

The adoption and use of Information and Communication Technologies in private high schools in the Western Cape

By

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DECLARATION

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Signed

Date

ABSTRACT

This study investigates some of the factors affecting the adoption and use of Information and Communication Technologies (ICTs) for curriculum delivery in selected private high schools in the Western Cape. In this 21st century, ICT has penetrated the society to the point that it is most likely to assume that the private high school in general, are effectively incorporating them (ICTs) in delivery of the curriculum. Regrettably, this assumption is not always true as revealed in most of the cases examined in this study. Instead, a lot of private high school teachers who were selected as participants or respondents in this study revealed that they are still facing critical challenges when they want to effectively adopt and use ICTs for curriculum delivery.

While the previous studies have focused more on the ICT integration in public schools in disadvantaged communities, this study employed a mixed methods research design (that is both quantitative and qualitative research methods) to explore the factors affecting the adoption and use of ICTs in private high schools in the Western Cape Province.

The two frameworks adopted in this study, the Teacher Development framework (DoE, 2007) and the Technological Pedagogical Content Knowledge (TPACK) framework guided the researcher in the analysis of the research findings. The study also used both deductive and inductive reasoning in the interpretation of the results. The results of the study show that despite the high level of appreciating the importance of ICT adoption and use in teaching and learning by private high school teachers in the Western Cape Province, there are still critical factors that continue to militate against the effective integration of technology in the classroom. The study revealed the following factors as critical regarding the effective adoption and use of ICTs in curriculum delivery: lack of skills, limited access to ICT resources, lack of technical support, shortage of class time, and lack of teacher motivation.

Key words: ICTs, Adoption of ICTs, Use of ICTs, private high schools, curriculum delivery

DEDICATION

This work is dedicated to my son, Anesuishe, as well as my two lovely daughters, Samantha and Mitchell.

I have set a score which I believe you will do well to exceed.

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GLOSSARY

Acronyms/Abbreviations

ICT: Information and Communication Technology

IT: Information Technology

DoE: Department of Education

WCED: Western Cape Education Department

TPACK: Technological Pedagogical Content Knowledge

PK: Pedagogical Knowledge

CK: Content Knowledge

TK: Technological Knowledge

TC: Technological Content Knowledge

PCK: Pedagogical Content Knowledge

TPK: Technological Pedagogical Knowledge

SPSS: Statistical Package for Social Sciences

MCITP: Microsoft Certified Information Technology Professional

SGB: School Governing Body

SMT: Senior Management Team

MIS: Management Information Systems

TLI: Teacher Laptop Initiative

ELRC: Education Labour Relations Council

FET: Further Education and Training

NRC: National Research Council

ICDL: International Computer Driving License

Chapter 1: Introduction and overview

Introduction

Information and Communication Technology (ICT) has penetrated into the global society to the point of becoming vital to most of its day-to-day functioning, and similarly, ICT has strongly featured in education for teaching and learning. The adoption and use of ICTs in teaching and learning is essential as it create more chances for teachers and learners to work better in an information age (Minty & Parther, 2014; Nkula & Krauss, 2014). However, the potential of ICTs could only be noticed if the educators are able to adopt and integrate them into teaching and learning effectively. This study examines the adoption and use of ICT in the private high schools in the Western Cape Province of South Africa. The study sought to establish the factors that influence the adoption and use of ICTs for curriculum delivery. Research has shown that the effective adoption and use of ICTs provide opportunities for learners (Howie & Blindnaut, 2009; Mdlongwa, 2012; Minty & Parther, 2014; Ndlovu & Lawrence, 2012; Chigona, Chigona & Davids, 2014) and therefore, most of the South African schools should develop a lot of interest in incorporating technology into curriculum delivery. Ali, Haolader, and Muhammad (2013: 4061) concur that the adoption and use of ICTs in the classroom teaching and learning has been seen as of paramount importance in providing opportunities for both teachers and learners. They point out that this enables both teachers and learners

“to operate, store, manipulate, and retrieve information, encourage independent and active learning and self-responsibility for learning such as distance learning, motivate teachers and students to continue learning outside school hours, plan and prepare lessons and design materials such as course content delivery and facilitate sharing of resources, expertise and advice”.

Thus, the school leadership should make a lot of efforts in finding the best ways of encouraging the teachers to successfully use the available ICT resources in their classrooms so as to boost effective teaching and learning.

In South Africa, private schools play a crucial role in that they complement the public schools by providing quality education to the learners who are enrolled by them. The parents choose to send their children to private schools because they believe that there is quality education. Most private schools in South Africa have a favourable teacher to pupil ratio which makes parents and other stakeholders in the field of education to believe that private schools offer quality education compared to public

schools. However, one cannot talk about quality education in the 21st century if the teaching and learning is not integrating ICTs.

It should, therefore, be noted that the adoption and use of ICT for curriculum delivery in private schools is not effective as the teachers are also finding it difficult to integrate technology into their classroom. It should also be noted that most of the private schools in South Africa are in the initial stage of ICT adoption and use, which is characterised by “patchy un-coordinated provision and use, some enhancement of the learning process, some development of e-learning, but no profound improvements in learning and teaching” (Mathipa & Mukhari, 2014: 1218). Thus it is imperative to examine the development of ICT integration in the private high schools so as to suggest solutions to the challenges that the schools could be facing.

