. While Oyinloye (2009) and Chaka and Ngesi (2010) have experimented with using SMS for writing purposes, other scholars note that most high school and college courses require some form of lengthy written work that is too difficult to complete on a small, hand-held device. In this case, instructors might design less text-dependent assignments, such as blogs, podcasts or digital stories, or provide students with access to more traditional devices, that is, laptops or desktop computers.

Researchers have also experimented with Twitter and Facebook as supplemental tools for teaching and learning (Al-Khalifa, 2010; English and Duncan-Howell, 2008;

Project Tomorrow, 2010; Schroeder and Greenbowe, 2009). Schroeder and Greenbowe, (2009) claims that facebook is a useful tool for supplementary teaching and learning. The aim would be for learners to be encouraged to use Facebook to discuss course content outside of the controlled classroom context. English and Duncan-Howell (2008) observe that Facebook could be used for affective purposes, such as group reinforcement, encouragement and support, which would be very appropriate in the South African context. Of course, the use of Facebook for learning purposes comes with such challenges as tensions between lecturers' teaching styles and student notion of learning, challenges of redundant postings, intergenerational tensions between lecturers and students, constraints of time and limitations of collective responsibility (Rambe, 2010). Borau, Ullrich, Feng and Shen (2009) conclude that Twitter is a useful tool for learning communicative and cultural competence anytime and anywhere and a convenient medium for social and collaborative learning if used appropriately. Borau et al., (2009) concur that Twitter serves as a quick and easy platform for informal communication and reading.

However, mobile phones have not been embraced enthusiastically by everyone in the educational community. The National Association of School Governing Bodies (NASGB), in fact, called for a ban on the use of cell phones in South African schools (Vonkova, Papajoanu, Stipek and Kralova, 2021). Supporters of the ban point to the potential for student distraction and classroom disruption. Such challenges as misbehaviour, online bullying, issues of privacy and self-representation, and addiction to social networks have been raised as well. Making course materials easily usable in a multitude of formats (i.e. both text and audio) can make it possible for students to complete their reading while on the go, but there are disadvantages to this as well. It is not as easy for students to actively take notes while reading in this way. Students may be multitasking (e.g. driving while listening to the text reading for the day), which will likely result in a lack of reflection and less deep processing of the material (Vonkova et al, 2021).

Even though many schools in South Africa have banned the use of cell phones, recent information revealed that in some provinces like Gauteng, high school learners were provided with iPads by the Department of Basic Education. The Mail and Guardian dated 02 April 2012 reported that iPads have brought about a new attitude to learning at schools in the Gauteng province. The iPad has similar functions as a cell phone;

calls can be made, it contains apps, internet access and many more, so the question is why then ban cell phones? It was further reported that the use of iPads in schools vastly improves pupils' engagement and involvement in lessons. Responding to an interview with the Mail and Guardian, Chairperson of the Programme for Educational Tablets in Schools (Pets) Foundation, Michael Rice, told the Mail and Guardian that the cultural and psychological issues around information communication technology (ICT) in schools cannot be underestimated, yet have hardly been recognised or researched (Mail and Guardian, 2012). Since the use of iPads has been accepted, hopefully this use of technology will alter the mind-sets of major stakeholders about lifting the ban on the use of cell phones at schools.

Means, Blando, Olson, Middleton, Morocco, and Remz (1993) report that cell phones are used to assist teachers in the curriculum and enhance student learning. One potential target could be "at-risk" students. Means et al (1993) suggest that technology in the classroom could provide authentic learning opportunities to "at-risk" students. Teachers can draw on technology applications to simulate real-world situations and create actual environments for experiments so students can carry out authentic tasks as real workers would, explore new terrains, meet people of different cultures, and use a variety of tools to gather information and solve problems (Means et al., 1993). Most of these "at risk" students will be entering the work field after high school, and real world experiences could be helpful in fostering these students' success.

To summarize, several studies suggest that any student, including the "at-risk" student, who has technology integrated into the curriculum, could potentially see a positive change in classroom grades, GPA, and attendance. Technology changes the classroom roles and organization, especially as it allows students to become more self-reliant. Students may use peer coaching, and teachers may function more as facilitators rather than lecturers (Means, 2010). Students would be allowed to work on their own, at their own pace, when working on computer projects. These students may not be afraid to fail when their failure is personal rather than in a large classroom discussion.

In addition, one of the greatest concerns is that the abbreviated text style of English used on mobile phones will make its way into official school writing and examination scripts. Weiss, Wechsung and Marquardt (2012) observe that SMS language

resembles a code rather than a language and that it may be incomprehensible to speakers of Standard English, which is associated with academic and professional achievement and the educational systems of English-speaking countries worldwide. Some scholars believe that SMS language used on mobile phones will degrade their students' language usage. High school teachers of English as home language for Afrikaans-speaking students in the Western Cape viewed SMSs as having a negative effect on students' writing, reflected in incorrect punctuation, non-conventional spellings and shortened sentences. Geertsema, Hyman and Van Deventer (2011) state that educators expected the use of SMSs to lead to poor grades and diminished knowledge of Standard English.

However, other researchers determined that this was not the case. For example, Freudenberg, Brimble and Cameron (2009) found that young people were avid users of SMSs and proficient in text speech when sending and receiving messages and chatting with friends. Despite this, students' samples of written work did not contain a great number of incidences of SMS language. Instead, students could produce written work that adhered to the formally approved standards of written high school English. Several SMS speak features were indeed present in their formal written work, which indicates that mobile phone usage had some impact on their written work. However, not all nonstandard features could be attributed to the influence of SMS speech, as some of the spelling and punctuation had been noted in the written English of learners even before the advent of the mobile phone (Freudenberg et al, 2009). Thus, evidence suggests that grammatical violations in the text messages of children, adolescents and adults do not reflect a decline in grammatical knowledge.

Roschelle, Pea, Hoadley, Gordin, and Means (2000) indicate that technology can be used in collaboration for all subject areas, but teachers must consider the different styles of teaching and the students' different styles of learning in order to use them effectively. Although this seems a favourable aspect, some educators are reluctant to incorporate the use of technology in learning and teaching.

Bassett (2005) argues that the digital age is not about technology; it is about what the teachers and the learners are doing with the technology to extend their capabilities. Furthermore, the question is not whether technology tools are available for teachers and students to use because technology tools are more available to

teachers and students than ever before. Therefore, the question is: Are technology tools improving education? Even though complex factors exist, such as the ways in which technology has been introduced in different schools' systems around our nation and the amount of money that has been used to purchase technology at individual schools, ultimately, the schools will be accountable for these investments.

2.3.3 The integration process

Integrating technology into the classroom begins with the teacher preparing lessons that use technology in meaningful and relevant ways, using technology to support the curriculum rather than dominate it. Technology should assist the teacher to create a collaborative learning environment and help the teacher transition from the role of facilitator to that of a learner. A major goal would be to allow students to use technology, experiment with real world problems and manipulate them to see what different scenarios would do to the problem. Thus, students would think about possible outcomes if the variable is changed. So, when teachers integrate technology into their classroom lessons, they can teach the basic concepts and then have the student work with the computer or other technology. Finally, everyone can gain from using technology if teachers are taught how to successfully integrate it into the classroom. Ranasinghe and Leisher (2009) state the belief that technology will hinder students' learning has been proven wrong because students can be taught to use it as a useful learning tool.

The figure 2 below was adapted from a Unified Model of Integration of ICT into The Teaching-Learning Process (2007). It indicates that the integration of ICT strengthens the learning process.

The posed questions were based on the interactions and interconnections. Hence, this model is not a linear model but cyclical. The questions "who", "why" and "how" are answered in the integration process while "how" is answered within the context of "what", "where" and "when". All structures of the model were formed both individually and collectively.

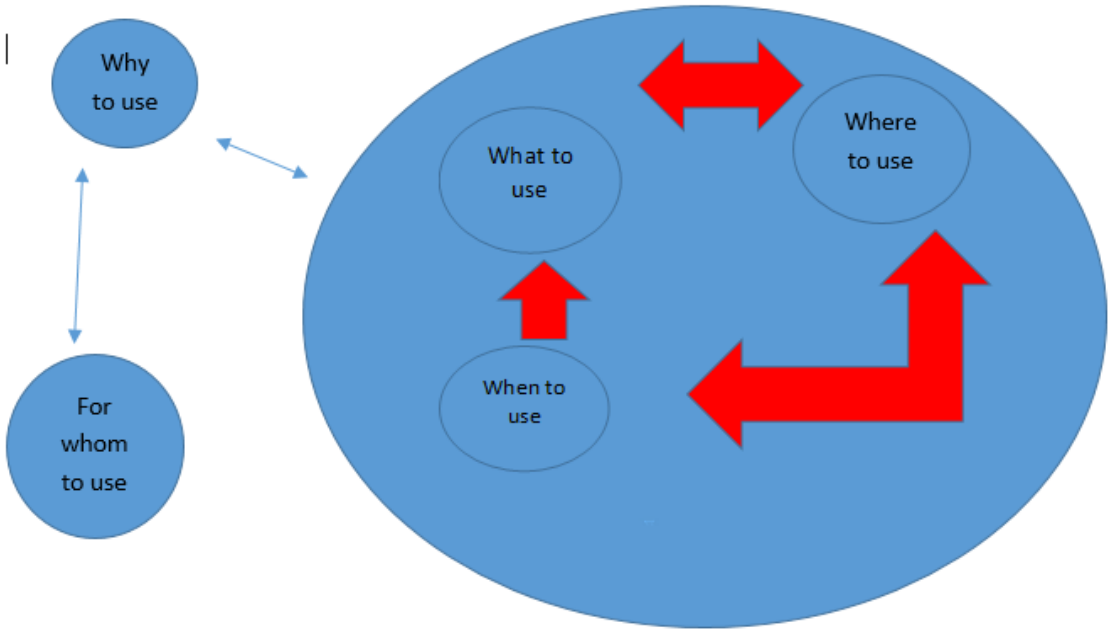


Figure 2: Adapted from a Unified Model of Integration of ICT into the Teaching-Learning Process (2007)

Becker (2001) argues that the extent to which the integration process strengthens learning and the effective use of ICT in the classroom depends on how aware the teachers are about the potential use of ICT in teaching and learning. The above model is a cylindrical model. The answer to the questions above should focus on the learning of the pupils in terms of their pedagogy. Haslaman, Kuskaya-Mumcu, and Kocak-Usluel (2008) indicate that the, who, why and how questions should be answered with the integration process of how and within the context of what, where and when. This study developed a unified model for integration of ICT resources and applications into teaching and learning to strengthen pupils' learning and to gain clarity on the learning process.

Wango (2012) claims that effective teaching and learning occurs through better teaching practices. Fung and Lui (2016) found that the integration of ICT in the classrooms enhanced pupil's interest, engagement and motivation. Herrera and Macías (2015) observe that technology and its contributions are evolving and changing the fields of knowledge at a rapid pace. Thus, education, as a discipline, is taking on new challenges that deserve detailed study. However, Kandiri and Mugand (2013) claim that ICT's success depends on how strong the teacher's support and

attitude is. Teachers are hesitant to use new strategies fearing that these might have a negative effect on examination results. Teachers who do not use ICT believe that ICT has no benefits. Therefore, teachers should be trained to use ICT effectively.

Researchers have identified various factors that influence the integration and adoption of ICT in teaching and learning. For example, Rogers (2003) has identified five technological characteristics or attributes that influence the decision to adopt an innovation. Stockdill and Moreshouse (1992) have identified user characteristics, content characteristics, technological considerations, and organizational capacity as factors that influence ICT adoption and integration in teaching. Balanskat, Blamire and Kefalla (2007) identified teacher-level, school-level and system-level as determining factors that influence ICT adoption and integration in teaching. Teachers' integration of ICT into teaching is also influenced by organizational factors, attitudes towards technology and other factors (Chen, 2008; Van Braak and Valcke, 2008; Lim and Chai, 2008). Sherry and Gibson (2002) claim that technological, individual, organizational, and institutional factors should be considered when examining ICT's adoption and integration. For Neyland (2011), factors such as institutional support as well as micro factors such as teacher capability influencing the use of online learning in high schools in Sydney, Australia. Clearly, there are numerous levels of involvement that influence the effective integration of ICT in teaching and learning.

The successful initialization and implementation of educational technology in a school's program depends on the teachers' support and attitudes. If teachers perceive technology programs as neither fulfilling their needs nor those of their students, they are unlikely to integrate technology into their teaching and learning. Hew and Brush (2007) and Keengwe and Onchwari (2008) indicate that teachers' attitudes and beliefs towards technology influence successful integration of ICT in learning and teaching. If teachers' attitudes are positive toward the use of educational technology, then they can easily provide useful insight about the adoption and integration of ICT into the teaching and learning processes. Research has shown that teachers' attitudes towards technology influence their acceptance of the usefulness of technology and its integration into teaching.

On the technological level, for successful adoption and integration of ICT into teaching, teachers must perceive the technology as better than previous practice, consistent with their existing values and past experiences and needs, Also, ICT should be easy to use, teachers should be able to experiment with ICT before adopting them and the results of the innovation should be visible to others. This research proved that many teachers are hesitant to change existing programs to something they had observed or used.

2.4 PROFESSIONAL DEVELOPMENT FOR ICT INTEGRATION

Education does not cease after earning a degree and starting a career. Through continuing education, career-minded individuals can constantly improve their skills and become proficient at their jobs. Educational technology, school guidelines and curriculum standards are constantly changing, making it challenging for teachers to keep up with trends and best practices in the field. Professional development transforms teachers into better and more apt educators by enabling them to create relevant and tailored course instructions for today's learners.

The use of educational technology by teachers in classes benefits both teachers and learners. Kirschner and Selinger (2003) note that many pupils are more adept than their teachers in using a variety of technologies to acquire and transmit knowledge. Jonassen (2000) claims that these pupils are often prolific and fearless users of technology which explains why certain teachers are resistant to use ICT in teaching and do not believe that it enhances their professionalism. Although the ability to use educational technology (ICT) in teaching adds to professional development, many teachers are resistant to use technology.

Gore, Lloyd, Smith, Bowe, Ellis, and Lubans (2017) argue that the use of educational technology as a tool for teaching adds to the educators' development and professionalism. Educators are also appraised yearly and if the appraisal is positive, they get 1, 5% salary increment. The use of educational technology enhances teachers' appraisal. Thus, both teacher and student benefit, the teacher experiences personal development and receives financial rewards and students' learning is enhanced.

Professionalism is imperative for teachers because it affects teaching quality and student achievement (McMeeking, Orsi, and Cobb, 2012). Irmawati, Widiati and Cahyono (2017) point out that the most popular approach to enhancing professionalism is traditional face-to-face teacher professional development (TPD) such as seminars, workshops, and training. Dean, Herden-Thew, Delahunty and Thomas (2019) claim that this approach, unfortunately, is "designed as mandatory for particular career stages (e.g., the new academic) or voluntary once-off events around a particular topic or innovation" (and this limits the freedoms of teachers to choose suitable TPD activities. Moreover, this approach presents several drawbacks in terms of practicality and financial viability.

Russell, Carey, Kleiman, and Venable (2009) note that teachers, particularly those in rural areas, find face-to-face TPD expensive and impractical. Thus, in the field of teacher training, there has been a call for providing a financially friendly, flexible, and practical TPD. The mobile phone offers one such avenue because it can provide a range of resources for teacher professional learning (Aubusson, Schuck, and Burden, 2009) so that teachers can freely choose activities that improve their skills and knowledge. This capability is rooted in the ability of the mobile phone to merge mobile and ubiquitous learning (Schon, 1987) with authentic and meaningful contexts (Hsu and Ching, 2012).

Furthermore, the use of mobile phones also helps teachers financially because the purchase and operation of mobile phones are comparatively low (Burns and Lucena, 2018). Walsh, Shrestha, and Hedges (2013) showed how a cell phone with hundreds of TPD and classroom audio and video files stored in micro secure digital (SD) cards enhanced teachers' professional knowledge and students' communicative English language acquisition. Meanwhile, Shaheen, Walsh, Power and Burton (2013) carried out the English in Action (EIA)'s School Based Professional Development (SBPD) model and discovered that a cell phone positively changed the classroom practice of English teachers in Bangladesh. Chen (2018) also agrees that professional development plays a vital role in the use of technology in education. Du Toit (2015) indicated that the more teachers participated in professional development, the more they used ICT in their classrooms suggesting that this development should be incorporated into teacher training courses.

Further, teacher training related to ICT should expand certain basic concepts and include models. For example, the Cascade model involves two teachers attending workshops and then returning to school to cascade the information and training (Gaible and Burns, 2005). However, these workshops have been criticised for dealing with technical rather than pedagogical aspects. Most research indicates that teaching experience influences the successful use of ICT in classrooms (Wong and Li, 2008; Conti and Giordano, 2014; Hernandez-Ramos, 2005).

Russell et al (2007) also observe that after a professional development programme for teachers, the use of technology in the classrooms also increases. These results are parallel with the studies revealing that the in-service training programs increase the teachers' technology usage for preparation of education and instruction both in-classroom and out-classroom environments (Russell et al, 2007; Van Braak, Tondeur and Valcke, 2004). The teachers who attended the assessed professional development program were inclined to motivate their students to increase their use of information technologies. Brinkerhoff (2006) adds that the teachers who attend professional development programs encourage their students to use technology. The nature of the lessons and the level of innovation depends on the skills and knowledge of the teachers. Hence, teachers should develop their competency levels.

Electrical power supply also seems to be a problem as some have inadequate backup power. Schools require investment in equipment, professional development and teacher training. Teacher's attitudes and support plays an essential role. To address these issues, the government needs to ensure that backup power is supplied. This can be achieved through collaboration with the various stakeholders.

Figure 3 belows reveal the results of research conducted on the beliefs of the use of cell phones for professional development in teaching and learning conducted by Saiful (2020)

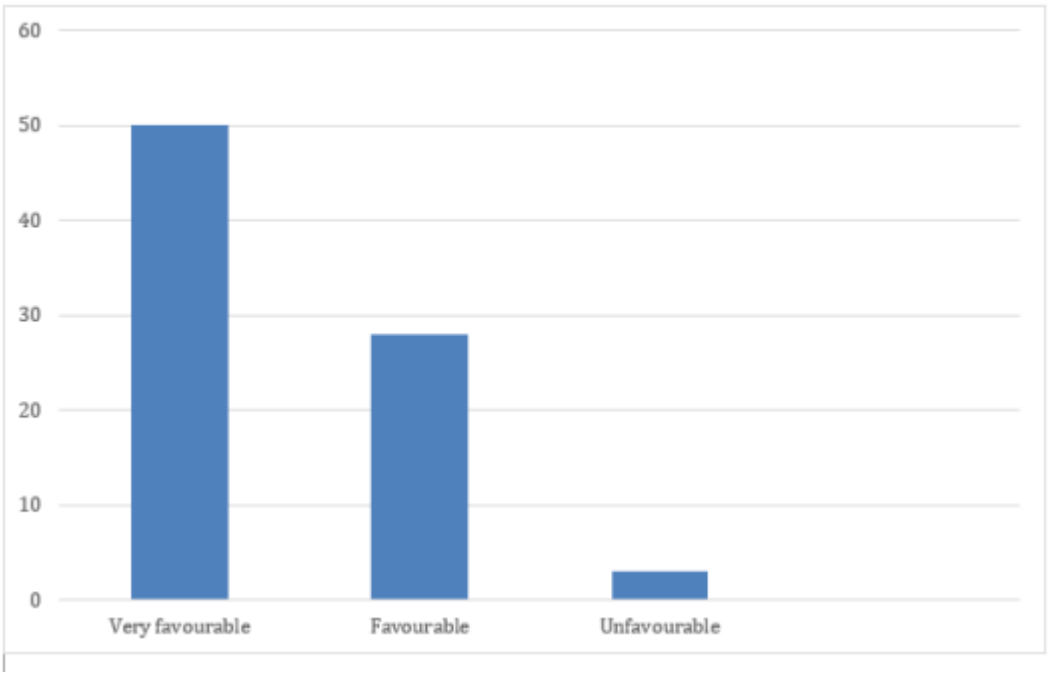


Figure 3 Indicating results of research conducted on the beliefs of the use of cell (adapted from Saiful, 2020)

The detailed responses in Figure 3 show that most participants (50) had favourable beliefs about the use of smartphones for Teacher Professional Development (TPD), while 28 had very favourable beliefs and only 3 reported unfavourable beliefs. None held very unfavourable beliefs about Mobile Teacher Professional Development (MTPD): Delving into English Teachers' Beliefs in the use of smartphones.

Saiful (2020) indicates that English teachers perceive the ability of smartphones to develop their competencies. This finding was corroborated by the interview results. Teachers reported significant benefits of smartphones in developing knowledge, building professional networks, and supporting instructional activities. However, a few participants believed that the development of teacher competence could only be achieved through face-to-face workshops and training. This poses challenges for teachers in rural areas because implementing face-to-face TPD in these areas is very expensive and impractical (Russell et al, 2009) so much so that often rural teachers gather in central urban areas for a couple of days at a time making TPD expensive and impractical. Additionally, there are times when the knowledge acquired during such activities may not be applicable to an individual teacher's needs, and thus, better alternatives should be developed.

The use of smartphones by English teachers in rural areas was found as a catalyst for TPD because of its low-cost (Burns and Lucena, 2018), handiness, and pocket-size (Lanz, Lundquist, Mansio, Maurer and Teh, 2018). These characteristics make it possible to conduct professional development processes and activities at anytime and anywhere, without generating huge expenses. More importantly, these characteristics make it possible to offer competence development activities which fit with the needs of many different types of teachers through the Web, games, social networking, and other prolific applications (Awad, Isabel and Tossell 2021). These resources are suitable for teacher professional learning (Hsu and Ching, 2012). Interview results confirmed that the presence of smartphones is crucial for English teachers because it allows them to review learning topics and get updated on the latest news about their professions and teaching materials.

Teachers' professional development is a key factor to successful integration of computers into classroom teaching. Moreover, several studies have revealed that whether beginner or experienced, ICT related training programs develop teachers' competencies in computer use (Bauer and Kenton, 2005; Franklin, 2007; Wozney, Venkatesh and Abrami, 2006), influence teachers' attitudes towards computers (Hew and Brush, 2007; Keengwe and Onchwari, 2008), assist teachers reorganize the task of technology. Plair, 2008) also notes that new technology tools are significant in student learning. Muller and Antoni (2020) related technology training to successful integration of technology in the classroom. In a study of 400 pre-tertiary teachers, they showed that professional development and the continuing support of good practice are among the greatest determinants of successful ICT integration. Sandholtz and Reilly (2004) claim that teachers' technology skills are a strong determinant of ICT integration, but are not conditions for effective use of technology in the classroom. They argue that training programs that concentrate on ICT pedagogical training, instead of technical issues and effective technical support, help teachers apply technologies in teaching and learning. Research reveals that a quality professional training program helps teachers implement technology and transform teaching practices (Brinkerhoff, 2006; Diehl, 2005). Lawless and Pellegrino (2007) claim that if a training program is of high quality, the period for training lasts longer, new technologies for teaching and learning are offered, educators are eagerly involved in important context activities, teamwork among colleagues is improved and

has clear vision for students' attainment. Teachers should adopt and integrate ICT into their teaching when training programs concentrate on subject matter, values and technology. Training must focus on how ICT can be incorporated into the learning area rather than emphasizing the technological aspect.

Plair (2008) argues that teachers require technology experts to show them how to integrate ICT in facilitating students' learning. Teachers' understanding of content knowledge and how to apply technology to support students' learning and attainment lead to increase in knowledge, confidence and attitudes towards technology. Educators who integrate technology with new teaching practices gained through professional training can transform the performance of the students (Lawless and Pellegrino, 2007). Chen (2008) advocates that professional training courses be designed to identify beliefs about successful teaching, policies for enhanced teaching and learning and syllabus design for teaching purposes. Wepner, Tao and Ziomek (2006) note that teachers committed to professional development activities gain knowledge of ICT integration and classroom technology organization. It is imperative to allow teacher trainees to apply ICT in their programs so that they can use technology to supplement their teaching activities. Teachers are likely to integrate technology into their teaching if they are given time to practice, learn, share and collaborate with peers on any new technological advancements. Levin and Wadmany, (2008) argues that training programs for teachers that embrace educational practices and strategies to address beliefs, skills and knowledge improve teachers' awareness and insights in advance, in relation to transformations in classroom activities.