The South African White Paper on e-Education (DoE, 2004) also provides a clear picture on the nature of learning projected, the ICT levels that are required, and the kind of school that is needed for effective ICT integration. However, despite the guidelines provided by the DoE the findings of this study have revealed that many private high schools in the Western Cape Province still face serious challenges in adopting and using ICTs in their classrooms.

This study used one-on-one semi-structured interviews and a cross-sectional survey questionnaire on a likert scale to examine some of the factors influencing the adoption and use of ICTs in their classrooms. The significance of the teachers, as participants in this study cannot be undermined as they are deemed the key players who have the responsibility of ensuring that the effective adoption and use of ICTs for the curriculum delivery take place. The Guidelines for teacher training and professional development also stipulate that ICT adoption and use in curriculum delivery demands that teachers possess good content knowledge and the ability to bring some changes in the classroom teaching methods (DoE, 2007).

Therefore, this study sought to establish some of the factors that influence the adoption and use of ICTs in selected private high schools in the Western Cape with the aim of suggesting ways in which the challenges can be dealt with in order to ensure valuable integration of ICTs in teaching and learning in these schools.

The rest of this chapter is organised into subsections as follows:

1.1 the background to the study

1.2 the research problem

1.3 the rationale for the study

- 1.4 the aims and objectives of the study
- 1.5 the assumptions of the study
- 1.6 the limitations of the study
- 1.7 the research designs used in the study
- 1.8 explanation of key concepts used in the study
- 1.9 the overview of the chapters
- 1.10 the overview of the chapters
- 1.11 Summary of the chapter

1.1 The background to the study

The emphasis that the South African Department of Education put on ICT integration in teaching and learning is aimed at improving learners' academic performance as well as preparing them to be useful in a society that is technologically orientated, both locally and internationally (DoE - Draft White Paper on e-Education, 2004). However, in this study it has been observed that the adoption and use of ICTs in private high schools in the Western Cape has proved to be problematic as most private schools are not effectively integrating technology in the curriculum delivery. This observation is supported by Nkula and Krauss (2014: 241) who have pointed out that regardless of the opportunities that are offered by ICTs, "there are still many schools in South Africa that" experience problems regarding the adoption and use of ICTs.

The aim of the Department of Education was to ensure that by 2013 ICTs should be fully incorporated into teaching and learning (DoE – Draft White Paper on e-Education, 2004). However, this goal is still far from being achieved. Minty and Pather (2014: 47) also claim that although "many schools have been provided with computers, the majority still have not put them to good use". The above information can surely be used as a justification for the need to carry out intensive research on the challenges associated with the adoption and use of ICTs in the classroom.

This research project focused on the factors that affect the adoption and use of ICTs for classroom teaching and learning in private high schools in the Western Cape. A focus on private high schools has been necessitated by the assumption that such schools offer quality education due to the fact that the class sizes are smaller and the distribution of teaching and learning resources is most likely manageable. However, it has been observed that, whereas some of the public schools in the Western Cape

are comparatively well-equipped with ICTs and well staffed, the same cannot be said of some of the private schools that are registered with the Western Cape Education Department (WCED). The latter are confronted with challenges in the adoption and use of ICTs for curriculum delivery thus calling for the need to investigate the factors that are militating against the successful ICT integration in the private schools in the Western Cape.

Moreover, there has been little research that focused on private schools regarding the adoption and use of ICTs. The previous studies have focused more on public schools in disadvantaged communities resulting in limited research that has been carried out in the private schools. Thus, this study will add value by exploring the factors affecting the adoption and use of ICTs for classroom teaching and learning in private high schools in Western Cape and possibly suggest recommendations to the private high schools on how to deal with these factors.

1.2 The research problem

1.2.1 The problem Statement

The adoption and use of ICTs for classroom teaching and learning in some private high schools in the Western Cape is not problem-free as the teachers find it difficult to integrate technologies into their classrooms. These technologies may include; computers, laptops, tablets, internet, e-mails, televisions, CDs, Videos, interactive whiteboards, overhead projectors and power point presentations. Thus it is imperative in this study to establish the factors affecting the adoption and use of ICT in private high schools to ensure appropriate teaching and learning in this 21st century. It must also be noted that ICT integration in schools, in general, has faced some challenges which need to be continuously identified so as to find possible solutions. The researcher strongly believes that the effective integration of ICTs in the classrooms can go a long way in improving the teaching and learning process, thus possibly leading to a remarkable improvement of learners' performance.

1.3 Rationale for the study

This study was carried out to establish some of the factors affecting the adoption and use of ICTs in selected private high schools in the Western Cape. Anecdotal evidence reveals that ICT integration in private high schools, in general is not happening effectively despite the high level of appreciating the importance of adopting and using ICTs for curriculum delivery. This research project assumes that in most private high schools in the province, teachers are not effectively integrating ICTs for evocative teaching and learning despite the WCED's emphasis on the adoption and use of ICTs in education. This provides a reason for the researcher to

carry out the study in an effort to identify the factors that are influencing the private schools in the Western Cape in the adoption and use of ICTs for curriculum delivery. The identified factors enabled the researcher to find possible solutions to deal with them and provide recommendations to the private high schools. Thus it is imperative to continuously investigate the various factors that affect the effective adoption and use of ICTs in the classrooms so as to find possible solutions to the demands of a new school curriculum. The solutions provided in this research will benefit the schools, the teachers, and the learners for they are geared towards enhancing learning and teaching in the classroom.