2.5 BARRIERS PREVENTING TEACHERS FROM USING ICT IN THE CLASSROOMS

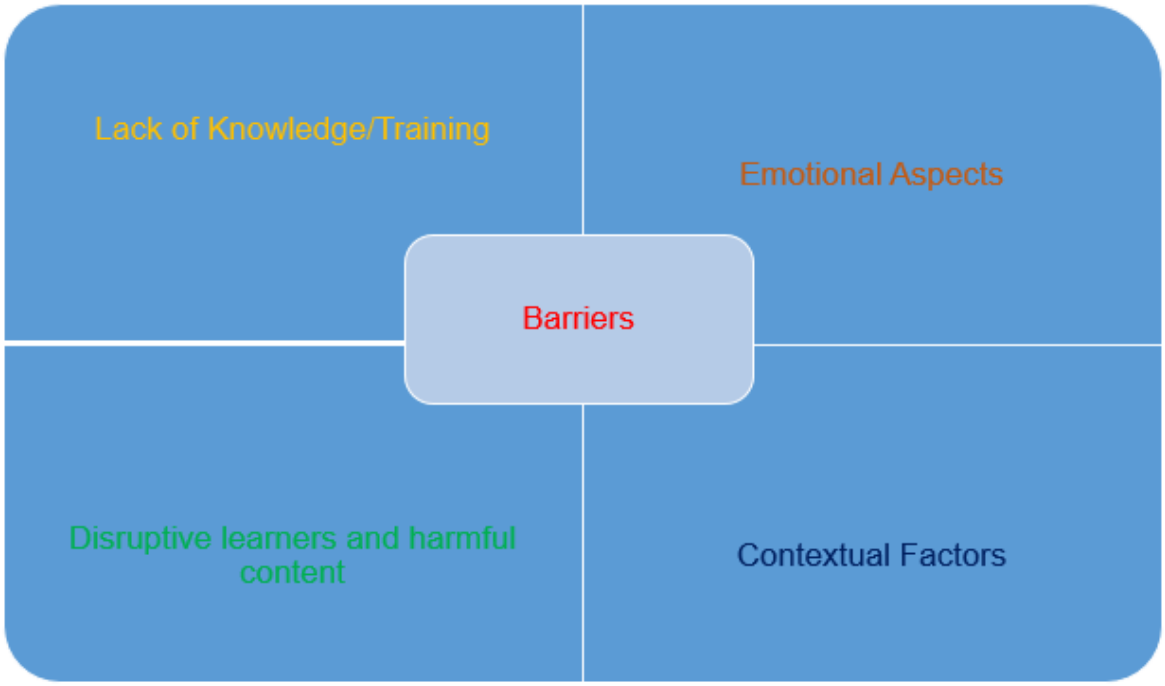


Figure 4: Indicating 4 Barriers

2.5.1. Lack of knowledge and training

Rubagiza,Were and Sutherland (2011) notes that knowledge is power and that the use of cell phones, like any innovation, requires the emergence of a new set of skills, attitudes and pedagogical approaches that require continuous training programs to build sufficient capacity among teachers, developers, educators and administrators. Bialobrzeska and Cohen (2005) point out that for positive outcomes, teachers must be conversant with the utilization and implementation of ICT integrated approach.

The use of ICT is not an easy task (Kozma, 2003; Tondeur Valcke and Van Braak, 2008). There are two main inter-related problems that became evident, firstly; the extent of the use of ICT in the classrooms have been relatively low. Many teachers are not using ICT consistently (Ward and Parr, 2010). Secondly, teachers do not have adequate training to use new technology in classrooms. Professional development is lacking and is one of the prominent barriers to implementing ICT in the classroom (Pegrum, Oakly and Faulker 2013).

Other barriers include the lack of experience amongst teachers, lack of distinct goals in the use of ICT in the classroom. There is also limited knowledge on teaching and how to integrate it with pedagogical content to assist pupils. Some teachers lack dedication to go the extra mile in assisting learners to use ICT. Hence, some teachers resist using cell phones as a tool for teaching. There exists a gap between what teachers are taught during their training and how to use technology in their teaching (Ottenbreit – Leftwich et al 2010). To change the situation, teaching and pedagogy should be integrated into the teacher training programme.

Studies carried out in Mombasa County, Kenya, indicated that secondary school teachers' use of ICT in the classroom was low. Pegrum et al (2013) revealed that there are insufficient training opportunities for teachers in the use of ICT in a classroom environment. Similarly, Beggs (2000) found that lack of training was the main barrier that prevents teachers from using ICT in the classroom. . In this regard, Rebore (1987, p.45) observes: "No employee will remain qualified in the face of accelerating change without some form of ongoing education and training". This underlines the need for continuous teacher training if ICT is to be effectively utilized in the classroom.

The main concern of most participants who attended ICT training is that the courses were too basic and short to make an impact on their ICT competencies.On the other hand, Bauer and Kenton (2005) reveals that despite teachers being highly skilled in technology, there are obstacles that prevent them from using ICT in the classroom. Lack of time with the technology as well as teachers needed extra planning time for technology lessons.

The South African Government has established nine Vodacom Mobile Education Programme centres in each province as an initiative to deal with ICT training for teachers. Vodacom has partnered with the Department of Education in order to help boost teacher training across all nine provinces of South Africa (Ayemoba, 2013). The programme aims to train 1400 teachers annually in the use of ICT to support teaching and learning, focusing in mathematics and science subjects. Additionally, several teachers from the rural areas benefit from the "Train the Trainer" Project initiated by the Internet Service Providers' Association of SA (ISPA) since 2001. The

initiative has provided ICT skills training to more than 2 000 teachers across South Africa since its inception in 2001 (ISPA, 2011).

A large part of the initiative targets schools in under-resourced and rural areas and is set to deliver beginner and intermediate level courses (ISPA, 2011). There is, however, concern that these initiatives focus on beginners and intermediate computer skills without equipping teachers with the necessary skills to benefit fully from ICT usage (Miller, Naidoo and Van Belle, 2006). Bialobrzeska and Cohen, (2005) recommend that such skills should include evaluation of material found on websites how “to make educationally appropriate use of resources for learning, including how to develop visual literacy skills, adapt material, design differentiated activities using the same resources and develop material”. (Finally, because of continuing changes in the technology sector, teachers should be lifelong learners so that they are not left behind by changes in technology and new teaching methods.

Kozma and Voto (2014) argue that ICT will transform education. ICT ensures meaningful learning, stimulates interests and keeps pace with contemporary life. Hence, adopting technology improves the quality of both teaching and learning. However, surveys and studies reveal that there is a considerable gap in the use of technology by teachers (Grey, Thomas and Lewis, 2010; Project Tomorrow, 2010a; 2010b). Thus, teachers should be helped to catch-up with the techno-savvy pupils.

2.5.2 Emotional aspect

Change of any kind can bring about fear, anxiety, and concern. Using technology as a teaching and learning tool does so to an even greater extent since it involves both changes in classroom procedures and the use of often-unfamiliar technologies. Bitner and Bitner (2002) believe that fear and anxiety are real issues amongst certain teachers. These teacher concerns about change must be addressed because adults do not easily embrace change. Those responsible for spearheading the use of technology in the curriculum should be aware that fears and concerns do exist among teachers. Helping teachers overcome their fears, concerns, and anxiety is crucial to the success of the program.

Research suggests that successful ICT integration is related to the thought processes of classroom teachers, such as the beliefs, motivation, and attitudes of teachers toward ICT. The results underpin the importance of an integrated and concurrent understanding of teachers' thinking processes. Van Braak, Tondeur and Valcken (2004) argue that in order to improve the innovation of classroom activities, teachers' thought processes should be challenged. O'Bannon and Thomas (2015) note that traditional barriers to technology integration which include fear of change, lack of training, modelling, and lack of personal use, motivation, and a negative school environment may hinder the integration of mobile phones into the classroom. These barriers "prevent teachers from developing the knowledge, pedagogy, and self-efficacy necessary to move past 'low levels' of technology integration and enable teachers to take full advantage of the instructional benefits that technologies provide" (O'Bannon and Thomas, 2015). O'Bannon and Thomas conclude that to accentuate the pros and minimize the cons associated with 1:1 computing with mobile devices like mobile phones, teacher preparation programs need to instruct pre-service teachers on how to use them effectively in the classroom. O'Bannon and Thomas also point out that the integration is dependent upon pre-service teachers' experience with faculty who effectively model the use of technologies. According to O'Bannon and Thomas, this realisation should lead to the following question: Are instructors integrating mobile phones into pedagogy, and if so, how?

Some teachers' think that the use of ICT is a threat to their professional status assuming that technologies will diminish their role (i.e. that ICT might substitute them), will degrade their relationship with students and will take over initiative and control in the classroom to the detriment of teachers. Some teachers are not willing to change their teaching practices because they perceive these as adequate. Others are technophobes, intimidated by the thought of using computers and similar technologies such as TV recorders, cameras and screen projectors. In this regard, Cox, Cox and Preston (2000) observes that a teacher might carry a resistant attitude mainly because of low level of confidence in his or her abilities.

2.5.3 Disruptive learners, over-reliance on ICT

Lenhart, Purcell, Smith and Zickuhr (2010) claim that the major complaint against the use of mobile phones in the classroom is the assumed disruption that they cause. Mikre (2011) identifies the following major problems associated with the ICT use in education as related to students' learning; their over-reliance which in turn affects their critical thinking and analytical skills. Students may be easily distracted from their learning and may visit unwanted sites and tend to neglect learning resources other than their cell phones. Mikre (2011) also points out that the weaker students might experience problems by failing to work independently without support from the teacher.

Kozma (2003) found a negative relationship between the frequency of use of ICT and school achievement while Isaacs (2007) discovered growing evidence to suggest that the use of ICTs may actually be the only feasible and economically sound means of expanding access to, and improving the quality of secondary school education in the short run. On the other hand, Lenhart et al (2010) found several rationales, namely economic, social, vocational and pedagogic, for the uptake of ICT in education. Pegrum et al (2013) claims that the economic rationale of ICT in education relates to potential increase of efficiency and effectiveness in educational tasks, which will result in labour saving costs.

Researchers have reported other negative effects of unregulated mobile phone use in the classroom. For example, Kuznekoff and Titsworth (2013) opine that learners who use cell phones in class have poor recollection abilities. Elder, Samarajiva, Gillwald and Galperin (2013) adds that phone use interferes with students' ability to concentrate on other activities. Similarly, Wei, Kannan and Moulod (2016) indicates that mobile phone use interrupts students' ability to focus on the lesson. However, some researchers have posited that mobile phones contribute positively to student learning when used productively in the classroom (Ledbetter and Finn, 2013; O'Bannon and Thomas, 2015). Cheung, Mak and Sit (2013) also states that mobile phones contribute to classroom experiments by making it easier and more efficient for students to text in answers or participate in online experiments. O'Bannon and Thomas's (2015, p.111-112) participants reported that "mobile phones were most

beneficial in developing digital fluency, providing anywhere/anytime learning opportunities, providing opportunities for differentiation of instruction, and increasing access to technology in the classroom". However, studies that confirm or disconfirm these potential effects are rare on the main learning task in class.

2.5.4 Contextual factors

Howie, Muller and Paterson (2005) note that apart from teachers' lack of capacity and attitude toward ICT usage, poor infrastructure remains a major obstacle in many developing states (For example, Makewa, Meremo, Role and Role ,2013) report that a survey in the USA by the National Centre for Education Statistics (NCES) in 2000 using the Fast Response Survey System (FRSS) revealed that 99% of full-time regular public school teachers had access to computers or the Internet somewhere in their schools. This high access to the internet at school has not been attained in South Africa.

Nonetheless, many countries (including developing countries such as South Africa) have increased the number of computers in schools in recent years or have plans (such as the Teacher Laptop Initiative in South Africa and Kenya) to increase teachers' and learners' access to computers (Kargiban and Siraj, 2009). Managed by the Education Labour Relations Council (ELRC), the Teacher Laptop Initiative (TLI) aims at improving Information and Communications Technology (ICT) in teaching and learning and ensure that more than 350 000 government school teachers in South Africa own and use a laptop, by providing them with a monthly allowance which will cover the purchase costs as well as the costs of connectivity (ELRC Annual Report, 2010/11). Launched in 2009 by the then Minister of Education, Naledi Pandor (2004-2009), the TLI was supposed to have completed the distribution of laptops to all qualifying teachers by the end of 2011. Due to funding problems and the fact that about 174 000 teachers of about 380 000 who are permanently employed nationally, are either blacklisted or not credit worthy (Maluleka, 2020), this objective had still not been achieved by 2014. However, even if it is completed, there is no guarantee that most rural schools will reap the benefits of these laptops because of lack of internet or prohibitive and exorbitant costs of internet for schools that have access to it or just because of teachers' lack of necessary skills to use them.

Farrell, Isaacs and Trucano (2009) states that because of prohibitive Internet costs in South Africa, of the estimated 6 000 schools that have access to PCs, only an estimated 2500 have Internet access. They further point out that even a lesser number of schools can use the internet because the government has been slow in implementing the e-rate policy. Started in the USA, “e-rate” is a nationally agreed upon discounted rate for Internet access for schools. Often, this rate is included in the relevant telecoms legislation at a national level and therefore the responsibility of the regulator (Espitia and School Net Africa, 2013). If implemented, the e-rate would allow public schools a 50% discount on calls to access the Internet as well as Internet access charges (Espitia and School Net Africa, 2013).

Plomp, Anderson, Law, and Quale (2009) observe that access to ICT infrastructure and resources in schools is a necessary condition to the integration of ICT in education. Effective adoption and integration of ICT into teaching in schools depends mainly on the availability and accessibility of ICT resources such as hardware and software. Obviously, teachers cannot use ICT resources if they cannot access them. Therefore, access to computers, updated software and hardware are key elements to successful adoption and integration of technology. Yildrim (2007) found that access to technological resources is one of the effective ways for teachers' pedagogical use of ICT in teaching. In a study of 814 faculty members in higher education in Turkey, Usluel, Askar and Bas, (2008) found that 82.5% and 81.2% of faculty members had access to computers and the internet respectively.

At school level, factors such as support, funding, training and facilities influence teachers’ adoption and integration of technologies into their classrooms. Teachers’ professional development is a key factor to successful integration of computers into classroom teaching. ICT related training programs develop teachers’ competencies in computer use (Bauer and Kenton, 2005; Franklin, 2007; Wozney et al., 2006) and influence teachers’ attitudes towards computers (Keengwe and Onchwari, 2008). Plair (2008) argues that training programs assist teachers reorganize the task of technology and how new technology tools are significant in student learning.

There are also barriers to teachers’ use of ICT and these include teacher-level, school-level and system-level barriers. Teacher-level barriers include lack of teacher ICT skills; lack of teacher confidence; lack of pedagogical teacher training and lack

of differentiated training programmes. The school-level barriers are absence of ICT infrastructure, old or poorly maintained hardware, lack of suitable educational software, limited access to ICT, limited project-related experience, lack of ICT mainstreaming into school's strategy. The system-level barriers are rigid structure of traditional education systems, traditional assessment, restrictive curricula and restricted organizational structure. Becta (2004) argues that knowing the extent to which these barriers affect individuals and institutions may help in making decisions about tackling such barriers.

2.6 THEORETICAL FRAMEWORK

The Constructivist and Social Constructivist theories were used as the theoretical framework of this study. Constructivism emphasises the role of learners in the education process. Learners are actively involved and responsible for their learning. Jansen (2000) posits that in constructivism, learners are active participants in their learning and construct their own knowledge about a subject matter. Educators impart skills that are needed by learners so that learning takes place through everyday experiences which help in the acquisition of knowledge. Different teaching methods, such as cooperative learning, guided discovery enhance critical thinking and social skills.

The use of technology offers flexibility, adaptability and reflective pedagogies across various learning models based in constructivism. The pedagogy of constructivist learning theories such as activity theory, social constructivism and situated learning have been altered and empowered using technology as a learning tool.

Constructivism triggers the learner's curiosity about the world around them and how things work. Learners do not reinvent the wheel but, rather, attempt to understand how it turns; how it functions. Learning involves a construction of knowledge rather than acquiring it; knowledge is constructed and is based on personal experience of the environment. Learners test this knowledge through social negotiation. The learner is not a blank slate (tabula rasa), but brings past experiences and cultural factors to the situation. Learners need to find out knowledge for themselves. Constructivists believe that all knowledge must be constructed through the learners' previous knowledge.

Constructivism does not dismiss the active role of the educator or the value of expert knowledge. Constructivism modifies that role of the educator so that educators help learners to construct knowledge rather than to reproduce a series of facts. The constructivist educator provides tools such as problem-solving and inquiry-based learning activities with which learners formulate and test their ideas, draw conclusions and inferences, and pool and convey their knowledge in a collaborative learning environment. A constructivist teacher will ensure that time is a crucial part of constructing new knowledge. The teacher needs to plan learning in a way that would best assist the learner. At the appropriate time the teacher will provide additional materials necessary to assist the learner in constructing knowledge. In a constructivist learning environment, feedback is also an essential part of the process. Feedback provides the learners with the opportunity to filter out and obtain additional information necessary to construct knowledge. The teacher is continually adjusting the steps for the learner to be successful in the task. Finally, the support of the teacher brings all the principles of constructivist learning together.

Constructivism transforms the learner from a passive recipient of information to an active participant in the learning process. Always guided by the educator, learners construct their knowledge actively rather than just mechanically ingesting knowledge from the educator or the textbook. Constructivism emphasizes that the responsibility of learning lies within the student while the teacher acts as a facilitator of the learning process. Desai, Hart, and Richards (2008) state: "Technology is also often assumed to be the catalyst of new pedagogical change". This research examined the pedagogical change impacted by technology within three constructivist based learning theories; activity theory, social constructivism, and situated learning.

2.6.1 Social Constructivist Theory

The pedagogies of Social Constructivism have been significantly affected by technology. According to Desai et al (1998), instructional design is a critical factor in the creation of effective online instruction and the development of flexible technology-based course content. These are crucial steps in successful e-learning. The instructor should invest time and effort to create a successful e-learning

environment. Thus, instructors should acquire skills, experience and commitment for e-learning to be successful in comparison to traditional learning.

Social interaction, a key component in the Social Constructivist pedagogy, is also dramatically altered by the impact of technology. Social constructivism changes the social interactions between students and students, and teachers and students. Students do not depend on the teacher as the source of information. Nevgi, Virtanen and Niemi (2006) argue that solving joint problems, building of knowledge and sharing of ideas requires web-based environments. Since students learn by communicating with knowledgeable people, educators in an online environment must redefine their communication skills.

In a pre-technology setting, traditional classroom communication would have not required much forethought. Technology requires the teacher to remain active in communicating with students to maintain attention and motivation. Nevgi et al., 2006) point out that prior to technology, a social presence was communicated by dialogue and social clues such as facial expressions, non-verbal clues and inflection. Desai et al., (1998) add that technology requires “a distinct interaction with learners and high technology devices” providing “a strong interaction between the learner, learner/instructor, and the content as well as other learners” in the distance education environment. Online learning management systems such as Moodle are based on Social Constructivism where a culture of collaboration of groups to construct knowledge is fostered.

Interaction is key in the Social Constructivist theory where development takes place through social interaction. The theory explains the important role of pupils taking charge of their own learning and the teacher acts as a mere facilitator, during which the learners transfer their own knowledge to the classroom learning. The learners, for example, develop communication skills when conveying their knowledge to their peers. Good communication is beneficial in the use of ICT in the classrooms since discussions increase, leads to constructive arguments around opinions and the development of reasoning skills.

Schunk (2000) argues that social constructivism combines the views of Vygotsky, Bruner and Bandura. These theorists believe that for learning to take place, learners should be put in groups. McMahon, (1997) notes that social constructivism emphasises culture and tries to understand what transpires in society and constructs knowledge based on this understanding. Gredler (1997) also observes that social constructivists believe that knowledge is a human product which is constructed according to people's social and cultural orientation. Knowledge is gained as the learner becomes familiar with the socially constructed environment. In their groups, learners bring in information they have about the world. McMahon (1997) supports this idea stating social constructivists view learning as a social process. The educator has the duty to guide learners and see to it that they learn cooperatively and help each other to acquire and impart important skills that learners have in them. In social constructivism, educators desist from encouraging rote learning because learners lay a strong foundation for oral communication when given a chance to work in groups. Social constructivists view learning as a social activity because it is intimately associated with people's connection with other human beings, educators, peers, family as well as casual acquaintances. We are more likely to be successful in our efforts to educate if we recognize this principle rather than try to avoid it.

Coupal (2004) reports on the peer mentorship model for professional development using the constructivist learning theory which involves an activity-based learning process. The aim is to provide support in various aspects (be it emotional or technical), so that participating teachers can build on both technical as well as teaching to solve their own problems. The teachers interact face-to-face through meetings and personal site visits as well as electronically. This initiative for teachers builds on existing technical skills by encouraging them to develop lessons on their own. This results in teachers feeling confident and empowered as the initiative demonstrates constructive pedagogy. Learned centred approaches are highly favoured and positively contributes to effective teaching and learning. Pajares (1992) and Higgins and Mosely (2001) observe that teachers opting for the constructivist educational beliefs are more enthusiastic in student-centred approaches and various other instructional processes that are innovative.

2.6.2 Active Learning Theory

Active learning is not a new construct in education. Historically, active learning was most likely the first form of education used in a hunter/gatherer society where the youngest members of the society learned to survive while watching and mimicking their elders. One of the earliest documented forms of active learning, the Socratic Method, occurred in ancient Greece. Throughout the centuries, other educational philosophers such as Rousseau, Dewey, Piaget and Kolberg have advocated for learning through play, using practical and sensory experiences to promote complex intellectual constructs and abstract reasoning (Jonassen, 2000). Many forms of active learning have been used in Grade R to Grade 12 settings for decades. Most experienced and effective educators use variations of this concept. In the last several decades, active learning has been promoted in higher education settings, where learners struggle with focusing on lectures and fail to pay attention in class. In one such study on learners' ability to pay attention in class, Jonassen (2000) surmised that when learners are passive recipients during lectures, the acquisition of facts took precedence over the development of higher cognitive processes, such as analysing, synthesising, and evaluating.

With the advent of technology in the form of the virtual classroom, the rules and tools affecting an activity system differ dramatically from the environment of the physical classroom. Murphy and Manzanares (2008) state that in virtual classrooms, instead of the tools being tangible, such as chalk and a blackboard, they take the shape of email, software and texting. The pedagogies associated with Activity Theory are impacted by technology's influence on the activity system components. The time and workload invested in the virtual classroom compared to the physical classroom is significantly heightened. Preparation, planning, evaluation and assessment in a physical classroom may be done informally and with ease. Murphy and Manzanares (2008) note that teachers in a virtual classroom must complete the same steps formally which result in a heavy investment of time and effort. Murphy and Manzanares provide the example of students in a physical classroom handing in homework which the teacher assesses during class time and gives feedback if needed. In a virtual classroom, homework must be downloaded, reviewed, marked

appropriately and then sent back to the student. Technology is assumed to automatically increase production by completing tasks more efficiently and effectively but the initial impact requires a significant investment from the teacher (Dillon, 2004).

Technology's greatest pedagogical impact within this theory is in social interaction. The exchange of personal, social and cultural norms determines the work environment which in turn creates the rules of performance in an activity system (Benson, Lawler and Whitworth, 2008). Murphy and Manzanares (2008) observes that in a physical classroom, personal, social and cultural clues are learned from direct social interaction in the form of body language, visual cues and facial expressions. The application of technology in a virtual classroom removes all physical contact and the environment of the system must be determined through email, texting and discussion forums. Murphy and Manzanares conclude that Activity Theory shifts focus from teaching students to helping them learn.

Technology has transformed people's lives and affected every aspect of society. Technology has also affected the current student population and made the world increasingly complex by changing the requirements for people entering the workforce. This change has made it necessary to create learning environments which support higher level thinking skill development. The integration of technology has created authentic learning environments where the students are motivated to attend classes, have a greater chance of communication and collaboration and have more opportunities to use higher order thinking and problem solving skills connected to real world applications (Fouts, 2000) This has led some to believe that new theories in learning needed to be developed that would help to support the creation of such learning environments. The three theories discussed above possess the ability to support the creation of such learning environments by supporting the idea that learning occurs through action. They all support that cognition happens through communication and collaboration with others and that the use of technology helps in the creation of such learning environments. It is through these new theories that learning environments, which support the development of these higher-level learning skills, can be created.

2.7 EXISTING GAPS

Literature review has made it evident that there is a need for teacher training in the use of ICT in teaching and learning in the classroom and this should also be included in initial teacher education programmes. However, there is still a lot to be done in order to align the training to meet the needs of all learners. However; most teachers in many countries are still unable to support learners even after being equipped with knowledge on the use of ICT in the classrooms during their initial training. Most countries seem not to have a strong, clear and focused stand about the use of ICT in the classrooms to enhance education and training. Teacher training curriculums should change to include the use of ICT in the classroom and should be aligned to pedagogy. In many cases, teachers at teacher training institutions are not compelled to use ICT in their teaching before qualifying as teachers. This leads to teachers with varied skills and competencies. On-going curriculum improvement is important for improving the academic achievement of learners, and for the holistic development of learners. It also serves to develop the competencies of teachers. Modipane and Themane (2014) argue that the need to improve both the academic achievement of learners and the competencies of teachers is normally evident in interventions that are meant to bring about curriculum change. Teachers that are unlikely to use ICT in the classroom will not effectively handle the needs of the techno-savvy pupils. Teachers should incorporate different teaching styles to include cell phones as a learning and teaching tool. Further, there should be collaboration between the use of cell phones in the classroom as well as the educational purposes of the use of these cell phones.

2.8 CONCLUSION

This chapter has reviewed literature on the use of ICT in the classrooms for teaching and learning. The review shows that despite barriers in the use of ICT in the classroom, it is highly beneficial for the learning process. Thus, there is a need to address challenges confronting teachers and their use of ICT in the classroom. The chapter has also presented social constructivism as the main theoretical framework

of this study. The acceleration of technological advancements means that educators can incorporate technology into constructivists learning theories. The Pedagogy of constructivist learning theories such as activity theory and social constructivism have been transformed by the use of technology as a learning tool. With the ever-increasing use of technology, more research on effective learning theories will be explored. The next chapter discusses this study methodology.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter discusses the methodological approaches adopted in this study. Polit and Hungler (2004) define a research methodology as ways of obtaining, organising and analysing data. Methodology decisions depend on the nature of the research question. This chapter therefore discusses the research approach and design, data collection methods, sampling approaches, data analysis procedures, quality assurance mechanisms as well as ethical considerations.

3.2 RESEARCH PARADIGM

The interpretive paradigm which looks at social phenomena, is used in this research. De Vos,Strydom, Fouche and Delport (2011) and Neuman (2011) point out that interpretive social science can be traced to Max Weber (1864-1920) and Wilhelm Dilthey (1833-1911). Weber maintains that all humans attempt to make sense of their worlds and continuously interpret, create, give meaning, define, justify and rationalise daily actions (Babbie and Mouton, 2008). Dilthey (1833-1911), on the other hand, deal with external experiences which relate to the constructive activity of reason. Understanding of one's inner world is achieved through introspection and understanding of someone else's world, by "living in", "co-experience," and empathy.

Interpretivism thus explores the complexity of social phenomena to gain understanding. The purpose of research in interpretivism is understanding and interpreting everyday happenings, experiences and social structures – as well as the values people attach to these phenomena (Collis and Hussey, 2009; Rubin and Babbie, 2010). Interpretivists believe that social reality is subjective and nuanced, because it is shaped by the perceptions of the participants, as well as the values and aims of the researcher.

Gephart (1999) says that interpretivism is directed on meaning and understanding the social interactions between humans. Consequently, the mind interprets experience and events, and constructs meanings from them. Meaning does not exist outside the mind. Willis, Jost and Nilakanta (2007), as well as Schurink Fouché and De Vos et al (2011) agree with Gephart (1999) by rejecting the notion that the social sciences should apply research principles adopted from the natural sciences. Interpretivists believe that the subject matter of the social sciences is fundamentally different from that of the natural sciences. Consequently, a different methodology is required to reach an interpretive understanding or "verstehen" and an explanation that would enable the social researcher to appreciate the subjective meaning of social actions.
Reality should rather be interpreted through the meanings that people give to their life world. Schwandt (2007) argues that this meaning can only be discovered through language, and not exclusively through quantitative analysis.

Blumberg (2016) notes that interpretivists argue that simple fundamental laws cannot explain the complexity of social phenomena. Interpretivists claim that an objective observation of the social world is impossible, as it has meaning for humans only, and is constructed by intentional behaviour and actions. Livesey (2011b) explains that interpretivism is a method that sees the social world as something that can only be produced and reproduced on a daily basis by people. Something that holds true for the moment might not necessarily hold true tomorrow, or in another society. Knowledge is developed and theory is built through developing ideas from observed and interpreted social constructions. As such, the researcher seeks to make sense of what is happening. This can even generate findings beyond the common scientific knowledge (Rubin and Babbie, 2010; Blumberg, 2016). So, interpretivists attempt to understand subjective realities and to offer explanations which are meaningful for the participants in the research.
In the phenomenological approach used in this study, data analysis consists of a series of systematic procedures that identifies the essential features and relationships as well as transforming data through interpretation (Groenwald, 2004).

Henning, Van Rensburg and Smith (2004) argue that the interpretive understanding is grounded in an interactive, field-based inductive methodology which in turn is

intertwined in practice within a specific context. Livesey (2002) proposes that the best methods within the interpretive research paradigm are those of observation and interpretation. Thus, he advances that a researcher should understand how human beings experience and interpret her or his world.

De Vos et al. (2011) suggest the use of participant observation and field research techniques where many hours and days are spent in direct contact with the participants. Neuman (2011) states that transcripts, conversations and video-tapes may be studied to gain a sense of subtle non-verbal communication or to understand the interaction in its real context. Blumberg (2016) adds that the researcher engages in active collaboration with the participants to address real-life problems in a specific context with the intention of offering and implementing feasible solutions to a problem.

3.3 RESEARCH APPROACH

This study adopted a qualitative research approach. This approach focuses on people as creators of their own reality and in their natural settings. Researchers who support this paradigm argue that it is important to try to see reality from the eyes of those who are living it as there is no single reality (Babbie and Mouton, 2001). Given (2008) elaborates that realities are already constructed and exist in the minds of individuals and cannot be broken into parts, but rather it must be examined holistically under natural conditions. Thus, in qualitative research, the researcher collects and interprets data and reports the research findings in a detailed descriptive manner (Given, 2008). That way, the researcher is able to make sense of and interpret the phenomenon in terms of the meanings that people bring (Mbengwa, 2010).

Qualitative methodology was used in this study because the use of ICT involves attitudes, perceptions, feelings and finally intentions. This cannot be reduced to numbers and is thus best captured in a qualitative way. Hancock, Ockleford and Windridge (2001) and Strauss and Corbin (1998) argue that the qualitative approach is suitable where the research is concerned with developing explanations of social phenomena and understanding why things are the way they are. Thus, by adopting this approach, the researcher assembled a multi-faceted, dense form and holistic

picture (Creswell, 2007) of the use of ICT. The approach also provided a better understanding of the use of ICT in enhancing teaching and learning.

3.4 RESEARCH DESIGN

Durkheim (2006, p.143) defines a research design as a “strategic framework for action that serves as a bridge between research questions and the execution or implementation of the research”. Mbengwa (2010) adds that it involves “establishing and planning ways in which the research will be conducted, so that sound conclusions in relation to the research question as well as the problem statement are reached”. Furthermore, the research design specifies who or what is involved and where and when it will take place, indicating the direction which should be taken and what should be done while heading in that specific direction (Mokoena, 2013). The research design outlines the plan of the research. The research design of qualitative research depends on the type of information the researcher wants to uncover. This study was conducted within an interpretive research framework using a phenomenological research design.

Phenomenology is a research design that seeks “to understand an experience from the participants’ point of view” (Leedy and Ormrod, 2001). Thus, phenomenological research focuses on the way people interpret the actions of others, how they make sense of events and how they build worlds of meaning’ (Bouma, 2000). This research design provides deep information and explains human perceptions through qualitative methods, all in a bid “to illuminate the specific and to identify phenomena through how they are perceived by the actors in a situation” (Lester, 1999). In phenomenology, ideas are generated from rich data by induction and human interests, as well as perspectives of stakeholders (Remeyni, Williams, Money and Swartz, 1998). Welman, Kruger and Mitchell (2005) describe research design as the plan according to which the participants of a proposed study are selected, as well as the means of data collection or generation. Babbie and Mouton (2008) describe a research design as a plan or blueprint for conducting research.

The research design also entails a detailed plan for undertaking research. Mouton (2003) says that a research design should enable a researcher to anticipate what the

appropriate research decisions are likely to be, and to maximise the validity of the eventual results. The research design should be seen as a mixed-bag approach that implies choosing from different alternatives and options to ensure that the research purpose and perspective are clarified and achieved. The research problem will determine the methods and procedures: the types of measurement, the sampling, the data collection and the data analysis to be employed for the proposed research (Zikmund, Babin, Carr and Griffinet, 2010).

Leedy and Ormrod (2010) argue that a phenomenological research design attempts to understand people's perceptions, perspectives and views of a particular situation. By looking at multiple perspectives on the same situation, the researcher can generalise on what something is like from an insider's perspective. Phenomenological research design aims to understand and interpret the meaning that participants give to their everyday life. Creswell (2007) states that a phenomenological study describes the meanings that the lived experiences of a phenomenon, topic or concept have for various individuals.

3.5 SAMPLING

Sampling is "a process of selecting subjects or participants to take part in a research investigation on the ground that they provide information considered relevant to the research problem" (Oppong, 2013, p. 203). Scott and Usher (2011) also state that sampling refers to the selection of a subset of persons or things from a larger population, also known as a sampling frame with the intention of representing the particular population (Gall et al., 2007; Neuman and Guggenhei 2011). In qualitative research, participants are selected based on their first-hand experience of a phenomenon of interest (Streubert and Carpenter 1999). The selected individuals are envisaged to deepen the understanding of a particular phenomenon. Mokoena (2013) says sampling in qualitative research is relatively limited, based on saturation, not representative, the size and not statistically determined and involving low cost.

For this study, participants were purposively sampled. A purposive sample was selected from different schools and had been identified as suitable for the attainment

of the study objectives. Welman et al (2005) argues that purposive sampling is the most important type of non-probability sampling. Researchers rely on their experience, ingenuity and/or previous research findings to purposely obtain units of analysis so that the sample they obtain is representative of the relevant population. The adequacy of this kind of sampling for quantitative studies depends on the judgment of the researcher, and is sometimes called judgment sampling. In purposive sampling, the researcher must first think critically about parameters and then choose the sample case accordingly. Criteria for the selection of participants are therefore important because they are dialectical and symbiotic.

McMillan and Schumacher (2001) point out that this strategy involves choosing small groups or individuals likely to be knowledgeable and informed about a phenomenon of interest and the selection is done without desiring to generalise the findings to all such cases. Mbengwa (2010, p.129) adds that “this sampling procedure depends on availability and willingness of people to participate and on the fact that cases that are truly similar to the population are selected”. A multi-stage sampling was followed in this study and city, high schools, teacher educator institutions, teachers, and learners were selected. Stake (1994, p.153) underlines the importance of selecting the right cases if one is to get the required information. He points out: “If qualitative research requires cases to be chosen, then nothing is more important than making a proper selection of cases”.

3.5.1 Selection of site: Polokwane

Polokwane city was selected for study. Polokwane was originally known as Pietersburg, and is in the Limpopo Province of South Africa. Its geographical coordinates are 23° 54' 0" South, 29° 27' 0" East. The city was chosen because it has several high schools from which a sample was drawn to assess their use of cell phones (ICT) in teaching and learning.

3.5.2 Selection of sample

Six teachers who teach Grade 8-12 from three schools were selected to be study participants. This selection was made because teachers constitute a valuable source of information due to their constant contact with learners and the substantial role they play in their development (UNICEF, 2008). Choosing teachers who teach across the board provided a detailed understanding and a broad picture of the participants' experiences about the use of ICT in teaching and learning.

3.6 DATA COLLECTION

Different measuring instruments were employed to obtain qualitative data. Measuring instruments included semi-structured interviews and classroom observations**.**

3.6.1 Semi-structured interviews

The interview is a social relationship designed to exchange information between the participant and the researcher.Monette, Sullivan and DeJong (2013) observe that the

quantity and quality of information exchanged would depend on how astute and creative the interviewer is at understanding and managing the relationship. Greeff (2011) adds that the interviewers are deeply and unavoidably implicated in creating meanings that ostensibly reside within the participants.

King (1994) points out that the goal of any qualitative research interview is to see the research topic from the perspective of the interviewees, and to understand why they have a particular perspective. King further lists the following general characteristics of a qualitative research interview: a low degree of structure imposed by the interviewer; a preponderance of open questions; a focus on specific situations and action sequences in the world of the interviewee – as opposed to mere abstractions and general opinions. Powney and Watts (1987) and Verma and Mallick (1999) note that the role of the interviewer is a demanding one because the interviewer must ask questions, record answers and try to keep the interview session interesting and worthwhile for the interviewees.

The semi-structured nature of the interview, with open-ended questions allow participants to include explanations and perspectives on given questions, while allowing time for further development of given responses and including more questions that will further enrich collected data. The open-ended nature of the questions that were used in this study defined the topic under investigation and "also provided opportunities for both interviewer and interviewee to discuss some topics in more detail" (Hancock, Windridge and Ockleford, 2007). The researcher was also able "to probe beneath the surface, soliciting detail and providing a holistic understanding of the interviewee's point of view" (Patton, 1987).

As recommended by Mokoena (2013), the interview method was used to compare the interviewer's perceptions and specific aspects of the situation and to understand the range and variety of significant experience from the point of view of interviewees. Thus, the interview process not only provided a record of the interviewee's views but was also used to symbolically recognise the legitimacy of their views (Stringer, 1999). The individual interviews were necessary because as Given (2008) points out, at times people are more willing to reveal personal behaviours or events that have occurred to them if there is no one to repeat the story to neighbours or friends. The interview schedules were developed based on the time and availability of the participants.

Through these interviews, teachers shared their experiences of their use or not using ICT for teaching and learning.

Teachers also shared their knowledge and understanding as well as their experiences. As articulated by Walliman (2010), interviews allowed “the researcher the chance to evaluate the quality of the responses of the participants, to observe if an item has not been properly understood, and to reassure and encourage the participant to fully provide an answer to an item. During the interview the researcher was able to observe the behaviour of the interviewees and visual signs such as nods and smiles that influenced or motivated the respondent to provide complete and reliable responses.

In gathering qualitative data, the researcher used a digital recorder to capture the interviewee’s words verbatim. The recorder allowed for more accuracy in data collection and the researcher was more attentive to the participants (Best and Kahn, 2016). Perakyla (2011) notes that working with tapes, recorders and transcripts eliminates many of the problems researchers have with the unspecified accuracy of field notes and with the limited public access to them. The researcher carefully studied the tapes to verify participants’ statements, and this eliminated the possibility of misrepresenting the interviewees. All participants were asked for permission to record the interviews. Recorded interviews were transferred to a computer and were kept safe by means of a digital password. The interviews were later transcribed and the data segmented, coded and categorized into themes and sub-themes relevant for the analysis using phenomenological data analysis procedures. Since data was collected during the COVID-19 pandemic, social distancing as well as the use of a mask were adhered to. To ensure conformability and dependability, the researcher maintained an audit trail of the data collection and analysis process, wrote field notes and noted non-verbal clues, observations, and impressions about each interviewee in a diary to aid in the interpretation of the data gathered.

3.6.2 Classroom observation

In this study, educators were also observed in their classroom, the place where teaching and learning took place. This gave the researcher an opportunity to understand the educators’ options and choice of quality measures that they used in

their learning. Exploring the experiences of educators and learners in their real-life situations helped to develop a sense of understanding of the meaning created by people during and within their social *milieu.* Thus, qualitative research is appropriate in providing the lived experience of the participants as was mentioned in Chapter One.

Macmillian and Schumacher (2010) define observation as a way for the researcher to see and hear what is occurring naturally in the research site. For this research, the lessons as well as learner's interactions were monitored to obtain rich understanding about the research phenomenon. The researcher obtained permission to observe the lessons and assumed the role of a participant observer since the researcher also completed classroom activities. The researcher becomes an insider whilst observing all social distancing protocol. This enriched the research with important information, such as observing whether ICT was being used and how the educator planned and implemented ICT. The researcher also observed the success and challenges that were experienced by participants.

The researcher kept an observation list which provided a brief account of the context of the source of the data. This facilitated understanding of participants' settings and provided information about the climate where the interview took place (Huberman and Miles, 2002; Creswell, 2003; 2009; Scott and Usher, 2011).

3.6.3 Reflective journal

On completion of the interview sessions, the researcher began a reflective journal which involved noting personal views and perceptions about the interview. In the same journal, the researcher repeated the process after the classroom observation was completed. As per McMillian and Schumacher (2006) prescription, the research journal contained the researcher's ideas, personal observations and opinions. The reflective journal was used to note participants' body language, facial expressions and the researcher's personal thoughts and perceptions. Although the journal was more personal, it supplemented the audio recording by providing useful information which was used to make recommendations to the educators.

3.7 DATA ANALYSIS

Whiting (2003) states data analysis is a mechanism for reducing and organising data to produce findings that require interpretation by the researcher.

3.7.1 Transcribing, translating and horizonalization

The complete transcriptions of each interview and observation were used as interviews were transcribed verbatim. Hancock et al (2007) indicate that transcribing is the procedure for producing a written version of an interview. Long statements were compressed into brief statements and concise expression and meaning units were determined. During transcribing interviews, the researcher got to intimately know the information collected and how that information relates to the research questions and the challenges experienced by educators.

After transcription, horizonalization then followed. This entailed going through data transcripts several times, and highlighting significant statements, sentences or quotes that illuminate the experiences of the educators using ICT. The researcher read the in-depth survey interviews and notes to get a grip on the content as well as listening to tapes of recorded interviews and became immersed in the data to achieve closeness to participants and gain a sense of the whole (Creswell, 2007). Burnard (1991) points out that the aim of this process is to become fully aware of the "life world" of the participants to enter their "frame of reference". This familiarized the researcher with the substance of the collected material on the challenges experienced by the educators. In addition, horizonalization involves taking notes of both the content of the interviews as well as the researcher's impressions on participants in terms of their speech, especially on how the participants speak and the implications of their speaking on the truthfulness or otherwise of their answers.

3.7.2 Clusters of units of meaning

Creswell (2007) and Moustakas (1994) state that clusters are typically formed by grouping units of meaning or themes together as the researcher identifies significant

topics. The researcher clustered statements into themes or meaning units, removing overlapping and repetitive statements. Under these broad categories, sub-categories were formulated. The arrangement of the sub-categories used a selective coding approach in which the categories were linked to the core categories. Coding at each stage was terminated when theoretical saturation was achieved and no further new information on the use of ICT was being gained. Hancock et al (2007) argue that theoretical saturation occurs when new data from new cases do not contribute to the development of emerging theory even after the researcher tries to ensure that the new cases are those most likely to extend or challenge his or her ideas. While this process of identifying key themes and forming categories in this study was interpretive in nature, it also included the perspectives and voices of the people who were interviewed.

3.7.3 Individual textural description

From the transcriptions and field notes, the researcher used the statements and themes to form or write individual textural descriptions on the varying experiences of different educators and verbatim examples are included. This was done for each participant using the relevant, valid invariant constituents and themes.

3.7.4 Individual structural descriptions

Following Creswell's (2007) recommendations, the researcher prepared individual structural descriptions of experiences of each respondent based on their individual textural descriptions and imaginative narrative and how they experienced the phenomenon in terms of the conditions, situations or contexts. Creswell (2007, p.235) points out that structural descriptions “involve seeking all possible meaning, seeking divergent perspectives and varying the frames of reference”.

3.7.5. Essential structure, invariant structure or essence

In this process, the researcher focused on the common experience of participants and tried to make sense of the underlying meanings, at the same time considering

individual variations. Groenewald (2004, p.21) argues that “unique or minority voices are important counterpoints to bring out regarding the phenomena researched”. Clusters of meanings emerged, thus furthering the researcher’s understanding of the essential structure on how equipped teachers are in the use of ICT in teaching and learning.

3.7.6 Reporting

This involved putting together the material into a meaningful format, making detailed comments about the findings, arranging the findings according to themes and topics and then drawing out key issues to be discussed. The aim was to communicate distinct critical elements of the phenomenon of educators and the use of ICT in teaching and learning. As Moustakas (1994) observes, this led to the report reflecting the context from which the themes emerged. The researcher interpreted and linked related the study findings. The implications of the findings were drawn out as linkages were made with the wider literature. Thus, in addition to the review of literature prior to fieldwork, , additional literature about relevant previous research was consulted during and after the survey.

3.8 STUDY LIMITATIONS

The study was conducted in only three Polokwane schools. While Polokwane is the capital city of Limpopo, there are many other towns in the province. Since this study was phenomenological and focussed on one city only, the findings cannot be generalised to other cities, unless these cities are contextually similar to Polokwane. Regardless of such shortcomings, however, the findings provide relatively new knowledge regarding the use of ICT in teaching and learning as well as the experiences and the challenges that teachers face in tackling challenges related to the use of ICT.

3.9 DELIMITATIONS OF STUDY

Data collection was limited to Polokwane in Limpopo Province. It would have been useful to extend the study to other cities, including rural and boarding schools in Limpopo so that the results could be more generalizable. However, due to limited time and shortage of funds, the study was limited to Polokwane. Due to the COVID 19 pandemic, there were challenges regarding the availability of educators as well as time constraints.

3.10 TRUSTWORTHINESS OF THE RESEARCH

Good research tells a convincing story by being rigorous in nature so that its conclusions can be accepted. In striving for this acceptance, the researcher should show the audience the procedures used in ensuring that the methods are reliable and conclusions valid. Kitchin and Tate (2000) observe that this brings to the fore important tenets of trustworthiness or criteria for evaluation of qualitative research which every researcher should be concerned about while designing a study and analysing results. In this study, the trustworthiness of the research was verified against Guba's (1995) model of trustworthiness which examines the a) credibility, b) transferability, c) dependability, and d) conformability of the information collected.

3.10.1 Credibility

Credibility is checking the truth of the findings ensuring the extent to which the collected data reflect reality. Lincoln and Guba (1995) argue that ensuring credibility is important in establishing trustworthiness in qualitative research. To ensure this credibility, this research adopted well established methods of enquiry whose procedures are clearly laid out as to how data gathering took place. Such methods have been used in other researches concerning children and inclusive education and yielded information and results that are credible. This research adopted a purposive sampling strategy to obtain credible study information. Engagement with the data such

as recordings, notes and transcripts was done intensively to demonstrate clear links between the data and the interpretations. Regular discussions were held and adjustments were made in accordance with suggestions and recommendations.

This study adopted triangulation, to ensure that the information collected was cross-verified. This is in line with Given's (2008) view that triangulation helps the researcher to look at the data from different perspectives and viewpoints to get a holistic picture of the environment. Ultimately, a rich picture of the attitudes, needs or behaviour of those under scrutiny was constructed based on a range of people and methods. To ensure honesty in informants when contributing data, each person who was approached was given an opportunity to refuse to participate in the research, or withdraw from the study at any point. This ensured that the data collection session involved only those who were genuinely willing to take part and prepared to offer data freely.

To ensure credibility, member checks were used whereby data, analytical categories, interpretations and conclusions were tested with stakeholders from whom the data were originally collected. This gave participants the opportunity to react to the data. Thus, credibility is demonstrated when participants recognise the reported research as their own experiences (Streubert and Carpenter, 1999; Lincoln and Guba, 1995). The researcher also disclosed researcher bias and invested enough time in the study, conducting a persistent in depth study to obtain relevant data. This enhanced the credibility of the information obtained.

3.10.2 Transferability

Merriam (1998:39) states that transferability "is concerned with the extent to which the findings of one study can be applied to other situations". The study was enhanced by purposeful selection of participants from different institutions, in different communal settings to allow for a diversity of voices and richer data. The researcher ensured consistency in research methods by meticulously following the research process.

Transferability was also ensured through member checks to enhance the possibility of findings having the same interpretation. However, as Erlandson, Harris, Skipper and

Allen (1993) note, conventional generalizability is never possible as all observations are defined by the specific contexts in which they occur. Thus, while it may be tempting to use the findings of this study to assess the use of cell-phones to enhance teaching and learning, the reality is that the findings may not be easily transferable. It is therefore not the intention of this study to generalize the findings to represent the whole of Limpopo, but rather to use the research to understand in greater detail the use of cell-phones to enhance teaching and learning. The findings will therefore be relevant to places that are contextually the same as Polokwane.

3.10.3 Dependability

Dependability ensures consistency in the research and indicates the degree that data represents the changing conditions of the studied phenomena. Lincoln and Guba (1985) argue that there are close ties between credibility and dependability, and that when you demonstrate credibility, you are, in a way, also demonstrating dependability. To ensure dependability, the researcher made sure that if the research were to be repeated, in the same context, with the same methods and with the same subjects or participants, similar results would be obtained. In this research, the use of overlapping methods such as the focus group, individual interview and document analysis addressed issues of dependability. As Guba (1981) points out, the fact that weaknesses of one method are compensated for by the other simultaneously also aids the dependability and credibility of results. The researcher also addressed issues of dependability by reporting in detail all the procedures followed in the research as well as the analysis of results so that a different researcher may follow the same protocol and come up with credible and dependable results. According to Riege (2003), dependability is analogous to the notion of reliability in quantitative research. The purpose of dependability tests was to show indications of stability and consistency in the process of inquiry. Care was taken to ensure that the research process was logical, traceable, and clearly documented in a reflexive manner by giving a detailed account of the research process.

3.10.4 Conformability

Conformability ensures that the findings of the research are the product of the study and not distorted by the biases, motivations, interests and perspectives of the researcher. As Miles and Huberman (2006) point out, a key criterion for conformability is the extent to which the researcher admits his or her own predispositions, beliefs and assumptions. In terms of conformability, this researcher has given a detailed methodological description, indicating what approaches have been favoured and why, endeavouring to lay out and justify the steps taken in the research process as well as acknowledging any weaknesses in the research process. The role of triangulation is important in promoting conformability to reduce the effects of investigator bias. Guba (1978) argues that confirmability and dependability are addressed by leaving an extensive audit trail of the processes of data gathering, data analysis and data interpretation to enable the auditor to trace the course of the research step-by-step determining if the conclusions, interpretations and recommendations can be traced in their sources and if they are supported by the inquiry. An audit process was implemented by working forward, as well as backward through the research process, to ensure that the data and interpretations of the findings were sound and confirmed findings. The intention during the interpretation process was not to generalize findings to a population, but to identify accepted principles and trends related to the research topic

3.11. ETHICAL CONSIDERATIONS

3.11.1 Informed consent

The researcher ensured that the research participants were fully informed about the foreseeable factors that could influence their willingness to participate and they knew what they were consenting to do in the research project. The participants also had given permission to the researcher to record the interviews. In addition, the researcher responded to any question raised by participants for clarity. Shaughness (2003) states that informed consent is a person's explicitly expressed willingness to participate in a research based on clear understanding of the nature of the research and all other

factors that may influence their willingness to participate. Powell (2004) states that ethics are important to all kinds of social and behavioural research, especially when the research involves human subjects. In addition to the ethical aspects discussed above, the researcher observed ethics of carrying research provided by the Faculty of Education at the University of Limpopo.

3.11.2 Discontinuance

When participants agree to participate in a research process, they do not do that for an unlimited time. Rather, Mbengwa (2010) points out that they agree to participate as long as they feel free and comfortable to continue participating. In this research, participants were informed that they have rights to terminate their participation as and when they felt like doing so and that their withdrawal would not have any negative impact on them. Thus, the consent forms that the participants signed explicitly indicated this right of withdrawal.

3.11.3 Confidentiality

Confidentiality is integral to the research process. Researchers should not disclose identifiable information about participants and should protect the identity of research participants through various processes designed to anonymize them (Rose and Kadvekar, 2015). In this research the researcher ensured that whatever information was collected from the participants was secure and was only used for academic purposes. Moreover, when results of the study are published, the researcher will make sure that all identifying marks are removed and that no participants can be identified from the information in the research report. Research participants were also informed about how the information supplied will be protected and they were assured of the anonymity of that information. Files for the research material collected in the field were securely stored and will only be accessed by the researcher and the supervisor.