Additionally, previous studies on ICT adoption and use in schools have focused more on public schools in disadvantaged communities (Howie & Blindnaut, 2009; Mdlongwa, 2012; Minty & Parther, 2014; Ndlovu & Lawrence, 2012; Chigona, Chigona & Davids, 2014). This resulted in limited research that covers the private schools, especially in the Western. Thus this study addresses this gap.

1.4 The aim and objectives of the study

With the previous sections serving as the basis of this study on the adoption and use of ICTs in the classroom, the aim of the study is to establish the factors that affect the adoption and use of ICTs in private high schools in the Western Cape. It is therefore hoped that the results of this research study will provide a yardstick for other private high schools in the province with regards to ensuring the effective adoption and use of ICTs for the curriculum delivery.

The specific objectives that emanate from the major aim of the study are as follows:

- To identify and analyse the factors that influence the adoption and use of ICTs in private schools.
- To explore the different techniques employed by the teachers when adopting and using ICTs for curriculum delivery in private schools.
- Provide possible recommendations to the private schools in the Western Cape Province, principals and teachers of the private schools in the Western Cape Province on how the challenges posed by ICT adoption and use in the classroom can be addressed.

1.4.1. The main Research question

It should be noted that the adoption and use of ICTs in education has a remarkable impact in enhancing the process of classroom teaching and learning. Mikre (2011: 2) echoes the same sentiments by saying “ICTs greatly facilitate the acquisition of

knowledge, offering developing countries unprecedented opportunities to enhance educational system". However, besides the foreseeable positive contribution of the adoption and use of ICTs in the classroom both teachers and learners experience challenges that militate against the effective integration of technology in the classroom.

It is against this background that the researcher decided to pose the following research question:

What are some of the factors influencing the adoption and use of ICTs for curriculum delivery in selected private high schools in the Western Cape?

1.4.2 Subsidiary questions

The main research question has been sub-divided into two sub-questions in order to be able to tackle the research main question effectively. Thus the researcher operationalized the main research question by the following two subsidiary questions:

- What challenges do teachers in selected private schools face when adopting ICTs for classroom use?
- What conditions are hindering or promoting the effective use of ICTs for curriculum delivery in selected private schools?

1.5 The assumptions of the study

- It is the researchers' contention that for effective learning and teaching to take place in schools there is need for ICT adoption and use in the classroom. This can only be achieved if there is adequate provision of ICT resources which include software and hardware.
- This study rests on the assumption that there is lack of knowledge to use ICTs amongst the teachers who teach in the private schools which then creates a challenge when it comes to technology integration in curriculum delivery. Therefore, there could be a need to ensure that qualified and competent personnel in ICT is employed to teach and provide support for ICT in all schools, particularly in under-resourced private schools.
- The private schools could also be affected by the lack of sufficient financial resources to procure and upgrade ICT resources and facilities that promote the effective adoption and use of ICTs for curriculum delivery. The researcher believes that adequate financial resources play a pivotal role towards a successful adoption and use of ICTs in the private school schools. This is

because without enough money it is almost impossible to procure the required ICT resources or even to upgrade the resources available in the school.

- The private schools could be affected by the lack of skilled management or the lack of management that has the desire for ICT adoption and use for curriculum delivery. It is the researcher's argument that if the School Management Team (SMT) has the desire to promote technology integration in the classroom the teachers will also be motivated to follow suit. Thus the element of motivation is very crucial for the effective adoption and use of ICTs for curriculum delivery.
- The lack of initiatives to train the teachers on the best ways of technology integration in their teaching could also be another factor affecting the private schools. The owners and the managers of private schools should take the initiative to ensure that programmes are put in place to develop teachers in order to equip them with ICT skills. The responsible private school managers should extend their efforts in sustaining the school connectivity projects which are of paramount importance if effective ICT integration is to take place in these private schools.

1.6 Theoretical frameworks

There is no doubt that the quality of ICT use in most of the South African Schools depends on the educator's ability to integrate the new tools in their subject teaching. In order to determine and understand the factors affecting the adoption and use of ICTs in the classroom teaching this researcher adopted the South African Teacher Development Framework (DoE, 2007) and the Technological Pedagogical Content Knowledge (TPACK) framework (Mishra and Koehler, 2006). The South African Development Framework provided insights or lenses on how to look at issues in the study, such as to determine the participant's (teachers and/ or principals) ability level to demonstrate the development of ICT integration in their classroom teaching. On the other hand, the TPACK framework furnished the researcher with an insight on the kinds of knowledge that the same participants need to ensure successful integration. Accordingly, the application of the two frameworks in this research is likely to ensure a detailed understanding of the concerns in the study.

1.7 The Research designs

1.7.1 Data collection methods and analysis

I used both qualitative and quantitative research designs. For the qualitative research design, face-to-face semi-structured interviews were used. For the quantitative

research design, a cross-sectional survey with validated questionnaires on a likert scale was used to examine the factors affecting the teachers in the adoption and use of ICTs in the classroom. Thus a survey questionnaire consisting of two main parts was prepared for this purpose. The first part dealt with teachers' familiarity with ICT use in the classroom and the second part dealt with challenges that teachers experience when integrating ICTs in the classroom. The research was conducted in 15 private high schools in the Western Cape also selected using a simple random sampling in order to reduce the chances of the researcher bias.