3.11.4 Anonymity

Andrews, Burns, Leach, Locke, Low and Torgerson (2002) states that both the researcher and the participant must have clear understanding regarding confidentiality

of the results and findings of the study. The researcher will therefore ensure absolute privacy regarding all participants' information and responses shared during the study.

3.11.5 Respect

This means that in this research utmost care was taken to preserve the integrity of the participants as well as the institutions within which these participants are located. Thus, all participants were treated equally, irrespective of their gender, race, ethnicity or other parameters that may be construed as discrimination.

3.11.6 Emotional risk

During the study, the researcher ensured that participants were not exposed to any undue physical and emotional harm. The researcher was also honest and respectful towards all participants.

3.12 CONCLUSION

This chapter provided a detailed and justified methodological approach used to investigate the use of ICT in teaching and learning. The qualitative approach used in this study involved the use of semi-structured interviews, classroom observation and document analysis. The collected data was analysed following the analytical procedures advocated by Moustakas (1994) consisting of transcribing and horizonalization, clusters of units of meaning, individual textual description, individual structural description, essential structure and reporting into the analysis as this best served the purpose of this research. Moreover, the chapter discussed issues of ethics and credibility, transferability, dependability and conformability of the information collected to ensure trustworthiness of the research. Research findings are presented in the next chapter. Data is also presented according to the instruments used to collect data for each group of participants in relation to the research questions.

CHAPTER 4

DATA PRESENTATION AND ANALYSIS OF RESULTS

4.1 INTRODUCTION

This chapter provides a comprehensive analysis and interpretation of the research data. Merriam (2002) says that data analysis is the process of making sense of the data. As outlined in Chapter 3, a qualitative approach was adopted. Data was collected from classroom observation and interviews with teachers and was then carefully analysed to establish the processes put in place by the teachers to ensure the effective use of cell phones in their lessons. This helped in answering the research questions. This chapter presents demographic information of the participants; followed by the themes that emerged from the data analysis process. Finally, the chapter highlights the actual themes that emerged from the study.

4.2 DEMOGRAPHIC INFORMATION OF PARTICIPANTS

The researcher considered various characteristics of the participants which were significant to understanding the use of cell phones in teaching and learning. The section below presents the significant characteristics of the participants, namely, gender, qualifications, age and their teaching experience in the school. The teachers' professional and teaching background are provided and a full explanation provided thereafter. A summary of the data is presented in Table 1.

Table 1: A summary of the characteristics of the participants

School	Participant Code	Gender	Age group	Qualifications	Number of years teaching at the school
School 1	E1	Female	50-55	Masters in in Education	28
School 1	E2	Female	50-55	Honours in English Literature	23
School 2	E3	Female	50-55	Masters in Town and regional planning, Bachelor in Education	16
School 2	E4	Male	45-50	Bachelor of Education and Diploma in Education	26
School 3	E5	Male	55-60	Honours in Education	30
School 3	E6	Female	45-50	Masters in Education	25

The table shows that all participants are qualified to teach with all holding at least an Honours degree and others having attained Masters Degrees.

The researcher considered various characteristics of the participants which should be significant in the use of ICT offering English Home Language subjects. Six educators were purposefully selected, two per school, from schools in Limpopo offering English Home Language.

Educator (E1) an energetic middle-aged female educator who is extremely passionate about debating. She holds a Bachelors of Arts degree as well as an Honours degree and recently completed her Master's degree. She is from Zambia, where she taught for eight years, two years in Mpumalanga and eighteen years in

Limpopo. She teaches English Home Language in Grades ten and eleven and twelve classes.

Educator (E2) is a soft-spoken female educator, holds an Honours degree in English Literature and teaches Grades eight English Home Language. She taught in Zambia for nine years (1996-2005), two years in France (2005- 2007), two years in the USA (2007-2009) and two years in Sekhukhune and eight years in Polokwane.

Educator (E3) is an enthusiastic, well-spoken female educator who holds a Master's degree in Town and regional planning and also a Bachelors in education. She has taught for the past 15 years in Limpopo and one year in Gauteng.

Educator (E4) is a vibrant female educator and holds a BEd Honours degree. She is currently completing her Master's degree in Education. She has taught in the Eastern Cape, Kwa-Zulu Natal as well as in Limpopo.

Educator (E5) is a calm male educator and holds an Honours degree. He is passionate about language and is a knowledgeable individual and has teaching experience in Polokwane. He taught for two years at Escourt, KZN and has been teaching for twenty eight years in Polokwane.

Educator (E6) is a female educator who commands authority through her verbal communication and holds a Master's degree. She has 25 years' teaching experience in Polokwane. She is a straight-forward individual and is passionate about her work. She has inter-provincial experience having taught in KZN for twelve years (1996-2007) and relocated to Eastern Cape where she was HOD of languages for five years (2007-2012). Due to family commitments, she relocated to Polokwane where she now lives and has been teaching English Home language for the past eight years. She teaches Grade 11 and 12.

All participants are educators with in-depth knowledge of English Home Language, and are willing to share their experiences in planning and implementation of group-work activities.

4.3 THEMES FROM THE DATA ANALYSIS

Research data was analysed using qualitative data analysis. Burton, Brundrett and Jones (2008) observe that qualitative data is more open to ambiguity and requires the identification of emergent key themes for it to be organised, collated and interpreted. The data was collected from participants to get in-depth information about the use of cell phones in enhancing teaching and learning. This was done by identifying, analysing and reporting themes within the data. Burton *et al*, (2008) note that this method organizes and describes data sets in detail. Thus, the researcher interpreted the findings in terms of the lived experiences of the participants. Data was interpreted through participants' perceptions of the use of cell phones, planning and implementation, assessment strategies and major challenges faced in implementing the utilization of ICT in learning and teaching. Each theme answered each of the research questions.

Data analysis led to the identification of themes. The identified themes were grouped based on similarity in content and this helped in developing patterns. The figure below illustrates the themes that emerged out of the discussion with participants.

Adapted from Glaser and Strauss (1968)

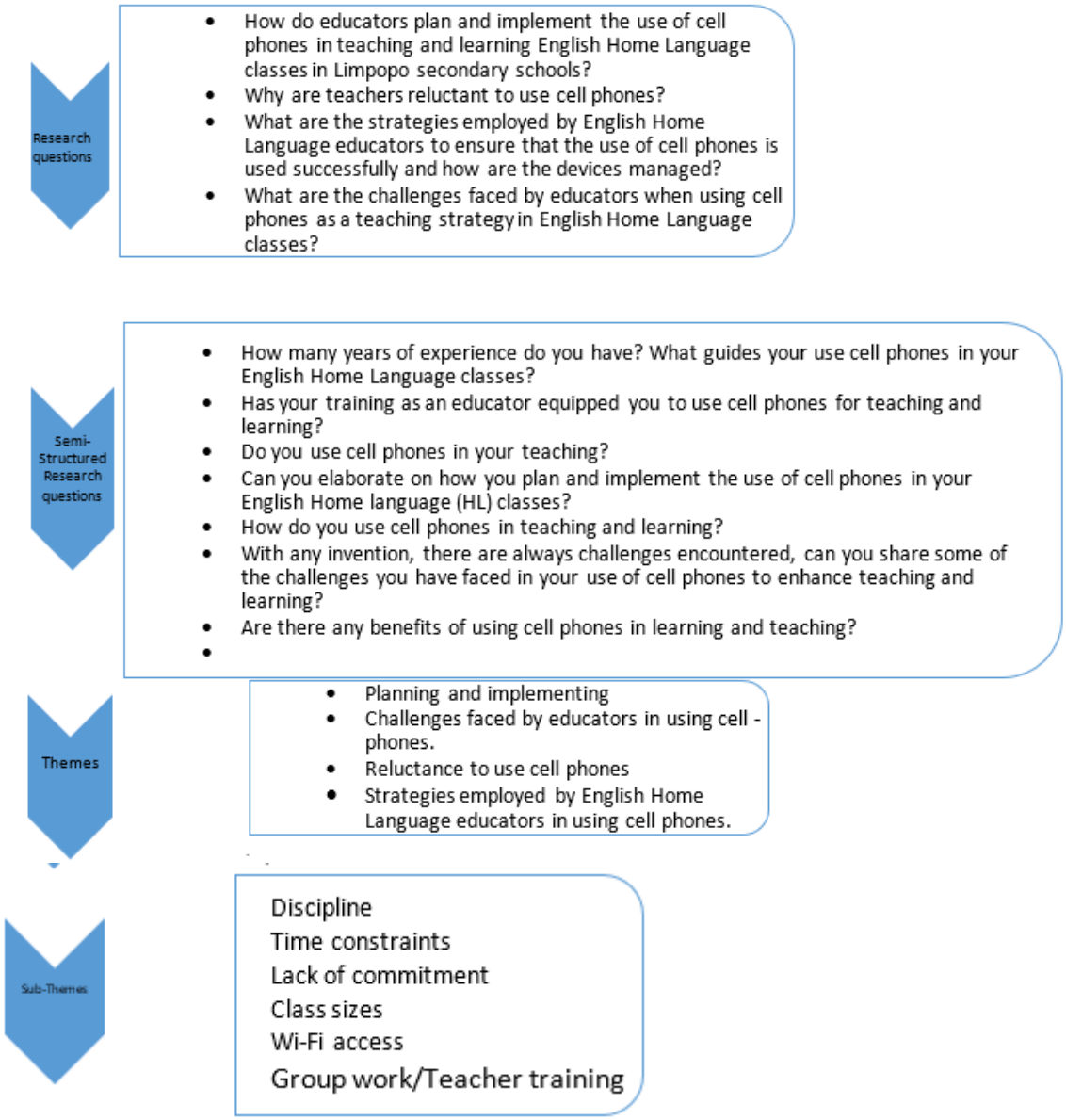
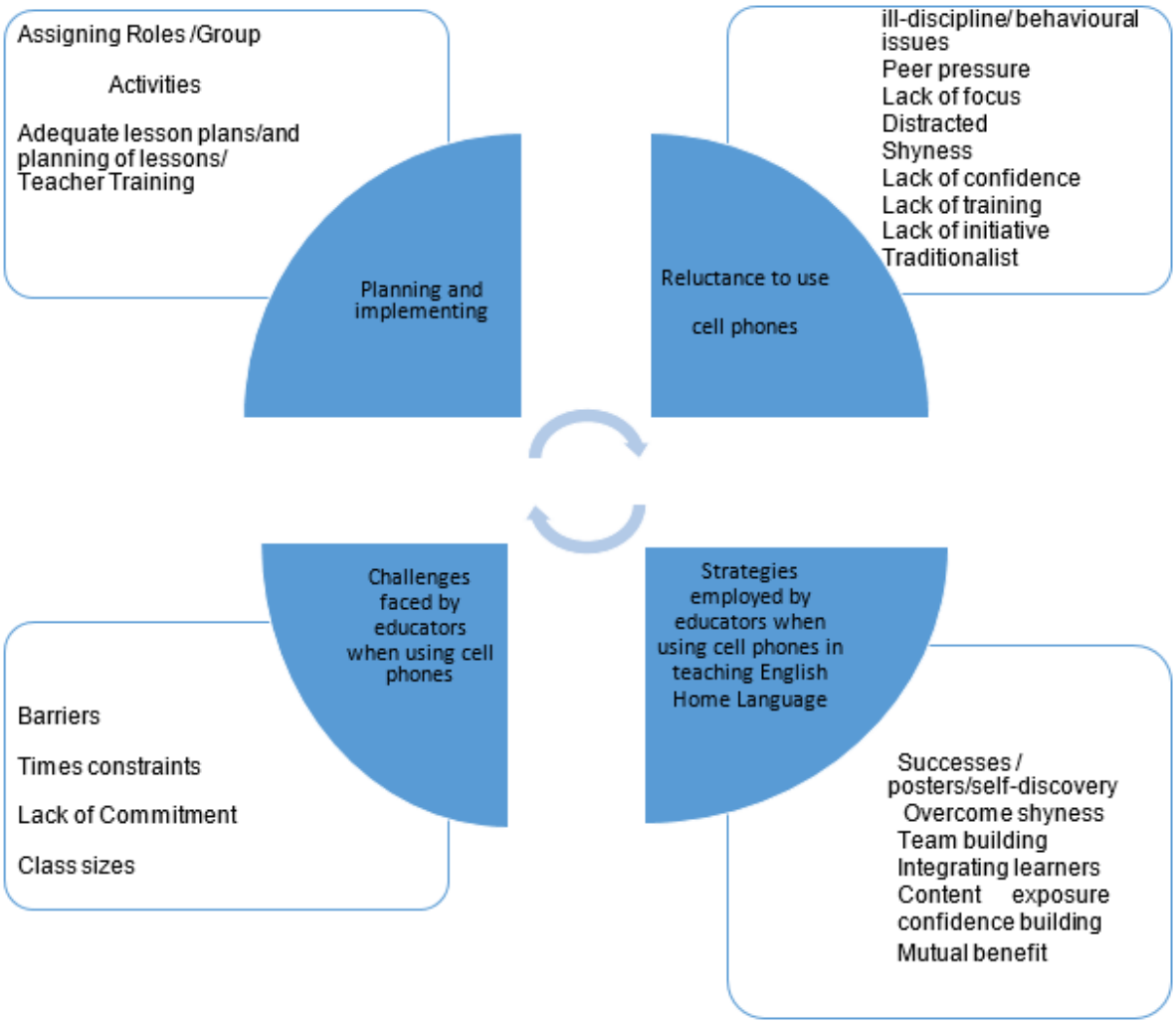


Figure 5: Constant comparison analysis and the themes

The four themes that emerged from the discussions with educators, as shown above, are integrated with the aim of the study which is to explore factors impacting on the use of cell phones in teaching and learning in English Home Language classes.



Challenges should not be repeated – theme and pattern. What about using barriers?

Figure 6: Patterns integrated and identified from the themes

These results are related to the aim of the research. The researcher outlined four themes that emerged from the research conducted - assigning roles, challenges, discipline and successes.

4.4 THEMES

4.4.1 Theme 1- Planning and Implementing

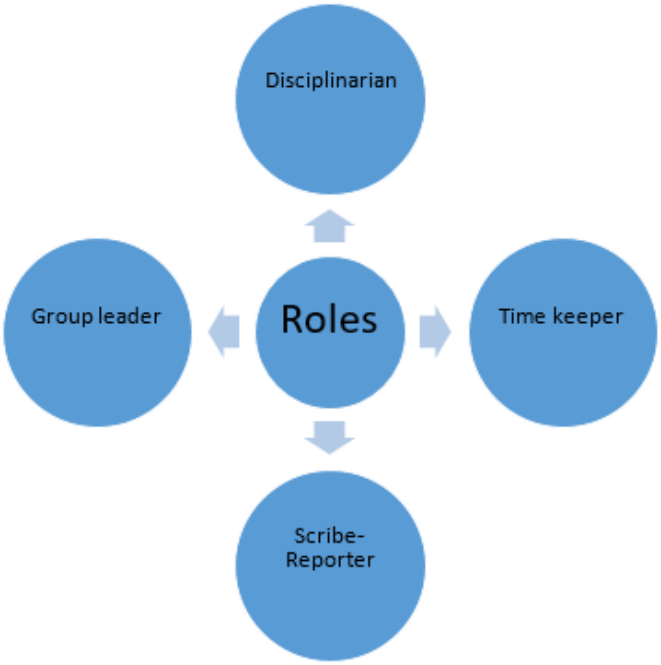


Figure 7: Cell Phones used to assign roles to learners during group work activities

Educators stated that when using cell phones during group work activities, it proved to be an effective teaching and learning method.

4.4.1.1 Sub Theme – Assigning of roles

The use of cell phones in certain group activities when teaching English Home Language requires structure. The study revealed that learner roles should be clearly stipulated when learners work in groups. The educators confirmed this during the interviews:

"I enjoy using group work in my class as the size of the class is also small and this cuts down on space. I find that it is also easy to manage the use of cell phones by the learners in groups. This has to be structured, hence, the response to assigning

roles to learners in doing group work has to be clear-cut. Once these roles are clear-cut it allows for a productive lesson". (E6)

"I found after roles were assigned to learners it became easier to control the group and the activities that involved the use of cell phones". (E2)

"The group worked much easier together when roles were assigned to them. If I find there are learners who are easily distracted or are normally badly behaved I encourage them to assume roles of group leader. Once leadership roles are assigned to them it facilitates the group work process and they take their responsibilities seriously. They are also kept on track when using their cell phones since they have to provide feedback". (E1)

"My learners assume roles such as; time keeper, researcher, editor and presenter. This is extremely beneficial in English since the learners synergize their personalities together. Giving roles to learners made them feel in-charge and this made them more confident and it resulted in a successful lesson. The use of cell phones within the group was easy to manage as there was a common goal". (E3)

Participants indicated that assigning roles and responsibilities to learners facilitated a smooth and productive lesson. These empowered learners by giving them control, and thus they took their responsibilities seriously.

"Learners in the group should be assigned different roles, such as:

a) A timekeeper

Learners need to be aware that their task needs to be completed within a specified time. It is up to the time keeper to alert the rest of the group and this prevents the learners from wasting time.

b) The group leader

They need to ensure the smooth running of the group activities and maintain consensus about what is going to be reported. The group leader also ensures that

members search for the same information on their cel lphones through the feedback provided by the learners.

c) The scribe

Notes need to be taken and it is the job of the scribe. The scribes can also be the speakers of the groups to report on the groups' progress. These notes can be typed on the word function of the cell phone and feedback sent instantaneously to the other members via whatsapp.

d) The disciplinarian

"This role involves someone ensuring that group members are not unruly or noisy. The educator that did not employ this strategy faced serious challenges in maintaining order and learners were not adhering to instructions and were using their cell phones for social benefit". (E4)

"When you assign roles to the learners they become confident and strive to do their best. It also makes them more responsible and they take responsibility for their learning. I have seen it being beneficial to the learner and teacher when using cell phones as a tool of teaching and learning the outcome is productive". (E5)

Educators who assigned roles to their learners had much more productive lessons than those who did not. Figure 7 indicates the various roles which would have a huge impact on the groups' success. Each learner in a group is assigned a role, such as reporter, recorder, time keeper and materials manager. The roles might be rotated each week or by activity in order to prevent what typically happens when learners select their own roles - the same learners end up performing the same tasks. Colorado (2007) notes that by rotating, learners develop critical skills needed for practice. Arguably, the constant rotation of learners in groups and the opportunity to learn from other learners helps shy learners to participate fully in tasks assigned to their groups.

4.4.1.2. Sub Theme-Adequate lesson plans/and planning of lessons/ Teacher Training

Panasuk, Stone and Todd (2002) defined lesson planning as an activity that takes place before instruction. "Teachers engage in a lot of planning, usually at various levels: yearly, term, unit, weekly, and daily" (808-829). MacDonald and Phillips add that quality lesson plans deliberately intend to stimulate learning through active participation.

"It is just so sad that teacher training colleges and universities do not equip the educators with the knowledge and skill to use ICT in the classroom. This is evident in the newly employed educators". (E 5)

"Planning is key; an educator has to plan his or lessons in order for the lesson to be productive. They cannot come to the class and thumb-suck and hope that everything will run smoothly". (E3)
"Learners pick up when educators have planned or not". (E6)

"Educators have discipline problems and rowdy classes due to poor planning or no planning at all". (E2)

"If a lesson is planned effectively, the educator can easily detect whether learners are going off topic or being side-tracked when using their cell phones in class". (E4)

"Prior to the lesson as part of my planning, I leave voice notes in my whatsapp group informing them about the next day's lesson, further to this, I also forward pre-reading activities that allow me to cover more content in the limited time that we have in class". (E1)

4.4.2 Theme 2–Reluctance to use cell phones

The various challenges experienced during the use of cell phones in classroom situations are indicated in Figure 8 (behavioural issues) and Figure 9 (teacher reluctance.

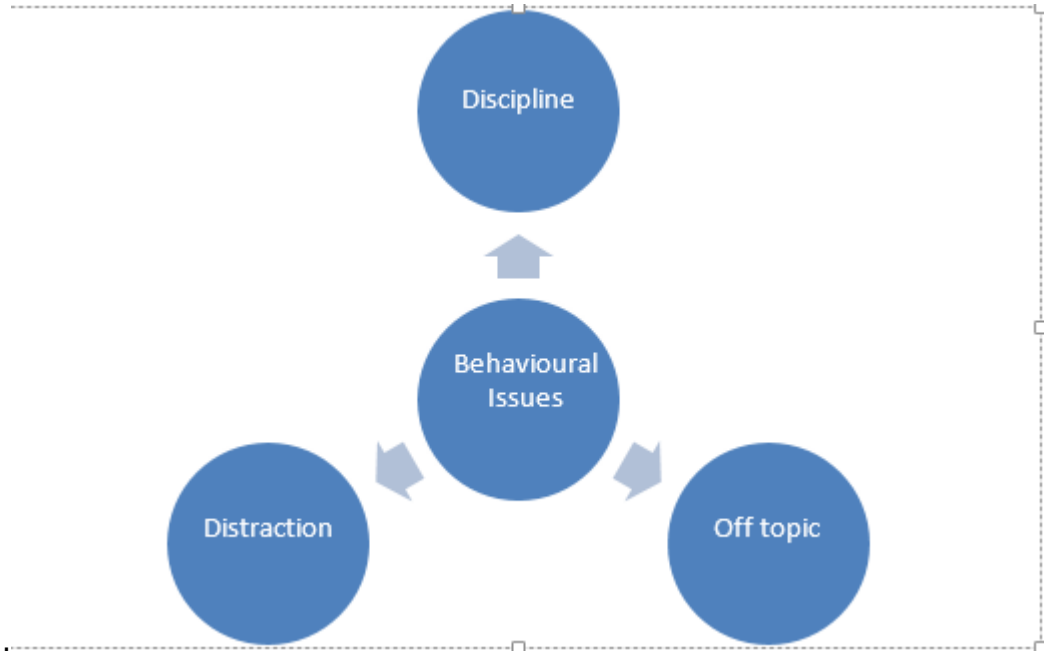


Figure 8: Behavioural issues experienced with the use of cell phones in class

4.4.2.1 Sub theme – ill-discipline, peer pressure and class sizes

Discipline proved to be an important theme. The researcher assessed the learners' active involvement and the number of times the educator reprimanded them especially in large class. Learners worked productively when clear-cut instructions were given and adhered to directives. This led to the productive use of cell phones and enhanced the process of teaching and learning.

The responses below capture educators' view about discipline:

"I do not have discipline problems, since I zone out. If I see that learners are working constructively with their cell phones, I do not have a problem with noise". (E 6)

"I have no problem with noise, I tell my learners: if you can spell the word, you know how to do it and if I can hear you then you are loud. They soon abate and when they are talking their minds are active and they are discussing their research collectively". (E 5)

"Some learners use this as a platform to 'show off' and want to impress their friends with their fancy cell phones and discuss unrelated topics and make a noise. This becomes frustrating to the educator since there are other groups to deal with, especially when working with groups. Furthermore, instructions must be clear, if it is not then the learners will lose track and end up making a noise". (E 3)

"I experience a huge discipline problem since our class sizes are large it becomes difficult to maintain order. At times, it hinders me from using cell phones in the class as I feel it is going to be a nightmare as learners will not cooperate. I feel the management needs to address the problem of our class sizes and once we have smaller classes the use of cell phones in classes will be an excellent teaching tool". (E 2)

"Prior to the use of cell phones, I found that there were learners who did not focus as a result they became bored or distracted and this gave rise to misbehaviour, however, when I used cell phones as a tool of teaching and learning the learners were interested and productive. It stimulated and motivated the learners as it was something new in the classroom and something they were used to outside the classroom. It was different from the norm of teaching and was beneficial". (E1)

"Learners are governed by peer pressure so they want to impress hence they speak. By asking learners to research on their phones and provide feedback to the class, this form of speech is constructive and educational. So, in this light, it can be seen as positive because they are providing feedback to the class. Using cell phones". (E4)

"Some learners are intimidated by their peers as a result they remain closed, as an educator I always insist on collective input and by using the cell phones for learning the learners become confident in contributing to their research. This adds confidence

in them. By using cell phones in class it allows learners to become confident and at the same time gain intellectual knowledge". (E6)

The researcher got immersed in the situation and the study phenomenon. In one class, there was mayhem because the educator was not a disciplinarian. Learners took advantage of this to cause disruptions by using their cell phones for private business. One learner was even on a voice phone call. The discipline issue is linked to lesson preparation. It was obvious that when a lesson was unplanned learners made noise and became unruly. To maintain class discipline, educators had to be active, provide ground-rules in the use of their cell phones and walk around providing clarification where necessary. Participants were anxious about maintaining discipline when cell phones were used in class. Participants indicated that it was initially challenging to maintain class discipline when they started using cell phones for learning and teaching. However, the situation improved as learners received guidance and supervision from their teachers.

Classroom observations provided the researcher with first-hand information about the use of cell phones in learning and teaching. In most classes, learners sat calmly and quietly during the lesson.

4.4.2.2 Sub theme: Distractive learners, lack of focus and being off-topic

The study revealed that participants had serious challenges that hindered the maximum success of group work. During the interview, educators highlighted some behavioural factors experienced when using cell phones for teaching and learning in the classroom.

Below are the educator's views about distracted learners:

"Hyper-active learners distract others and do not understand about giving an opportunity to those that are speaking". (E2)

“I have two boys in the same group who get distracted very easily. The one is a stronger learner while the other is a weaker learner; the stronger learner is maximizing his potential and takes English for granted at the expense of the weaker learner”. (E5)

“The stronger learners are always eager to make use of the cell phones to learn new information and eagerly ask questions”. (E6)

“When clear instructions are not given to the learners they are easily distracted”. (E3)

*“I try to make my lessons innovative since I find my learners switch off after a while when I am standing in front of the class, they get distracted and by using cell phones in teaching and learning it allows them to be active and they benefit from new content and by each other”. (*E6)

“I have experienced learners who deviated from the topic due to similar interests or they are passionate about something, such as soccer”. (E4)

“Some learners take the subject for granted and they divert from the lesson”. (E1)

4.4.2.3 Sub theme: Shy learners

Participants viewed shyness as a challenge. However, when working in groups and using their cell phones for research, shy learners become confident and work in accordance with the ground rules of the task teams. One participant mentioned that when he was young, he realized that his inability to partake in group work was a setback, so he made deliberate efforts to learn from friends and played his part in group activities.

Below is what participants said about shy learners:

“Shy learners are normally withdrawn but once they are in a group with their peers they tend to come out of their shell. They contribute to the topic by actively working on the task at hand. They research their information and are eager to provide input”. (E2)

“It is remarkable to see how the normally shy learners become open and talkative with their peers. They feel confident with using their phones, it provides them with some sort of security”. (E1)

“It gives the learners confidence; it gets them out of their shells and gets them to speak and this is so rewarding to see”. (E 3)

4.4.2.4 Sub theme: Lack of training, confidence, initiative and a traditional approach

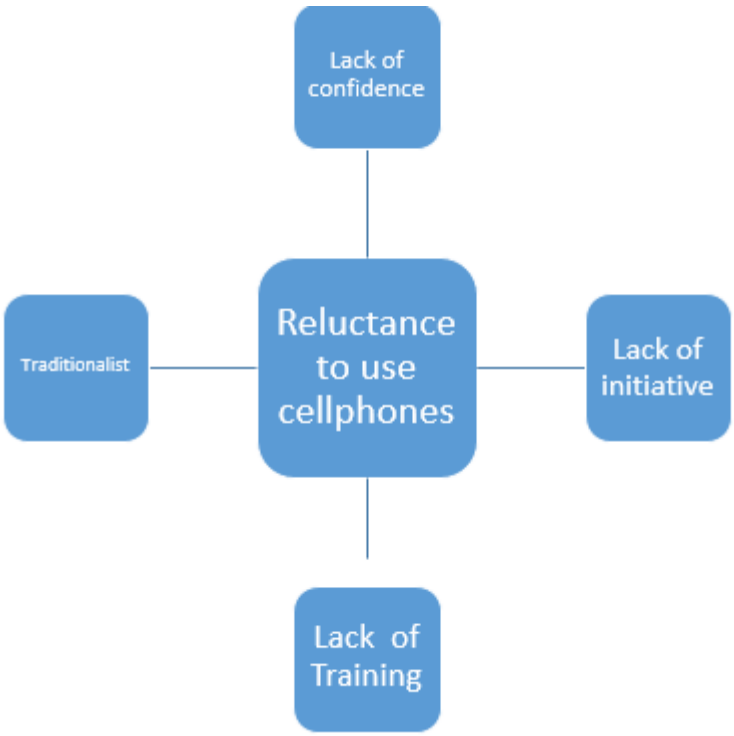


Figure 9: Factors preventing teachers from using cell phones in teaching

Participants suggested reasons for teachers not wanting to use cell phones in teaching. Firstly, some teachers are set in their conservative, traditional, chalk and talk form of teaching. Using cell phones learning and teaching takes time and planning and some teachers are not willing to make such investments. Additionally, teachers lack adequate training and do not want to embarrass themselves in front of their learners.

Participants' responses below indicate why some teachers do not use cell phones for classroom learning and teaching:

"Lack of training in the use of ICT plays a major role in the implementation of cell phones in teaching. Teacher training institutions need to make ICT training part of the curriculum. Further to this, schools need to provide adequate training for existing teachers". (E1)

“I do feel intimidated when I use ICT in teaching as I am not well versed in the use of technology. I am afraid that I might do something wrong and the learners might make fun of me”. (E4)

“I am a bit of a traditionalist in my teaching methods for many years, however, my learners have set up a whatsapp group and I have been posting information for my learners. I am taking the initiative to keep up with the times. I have noticed that some teachers enjoy just the traditional way of teaching because it involves additional preparation to use ICT in teaching”. (E5)

I enjoy using cell phones and any type of technology in teaching, I am not very techno-savvy but I include my learners in assisting me if I am unsure about something. Believe me, this actually makes them feel needed and worthwhile. We have very productive lessons”. (E6)

4.4.3 Theme 3- Strategies employed by English Home Language educators when teaching using cell phones

4.4.3.1 Sub Theme – Successes

In all interview sessions, the participants said they were successful in using cell phones for learning and teaching. Some reported that passive learners become vocal when learning through cell phones. Participants also observed that poor performing learners take the initiative to work collectively as a team or even individually by contributing information when cell phones are introduced. Moreover, working with learners in groups, more specifically smaller group sizes proved successful when cell phones were used. Furthermore, the stimulus of cell phones enhanced the learners’ visual senses especially in studying literature and this also allowed learners to learn from each other. English Home Language requires learners to study Shakespearean plays as well as poetry. However, learners are unfamiliar with the Elizabethan language and thus using cell phones to work in groups proved to be an effective learning strategy. Group members learn from each other and acquire a better understanding of the subject matter. The use of cell phones allowed learners to quickly interpret Shakespearean language by watching the play on their cell phones. The use

of cell phones enabled them to work together to role-play various acts of the plays. These activities created teamwork which further enhanced the learning process.

Below is what participants said about this aspect:

"The use of cell phones provides variety; it captures interest since the learners become tired of listening to the educator. When you actually do it you remember and do not forget. Since learners are governed by their peer pressure they want to impress their peers so they research and speak. The use of cell phones adds variety, it is not the usual norm. The learners are now taking charge of their learning under the supervision of the educator". (E 2)

"As an educator, I am passionate about what I do, it is not about me but the learners. Hence, I ensure they are stimulated and the strategy I use is allowing them self – discovery". (E4)

"I stimulate the learners by using visual stimuli from their cell phones or even using my smart board, their cell phones and they use this in their group discussions or individually. As an educator, I found that learners need stimulation for productivity. My learners have a very limited exposure as a result by visually accessing information from their cell phones it enhances the quality of their knowledge". (E 5)

"The use of cell phones sets the scene for an interesting and exciting lesson as learners can make use of it as a dictionary, video recorder, accessing visual stimuli and many others. My learners' video record their speeches and send it to me via whatsapp, this saves time and their creative energies are made evident". (E6)

"I have noticed that the quality of my learners' speeches have improved tremendously. It is evident that they use numerous resources and they have accessed their information productively using their cell phones". (E1)

"I find the use of cell phones for learners extremely beneficial as many learners read at their own pace so if they have the content, which I forward to their whatsapp groups, they can read at their own pace and are not rushed". (E2)

“The use of cell phones in teaching and learning gives the educator freedom to communicate in various ways”. (E3)

4.4.3.2 Sub theme: Overcoming shyness

Crozier (2004) states shy students are less confident about their participation whether or not they believe that they participate less than their peers do. However, the participants below believe otherwise.

“It surprises you as the educator when the quiet learner now flourishes because they are able to contribute. This is a huge contribution to the learner’s life and this is accomplished because I deliberately seat a shy learner with learners that I know would encourage them to contribute”. (E3)

“Sometimes when learners are given time to research certain aspects the quiet learners would now take up the lead and this leaves the educator in awe”. (E2)

4.4.3.3 Sub-theme: Team Building and Confidence Building

Team building is extremely beneficial for building trust, understanding and each other. The participants had the following to say about team building and confidence building.

“Using cell phones in a group work setting also proved beneficial as it develops the child and provides a huge contribution to their life. It also facilitates creativity and fosters confidence building since all members are placed in the same group for the first time. This also assisted learners who did not have cell phones and this developed a sense of camaraderie”. (E3)

“When children are together they are free to share their views instead of standing out, 1 out of 40”. (E2)

“Learners learn from each other and self-discovery”. (E1)

“When I work in groups with my learners, I find that the learners find it easy to open-up in small groups and when they have to deliver their responses collectively there is immense team spirit and unity and this is done by me giving them the space to explore. Furthermore, they are eager to participate as they have access to more than one resource available on their cell phones' '. (E6)

4.4.3.4 Sub theme: Integrating learners, content exposure and its mutual benefit

Integrating learners is crucial and it allows for mutual respect for each other. The participants felt that it was extremely important.

“In our school, we have children from various parts of the world as well as various parts of South Africa, by using cell phones in teaching and learning it allows learners to integrate and to find out of each other’s culture at the touch of a button as a result they become more accepting of each other and respect each other’s culture. When teaching English Home Language, the use of cell phones is God sent, in the sense that if the learners need to find a meaning of a word all they have to do is ask for permission to search for it on their phones. This really helps since I have only one dictionary in my class of 40 learners. This is mutually beneficial for both learner and educator”. (E6)

“I was teaching a poem titled “Vultures”, and part of the poem described that the vulture is ugly beyond redemption as well as its head looks like it is bashed in. My learners could not relate as they did not know what a vulture looked like, until I asked them to take out their cell phones and search for a vulture and then the poem became more meaningful to them. It proved so successful because whenever the poem is being tested they choose it to answer despite having other choices”. (E1)

“The learners benefit from each other’s knowledge as well as experiences especially if some learners are not exposed to certain aspects, it is then very easy to search for it on their cell phones and then they do not feel left out”. (E5)

“Sometimes there are dynamics in the class whereby some children don’t want to work so hence the educator needs to engage in persuasion tactics as well as strategically

re-assigning seats to learners or even engage in group work. Once this is achieved the learners engage in a productive lesson. The problematic learners settle down and become contributors to the lesson since they have also researched on the topic that was being discussed". (E3)

"When discussing the prescribed books, the use of cell phones acts as a powerful tool since the learners learn from each other by sharing their research collectively if they are working in groups or the class at large if working individually. It gives them various views other than their own. Further to that since there are shortages of textbooks I send a PDF copy of their prescribed books via whatsapp so that learners are not disadvantaged". (E4)

4.4.4 Theme 4 – Challenges faced by educators using cell phones

Figure 10 indicates challenges experienced in classroom situations.

4.4.4.1 Sub Theme- Challenges faced by educators using cell phones

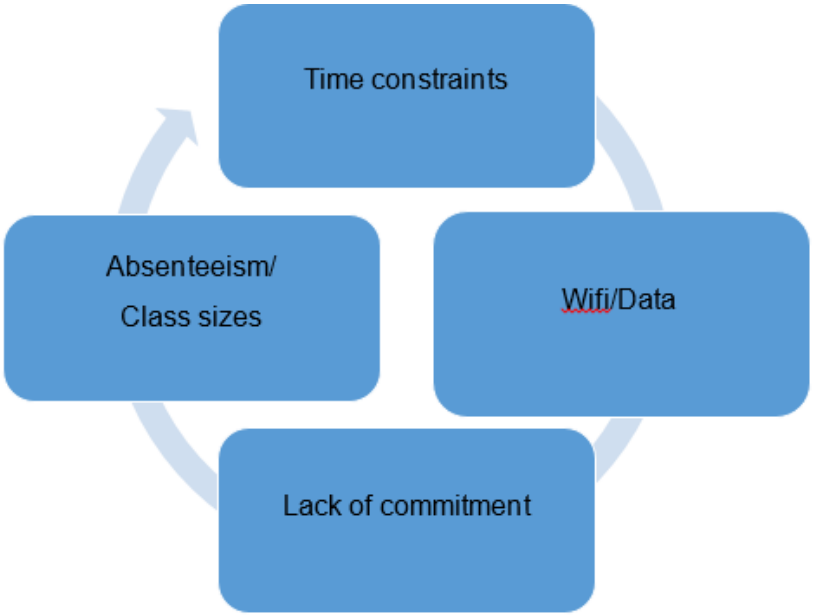


Figure 10: Challenges experienced in classroom situations

Mendoza, Pody, Lee, Kim and McDonough (2018) state that cell phones can cause a feeling of anxiety and a major distraction since learners become dependent on

their phones and may feel compelled to check them all the time. Furthermore, Mendoza et al (2018) elaborate that the internet is flooded with wrong resources and that learners are exposed to a lot of wrong and false information.

4.4.4.2 Sub-theme: Time Constraints and school activities

Time also poses a challenge since in some schools the length of the lessons is not fixed but varies from day to day. When using cell phones in class, learners require adequate time to switch their phones on, search the information as well as discuss and provide feedback. Furthermore, there are planned school activities that take place which are beyond the educators' control. This is what participants said about this theme:

"Language barrier is a challenge since some of our learners struggle with interpretation of the task at hand, so a lot of time is spent on interpretation of the task before they actually do the task". (E 4)

"It takes a long time for the learners to be seated and to settle down and this is time consuming, a lot of time is wasted". (E 1)

"I do not have a problem with time lost, I inform the learners beforehand on whatsapp what they need to prepare for the next lesson and when they come to class they listen to the instructions and get on with the tasks. If there is any unfinished work, I put the information on whatsapp for them". (E 5)

"The lengths of our lessons are not constant in terms of time. On some occasions, there is a test period in the morning or on other occasions the bell just rings late for the end of registration. This has a ripple effect on all the periods for the day. So, the length of the lesson can be anything from 20 minutes to 55 minutes in length". (E 2)

"Our school is not constant with regard to when we have an assembly. As a result, I could plan for a group activity on a particular day only to find out in the morning we are having an assembly. It is time consuming and even though this matter was raised to management, nothing has been done". (E3)

“The Department of Education wants our school to write common tests, as a result, provision needs to be made within the school hours for the test. We lose valuable teaching time”. (E4)

4.4.4.3 Sub-theme: Class sizes

This sub-theme relates to challenges when educators fail to control the class due to its large size. Some classes have up to forty-two learners and this makes the use of cell phones a tedious task.

My classes are over forty, and as a result, I am faced with a few challenges. Firstly, the classroom is not big enough, so space becomes a problem so I have to arrange my classes in groups’. Secondly, there is a constant buzz in my class due to the discussions”. (E2)

“Since the classes are large, sometimes the noise levels increase and the school management does not approve and they come to investigate and I am told to lower the noise level. When doing group activities with the learners using their cell phones we have no control of the other groups. Personally, I do not have a problem, as it is constructive noise. Learners are eager to share their information that they have researched”. (E1)

Class sizes for most educators play a crucial role because they claim to have a more productive lesson with fewer learners.

4.4.4.4 Sub-theme: Absenteeism

Participants pointed out that learners' absenteeism has a direct impact on teaching and learning.

"There is a challenge of chronic absenteeism, learners in school attend classes at the beginning but as the year progresses they start to take drugs or are suspended. When class is conducted, they are absent and if activities are used for assessment purposes it becomes challenging for the teacher to assess the learner. It further compounds the problem, however, I do put important content on the whatsapp group so that all learners benefit". (E4).

"When learners are absent chronically according to the Department of Education, they need to be absent for a period of 30 consecutive days in order to be removed. The learners are very knowledgeable with this ruling so they present themselves occasional". (E 1)

"I do not have a problem with absenteeism; the learners come to school on a regular basis". (E 6)

It was evident from the educators' responses that absenteeism challenges, hinders and negatively impacts the implementation and outcome of productive lessons.

4.4.4.5 Sub-theme: Lack of Commitment

Lack of learners' commitment and self-discipline towards their studies was mentioned as another reason for bad performance. Participants cited learners' lack of commitment to learning as a stumbling block towards improving performance. Below is what they said:

"Our learners are not prepared to work, they just want to be spoon-fed with all information. Hence, the use of cell phones in teaching and learning makes the learners take control of their own well-being". (E3)

“They come to the school but do not attend classes. I constantly post work on our whatsapp groups hoping those learners take advantage of it”. (E1)

“The parents are busy working and most of the time-mostly out of town- the learners live in child-headed homes so they are left to do whatever they please. They stay up late and when they come to school they are tired and switch off. Hence, the whatsapp groups proved extremely successful”. (E 1)

“Bunking is a huge problem in our school as a result this impacts on our classroom activities”. (E6)

Educators believe learners are not committed to their work and that this is the cause of their academic challenges.

4.4.4.6 Subtheme – Wi-Fi /Data

The access to wi-fi and data allows connecting to the internet, absence of it can pose a challenge. The participants had their views below.

“The problem we experience is that we only have Wi-Fi in the staffroom, we are such a large school but unfortunately we do not have access to it in our classroom”. (E2)

“We have to use our own data, at our own cost. That can also prevent some teachers from using ICT in teaching and learning”. (E3)

“When using cell phones in class, I first have to ascertain if the learners have data and if they are going to use it. I then put learners in groups so that everyone has access to information”. (E4)

“Data can be costly, however, Vodacom has provided data for learners with Vodacom network”. (E5)

“I also find that some teachers lack the skills to use ICT in teaching and learning but most of all the management of the school is not helpful as we are making use of our own data”. (E1)

All educators pointed out that the use of cell phones is an effective learning and teaching tool.

These results are in keeping with Karim (2012) who states that there are several positive reasons why cell phones should be used in learning and teaching. The use of cell phones is especially important in language learning. Communication via mobile phones is a collaboration activity that facilitates appropriate and proper social relations with learners. Students can exchange information at any time about any subject to help each other understand difficult concepts.

4.5 CONCLUSION

The qualitative research approach and the case study format played a vital role in collecting rich and descriptive data. In this study, data was collected through semi-structured interviews and classroom observations. The themes that emerged from the data are planning and implementation of group-work activities, behavioural issues, challenges faced and strategies employed by English Home Language educators in teaching English. These themes helped in answering the study research questions.

CHAPTER 5

SUMMARY, DISCUSSION OF FINDINGS AND RECOMMENDATIONS

5.1 INTRODUCTION

This chapter draws together the research questions, the research process and the results, makes recommendations and provides the study conclusion. The study findings emanated from the literature review process, personal experiences and theories underpinning classroom interactions.

The findings are discussed in conjunction with the research objectives outlined in Chapter One and by referring to the literature review discussed in Chapter Two. Reference is also made to the research data reported in Chapter Four. As discussed in Chapter Four, the qualitative data gathered through semi-structured interviews, site observations and document analysis were deductively organised according to priori themes that were derived from the conceptual framework, literature review, as well as the research questions. The sub-themes that emerged from the text were inductively developed and subsequently placed under relevant themes and categories.

This study explored the use of cell phones to enhance teaching and learning in selected schools in Limpopo. The main research question was:

What is the impact of the use of cell phones (smart phones) in selected secondary schools of Limpopo Province?

The research sub-questions were:

- How do teachers plan and implement the use of cell phones in teaching and learning English Home Language classes in Limpopo secondary schools?
- Why are teachers reluctant to use cell phones?
- What are the strategies employed by English Home Language teachers to ensure that cell phones are used successfully and how are the devices managed?

- What are the challenges faced by teachers when using cell phones as a teaching strategy in English Home Language classes?

5.2 SUMMARY OF CHAPTERS

1. Chapter 1 provides background information about the research study, describes the problem, and outlines the purpose of the study as well as the research design.
2. Chapter 2 provides a background to the study, identifies what has been established and any gaps thereby ensuring the relevance, importance and usefulness of the present study.
3. Chapter 3 discusses the study research design in preparation for the qualitative study whose data is presented in Chapter Four. The section provides information about the research paradigm, sampling issues, as well as the semi-structured interviews, researcher's diary and classroom observation as data collection methods.

4. Chapter 4 presents the data collected through semi-structured interviews, document analysis and the researcher's reflective diary as presented in Chapter Three. Data was collected using the qualitative approach provided comprehensively on the research objectives. Data also helped in the development of themes which were subsequently linked to the research questions in Chapter 5.

Below, study findings are discussed to show how research questions are answered and to support research outcomes.

5.3 DISCUSSION OF FINDINGS

The discussion of findings is divided into four parts. The first part deals with the planning and implementation of the use of cell phones in teaching and learning; the second part explores the reluctance of teachers to use ICT, while the third part reviews the strategies employed by English Home Language teachers to ensure successful teaching and learning takes place and the fourth part deals with the challenges faced by teachers.

The figure below briefly illustrates the findings of this study.

Figure 11: Summary of study findings

Figure 11 has three levels. The first level indicates the number of objectives; the second shows the themes derived from each objective, while the last indicates the study findings.

5.3.1 Findings about the first research question and aim of the study:

How is the use of cell phones planned and implemented in English Home Language classes in Limpopo to enhance teaching and learning?

It was found that teachers regularly plan and implement specific English Home Language activities using cell phones. Teachers select activities that allow learners to use their cell phones, setting of assessment tasks and designing assessment tools. Teachers plan comprehensively for assessment in order to ensure the clarity, validity, reliability and relevance of assessment procedures. During classroom observations and interviews it was clear that using cell phones in class activities involves intense, thorough and comprehensive planning for authentic learning to take place. The CAPS policy for English Home Language compels teachers to plan and implement specific topics and to teach according to a teaching plan, per term and per grade. If effective planning is not done, then learners will stray from the topic and this results in an unproductive lesson. Some teachers pointed out that assigning learners to cell phone using groups makes teaching easier and manageable.

Most teachers emphasized the importance of thorough planning. Below is what some participants said:

"Planning takes a lot of time so most teachers shy away from using cell phones for activities even though it is so beneficial". (E 1)

"The CAPS curriculum syllabus is so long and content oriented that I feel that the use of cell phones provides a variety. Further to this, I use whatsapp a lot with my learners, especially if I did not complete an aspect that I planned to finish in class. (E2).

"I feel that teachers sometimes feel a bit intimidated using cell phones in their teaching as they are not confident enough with their content. Learners can be nasty and can call an educator out on any incorrect information conveyed to them". (E 3)

“I plan in-advance and I find using cell phones in teaching and learning is a wonderful tool. I use it constantly especially if I am marking activities in class and if the bell rings at the end of lesson and I am not done, I merely post the answers in our whatsapp group for the learners to complete at home”. (E6)

“I use group work in my classes and I find it works well for me especially with use of cell phones”. (E5)

The interviews were intended to understand the teachers’ strategies when teaching the subject. Vakalisa (2011) argues that in order for effective learning to take place, an educator should have a sound knowledge of the learning content, a broad repertoire of teaching methods, as well as effective classroom management strategies. This creates a conducive environment for effective learning. Vakalisa (2011) also recommends that teachers should be encouraged to develop skills for gaining access to the inner world of their learners because when teachers possess the right skills, they earn their learners’ trust.

Motitswe (2012) expresses views like those of the participants of this study when she states that multi-level teaching, storytelling, learning through play, songs, rhymes, group work, individual work and cooperative learning are beneficial to learners. Motitswe (2012) also asserts that differentiated instruction and accommodation help in catering for all individuals when teaching language.

Some participants used group work in their lessons. Regarding group work, participants said the following:

“My group comprises of four learners. I give each child in the class a number from 1 to 4; the numbers are based on their academic ability.
1 being the top learner
2 being the medium learner
3 being the medium learner
4 being the weaker learner”. (E6)

"The explanation of the numbers is for my own reference, I always have excess of number 2, which shows many of the learners are average. I give them freedom to work, even poetry is done in a group with the use of their cell phones; one reads the poem and they collectively research the poem. Finally, they discuss the questions that I have given them as a group. After a week, I changed the group since they get bored of each other. I tend to have a successful outcome". (E6)

"I have introduced a Flip class technique with my Gr 10 class. I provide all the resource material as well as pre-recorded video lessons via my cell phone and post it in my class groups. They must prepare at home and when they come to school they are knowledgeable about the subject matter, example: if I give them a poem and tell them it is an extended metaphor, they must research at home: why is this so and so on. The preparation beforehand is beneficial since learners are far less tolerant to lazy learners and they will report on their failure to do the preparation. It works successfully for me". (E6)

"I have to incite the learners before my class activities; this is where the use of cell phones is extremely beneficial. I communicate with my learners constantly. When they get to class they are well prepared and extremely cooperative. They feel more confident as they have researched and are knowledgeable". (E3)

Participants stated that using cell phones for teaching and learning helps learners expand their knowledge. It was established from participants and other researchers that there are many benefits for allowing learners to be active in the teaching and learning environment.

This study proved the importance of using cell phones in teaching and the need for teachers to employ the right strategies in order to create an effective learning environment.

Participants said the use of cell phones in learning and teaching is a communicative approach or what is commonly termed 'the question and answer method'. This is when lessons are introduced by posing questions to learners. Participants stated that this approach makes them prepare well knowing their learners are trained to answer questions. Participants also pointed out that questions move learners from the known

to the unknown as they get deeper into the communicative approach in line with Bloom's cognitive taxonomy of mastery learning (Bloom, 1956).

Killen (2003, p.1-14) opines: "Instructing can be considered as the way toward directing learners as they work with data". He also says "educators help learners to discover data, recall it, comprehend it, compose it, apply it, assess it and do innovative things with it". This suggests that teachers prepare well and utilize systems that are fit for the level of their learners. In the current study, teachers pointed out that they ask each learner to read followed by discussion and assessment after research conducted with their cell phones. This approach is not directly related to cooperative learning but teachers reflectively resort to discussion.

Cell phone use in teaching and learning and learners' providing of feedback is cooperative learning which teachers employed as a teaching technique. Most of the participants referred to group work as a 'cooperative learning' approach. Under this strategy they used the communicative approach and discussions in their teaching.

Participants of this study who are all professionally qualified and trained to implement CAPS are knowledgeable with the use of ICT. Thus, they bring their training and experience to bear on their teaching through the use of cell phones.

Grundy (1987) advises that any teaching strategy that teachers choose must equip learners with solutions to problems that they may encounter in their studies by innovative thinking when it comes to real-life situations or what is termed praxis in educational circles. Transfer of learning means that after teaching has taken learners should experience a relatively permanent change in attitude. Any teaching strategy that does not equip learners with skills, knowledge, experience and attitude for life outside the classroom is not beneficial to learners.