In the analysis phase, the data obtained from the survey questionnaires was analysed using Statistical Package for Social Sciences (SPSS). The raw data obtained from the semi-structured interviews was first organised and transcribed into written text before the actual analysis. This process involved transcribing the full responses by participants during interviews. After transcribing then the written text had to go through three stages of analysis which are; open coding, axial coding, and selective coding.

1.7.2 The validity of the research

The validity of this research rest on the reliable research tools to be used, such as the closed-ended questionnaires which were used to find out the teachers' perceptions about their familiarity with the use of ICTs in the classroom as well as their perceptions about the challenges associated with the use of ICTs in the classrooms. Additionally, the application of validation in this research increased its trustworthiness. The various data gathered from both survey questionnaires and semi-structured interviews were triangulated so as to provide a reliable and comprehensive report of the findings.

1.7.3 Ethical considerations and clearance process

In research, ethics are fundamental because they potentially influence all the stakeholders involved. The researcher formally informed the participants of what will be required of them during their participation and therefore, were asked to sign their consent. In collecting data from these participants priority was given to their physical and psychological comfort. Over and above, the researcher explained that participation must be completely voluntary and participants were informed about their prerogative to pull out at any phase of the research process without any negative penalty or incurring loss of services received (Burton, Brundrett & Jones, 2008:52).

1.7.4 The limitations of the study

During any research process, it may not be easy for the researcher to avoid having data stained by bias of one sort or another. Koonin (2014: 257) concurs that

“unfortunately, there will always be a small margin of error in all research studies regardless of how meticulous the researcher” can be. However, failure to acknowledge the possibility of such limitations is not only unethical but unprofessional as well. There could be some unpremeditated slip-ups in the research design and process. For instance, if some participants misinterpret a question in the questionnaire they will provide irrelevant answers. This obviously results in the collection of data that may fail to answer the research questions. Another challenge was experienced during the data collection process when the participants and/or respondents kept on postponing the scheduled appointments for different reasons. Some participants withdrew their participation or failed to submit their completed questionnaires. Other challenges include; some schools refusing to permit the researcher to carry out the study in their schools or to interview their teachers, time and financial constraints to cover all the targeted areas and participants.

1.8 Explanation of Key concepts

In an effort to make the research problem and the research question clearer it is imperative to provide the operational definitions of the key concepts raised in this study. The researcher has therefore, identified the following concepts as of major concern: ICTs, adoption and use of ICTs, private schools, Curriculum delivery and e-learning.

Information and Communication technology (ICT) “generally refers to a varied set of technological tools and resources that are used to communicate, and create, disseminate, store, and manage information” (Meenashki, 2013: 3). Thus ICT, for the purposes of this study, can be explained as an “electronic means of capturing, processing, storing, and communicating information”. This can include computing devices (such as laptops, desktops, smart phones, and tablets), data projectors and interactive whiteboards with video-capture technology, CD-ROMs, interactive CDs, internet, e-mails, SMS text messaging, podcasting, e-learning platforms (e.g. Blackboard), photocopiers, scanners, digital cameras, and digital camcorders.

Adoption of ICTs in the classroom involves the development from the time when the decision to purchase the technological tools and resources is made up to the time when the technologies are fully utilized in the teaching and learning process. Chigona (2015) argue that the adoption of ICTs in schools does not guarantee that these technological tools and resources will be used or integrated, as there should be some thoughtful steps that need to be taken in order to use or integrate the available technologies. Thus, Technology adoption and use in schools covers both the decision

to make use of technology and the implied blending of technological components into classroom teaching and learning.

Use of ICTs refers to the extent to which technological resources are being incorporated into the school programmes and the degree of the impact on the school's organization and pedagogies. The level of ICT use is determined by the relationship between teacher motivations, infrastructure, development of e-pedagogies and innovations.

Private schools, for the purposes of this study, refers to schools that are started, directed, and maintained by a private group or individuals rather than by the government. Such schools are also known as “independent schools, non-governmental, or non-state schools”. Usually private schools hold their privilege to enroll learners of their choice and are financed partially or fully by the tuition paid by their learners. In this study, the focus is on the private schools that are registered with the Western Cape Education department although these schools may follow their particular philosophies or viewpoints.

Curriculum delivery in this context refers to the many ways by which a curriculum enables learners to achieve their learning goals. Within this process curriculum refers to “what a learner is required to encounter, study, practice and master. It entails taking decisions about what should be taught, how it should be taught and when it should be taught”. The delivery of the curriculum is defined as the point at which learners interact with the designed curriculum, organizational and learning challenges.

E-learning when simply put it refers to “electronic learning, and typically this means using a computer to deliver part, or all of a course whether it's in a school”. Mikre (2011, 3) defines e-learning as “a learning program that makes use of an information network – such as the internet, an intranet (LAN) or extranet (WAN) whether wholly or in part, for course delivery, interaction and/or facilitation”. Additionally, “web-based learning is a subset of e-learning and refers to learning using an internet browser such as the Moodle, blackboard or internet or internet explorer” (Mikre, 2011, 3). Thus for the purposes of this study the concept of e-learning shall be used as defined by Mikre (2011).

1.9 Overview of the chapters

This section presents a summary of the stages of the inquiry as presented in this research report. The thesis comprises of five chapters.

Chapter one provides background to the study, rationale for the study, the aim and objectives of the study and the research designs followed. The chapter also outlines the methods used to collect data as well as the issues of trustworthiness; challenges experienced during the research process as well as the ethical considerations are briefly outlined. This background to the research has been given from the general perspective, focusing on ICT education in South African classrooms. The chapter also helps to present the specific research questions which formed the foundation for the study. The key concepts such as ICT, adoption and use, and private schools are clearly defined in this chapter. Examples of the current and evolving technologies as used in education from the standpoint of both the policy and the classroom are examined.

Chapter two presents a detailed literature review on ICT integration in education. The chapter focuses on the importance of ICTs in education, the challenges associated with the deployment in schools, teacher's knowledge of ICTs for curriculum delivery, barriers to ICT use in the classroom, the South African Government's initiatives in promoting ICT integration in schools, and the two theoretical frameworks that guided the research process.

Chapter three gives details of the research designs used in this study which includes the sampling of the research participants and the empirical data analysis. Justification to the choices made regarding the research methods used is clearly explained. The Chapter also clarifies in detail issues of trustworthiness as well as the challenges experienced during the research process. Lastly, this chapter elucidates the ethical considerations and the clearance process followed during the research process.

Chapter four discusses in detail the research findings that are presented under the main themes that emerged during the analysis phase. Both quantitative and qualitative data gathered from the participants is provided in detail and reference to the previous studies is made to substantiate this data. The findings have been linked to the theoretical frameworks that have been applied in this study.

Chapter five provides a detailed analysis of this study. The findings are blended to determine the impact of integrating ICTs in teaching and learning. The chapter also provides the various conclusions reached in this study as well as the key recommendations to the private high schools in the Western Cape Province on the ways that can improve the adoption and use of ICTs in the classroom.

1.10 Summary of the chapter

In this chapter, the research study has been introduced focusing on the general outline of the research process that has been followed. The research problem, the aim of the research, and the research question has been clarified. Strong emphasis is put on the call for a thorough investigation to be carried out on the factors affecting the adoption and use of ICTs in the private high schools in the Western Cape province of South Africa.

In the chapter that follows, a detailed literature review which paves the way for a thorough research process is presented.

Chapter 2: Literature Review

Introduction

As mentioned in Chapter 1, this study focuses on establishing some of the factors affecting the adoption and use of ICTs for classroom teaching and learning in selected private high schools in the Western Cape. It is therefore, important to examine the previous studies on the adoption and use of ICTs in schools in order to broaden the understanding of the issues surrounding the integration of ICTs in curriculum delivery. The issue of ICT integration in schools is no longer an option since the South African National Department of Education has “deemed it necessary for ICTs to be included in education to support teaching and learning” (Minty & Pather, 2014: 47). Thus, Chapter 2 presents the literature review that explains issues surrounding ICT adoption and use for curriculum delivery in schools.

The rest of this chapter is organised into subsections as follows:

- 2.1 The importance of ICT integration in classrooms;
- 2.2 Challenges associated with ICT deployment in schools;
- 2.3 Teacher’s knowledge of ICTs for curriculum delivery;
- 2.4 Barriers to ICT use in the classroom;
- 2.5 The South African Government’s initiatives on ICT use in schools;
- 2.6 Theoretical frameworks: *The Teacher Development Framework and the Technological Pedagogical Content Knowledge; and*
- 2.7 The summary of the chapter.

2.1 Importance of ICT integration in classrooms

Literature on technology integration in education has revealed both educational merits and demerits resulting from the adoption and use of these technologies.

Amedzo (2007: 2) has pointed out that one of the key benefits of integrating ICTs into the classroom is promoting learner-centred education instead of educator-centred education, thus customising curricula to meet learner needs and development. Hart and Laher (2015: 3) add that learners can develop better writing skills in their different learning areas by using word process, which enables them to look back on what they have written and effect the necessary changes. By frequently using ICTs, learners “begin to cultivate a culture of personal information management, independent learning and working without supervision, communication skills, teamwork and

research skills, which are highly valued in today's global workforce" (Mdlongwa, 2012: 4). The development of such skills in learners as a result of ICT use will go a long way in promoting aspects of learners' thinking (such as reasoning, understanding and creativity) than would be achieved when employing traditional teaching practices (Chigona, 2015).

Additionally, with teaching and learning becoming more interactive as a result of the use of technology, learners' motivation, participation, responsibility and self-esteem will increase. For both teachers and learners, if properly implemented, ICTs can decrease the task of physically processing information, giving more time for its interpretation and use (Hart & Laher, 2015). They further point out that "teachers can use ICT tools to create high-quality teaching which would inspire more interest in learners". Moreover, Mdlongwa (2012: 5) discovered that learners may be connected to specialists and may have more exposure to quality international learning resources through the use of ICTs. He further notes that through technology such as data projectors, use of animated graphics or computer simulation, learners show a better understanding of topics under study as they are exposed to practical real-life situations. One study showed that when computer-based instruction was implemented in teaching to elementary school children about diffusion, it resulted in significantly higher scores for learners with technology compared to children taught with traditional instruction (Shirvani, 2014: 37).