5.3.2 Findings regarding the second research question and the aim of the study: *Why are teachers reluctant to use cell phones?*

Teachers' use of ICT depends on how comfortable they are with a given technology. Their expertise in using technology affects how they use it as well as how they design

lessons and learning environments. Hence, Becker, (2001) argues that for ICT to be successfully implemented teacher trainees, teachers and teacher-educators should be adequately trained

Low ICT confidence is another factor that leads to teachers' reluctance to use ICT. Jones (2004) points out that teachers with little or no confidence in using computers in their work will try to avoid them altogether. Jones' review demonstrates that there is a close relationship between barriers to the integration of ICT. Jones states that lack of personal access, technical problems or lack of teacher competence can lead to lack of teacher confidence, but in turn, a lack of confidence could itself magnify the effects of these three barriers. For teachers, learning is not finished after one week of training. As an important part of our concept the position of an ICT integrator is being created. His task is to motivate teachers, provide further pedagogic assistance and examples of integrating ICT in class.

Jacobsen, Clifford and Friesen (2002) advise that teachers should have imagination, intellect, creativity, and be encouraged to learn how to teach and learn using new technologies. Leadership needs to be strong and have an informed vision for the integration of technology and the ability to provide additional support required in teacher preparation programs and by departments of education.

With the adoption of 21st century technology, there is a major paradigm shift in instructional methods to reflect contemporary societal challenges. The role of the teacher and student has changed dramatically over the years since the teacher no longer simply disseminates information to students for them to consume and retain as many of the facts and figures as they could. In a student-centric classroom, the role of the teacher changes to that of a facilitator and resource person. The teacher acts as a catalyst helping the student to promote his or her individual learning. The use of technology gives students access to the teacher at all times where they can ask and receive answers to their questions without having to speak in front of a large group. Students can also access lectures, demonstrations or discussions when required, rather than relying on a fixed schedule. Below is what participants said about this issue:

“I find the teachers are reluctant to use ICT in their classes because they are scared that they might be embarrassed in front of the learners for doing the wrong things”. (E5)

“Initially, I was not using ICT, however after the lockdown I was forced to start whatsapp groups and post work. I do not like to use the cell phones often as I find it consumes data, which is at my own cost. Furthermore, I am not too technologically knowledgeable”. (E4)

“I am very comfortable using cell phones with my learners. I leave voice notes, post work in groups. Since I am studying further, I think that it has also equipped me to be more confident as I constantly use ICT”. (E1)

“I feel that teachers are reluctant to use ICT because they do not have the exposure as well as the training to equip them with the skill”. (E3)

“I do not use cell phones all the time, I use it partially. I find that it is beneficial for learners who want to work. Teachers are reluctant to use it in their classes because they do not have the support of the management”. (E2)

*“Some teachers are reluctant to use cell phones in teaching and learning because they are traditionalists. They are used to the teacher being at the forefront of the lesson. They are reluctant to change as they feel secure with what they know”. (*E6)

“The idea of using cell phones as a tool for teaching is appealing, however, when I think of the discipline issues it will accompany it then makes me doubt using it”. (E4)

5.3.3 Findings regarding the third research question and the aim of the study: *What strategies are employed by English Home Language teachers to ensure the use of cell phones is taking place successfully in teaching and learning?*

Summarising the findings for the third research question indicates that educators use multiple strategies to stimulate learning. Charts, posters, smart boards, group arrangement and self-discovery are some of the methods utilized by teachers.

English language learning and cooperative learning go hand in hand. Therefore, some teachers chose to work in groups when using cell phones, and this promotes the acquisition of the English language among learners. This is achieved by helping learners to be confident in producing and using English when working in small groups. Learners pick up new learning methods by observing how their peers solve problems that involve learning English. When a teacher assigns learners to various groups, it means forming groups that include learners of all levels and abilities. Each learner in a group has something to contribute to the overall success of the group. The roles assigned to members in the group encourage learners to practice English by taking on various roles. It is also important to vary who is on what team since this allows learners to hear and work with peers of various levels of English abilities.

Many cooperative learning strategies work well in groups of four. This may not be appropriate for the class sizes and compositions in the schools used for this research. Furthermore, the seating arrangement illustrated in Chapter 4 enables learners to work collectively as a group. The group discussions mentioned by teachers, also are a platform for learners to develop, share ideas and develop a positive appreciation of their peers. Teachers also confirmed that they group learners to work together to reach the objectives of a given task.

Cooperative learning is especially effective when learners of differing abilities work together in groups when using cell phones as a tool for teaching and learning. Learners depend on each other to complete a task and not just on one strong leader. Although learners are individually responsible for their tasks, they work together and provide feedback from working with their cell phones to create a finished product. Learners also become confident in their abilities to use English as they are motivated by the use of ICT to contribute in a larger group as well as to communicate at individual level.

Burke (2011) suggests that group tasks should be integral to the aims of the subject. In other words, the use of cell phones in group activities should complement the learning objectives outlined in the syllabus. If one of the learning objectives is to promote critical thinking skills or writing enhancement, then the group work should

support these areas. It can be challenging for an educator to design and implement the use of cell phones in teaching and learning. Many learners have never used cell phones in learning and lack the skills to work with others. Hence, the educator should ensure that each student understands the task and what is required by issuing clear-cut instructions. Strategies and techniques adopted by the educator should be effective and work towards achieving the desired goal.

Below are participants' views about the use of cell phones:

"I *find that cell phones are an excellent tool in teaching and learning. I use the cell phones to leave voice notes and forward any information to my learners".* (E1)

"In poetry, I teach the poem in class and I forward their notes via whatsapp or sometimes I send voice recorded power point presentations to my learners. I was teaching a poem titled Vulture and the learners did not know what a vulture looks like so I requested them to take out their cell phones and google a vulture. I found this was an extremely meaningful exercise". (E6)

"Time is of an essence especially in an English class so I ask my learners to record themselves doing their speech via their cell phones and I assess them at my leisure". (E2)

"I have forwarded my learners a pdf copy of their set book in November 2020 for 2021, this enabled them to read it at their pleasure during their holidays and they are well knowledgeable on the novel when we are discussing it. The cell phones allow for easy communication as well as an excellent teaching tool. I also find working in groups helps tremendously". (E5)

"English is a universal language and I tend to use numerous resources with my learners' do not tie them down with just one resource. As a result the use of the cell phones by the learners in their English class has been nothing but beneficial for me. Literature is now such a pleasure to teach". (E3)

"I do ask my learners to record themselves saying their speeches and forward it to me. I did find that the learners are very technologically advanced as the quality of work

presented in the recording compared to the traditional way of assessment was a great difference. I would settle for the recording anytime and it saves a lot of time". (E4)

"I find assigning my learners in groups' works well. Cooperative learning works for me. I find this also overcomes the shyness of the shy learners, who now become cooperative". (E5)

5.3.4 Findings regarding the fourth research question and the aim of the study: *What are the challenges faced by teachers when using cell phones as a teaching strategy in English Home Language classes?*

The challenge of class control in terms of learner indiscipline and that of demotivated and disinterested learners cropped up immediately when the issue of challenges was raised. Johnson and Johnson (1994) point out that when one puts learners of different abilities to work together as per the requirements for setting up task teams in cooperative learning, problems are bound to come up. Teachers also experience problems because school management is not consistent with learner discipline. Thus, teachers spend a lot of teaching time disciplining rather than on constructive work.

The attitude of learners is also influenced by shyness. Some learners will be very confident and some will be very shy and the latter group pose a challenge in group activities and feedback that learners must give. Shy learners are often not ready or able to partake in the tasks given because of lack of confidence.

Chen (1998) argues that some learners could be stressed in a traditional English classroom because they worry that their peers, whom they consider rivals for good grades as well as the teacher's attention and approval, might make fun of them if they fail to provide an accurate answer in front of the whole class. Significantly, participants indicated that after being probed, shy learners assimilate into a group or with a partner and start working well together. Thus, shyness can be overcome by either partnering shy learners with extroverts or asking them to work within groups with mixed learners.

Participants also highlighted that the use of cell phones in groups lead to a free rider syndrome where some learners do nothing but still benefit from the work of others.

Slavin (2009) calls this situation the ‘free rider’ effect’. Sims (2010) notes that learners may desire achieving a group reward with the least possible effort and so will focus on getting the “right” answer than on ensuring that all group members understand the subject matter being studied. Slims concludes that if a student talks and works more than the others in the team, that student has the potential to learn more than the others in the group. This situation renders the assessment of groups, collectively, ineffective.

A timetable is important in all teaching and learning environments because it indicates the times for which lessons and other activities should be held. In the present study, participants did not directly talk about the time table but conceded that the use of cell phones can be time consuming. Notably, participants reflected that by making learners work in large groups, it can be time consuming, since learners waste a lot of time before settling into their activities. Participants also noted a situation where learners frivolously excuse themselves to go to washrooms which then requires repeating the same material once these learners come back. This means that planned activities may not be completed within the allotted time. Participants who are all English Home Language teachers, also mentioned that they encounter negative attitudes from other teachers who do not use cell phones in their teaching accusing them of wasting time. Regarding time tabling, it is clear that learners’ attitude does not favour the implementation of the use of cell phones since the time allocated for English Home Language is not enough. Moreover, participants have not negotiated with other teachers to exchange periods in order to get adequate time to implement cell phone activities.

The use of cell phones for learning and teaching will be successful if it is conducted according to set rules. I have also seen first-hand that Learners take their duties responsibly when they are assigned roles.
This research was strengthened by the fact that teachers were keen participants. However, the unavailability of Wi-Fi at school causes apprehension among teachers and limits their use of cell phones as a learning tool. Teachers unanimously recommended that school management should provide Wi-Fi for everyone.

The use of cell phones creates rich contexts and enables teachers to present learners with authentic tasks, encourages active and autonomous learning, stimulates

cooperative learning , and the curriculum is adapted to the needs and capabilities of learners. These characteristics are important when cell phones are used as a tool in teaching and learning. The response below indicates the views of the participants.

"We have large class sizes and the management does not seem to be too concerned about our issue. My biggest class is 54 learners, when it is my lesson with this class I have to seek a bigger venue". (E3)

"Discipline is a huge problem as this ties in with large class sizes". (E2)

"The management has made no provisions in providing Wi-Fi in our school as a result, this stunts us when we want to use cell phones as a tool for teaching. Most of the time we are using our own data". (E6)

"Our lesson time is insufficient as a result most of the activities are carried over". (E4)

"Management support is also a huge challenge, as school activities are given preference over our academics". (E5)

"We have learners who absent themselves regularly or even bunk lessons, with the school's management support this can be rectified". (E1)

These responses suggest that with the necessary managerial support to solve challenges related to class sizes and data availability cell phones can be used successfully in teaching and learning.

5.4 RECOMMENDATIONS

Based on the findings of the research the following recommendations can be made

5.4.1. Recommendation regarding how teachers plan and implement the use of cell phones when teaching English Home Language classes in Limpopo secondary schools.

The recommendations below are specifically for the following role-players:

- **Teachers**

  Teachers can be ready for evaluations if they study CAPS as a policy, plan, implement and furnish themselves with detailed information to comprehend rules in their individual subjects. Teachers should regularly attend workshops to stay up to date with the classrooms' new procedures for quality instruction.

  Teachers should be encouraged to develop skills to gain access to the inner world of their learners. If teachers develop the right skills, they will earn the trust of their learners.

  Teachers should endeavour to use different methods such as: multi-level teaching, storytelling, learning through play, songs, rhymes, group work, individual work and cooperative learning to help learners experience a variety of learning and teaching styles. Learners need diverse learning methods as they become bored easily.

  Teachers should use learner-centred strategies and expand what learners already know as they interact with other group members.

  Teachers should employ the right strategy or strategies in their teaching in order to succeed in their teaching.

  Teachers should use the communicative approach that is, the use of questions and answers. This approach requires a lot of preparation on the part of teachers. Thorough teacher preparation will ensure learners are ready to ask and answer questions posed by their teachers and class-mates.

Teachers should provide learners with many opportunities to research the content with their cell phones before academic content can be successfully acquired. Furthermore, if the educator is using group work for activities by using cell phones as a tool, the skills level of learners within the group should be assessed. Teachers should determine whether all learners perform at the same level.

Teachers should post or provide outcomes expected of a group. This helps to guide learners and keep them on a given task. Teachers should use strategies that encourage learners to find information, remember it, organise it, apply it and do creative things with it.

Teachers should also introduce an element of inspiration as well as motivation. This incites and motivates the learners to excel.

Heads of Departments (HODs)

HODs in schools should encourage teachers to work together as a team and work towards a common goal.

- **The School Management Team (SMT)**

  The School Management Team should discuss and implement the use of cell phones as a teaching and learning tool. The SMT should empower teachers and be pillars of support to them.

Group work should be employed so that learners understand they are not competing with other group members but learning to gain knowledge and skills as they help their task teams to succeed in given tasks.

5.4.2. Recommendation regarding the second research question and the aim of the study:

Why are teachers reluctant to use cell phones?

The education department should ensure that teachers are adequately trained in the use of ICT. Further, school management should ensure that there are sufficient technological facilities for the teachers.

The teacher is responsible for establishing the classroom environment and preparing learning opportunities that facilitate students' use of technology to learn and communicate. Consequently, it is critical that all teachers are prepared to provide their students with these opportunities.

Salary increases should be linked to effective use of ICT. Policymakers may link teacher salary increase to evidence of effective use of ICT in instruction and/or evidence of impact of ICT on student learning. This will provide incentive for teachers to take the initiative to use ICT.

Teacher training is indeed crucial and teacher education institutions will continue to face challenges of preparing teachers to effectively use ICTs. Teacher educators should be trained on ICTs for them to pass this knowledge to trainee teachers. Classroom practice will be significantly influenced by the possibilities of technology–enhanced teaching and learning if there is effective instruction and modelling of technology integration during the teacher education experience.

New technologies require new teacher roles, new pedagogies, and new approaches for teacher training. The successful integration of ICT into the classroom will depend on the ability of teachers to structure the learning environment in non-traditional ways, to merge new technology with new pedagogy, to develop socially active classrooms, encouraging cooperative interaction, collaborative learning, and group work. This requires a different set of classroom management skills to be developed. Thus, ICT integration is a prerequisite for prospective teachers.

However, for successful and effective implementation, teachers should ensure strict disciplinary measures are put in place to maintain order. Teachers can request assistance from school management if they need help with enforcing discipline.

5.4.3. Recommendations regarding the third research question and the aim of the study: *Strategies employed by English Home Language teachers to ensure the effective use of cell phones.*

For learners and teachers alike, cell phones can be tedious. Therefore, to guarantee that the procedure runs easily and efficiently, the following proposals ought to be taken into consideration:

- The teacher needs to clearly outline the rules and instructions of the task on hand, from the onset of the activity.
- Learners should be informed about the activity in advance for them to adequately prepare.
- Teachers should monitor given activities to ensure that learners work successfully through their cell phones and are not distracted with other internet based features.
- Teachers should ensure that learners obtain each other's contact numbers when working together via whatsapp video call after school hours.
- When assigning groups to learners, the educator should allocate learners into groups or allow them to form their own groups. The teacher should ensure that groups are not too big. The teacher should monitor learners so that they do not use their cell phones for non-school activities.

Teachers should engage learners by asking them to respond in writing at the end of a class session. The following questions can be asked: (a) What important question remains unanswered? or (b) What was the most important thing you learnt during this class? This will assist the educator to improve and ensure success in the next lesson.

Key to the success of the teachers' Lessons will be successful if teachers emphasise the following information to learners from the onset:

- Clear goals: Why are learners working together? What are learners expected to accomplish?
- What tasks can be broken down into smaller units?
- How can responsibility for different aspects of the work be allocated?
- How can organizational responsibility be allocated?

- Teachers should provide a sample timeline with suggested check points for stages of work to be completed.

The use of cell phones will be productive when learners are informed about the nature of the task in advance. All learners should be included for them to express their inexperience, hesitations as well as their experiences in the group task. The teacher should move around during cell phone class tasks and listen to learners' ideas and encourage divergent thinking by brainstorming if necessary. Learners benefit by working in groups since group work encourages learners to take responsibility for their own learning. The group leader is responsible for seeing that the work is organized and that it is done. The leader is also responsible for understanding and managing group interactions so that the atmosphere is positive. The scribe, ideally not the leader, should capture all ideas as they are suggested while the designated spokes-person provides feedback of the group's decisions. Since time is of essence, the time-manager should ensure that time is productively used.
If implemented correctly, the above recommendations would lead to the successful implementation of cell phones.

5.4.4. Recommendations regarding the fourth research question and the aim of the study: *Challenges faced by teachers when using cell phones as a teaching strategy in English Home Language classes.*

Teachers should facilitate the use of cell phones in class activities so that learners are motivated and interested in the learning experience. Teachers should study the CAPS policy to ensure that they understand the curriculum and know how to implement it through effective class activities. Teachers should be firm and set a positive tone for the class and make their expectations known. Teachers should also be consistent in their disciplinary measures to establish a stable environment that would make learners feel emotionally comfortable and physically safe, both in and outside the classroom. This can be established by disciplining learners privately and having a reward system for good behaviour as well as integrating correct behaviour and accountability instruction into the educator's plan. Educators should frequently praise learners and find something positive to say about their work.

Shy learners can be helped by task team members to develop confidence. Teams should have both confident and shy learners so they can assist each other. Shy learners exhibited confidence when providing feedback when using their cell phones in various activities.

First, curriculum planners for English Home Language tasks should restructure the syllabus so that teachers are not overloaded with work. Second, teachers should break down the content to effectively cater for the use of cell phones in their teaching activities. It is recommended that the curriculum policies should outline theories that underpin classroom interaction and teaching.

Timetabling and the duration of time spent on activities should be negotiated with the School Management Team to arrange for appropriate times for these activities. Teachers should have their activities organized in advance to avoid wasting time trying to organize learners by providing lengthy instructions just before classes start. These instructions should be forwarded to the learners via their cell phones before class to avoid wasting teaching time.

Teachers should negotiate with their School Management and other teachers to create awareness of the essence of the use of cell phones as a positive tool in teaching and learning. This will likely dispel the notion that English Home Language teachers waste time when they use cell phones for teaching.
The school management should provide Wi-Fi or the Department of Education officials should consult the various network providers to provide subsidized data to learners and teachers.

5.5 LIMITATIONS

The research methodology

McMillan and Schumacher (2010) stipulate that the use of qualitative research methodology warrants caution. The sample of this research were six participants who were purposefully selected from three secondary schools to explore the use of cell phones in teaching and learning. Given the fact that the study adopted a qualitative research design with a very small sample of six participants of English (HL) teachers

from selected schools in Limpopo Province, its findings cannot be generalised to all schools in the province or other parts of the country.

McMillan and Schumacher (2010) state that the validity of qualitative designs is the degree to which the interpretations have mutual meanings between participants and researchers. For this research, it was important that the data from the interviews were phrased in the participants' language. However, there is the possibility that the researcher could have misread the participants' body language.

The use of the research site might also give a limited scope to the research. A wider scope of the research might have given different data.

5.6 AVENUES FOR FURTHER RESEARCH

This research has exposed how ICT (cell phones) is used to enhance teaching and learning in selected schools in Limpopo. The following aspects are recommended for further study:

- Use of group work and grouping patterns to make cell phone use more effective in the classroom;
- How tasks can be subdivided using cell phones to ensure timeous completion of tasks;
- Strategies to reduce discipline challenges during the use of cell phones in teaching and learning;
- Explore other teaching strategies that can combine most constructively with the use of cell phones as tools for teaching and learning.
- Including the use of ICT in teacher-training courses.

5.7 CONCLUSION

The adoption of a qualitative research approach and case study method contributed to the collection of rich-descriptive data. The data collection methods for this study produced significant data which effectively addressed the research questions. It was evident that teachers firmly believe that the use of cell phones as a tool of teaching and learning is beneficial and improves performance.

The study further indicated the need to capacitate teachers, HODs and Management in the effective use of cell phones. The study also revealed that there were contextual factors within the schools hindering the effective implementation of cell phones in teaching and learning. These included learners' lack of commitment, chronic learner absenteeism, language barrier and lack of Wi-Fi.

6. REFERENCES

Ally, M. (Ed.). (2009). *Mobile learning: Transforming the delivery of education and training*. Athabasca University Press.

Aguero, A. (2009). Education, mobile phone use and production decisions: a rural case study in Peru. *Mobile*, *2*, 1-21.

Agyei, D. D., and Voogt, J. (2012). Developing technological pedagogical content knowledge in pre-service mathematics teachers through collaborative design. *Australasian Journal of Educational Technology*, *28*(4).

Al-Ansari, H. (2006). Internet use by the faculty members of Kuwait University. *The Electronic Library*, *24* (6), 791-803.

Al-Khalifa, H. S. (2010). E-learning and ICT integration in colleges and universities in Saudi Arabia. *eLearn*, *2010*(3).

Amarilla, S. B. G., and Vargas, S. F. P. (2009). Teacher's technostress: The other side of the use of new technologies by High School teachers. *Rev. Cient. Estud. E Investig*, *8*, 21-35.

Andrews, R., Burn, A., Leach, J., Locke, T., Low, G., and Torgerson, C. (2002). A systematic review of the impact of networked ICT on 5-16 year-olds' literacy in English.

Aubusson, P., Schuck, S., and Burden, K. (2009). Mobile learning for teacher professional learning: benefits, obstacles and issues. *ALT-J*, *17*(3), 233-247.

Awad, Isabel, and Jonathan Tossell. "Is the smartphone always a smart choice? Against the utilitarian view of the 'connected migrant'." *Information, Communication and Society* 24, no. 4 (2021): 611-626.

Ayemoba, A. (2013). New Limpopo ICT resource centre to boost teacher training in Maths and Science. *Available from: Southafricabcusinesscommunities. com/profiles/blog/new-limpopo-ict-resourcecentre-to-boost-teacher-training-in (Accessed: 19 August 2013)*.

Babbie, E. (2007). *The practice of social research*. Belmont. *Ca: Wadsworth*.

Babbie, E. and J. Mouton. (2003). *The practice of social research*. Oxford: Oxford University Press.

Balanskat, A., Blamire, R., and Kefala, S. (2007). The ICT impact report. A review of studies of ICT impact on schools in Europe. European Schoolnet. Consultado el 5 de junio de 2009.

Bauer, J., and Kenton, J. (2005). Toward technology integration in the schools: Why it isn't happening. *Journal of Technology and Teacher Education*, *13*(4), 519-546.

Becker, H. J. (2000). Findings from the teaching, learning, and computing survey. *Education Policy Analysis Archives*, *8*, 51.

Becker, H. J. (2001, April). How are teachers using computers in instruction? In *Annual meeting of the American Educational Research Association, Seattle, WA*.

Becta, A. (2004). A review of the research literature on barriers to the uptake of ICT by teachers. *London, UK, BECTA) http://publications. becta. org. uk/display. cfm*.

Beggs, T. A. (2000). Influences and Barriers to the Adoption of Instructional Technology.

Benson, A., Lawler, C., and Whitworth, A. (2008). Rules, roles and tools: Activity theory and the comparative study of e-learning. *British Journal of Educational Technology*, *39*(3), 456-467.

Best, J.W., and Kahn, J. V. (2006) *Research in Education.* Boston, MA: Pearson Education Inc.

Best, J. W., and Kahn, J. V. (2016). *Research in education*. Pearson Education India.

Bharti, P. (2014, july 21). Tech savvy teachers talk less about technology and more about teaching. Retrieved from EdTechReview: https://edtechreview.in/trends-insights/insights/1309-tech-savvy-teachers-talk-less-about-technology-and-more-about-teaching.

Bialobrzeska, M., and Cohen, S. (2005). Managing ICTs in South African schools: A guide for school principals.

Bitner, N., and Bitner, J. O. E. (2002). Integrating technology into the classroom: Eight keys to success. *Journal of Technology and Teacher Education*, *10*(1), 95-100.

Bloom, B. S. (1956). Taxonomy of educational objectives. Vol. 1: Cognitive domain. *New York: McKay*, *20*(24), 1.

Blumberg, P. (2016). How critical reflection benefits faculty as they implement learner-centered teaching. *New Directions for Teaching and Learning*, *144*, 87-97.

Borau, K., Ullrich, C., Feng, J., and Shen, R. (2009, August). Microblogging for language learning: Using twitter to train communicative and cultural competence. In *International Conference on Web-based Learning* (pp. 78-87). Springer, Berlin, Heidelberg.

Bosch, T. E. (2008). WOTS ur ASLR? Adolescent girls' use of cell phones in Cape Town. *Commonwealth Youth and Development*, *6*(2), 52-69.

Bouma, D. G. (2000) .*The research process.* 4th edition. Australia: OUP.

Braun, V., and Clarke, V. (2013). *Successful qualitative research: A practical guide for beginners*. Sage.

Brinkerhoff, J. (2006). Effects of a long-duration, professional development academy on technology skills, computer self-efficacy, and technology integration beliefs and practices. *Journal of research on Technology in Education*, *39*(1), 22-43.

Brown, S. (2013). Large-scale innovation and change in UK higher education. *Research in Learning Technology*, *21*.

Burnard, P. (1991). A method of analysing interview transcripts in qualitative research. *Nurse Education Today*, *11*(6), 461-466.

Burns, C. M., and Lucena, C. A. (2018). Information and Communication Technology (ICT) and Human Interaction.

Burton, N., Brundrett, M., and Jones, M. (2014). *Doing your education research project*. London, Sage.

Chaka, J.G. and Govendor, I. (2017). 'Students' perceptions and readiness towards mobile learning in colleges of education: A Nigerian perspective', *South African Journal of Education 37*(1), 1–12.

Chaka, C., and Ngesi, N. (2010). Mobile writing: Using SMSes to write short paragraphs in English. *Mobile learning: Pilot projects and initiatives*, 185-233.