The effective use of ICTs can also generate administrative benefits, such as improving the capturing and storage of data to support decision making thus ensuring improved ways of accountability, transparency and reporting (Dzansi & Amedzo, 2014). Mdlongwa (2012:5) echoes similar sentiments when he notes that "routine tasks, such as accessing learner's records can be performed much faster with record keeping becoming more orderly and reliable as opposed to manual records that can get lost due to poor filing". Consequently, storing data electronically improves the efficiency of the school administrative functions as it "makes more data available for collaborative work, and decreases the educator's time expended on administrative functions" (Chigona, 2015). In the end teachers will have more time to deal with core issues, which includes lesson preparation and lesson delivery. Hart and Laher, (2015: 3) concur that "within educational institutions, ICTs can help save time and money which can ultimately improve the use of teacher's time". Similarly, the reduction in administrative expenses can result in more money being spent on purchasing the resources that are directly linked to teaching and learning.

Beyond the classroom, ICT helps in advancing the possibility for partnership between family members and the school community (Amedzo, 2007: 2), thus bridging the digital divide in the country (Msila, 2015: 175). The concept 'digital divide' is used to refer to "the gap between those who have adequate access to Information and Communication Technologies, such as computers and the Internet (information haves) and those who have limited or no access, for either socio-economic or geographical reasons, or both (information have-nots)". As it is believed that effective ICT implementation improves communication within the school, it can be reasonably argued that such effective implementation of ICTs in schools can have expanded positive effects such as improving learners communication with people all over the world, thus narrowing the "gap between those groups that have access to quality, useful digital content and those that do not" (Mdlongwa, 2012: 5). Other benefits beyond the classroom that can be derived from ICT implementation in schools can be the acquisition of skills such as the use of online applications which are now common in tertiary institutions or workplaces.

On the other hand, Mikre (2011: 3) discover the following key setbacks linked to the ICT use in teaching and learning:

- "Over-reliance on ICT limits students' critical thinking and analytical skills,
- Students often have only a superficial understanding of the information they download,
- Computer-based learning has negative physical side-effects such as vision problems,
- Students may be easily distracted from their learning and may visit unwanted sites,
- Students tend to neglect learning resources other than computer and the internet,
- Students tend to focus on superficial presentations and copy from the internet,
- Students may have less opportunity to use oral skills and handwriting,
- Use of ICT may be difficult for weaker students, because they may have problems with working independently and may need more support from the teacher".

However, despite the aforementioned drawbacks of ICT adoption and use in teaching and learning, a number of studies (Bingimlas, 2009; Bialobrzaska & Cohen, 2005; Minty & Pather, 2014; Salehi & Salehi, 2012; Nkula & krauss, 2014; Wilson- Strydom & Thomson, 2005; Isaacs, 2007) have revealed that the use of ICTs in teaching and learning is crucial as it create more chances for both teachers and students to effectively work in this era of information and technology. Bingimlas (2009: 236) declared that institutions that do not include the use of ICTs in schools “cannot seriously claim to prepare students for life in the twenty-first century”. It is for this reason that South Africa has a “host of dispersed and uncoordinated programmes and projects that promote education through the use of ICTs at various levels of the education system, particularly in the formal school sector” (Isaacs, 2007: 10). The Department of Education (DoE) in South Africa has confirmed the significance of ICT use in education by proposing that every student should be computer knowledgeable by 2013 (DoE, 2004: 2). Accordingly, the adoption and use of ICTs in schools can produce dramatic benefits for both teachers and learners alike.

Despite these foreseeable benefits of ICT adoption and use in educational institutions in general, and in using it in teaching and learning in particular, few schools and colleges are integrating ICTs to their full potential. This is why it is imperative to continuously explore the challenges that teachers and learners in South African Schools face when using ICTs.

2.2 Challenges associated with ICT deployment in schools

The advent of “computers in South African schools occurred during the 1980s, mainly in private schools and well-resourced public schools” with the main purpose of carrying out administrative tasks, such as maintaining the records of learners, capturing examination results, creating reports for learners, and making of timetables (Mdlongwa, 2012: 2). However, this changed as a result of continuous advances in ITC. According to Wilson-Strydom and Thompson (2005: 2) the idea of ICT use and integration as an approach emerged as a reaction to the restrictions of computer usage in schools which focused only “on promoting computer literacy or technical knowledge of computers and the use of various computer applications rather than putting emphasis on using ICTs to learn”. They further argue that “the acquisition of technical skills and learning about computers is implementation without integration whereas learning through or using a computer is referred to as implementation with integration”. Nkula & Krauss (2014: 243) support this by stating that ICT integration neither refer to simply placing of computers in the classroom nor using technology to sustain traditional teaching methods, but rather integration refers to the use of technology to promote teaching and learning, that is, where students use ICTs in

acquiring new knowledge and skills. Therefore, implementation with integration puts ICTs at the heart of teaching and learning. With this in mind, there is no doubt that “ICT implementation with integration encourages cross-curricular use of ICTs rather than having it only as a separate subject” (Nkula & Krauss, 2014: 242).