Charbonneau-Gowdy, P. (2015). It takes a community to develop a teacher: Testing a new teacher education model for promoting ICT in classroom teaching practices in Chile. *Electronic Journal of e-Learning*, *13*(4), pp 237-249.

Chen, C. H. (2008). Why do teachers not practice what they believe regarding technology integration? *The Journal of Educational Research, 102*(1), 65-75.

Christie, T., and Afzaal, M. (2005). Rote Memorization as a Sufficient Explanation of Secondary School Examination Achievement in Pakistan: An Empirical Investigation of a Widespread Assumption. Presented in a conference 'Assessment and the future schooling and learning' held in Abuja, Nigeria from September 4-9, 2005. Retrieved from: http://www.aku.edu/AKUEB/pdfs/IAEA05.pdf.

Cheung, K. C., Mak, S. K., and Sit, P. S. (2013). Online reading activities and ICT use as mediating variables in explaining the gender difference in digital reading literacy: Comparing Hong Kong and Korea. *The Asia-Pacific Education Researcher*, *22*(4), 709-720.

Clopton, H. (1997). Nobody Believes It's a Quick-fix for America's K-12 Ills. *Interview with Linda Roberts, US Department of Education.) KeyNotes, South Central Regional Technology in Education Consortium*.

Collis, J., and Hussey, R. (2013). *Business research: A practical guide for undergraduate and postgraduate students*. Macmillan International Higher Education.

Conti, M., and Giordano, S. (2014). Mobile ad hoc networking: milestones, challenges, and new research directions. *IEEE Communications Magazine*, *52*(1), 85-96.

Coupal, L. V. (2004). Constructivist learning theory and human capital theory: shifting political and educational frameworks for teachers' ICT professional development. *British Journal of Educational Technology*, *35*(5), 587-596.

Cox, M. J., Cox, K., and Preston, C. (2000). What factors support or prevent teachers from using ICT in their classrooms?

Creswell, J.W. (2009). Research *design: Qualitative and quantitative approaches* Thousand Oaks: Sage.

Creswell, J. W., and Poth, C. N. (2007). Qualitative inquiry and research method: Choosing among five approaches.

Crozier, R. (2004).Shyness, self-perceptions of Seminars.*Psychology Learning and Teaching,4(1),27-34.*

Czerniewicz, L., and Brown, C. (2014). The habitus and technological practices of rural students: a case study. *South African Journal of Education*, *34*(1).

Daniels J.S. (2002): “Foreword” in Information and Communication Technology in Education–A Curriculum for Schools and Programme for Teacher Development. Paris: UNESCO.

Dean, B.A., Harden-Thew K., Delahunty J., Thomas L. (2019). Flexible Spaces and Sustainable Opportunities: Designing Online Professional Learning for Sessional Teachers. In: Zhang Y., Cristol, D. (eds) Handbook of Mobile Teaching and Learning. Springer, Berlin, Heidelberg. https://doi.org/10.1007/978-3-642-41981-2_134-1

DeWitt, D., and Siraj, S. (2010). Design and development of a collaborative learning module for secondary school science in Malaysia: addressing learners’ needs of the use and perceptions of technology. *Procedia-Social and Behavioral Sciences*, *2*(2), 471-475.

De Vos, A. S., Strydom, H., Fouche, C. B., and Delport, C. S. L. (2011). *Research at grass roots*. Pretoria: Van Schaik.

Desai, M. S., Hart, J., and Richards, T. C. (2008). E-learning: Paradigm shift in education. *Education*, *129*(2).

Diehl, D. E. (2005). A study of faculty-related variables and competence in integrating instructional technologies into pedagogical practices (pp. 1-108). Texas Southern University.

Dillon, P. (2004). Trajectories and tensions in the theory of information and communication technology in education. *British Journal of Educational Studies*, *52*(2), 138-150.

Durkheim, É., and Pickering, W. S. (2006). *Selected Writings on Education: Durkheim: Essays on Morals and Education*. Routledge.

Du Toit, J. (2015). Teacher training and usage of ICT in education. New directions for the UIS global data collection in the post-2015 context. *UNESCO Institute for Statistics, Retrieved*, *16*.

Dwyer, D. C., Ringstaff, C., and Sandholtz, J. H. (1991). Changes in teachers' beliefs and practices in technology-rich classrooms. *Educational Leadership, 48*(8), 45–52.

Earle, R. (2001). The integration of instructional technology into public education: promises and challenges. *ET Magazine. 42*(1). 5-13.

Ely, D. P. (2002). *Trends in educational technology*. ERIC Clearinghouse on Information and Technology, 621 Skytop Road, Suite 160, Syracuse University, Syracuse, NY 1324-5290.

English, R., and Duncan-Howell, J. (2008). â€œFacebookÂ© Goes to College: Using Social Networking Tools to Support Students Undertaking Teaching Practicumâ€. *Merlot Journal of Online Learning and Teaching*, *4*(4), 596-601.

Erlandson, D. A., Harris, E. L., Skipper, B., and Allen, S. D. (1993). Doing naturalistic inquiry: A guide to methods. Newbury Park, CA: Sage Publications.

Ertmer, P. A., and 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.

Fakokunde, J. B. (2017). Secondary school students' awareness and use of mobile phones for academic purpose. *Educational Journal of the University of Patras UNESCO Chair*.

Farrell, G., Isaacs, S., and Trucano, M. (2009). Survey of ICT in education in Africa (Vol. 2): 53 country reports.

Ferguson, S. (2005). How computers make our kids stupid. *Maclean's*, *118*(23), 24-30.

Ferriter, W.M. (2010). Digitally Speaking/cell phones as teaching tools. *Electronic Journal of e-Learning*, *68*(2), 85-86.

Ford, M., and Batchelor, J. (2007). From zero to hero–is the mobile phone a viable learning tool for Africa?

Fouché, C. B., and Schurink, W. (2011). Qualitative research designs. *Research at grass roots: For the social sciences and human service professions*, *4*, 307-327.

Fouts, J. T. (2000). Research on computers and education: Past, present and future. Seattle, WA: Bill and Melinda Gates Foundation.

Franklin, C. (2007). Factors that influence elementary teachers' use of computers. *Journal of Technology and Teacher Education, 15(*2), 267–293.

Freudenberg, B., Brimble, M., and Cameron, C. (2009). The building of a professional: Creating greater career identity within a degree. *The International Journal of Learning, 16*(10), 253–266.

Fried, C. B. (2008). In-class laptop use and its effects on student learning. *Computers and Education*, *50*(3), 906-914.

Fung, D., and Lui, W. M. (2016). Individual to collaborative: guided group work and the role of teachers in junior secondary science classrooms. *International Journal of Science Education*, *38*(7), 1057-1076.

Gaible, E., and Burns, M. (2005). Using Technology to Train Teachers: Appropriate Uses of ICT for Teacher Professional Development in Developing Countries. *Online Submission*.

Gall, M. D., Gall, J. P., and Borg, W. R. (2007). In Burvikovs AE. *Educational Research: An Introduction (Eighth ed. ed.). Boston, Massachusetts: Pearson Publishing Allyn and Bacon*.

Geertsema, S., Hyman, C., and Van Deventer, C. (2011). Short message service (SMS) language and written language skills: educators' perspectives. *South African Journal of Education*, *31*(4), 475-487.

Gephart, R. (1999, January). Paradigms and research methods. In *Research Methods Forum* (Vol. 4, No. 1, p. 11).

Ghavifekr, S., and Rosdy, W. A. W. (2015). Teaching and learning with technology: Effectiveness of ICT integration in schools. *International Journal of Research in Education and Science*, *1*(2), 175-191.

Given, L. M. (Ed.). (2008). *The Sage encyclopedia of qualitative research methods*. Sage publications.

Glaser, B. G., Strauss, A. L., and Strutzel, E. (1968). The discovery of grounded theory; strategies for qualitative research. *Nursing research*, *17*(4), 364.

Godwin-Jones, R. (2017). Smartphones and language learning. *Language Learning and Technology*, *21*(2), 3-17.

Gore, J., Lloyd, A., Smith, M., Bowe, J., Ellis, H., and Lubans, D. (2017). Effects of professional development on the quality of teaching: Results from a randomised controlled trial of Quality Teaching Rounds. *Teaching and Teacher Education*, *68*, 99-113.

Gredler, M.E. (1997). *Learning and instruction: Theory into practice.* New Jersey:

Merrill Pearson Publishers.

Greeff, M. (2011). Information collection: interviewing. In De Vos A.S., Strydom, H., Fouché C.B. and Delport C.S.L. Research at the grass roots for the social sciences and human service professions. 4th ed. Pretoria: JL Van Schaik Publishers.

Grey, L., Thomas, N., and Lewis, L. (2010). Teachers' use of educational technology in US public schools: 2009. *Washington, DC: National Center for Educational Statistics, Institute of Educational Sciences, US Department of Education*.

Groenewald, T. (2004). A phenomenological research design illustrated. *International Journal of Qualitative Methods*, *3*(1), 42-55.

Grundy, S. (1987). *Curriculum: product or praxis*? Lewes: Falmer Press.

Guba, E. G. (1978). Toward a Methodology of Naturalistic Inquiry in Educational Evaluation. CSE Monograph Series in Evaluation, 8.

Guba, E. G. (1981). Criteria for assessing the trustworthiness of naturalistic inquiries. *Ectj*, *29*(2), 75-91.

Hancock, B., Ockleford, E., and Windridge, K. (2001). *An introduction to qualitative research*. Trent focus group.

Haruna, R., Aisha, I.M., Yunusa, U. and Hadiza, T.A. (2016). 'Impact of mobile phone usage on academic performance among secondary school students in Taraba State, Nigeria', *European Scientific Journal 12*(1), 466–479.

Haslaman, T., Kuskaya-Mumcu, F., and Kocak-Usluel, Y. (2008, June). Integration of ICT into the teaching-learning process: Toward a unified model. In *EdMedia+ Innovate Learning* (pp. 2384-2389). Association for the Advancement of Computing in Education (AACE).

Henning, E., Van Rensburg, W., and Smit, B. (2004). *Finding your own way in qualitative Research.* Pretoria: Van Schaik.

Herrera Mosquera, L., and Macías V, D. F. (2015). A call for language assessment literacy in the education and development of teachers of English as a foreign language. *Colombian Applied Linguistics Journal*, *17*(2), 302-312.

Hew, K. F., and 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),* 223-253.

Higgins, S., and Moseley, D. (2001). Teachers' thinking about information and communications technology and learning: Beliefs and outcomes. *Teacher Development*, *5*(2), 191-210.

Hoffmann, M. (2015). *An exploratory study: Mobile device use for academics* (Doctoral dissertation, Pepperdine University).

Honey, M., Culp, K. M., and Spielvogel, R. (2005). Critical issue: Using technology to improve student achievement. *Tersedia: http://www. ncrel. Org/sdrs/areas/issues/methods/technlgy/te800. html [3 Juli 2010]*.

Howie, S. J., Muller, A., and Paterson, A. (2005). *Information and communication technologies in South African secondary schools*. HSRC Press.

Hsu, Y. C., and Ching, Y. H. (2012). Mobile microblogging: Using Twitter and mobile devices in an online course to promote learning in authentic contexts. *International Review of Research in Open and Distributed Learning*, *13*(4), 211-227.

Huberman, M., and Miles, M. B. (2002). *The qualitative researcher's companion*. California: Sage.

Jacobsen, M., Clifford, P., and Friesen, S. (2002). Preparing teachers for technology integration: Creating a culture of inquiry in the context of use. *Contemporary Issues in Technology and Teacher Education*, *2*(3), 363-388.

Jairus, E. U., Christian, U. U., Ogwuche, A. J., Thomas, O. I., Tyavlum, T. T., and Ode, E. J. (2017). Impact of mobile phone usage on students' academic performance among public secondary schools in Oju local government area of Benue State. *Ijsrm Human*, *6*(3), 104-118.

Jansen, J.D. (2000). 'How higher education has changed: new opportunities (and threats) for high school graduates'*, New Agenda* (1), 65-67.

Jensen, D., 2008, 'Transferability', In L.M. Given (ed.), *The SAGE Encyclopaedia of qualitative research methods,* SAGE Publications, Los Angeles, USA.

Jonassen, D. H. (2000). Transforming learning with technology: Beyond modernism and postmodernism or whoever controls the technology creates the reality. *Educational Technology 40*, 21-25.

Jones, A. (2004). A review of the research literature on barriers to the uptake of ICT by teachers.

Kalpana, T. (2014). A Constructivist Perspective on Teaching and Learning: *A Conceptual Framework*, *3*(1), 27-29.

Kandiri, J., and Mugand, N. (2013, May). Determinants of technology innovation implementation effectiveness in higher education institutions. In *2013 IST-Africa Conference and Exhibition* (pp. 1-13). IEEE.

Kargiban, Z. A., and Siraj, S. (2009). The utilization and integrating of ICT in chemistry teaching in Iranian high schools. *World Applied Sciences Journal*, *6*(11), 1447-1456.

Karim, S. (2012). The Role of Mobile Phones in Education and Instruction of Classroom Materials.

Keengwe, J., and Onchwari, G. (2008). Computer technology integration and student learning: Barriers and promise, *Journal of Science Education and Technology, 17*, 560– 565.

Killen, R. (2003). Validity in outcomes-based assessment. *Perspectives in Education, 21* (1), 1–14.

Kimura, M. (2011). Mobile learning using mobile phones in Japan. In *Open Source Mobile Learning: Mobile Linux Applications* (pp. 64-83). IGI Global.

King, A. (1994). Guiding knowledge construction in the classroom: Effects of teaching children how to question and how to explain. *American Educational Research Journal*, *31*(2), 338-368.

Kirschner, P., and Selinger, M. (2003). The state of affairs of teacher education with respect to information and communications technology. *Technology, pedagogy and education*, *12*(1), 5-17.

Kitchin, R., and Tate, N. (2013). *Conducting research in human geography: theory, methodology and practice*. Routledge.

Kozma, R. B. (2003). Technology and classroom practices: An international study. *Journal of research on technology in education*, *36*(1), 1-14.

Kurnia Irmawati, D., Widiati, U., and Cahyono, B. (2017). How Do Indonesian Professional English Teachers Develop Their Pedagogical Competence in Teaching Implementation? *Arab World English Journal (AWEJ) Volume*, *8*.

Kuznekoff, J. H., and Titsworth, S. (2013). The impact of mobile phone usage on student learning. *Communication Education*, *62*(3), 233-252.

Lanz, R., Lundquist, K., Mansio, G., Maurer, A., and Teh, R. (2018). *E-commerce and developing country-SME participation in global value chains* (No. ERSD-2018-13). WTO Staff Working Paper.

Laurillard, D. (2007). Technology, pedagogy and education: Concluding comments. *Technology, Pedagogy and Education*, *16*(3), 357-360.

Lawless, K., and Pellegrino, J. (2007). Professional development in integrating technology into teaching and learning: Knowns, unknowns and ways to pursue better questions and answers. *Review of Educational Research, 77*(4), 575-614.

Ledbetter, A. M., and Finn, A. N. (2013). Teacher technology policies and online communication apprehension as predictors of learner empowerment. *Communication Education, 62*(3), 301-317.

Leedy, P. D., and Ormrod, J. E. (2005). *Practical research: planning and design*. Pearson Merrill Prentice Hall.

Lenhart, A., Purcell, K., Smith, A., and Zickuhr, K. (2010). Social Media and Mobile Internet Use among Teens and Young Adults. Millennials. *Pew internet and American life project*.

Lester, S (1999) .*An introduction to phenomenological research*. Taunton UK, Stan Lester Developments (www.sld.demon.co.uk/resmethy.pdf, accessed [date]).

Levin, T., and Wadmany, R. (2008). Teachers' views on factors affecting effective integration of information technology in the classroom: Developmental scenery. *Journal of Technology and Teacher Education, 16*(2), 233-236.

Lim, C. P., and Chai, C. S. (2008). Teachers' pedagogical beliefs and their planning and conduct of computer-mediated classroom lessons. *British Journal of Educational Technology*, 39(5), 807–828.

Lincoln, Y. S., and Guba, E. G. (1985). *Naturalistic inquiry*. London:Sage.

Littlejohn, A., Margaryan, A., and Vojt, G. (2010). "Exploring Students" use of ICT and Expectations of Learning Methods". *Electronic Journal of e-Learning*, *8* (1), 13 – 20.

Livesey, S.M. (2002), "Global warming wars: rhetorical and discourse analytical approaches to Exxon Mobile"s corporate public disclosure", *Journal of Business Communication, 39*(1), 117-146.

MacDonald, J. and Phillips, R.A.D. (2005). Developing teaching briefs and plan teaching sessions. Education for Primary Care, 16, 496-498.

Makewa, L., Meremo, J., Role, E., and Role, J. (2013). ICT in secondary school administration in rural southern Kenya: An educator's eye on its importance and use. *International Journal of Education and Development Using ICT*, *9*(2).

Mallick, K., and Verma, G. (2005). *Researching education: Perspectives and techniques*. London: Routledge.

Mahmud, R., Ismail, M. A. H., Ali, W. Z. W., Nawawi, M. D. H., and Luan, W. S. (2008). ICT integration of novice and experienced teachers: Differences and similarities. Malaysian Journal of Education Technology, 1.

Maluleka, T. (2020). *The Benefits of Technology on Youth Enterprise Development*. University of Johannesburg (South Africa).

Manzo, B. S. (2020). ICT Skills Acquisition and Competencies of Academic Librarians in Katsina State Tertiary Institutions of Learning.

Mbengwa, E. B. (2010). *Adjusting secondary teacher training programmes in Botswana to ensure effective support within inclusive education* (Doctoral dissertation, University of the Free State).

McKenzie, J. (2003). The technology presumption: Could integrating technology sometimes be wrong-minded. *From Now On: The Educational Technology Journal*, *12*(9).

McMahon, S. I., and Raphael, T. E. (1997). *The Book Club Connection: Literacy Learning and Classroom Talk. Language and Literacy Series*. Order Department, International Reading Association, 800 Barksdale Road, PO Box 8139, Newark, DE 19714-8139.

McMeeking, L. B. S., Orsi, R., and Cobb, R. B. (2012). Effects of a teacher professional development program on the mathematics achievement of middle school students. Journal for Research in Mathematics Education, 43(2), 159-181.

McMillan, J. H., and Schumacher, S. (2006). *Research in education: Evidence-based inquiry*. Pearson/Allyn and Bacon.

McMillan, J. H., and Schumacher, S. (2010). Research in Education: Evidence-Based Inquiry, MyEducationLab Series. *Pearson*.

Mcnulty.N.(2017).How edtech can equip learners with the right skills for the 4th industrial revolution.Retrieved from

https://www.niallmcnulty.com/2017/08/how-edtech-can-equip-learners-with-the-right-skills-for-the-4th-industrial-revolution/

Means, B. (2010). Technology and education change: Focus on student learning. *Journal of Research on Technology in Education*, *42*(3), 285-307.

Means, B., Blando, J., Olson, K., Middleton, T., Morocco, C., Remz, A., and Zorfass, J. (1993). Using technology to support education reform. Washington, DC: U.S. Department of Education. [Online]. Available: http://www.ed.gov/pubs/EdReformStudies/TechReforms/.

Mendoza, J. S., Pody, B. C., Lee, S., Kim, M., and McDonough, I. M. (2018). The effect of cell phones on attention and learning: The influences of time, distraction, and nomophobia. *Computers in Human Behavior, 86,* 52–60.

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.

Mikre, F. (2011). The roles of information communication technologies in education: Review article with emphasis to the computer and internet. *Ethiopian Journal of Education and Sciences*, *6*(2), 109-126.

Miller, L., Naidoo, M., Van Belle, J. P., and Chigona, W. (2006, July). School-level ICT adoption factors in the Western Cape schools. In *Fourth IEEE International Workshop on Technology for Education in Developing Countries (TEDC'06)* (pp. 57-61). IEEE.

Modipane, M., and Themane, M. (2014). Teachers' social capital as a resource for curriculum development: lessons learnt in the implementation of a Child-Friendly Schools programme. *South African Journal of Education*, *34*(4).

Mokoena, M. D. (2013). *Implementation of no-fee schools' policy: a case study in Bolobedu Cluster Circuits of Mopani District* (Doctoral dissertation, University of Limpopo).

Monette, D. R., Sullivan, T. J., and DeJong, C. R. (2013). Applied social research: A tool for the human services. Cengage Learning.

Motitswe, J. M. C. (2012). *Teaching and learning methods in inclusive classrooms in the foundation phase* (Doctoral dissertation).

Moustakas, C. (1994). *Phenomenological research methods*.London: Sage publications.

Müller, R., and Antoni, C. H. (2020). Individual perceptions of shared mental models of information and communication technology (ICT) and virtual team coordination and performance—The moderating role of flexibility in ICT use. *Group Dynamics: Theory, Research, and Practice*, *24*(3), 186.

Murphy, E., and Rodriguez-Manzanares, M. A. (2008). Using activity theory and its principle of contradictions to guide research in educational technology. *Australasian Journal of Educational Technology*, *24*(4).

Neuman, W. R., and Guggenheim, L. (2011). The evolution of media effects theory: A six-stage model of cumulative research. *Communication Theory*, *21*(2), 169-196.

Nevgi, A., Virtanen, P., and Niemi, H. (2006). Supporting students to develop collaborative learning skills in technology-based environments. *British Journal of Educational Technology*, *37*(6), 937-947.

Neyland, E. (2011). Integrating online learning in NSW secondary schools: Three schools' perspectives on ICT adoption. *Australasian Journal of Educational Technology*, *27*(1).

Ngesi N., Landa, N., Madikiza, N., Cekiso, M.P., Tshotsho, B. and Walters, L.M. (2018) 'Use of mobile phones as supplementary teaching and learning tools to learners in South Africa', *Reading and Writing, 9*(1), a190. https:// doi.org/10.4102/rw.v9i1.190

Nordin, N. M., Hamzah, M. I., Yunus, M. M., and Embi, M. A. (2010). The mobile learning environment for the in-service school administrators. *Procedia-Social and Behavioral Sciences*, *7*, 671-679.

O'Bannon, B. W., and Thomas, K. M. (2015). Mobile phones in the classroom: Preservice teachers answer the call. *Computers and Education*, *85*, 110-122.

O'Bannon, B., Lubke, J., Beard, J., and Britt, G. (2017). Teachers and Students Poised to Use Mobile Phones in the Classroom. *Computers in the School, 57* (1885–1892).

Olufadi, Y. (2015). A configurational approach to the investigation of the multiple paths to success of students through mobile phone use behaviors. *Computers and Education*, *86*, 84-104.

Oppong, S. H. (2013). The problem of sampling in qualitative research. *Asian Journal of Management Sciences and Education*, *2*(2), 202-210.

Pajares, M. F. (1992). Teachers' beliefs and educational research: Cleaning up a messy construct. *Review of Educational Research*, *62*(3), 307-332.

Palalas, A. (2011). Mobile-assisted language learning: Designing for your students. *Second language teaching and learning with technology: views of emergent researchers*, 71-94.

Panasuk, R.; Stone, W. and Todd,J. (2002). Lesson planning strategy for effective mathematics teaching. Education, 122(4), 808-829.

Patton, M. Q. (1987). *How to use qualitative methods in evaluation* (No. 4). London:Sage.

Pegrum, M., Oakley, G., Faulkner, R. (2013). Schools going mobile: A study of the adoption of mobile handheld technologies in Western Australian independent schools. Australian Journal of Educational Technology, 29, 66–81.

Peräkylä, A. (2011). Validity in research on naturally occurring social interaction. *Qualitative Research*, *365*, 382.

Plair, S. K. (2008). Revamping professional development for technology integration and fluency. *The Clearing House: A Journal of Educational Strategies, Issues and Ideas*, *82*(2), 70-74.

Plomp, T., Anderson, R. E., Law,N., and Quale, A. (Eds.). (2009). *Cross National Information and Communication Technology Policies and Practices in Education:(Revised Second Edition)*. IAP.

Plymale, W. O. (2007). Do we need discreet computing in instruction? *Educause Review*, *42*(3), 84.

Polit, D. F., Beck, C. T., and Hungler, B. P. (2004). *Lehrbuch Pflegeforschung*. Huber.

Powell, P. C. (2004). Assessment of team-based projects in project-led education. *European Journal of Engineering Education*, *29*(2), 221-230.

Powney, J., and Watts, M. (2018). *Interviewing in educational research*. London: Routledge

Preston, J., Wiebe, S., Gabriel, M., McAuley, A., Campbell, B., and McDonald, R. (2015). Benefits and challenges of technology in high schools: *A voice from educational leaders with a Freire echo. Interchange, 46*(169–185).

Project Tomorrow, P. (2010). *Unleashing the future: Educators speak up about the use of emerging technologies for learning*.

Rambe, P. (2012). Critical discourse analysis of collaborative engagement in Facebook postings. *Australasian Journal of Educational Technology*, *28*(2).

Ramos, P. (2005). If not here, where? Understanding teachers' use of technology in Silicon Valley schools. *Journal of Research on Technology in Education*, *38*(1), 39-64.

Ranasinghe, A. I., and Leisher, D. (2009). The benefit of integrating technology into the classroom. In *International Mathematical Forum* (Vol. 4, No. 40, pp. 1955-1961).

Rebore, R. W. (1987). Personnel administration in education: A management approach. Englewood Cliffs, NJ: Prer.'Ice-Hall.

Remenyi, D., Williams, B., Money, A., and Swartz, E. (1998). *Doing research in business and management: an introduction to process and method*. Sage.

Richey, R. C. (2008). Reflections on the 2008 AECT Definitions of the Field.

Riege, A. M. (2003). Validity and reliability tests in case study research: a literature review with "hands-on" applications for each research phase. *Qualitative market research: An international journal*.

Rogers, E. M. (2003). *Diffusion of innovations (5th ed.)*.New York: Free Press.

Roschelle, J. M., Pea, R. D., Hoadley, C. M., Gordin, D. N., and Means, B. M. (2000). Changing how and what children learn in school with computer-based technologies. *The future of children*, 76-101.

Rose, A., and Kadvekar, S. (2015). ICT (information and communication technologies) adoption model for educational institutions. *Journal of Commerce and Management Thought*, *6*(3), 558-570.

Rubin, A., and Babbie, E. (2010). Research methods for social work. Belmont.

Russell, M., Carey, R., Kleiman, G., and Venable, J. D. (2009). Face-to-face and online professional development for mathematics teachers: A comparative study. *Journal of asynchronous learning networks*, *13*(2), 71-87.

SAIDE, (2008). Using mobile technology for learner in Open Schooling, viewed 18 November 2009, from http://www.col.org/SiteCollectionDocuments/

Saiful, J. A. (2020). Mobile Teacher Professional Development (MTPD): Delving into English Teachers' Beliefs in Indonesia. *The International Review of Research in Open and Distributed Learning*, *21*(4), 143-160.

Sandholtz, J. H., and Reilly, B. (2004). Teachers, not technicians: Rethinking technical expectations for teachers. *Teachers College Record, 106*(3), 487–512.

Schön, D. A. (1987). *Educating the reflective practitioner: Toward a new design for teaching and learning in the professions*. Jossey-Bass.

Schroeder, J., and Greenbowe, T. J. (2009). The chemistry of Facebook: Using social networking to create an online community for the organic chemistry laboratory. *Innovate: Journal of Online Education*, *5*(4), 3.

Schwandt, T. A. (2001). Dictionary of qualitative inquiry. In *Dictionary of qualitative inquiry* (pp. xxxiv-281).

Schurink, W., Fouché, C. B., and De Vos, A. S. (2011). Qualitative data analysis and interpretation. *Research at Grass roots: For the Social Sciences and Human Service Professions*, *4*, 397-423.

Schunk, D. H. (2000). Coming to terms with motivation constructs. *Contemporary Educational Psychology*, *25*(1), 116-119.

Scott, D., and Usher, R. (2011). Researching education 2nd ed. *Data methods and theory in educational enquiry*. London: Continuum.

Sequeira, A. H. (2012). Introduction to concepts of teaching and learning. *Available at SSRN 2150166*.

Sevari, K. (2012), The Role of Mobile Phones in Education and Instruction of Classroom Materials, *Advances in Education*, *1*(1), 19-20.

Shaheen, R., Walsh, C., Power, T., and Burton, S. (2013). Assessing the impact of large-scale teacher professional development (TPD) in Bangladesh: English in Action (EIA).

Sharples, M., Taylor, J., and Vavoula, G. (2005, October). Towards a theory of mobile learning. In *Proceedings of mLearn* (Vol. 1, No. 1, pp. 1-9).

Sherry, L., and Gibson, D. (2002). The path to teacher leadership in educational technology. *Contemporary Issues in Technology and Teacher Education, 2* (2), 178-203.

Stake, R. (1994), Case Studies, *Handbook of Qualitative Research (pp.236-47).* London: Sage Publications.

Stockdill, S.H., and Morehouse, D. L. (1992). Critical factors in the successful adoption of technology: A checklist based on the findings. *Educational Technology, 32*(1), 57-58.

Strauss, A., and Corbin, J. (1998). *Basics of qualitative research techniques* (pp. 1-312). Thousand oaks, CA: Sage publications.

Stringer, E. T. (1999). *Action research second edition*. Thousand Oaks, CA: Sage.

Speziale, H. S., Streubert, H. J., and Carpenter, D. R. (2011). *Qualitative research in nursing: Advancing the humanistic imperative*. Lippincott Williams and Wilkins.

Suárez-Rodríguez, J., Almerich, G., Orellana, N., and Díaz-García, I. (2018). A basic model of integration of ICT by teachers: competence and use. *Educational Technology Research and Development*, *66*(5), 1165-1187.

Sung, Y. T., Chang, K. E., and Liu, T. C. (2016). The effects of integrating mobile devices with teaching and learning on students' learning performance: A meta-analysis and research synthesis. *Computers and Education*, *94*, 252-275.

Tagliamonte, S. A., and Denis, D. (2008). Linguistic ruin? LOL! Instant messaging and teen language. *American speech*, *83*(1), 3-34.

Tasios, A., and Solomonidou, C. (2002). Students' (aged 9–12 years old) representations about everyday life technologies and the place of ICT in those representations. In *The Information and Communication Technologies in Education. Proceedings of the 3rd Pan-Hellenic Conference with International Participation (Rhodes: TPE, University of Aegean, 9/2002). Athens: Kastaniotis editions inter@ ctive* (Vol. 1, pp. 379-390).

Teo, T. (2003). Wilhelm Dilthey (1833–1911) and Eduard Spranger (1882–1963) on the developing person. *The Humanistic Psychologist*, *31*(1), 74-94.

Terras, M. M., and Ramsay, J. (2012). The five central psychological challenges facing effective mobile learning. *British Journal of Educational Technology*, *43*(5), 820-832.

Tessier, J. (2013). Student impressions of academic cell phone use in the classroom. *Journal of College Science Teaching*, *43*(1), 25-29.

Tondeur, J., Valcke, M., and van Braak, J. (2008). A multidimensional approach to determinants of computer use in primary education: Teacher and school characteristics. *Journal of Computer Assisted Learning,* 24, 494–506.

Tondeur, J., and Keer, H., and van Braak, J., and Valcke, M. (2008). ICT integration in the classroom: Challenging the potential of a school policy. *Computers and Education,* 212-223.

Trinidad, S., Clarkson, B., and Newhouse, P. (2004, July). Framework for implementation of ICT in schools. In *ACEC 2004 Conference, Adelaide, July. Retrieved March* (Vol. 28, p. 2005).

Trucano, M., Liu, J., and Iglesias, C. J. (2012). Surveying Mobile Learning Around the World (part one).

Walliman, N. (2005). Your research project: A step-by –step guide for the first-time Researcher. London: SAGE. *Journal of Critical Inquiry into Curriculum and instruction 3(3),* 7-11.

Walliman, N. (2010). *Research methods: The basics*. Routledge.

Walsh, C. S., Shrestha, P., and Hedges, C. (2013). Mobile phones for professional development and English teaching in Bangladesh. *International Journal of Innovation and Learning*, *13*(2), 183-200.

Ward, L., and Parr, J. M. (2010). Revisiting and reframing use: Implications for the integration of ICT. *Computers and Education*, *54*(1), 113-122.

Welman, C., Kruger, F., and Mitchell, B. (2005). *Research methodology*. Oxford University Press.

Willis, J. W., Jost, M., and Nilakanta, R. (2007). *Foundations of qualitative research: Interpretive and critical approaches*. London: Sage.

UNESCO. (2012) Turning on Mobile Learning in Europe, UNESCO, Paris, France.

UNESCO. (2017). Supporting teachers with mobile technology. Lessons drawn from UNESCO projects in Mexico, Nigeria, Pakistan and Senegal, United Nations Educational, Scientific and Cultural Organization, France, Paris.

Uslu, O., and Bumen, N. T. (2012). Effects of the professional development program on Turkish teachers: Technology integration along with attitude towards ICT in 240 education. *Turkish Online Journal of Educational Technology - TOJET*, 11(3), 115–127. Retrieved from http://eric.ed.gov/?id=EJ989205

Usluel, Y. K., Askar, P., and Bas, T. (2008). A Structural Equation Model for ICT Usage in Higher Education. *Educational Technology and Society, 11*(2), 262-273.

Vakalisa, N. (2011). *Teaching –Learning Dynamics.* Cape Town: Pearson Learning Education.

Valk, J. H., Rashid, A. T., and Elder, L. (2010). Using mobile phones to improve educational outcomes: An analysis of evidence from Asia. *International Review of Research in Open and Distributed Learning*, *11*(1), 117-140.

Van Braak, J., Tondeur, J., and Valcke, M. (2004). Explaining different types of computer use among primary school teachers. *European Journal of Psychology of Education*, *19*(4), 407-422.

Van Weert, T. J. (Ed.). (2005). *Education and the knowledge society: information technology supporting human development* (Vol. 161). Springer.

Vonkova, H., Papajoanu, O., Stipek, J., and Kralova, K. (2021). Identifying the accuracy of and exaggeration in self-reports of ICT knowledge among different groups of students: The use of the overclaiming technique. *Computers and Education*, *164*, 104112.

Vosloo, S. (2009). The effects of texting on literacy: Modern scourge or opportunity. *Shuttleworth Foundation*, 2-6.

Vygotsky, L. (1978). Interaction between learning and development. *Readings on the development of children*, *23*(3), 34-41.

Walliman, N. (2010). *Research methods: The basics*. Routledge.

Wang, Q. Y., and Woo, H. L (2007). Systematic planning for ICT integration in topic learning. *Educational Technology and Society*, *10*(1), 148-156.

Wango, G. (2012). School administration and management: Quality assurance and standards in schools. Nairobi: Jomo Kenyatta Foundation. 22

Welman, C., Kruger, F., and Mitchell, B. (2005). *Research methodology*. New York: Wiley, 45-87.

Wei, L. M., Piaw, C. Y., Kannan, S., and Moulod, S. A. (2016). Relationship between teacher ICT competency and teacher acceptance and use of School Management System (SMS). *Malaysian Online Journal of Educational Technology*, *4*(4), 36-52.

Weiss, B., Wechsung, I., and Marquardt, S. (2012, October). Assessing ICT user groups. In *Proceedings of the 7th Nordic Conference on Human-Computer Interaction: Making Sense Through Design* (pp. 275-283).

Wepner, S., Tao, L., and Ziomek, N. (2006). Broadening our view about technology integration: Three literacy educators' perspectives. *Reading Horizons, 46*(3), 215-237.

Whiting, L. S. (2008). Semi-structured interviews: guidance for novice researchers. *Nursing Standard (through 2013)*, *22*(23), 35.

Wong, E. M., and Li, S. C. (2008). Framing ICT implementation in a context of educational change: A multilevel analysis. *School effectiveness and school improvement*, *19*(1), 99-120.

Wood, C., Jackson, E., Plester, B., and Wilde, L. (2009). Children's use of mobile phone text messaging and its impact on literacy development in primary school. *British Educational Communications and Technology Agency (BECTA)*.

Woodrow, J. (1990). Locus of Control and student teacher computer attitudes. *Computers Education*, *14* (4), 421-432.

Wozney, L., Venkatesh, V., and Abrami, P.C. (2006). Implementing computer technologies: Teachers' perceptions and practices. *Journal of Technology and Teacher Education, 4*, (1), pp. 173-207.

Xu, M., and David., and Kim, S.H. (2018). The Fourth Industrial Revolution: Opportunities and Challenges. *International Journal of Financial Research*, *9*(90).

Yildirim, S. (2007). "Current Utilization of ICT in Turkish Basic Education Schools: A Review of Teacher's ICT Use and Barriers to Integration". *International Journal of Instructional Media*, *34*(2), 171-86.

Young, S. S. C. (2003). Integrating ICT into second language education in a vocational high school. *Journal of Computer Assisted Learning*, *19*(4), 447-461.

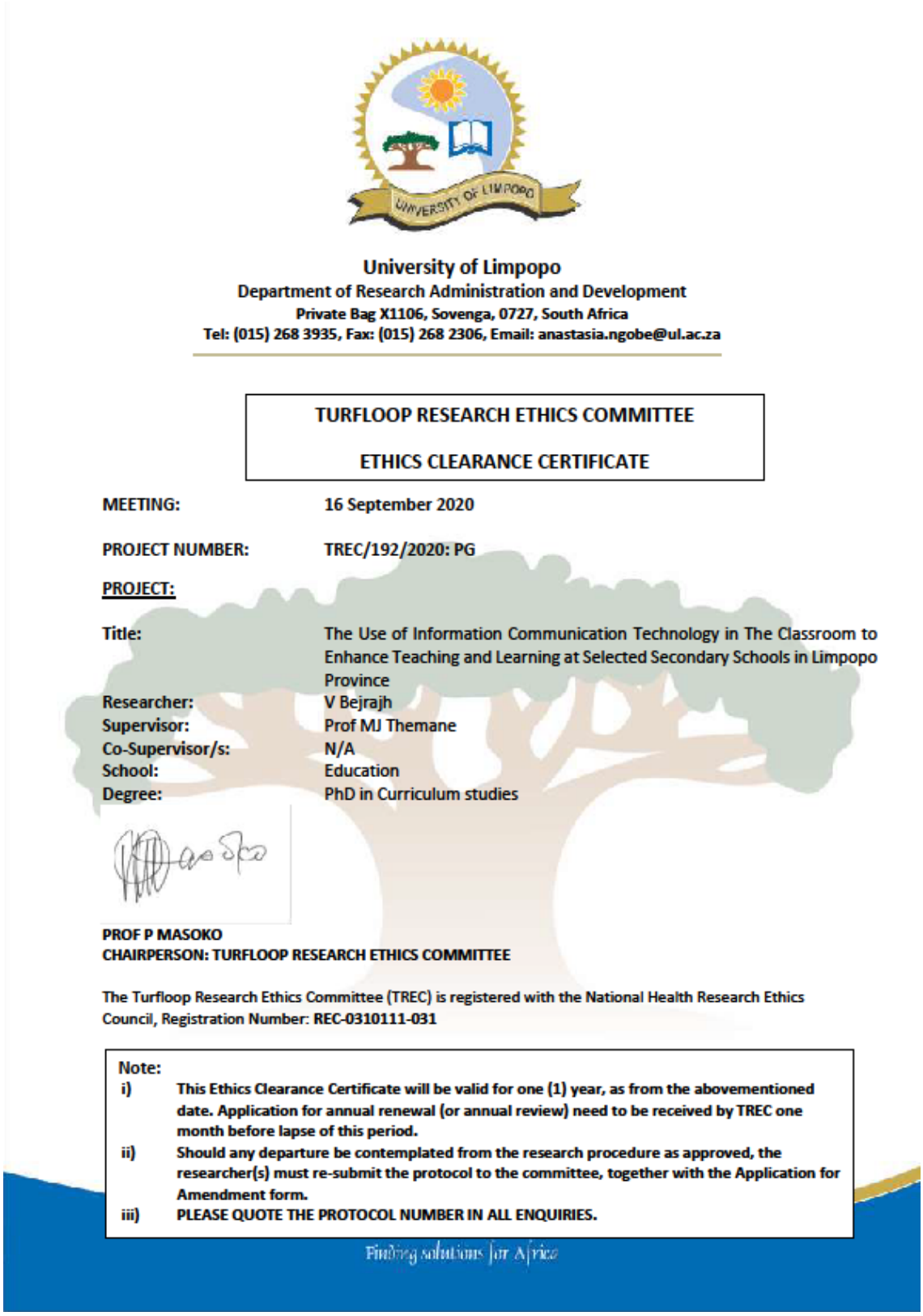
Yusuf, M.O. (2005). Information and communication education: Analyzing the Nigerian national policy for information technology. *International Education Journal*, *6* (3), 316-321.

Zhao, Y., and Frank, K. A. (2003). Factors affecting technology uses in schools: An ecological perspective. *American Educational Research Journal*, *40*(4), 807-840.

Zikmund, W. G., Babin, B. J., Carr, J. C., and Griffin, M. (2010). Business Research Methods, South Western. *Cengage Learning*.

APPENDICES

Appendix A – Ethical Clearance



University of Limpopo
Department of Research Administration and Development
Private Bag X1106, Sovenga, 0727, South Africa
Tel: (015) 268 3935, Fax: (015) 268 2306, Email: anastasia.ngobe@ul.ac.za

TURFLOOP RESEARCH ETHICS COMMITTEE

ETHICS CLEARANCE CERTIFICATE

MEETING: 16 September 2020

PROJECT NUMBER: TREC/192/2020: PG

PROJECT:

Title: The Use of Information Communication Technology in The Classroom to Enhance Teaching and Learning at Selected Secondary Schools in Limpopo Province
Researcher: V Bejrajh
Supervisor: Prof MJ Themane
Co-Supervisor/s: N/A
School: Education
Degree: PhD in Curriculum studies

PROF P MASOKO
CHAIRPERSON: TURFLOOP RESEARCH ETHICS COMMITTEE

The Turfloop Research Ethics Committee (TREC) is registered with the National Health Research Ethics Council, Registration Number: **REC-0310111-031**

Note:
i) This Ethics Clearance Certificate will be valid for one (1) year, as from the abovementioned date. Application for annual renewal (or annual review) need to be received by TREC one month before lapse of this period.
ii) Should any departure be contemplated from the research procedure as approved, the researcher(s) must re-submit the protocol to the committee, together with the Application for Amendment form.
iii) PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES.

Finding solutions for Africa

Appendix B - Permission from the Office of the Premier

TO: MAKOLA MC

FROM: DR T MABILA-

CHAIRPERSON: LIMPOPO PROVINCIAL RESEARCH ETHICS COMMITTEE (LPREC)

DATE: NOVEMBER 2020

SUBJECT: THE USE OF INFORMATION COMMUNICATION TECHNOLOGY IN THE CLASSROOM TO ENHANCE TEACHING AND LEARNING AT SELECTED SECONDARY SCHOOLS IN LIMPOPO PROVINCE

RESEARCHER: BEJRAJH V

Dear Colleague

The above researcher's research proposal served at the Limpopo Provincial Research Ethics Committee (LPREC). The committee is satisfied with the ethical soundness of the research proposal.

Decision: The research proposal is granted full approval and ethical clearance.

Regards

Chairperson: Dr T Mabila

Secretariat: Ms J Mokobi

Date: 01/02/2021

Appendix C – Permission from the Department of Education

LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF
EDUCATION

CONFIDENTIAL

Ref: 2/2/2 Enq: Mabogo MC Tel No: 015 290 9385 E-mail: MabogoMC@edu.limpopo.gov.za

Bejrajh V
116 Thabo Mbeki Street
Fauna Park
Polokwane
0699

RE: REQUEST FOR PERMISSION TO CONDUCT RESEARCH

1. The above bears reference.

2. The Department wishes to inform you that your request to conduct research has been approved. Topic of the research proposal: **"THE USE OF INFORMATION COMMUNICATION TECHNOLOGY (ICT) TO ENHANCE TEACHING AND LEARNING AT SELECTED SECONDARY SCHOOLS IN LIMPOPO PROVINCE "**

3. The following conditions should be considered:

3.1 The research should not have any financial implications for Limpopo Department of Education.

3.2 Arrangements should be made with the Circuit Office and the School concerned.

3.3 The conduct of research should not in anyhow disrupt the academic programs at the schools.

3.4 The research should not be conducted during the time of Examinations especially the fourth term.

3.5 During the study, applicable research ethics should be adhered to; in particular the principle of voluntary participation (the people involved should be respected).

REQUEST FOR PERMISSION TO CONDUCT RESEARCH: BEJRAJH V

Cnr. 113 Biccard & 24 Excelsior Street, POLOKWANE, 0700, Private Bag X9489, POLOKWANE, 0700
Tel: 015 290 7600, Fax: 015 297 6920/4220/4494

The heartland of southern Africa - development is about people!

Appendix D - Checklist for Classroom observation

1. Is the educator using cell phones in the classroom? Yes No

2. Has the task been clearly outlined by the Educator?

Yes No

3. Is the size of the class manageable? Yes No

4. Is there discipline within the classroom? Yes No

5. Is there constructive work taking place with the use of ICT? Yes No

6. Are all learners in class involved in the activity? Yes No

7. Are there any learners dominating the activities? Yes No

8. Is the educator facilitating the lesson? Yes No

9. Should the educator adopt a stern approach to

facilitate the exercise? Yes No

10. Was there a productive outcome from the activity? Yes No

Appendix E - Interview Schedule

Interview Schedule – Duration 45 minutes

Educator	Date	Time
Educator 1	6/02/19	1: 30 pm
Educator 2	6/02/19	4:30 pm
Educator 3	7/02/19	11:30 am
Educator 4	7/02/19	2:30 pm
Educator 5	8/02/19	1:30 pm
Educator 6	8/02/19	4:30 pm

1. The interview schedule can change due to various commitments held by educators. After the end of the school day educators are engaged in the following:

- providing extra classes in the afternoons due to shortage of educators.
- performing extra-curricular duties
- meetings
- personal matters

2. The purpose of this study is to see how information communication technology (ICT) is implemented in schools to enhance teaching and learning at selected secondary schools in the Limpopo Province.

(a) The researchers aim is to interview educators in secondary schools in Polokwane, Limpopo Province.

(b) Participants will be given an alias for anonymity purposes.

(c) The duration of the interview will be approximately 45 minutes.

(d) The interviewee will be requested to read and sign the consent form.

(e) The researcher will ask for permission to record the conversation.

The interview will be structured around the following questions:

- Do you make use of ICT in class?
- What strategies are employed by educators to ensure authentic learning is taking place through ICT?
- What challenges result because of using ICT as a learning and teaching?
- Are there any positive outcomes from using ICT in class?

Appendix F - Letter to request consent from Limpopo Education Department

116 Thabo Mbeki Road

Fauna Park

Polokwane

Limpopo

0699

Mashaba, KM

113 Bicard Street

Polokwane

0700

Private Bag X9489

Dear Sir/Madam

Permission to conduct research at selected schools in Limpopo Province

I, Viloshni Bejrajh, am currently studying towards my PHD under the supervision of Professor Themane at the University of Limpopo. An invitation is opened to you to partake in the research titled**: THE USE OF INFORMATION COMMUNICATION TECHNOLOGY (ICT) IN THE CLASSROOM TO ENHANCE TEACHING AND LEARNING AT SELECTED SECONDARY SCHOOLS IN LIMPOPO PROVINCE.**

The researcher aims to investigate the use of ICT in classes to strengthen both teaching and learning.

This study will investigate how educators and learners use ICT in the classroom. I will also request to observe their lessons as well as interview the educators.

The interview sessions with participants will be audio recorded. The duration of the interview will be approximately 45 minutes per participant.

Participation in this research is voluntary and participants can withdraw at any time.

Participants will not be compensated in any way for participation.

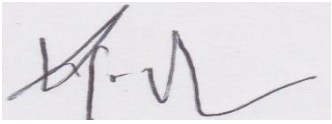
An alias will be used and the participants will not be identifiable in the published study.

Results will be made available to all stakeholders after the study. For additional information, please contact Mrs V. Bejrajh on 0844087701 or vilob@telkomsa.net. Further concerns can be directed to my supervisor, Prof. Themane at 0822006042 or mahlapahlapana.themane@ul.ac.za.

Thank you in advance

Yours sincerely

Viloshni Bejrajh



Appendix G - Authorisation form to the Principal

University of Limpopo

College of Education

0699

Dear Principal

I, Mrs V. Bejrajh am presently a PHD student at the University of Limpopo and I am enrolled for the dissertation module that forms part of a structured PHD in Education. My topic is: The use of information communication technology (ICT) in the classroom to enhance teaching and learning at selected secondary schools in Limpopo Province.

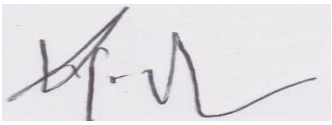
In order to obtain the necessary research knowledge and skills that I need for this module, I would need to interview a few of your educators to obtain data. I will then analyse the data and formulate conclusions on my findings.

Please note that the name of the school and the names of individual participants will be anonymously processed in my report.

I am therefore asking that you grant permission for this research in your school and that you agree that certain selected members of your staff and learners be allowed to participate in the research. You are most welcome to ask questions and participation is totally on a voluntary basis.

You are welcome to contact my supervisor, Prof. Themane at 0822006042 or mahlapahlapana.themane@ul.ac.za.

Yours faithfully



(Mrs.V.Bejrajh)

Student Contact details:

E-mail:vilob@telkomsa.net

Cell: 0844087701

Appendix H - Permission to participate

CONSENT TO PARTICIPATE IN THE RESEARCH:

The use of information communication technology (ICT) in the classroom to enhance teaching and learning at selected secondary schools in Limpopo Province.

I, _____ (participant name), consent to participate in the research that was outlined to me. I am fully aware of the risks and any potential vexation.

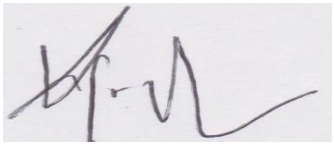
I fully comprehend the purpose of the study and received clarity on aspects that were unclear.

Participation in this study is voluntary and I am not compelled to proceed if I am uncomfortable.

The results of the research will be made available to me and I am aware that it is also for publication.

I agree to interviews being recorded.

Further to this, once I sign the consent form, I will also receive a copy for my responses.

Participant's name (print)	Researchers name (print)
_____	Viloshni Bejrajh
Signature of participant	Signature of researcher
	
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Date: ----------	Date: ----------

Appendix I - Editing Report

Editing and Proofreading Report

27 September 2021

This letter serves to confirm that I, Dr I. Ndlovu of the English Department, University of Venda, have proofread and edited a PhD thesis titled "**The use of Information Communication Technology to Enhance Teaching and Learning at Selected Secondary Schools in Limpopo Province**" by Viloshni Bejrajh.

I carefully read through the document, focusing on proofreading and editorial issues. The recommended suggestions are clearly highlighted and can either be accepted or rejected using the Microsoft Track Changes Function.

Yours Sincerely

Dr Isaac Ndlovu, PhD
Lecturer: Department English, Media Studies and Linguistics
University of Venda
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Tel.: +27 15 962 8361
Fax: +27 15 962 4749
E-mail: isaac.ndlovu@univen.ac.za