Additionally, Wilson-Strydom, Thomson and Hodgkinson-Williams (2005: 73) describe integration firstly, as associated with ICT adoption and secondly, as associated with ICT use. Nkula & Krauss (2014: 243) outlines the “two types of ICT use, namely, learning about computers (representational use) and learning with or through computers (generative use)”. The phrase “representational use” depicts how ICTs are used to simply “represent information in another medium” (Wilson-strydom & Thomsom, 2005: 4). They further emphasise that in this case the ICTs are included within an assignment, but their function will be to “re-present” information, and not to produce or create new information. Moreover, “if teacher’s epistemological assumptions are defined by objectivist beliefs of knowledge and their pedagogical practices are informed by behaviourist theories of learning, then they are likely to limit their use of computers to representational uses” (Wilson-Strydom & Thompson, 2005: 4). Thus, using ICTs as a “representational tools” is not fully integrative.

On the other hand, the notion of generative use seems “to be underpinned by a Piagetian cognitive constructivist view of knowledge and learning which assumes that knowledge is not a product that can be transmitted from one person to another, but is a process of individually constructing knowledge” (Wilson-Strydom & Thomson, 2005: 4). Thus by contrast, “if teachers’ epistemological assumptions are defined by constructivist beliefs of knowledge and their pedagogical practice are informed by cognitive constructivist theories of learning, then they are likely to extend the use of computers to generative uses” (Wilson-strydom & Thomson, 2005: 4). Accordingly, using ICTs as a “cognitive tool” is fully integrative.

Bialobrzeska and Cohen (2005: 68) reveal that generative use (or implementation with integration) is not a custom in South African Schools, largely because a lot of teachers do not possess the skills required to integrate ICTs into teaching and learning activities. A study conducted on ten South African schools confirm that many of the teachers cannot go further than using ICTs to prepare lesson plans, tasks and tests for their learners (Ndlovu & Lawrence, 2012: 5). This implies that the teachers are not capitalising on the potential of computers especially for promoting quality teaching and learning of their subjects. Unwin (in Nkula & Krauss, (2014: 243) concurs that this is a problem throughout Africa and a lot of countries that are developing. According to Nkula and Krauss (2014: 243) many studies have also

revealed that “teachers lack the computer skills necessary for effectively integrating ICTs into learning resulting in computers being set aside for use only on unique occasions”.

Mdlongwa, (2012: 4) notes that a serious limitation in the operation of ICTs in schools is that Information Technology (IT) based Management Information Systems (MIS) are costly to put in place, especially buying “the hardware and software required for setting up MIS”, retraining the teachers and the other personnel at the schools and recruiting more staff so as to make it possible to use the MIS. This challenge is further aggravated by the school's inability to get learners' fees from their parents, as well as the failure by the government to provide financial support to the schools (Mdlongwa, 2012: 2). Mdlongwa (2012: 2-3) further argues that another challenge stems from the failure by government to prioritise the matter of implementing ICTs in schools compared to other essential provisions such as providing citizens with safe and “clean running water, sanitation and electricity which always take precedence over ICT implementation”. In the end the implementation of ICTs in schools will remain a major challenge.

2.3 Teacher's knowledge of ICTs for curriculum delivery

Teacher's attitudes and pedagogical beliefs have been identified as a crucial contributing factor in the adoption and use of ICTs in the classroom (Nkula & Krauss, 2014). It is true that teachers do not possess a similar set of beliefs on how students learn and their decision on how to use ICTs in the classroom depends on their beliefs about teaching and learning. Shirvani, (2014: 39) revealed that the majority of student teachers have displayed proficiency in the use of ICTs; however, they most probably do not use these technologies in their classroom because they consider that it is not valuable in teaching subject matter. Several studies, according to Nkula & Krauss (2014: 243) revealed “that teachers with constructivist pedagogical beliefs (i.e. student-centred learning) are associated with high levels of computer use, whereas low computer use is associated with traditional pedagogical beliefs (i.e. teacher-centred learning)”. The same studies confirm the importance of teacher's pedagogical beliefs in determining their use of ICTs in the classroom or not. Shirvani, (2014: 39) examined whether the use of ICTs enhanced teacher's self-efficacy, even many years after attaining a thorough training in a technology course. The study established that teachers who had optimistic attitudes toward technology had used it more successfully. The same study also proved that computer self-efficacy was a key factor in determining the use of ICTs in teaching and learning.

According to Salehi & Salehi, (2012: 40) “the integration of ICTs in teaching and learning is not a method; rather it is a medium in which a variety of methods, approaches and pedagogical philosophies may be implemented”. This implies that the success of ICT use depends on how and why it is applied and integrated. Mathevula and Uwizeyimana (2014: 1090) realised that “the use of ICT, in learning and managing educational institutions, just like any other innovation compels the emergence of a new set of skills, attitudes and pedagogical approaches that requires continuous training programs to build capacity among teachers, developers, educators and administrators”. This implies that even for schools that have abundant ICT resources, teachers have to be acquainted in utilising these technologies in order to implement an integrated approach in the adoption and use of ICTs. Thus, the thriving integration of ICT into the classroom depends on the capacity of teachers to make use of their learning settings in updated ways, reconciling technology with new pedagogies (Hennessy, Harrison, and Wamakote, 2010: 43). They further add that this calls for a “diverse set of classroom management skills to be expanded, together with modern ways of using ICTs to augment learning and promote technology literacy, knowledge deepening and knowledge creation”.

Minty & Pather (2014: 48) concur that if the use of ICTs is to have a positive force on teaching and learning then teachers should be developed professionally to be capable to carry out the extra duties that the use of ICTs obliges them to do. They further suggest that “training is essential in the form of **human contact** as the use of manuals to learn skills to use technology is not adequate”. The same sentiments are echoed by Salehi and Salehi (2012: 40) who argue that the “virtually limitless opportunities of access to information in an educational context can pose a real danger of information overload if the teachers do not have the skills in filtering information for relevance, or are unable to establish a coherent organising principle”. Even though providing training to the teachers on the use of ICTs in the classroom may not guarantee ICT integration in their classroom the point still remains that their capacity to use ICTs affects their enthusiasm to integrate them into the classroom. On the other hand, Msila (2015) points out that if teachers lack the knowledge and skills to use ICTs they will not integrate them. Thus, the opportunities provided by ICT to support teaching and learning are not problem-free. It is imperative for teachers to realise the need to be lifetime students in order to stay abreast with continuous technological and recent teaching approaches.

2.4 Barriers to ICT use in classrooms

The barriers that can impede teachers from successfully integrate ICT into the classroom could be varied. As Schoepp (2005: 14) defines, “a barrier is considered

as any condition that makes it difficult to make progress or to achieve an aim". According to Salehi and Salehi (2012: 41) barriers have been classified into extrinsic and intrinsic barriers. They further explain that extrinsic barriers (or 'first order') include "access, time, support, resources and training while intrinsic barriers (or 'second order') include attitudes, beliefs, practice, and resistance". Additionally, Al-Alwani (2005) refers to "extrinsic barriers as those that are linked to organisations rather than individuals while intrinsic barriers are those which are linked to teachers". Becta (2004) identified "lack of confidence, shortage of time, and resistance to change" as teacher-level barriers while "lack of effective training in solving technical problems and lack of access to resources" were classified under school-level barriers. Furthermore, Pelgrum (2001: 166) explain the barriers as

"those pertaining to two types of conditions, that is, material and non-material conditions. The material conditions refer to the insufficient number of computers or copies of software while the non-material barriers refer to teacher's insufficient ICT knowledge and skills, the difficulty of integrating ICT in instruction, and insufficient teacher time".

Furthermore, Gulati (2008) identifies infrastructure such as: "physical space, furniture, electricity and internet connectivity" as of supreme importance in ensuring effective adoption of ICTs in schools. This implies that it is complicated for the expected operation of ICT services in the absence of such infrastructure. Mdlongwa (2012: 2) points that the government of South African lacks the financial stamina to procure ICT resources and construct the infrastructure that is required for effective implementation of ICTs in many provincial education departments. This leads to shortage of technological resources, such as adequate computers for the whole school as well as the provision of internet, which of paramount importance in the successful adoption and use of ICTs. "A high learner-to-computer ratio results in less exposure to the computer per learner and may result in one learner dominating the use of a computer while others simply watch passively" (Chigona, 2015). This, according to Pelgrum (2001: 167), results in teaching and learning that is fruitless because not every one of the learners may likewise gain from the technology. While the lack of access to ICTs is without doubt a most important obstacle in its use, Hennessy, et al (2010: 42) argue that it is a general false impression that the successful application of ICTs in teaching depends mainly on their availability in schools. This means more has to be done to promote the use of ICTs in teaching and learning even if ICTs resources are available in the schools.

Mathipa and Mukhari (2014: 2018) argue that lack of a proper vision, leadership and management in poorly-managed institutions may cause the ineffective use of ICTs. They further present that in situations where there is a 'top-down' administration approach with pocket-sized consultation between levels; employees feel pressurised into using ICT and consequently do not use it valuably. Hennessy, et al (2010: 43) add that "the lack of incentives and support for teachers" also prevent them from using ICTs in their teaching. They further argue that the school management offer diminutive organisational support and little incentives to use ICTs efficiently in the classroom. Additionally, "national polices need to make more commitment to helping teachers effectively integrate computers and internet technologies into the classrooms by aligning curricula, exams, and incentives with the educational outcomes that they hope to gain" (Hennessy, et al, 2010: 43). Otherwise, some teachers may resist the implementation of ICTs in the teaching of their subjects.

The adoption and use of ICTs may be resisted by teachers in some "schools due to fear of change and also due to the fear that they will not be able to cope with the new technology and thus their work will become insufficient" (Mdlongwa, 2012: 4). Mathevhula & Uwizeyimana, (2014: 1090) argues that this resistance by teachers to use ICTs in promoting effective learning is largely dependent on the "risk of teachers losing influence over the values and directions of classroom activity". Shirvan (2014: 40) concurs that technology anxiety determines an individual usage ICT in education. Studies have revealed that both teacher's and learner's computer anxiety was linked to their avoidance of it, which resulted in developing depressing reactions, concern, and fear toward ICT use (Shirvan, 2014: 40). This could be true as studies discovered that both teachers and learners who had exposure to computers at home had more computer knowledge and tended to have lower anxiety and more constructive attitudes toward ICT than those who had less exposure to computers (Shirvan, 2014: 40; Chigona, 2015; Hart & Laher, 2015; Dzansi & Amedzo, 2014; Msila, 2015).

This situation of technology anxiety has been worsened by the issue of language barrier. Mdlongwa (2012: 4) notes that the overriding medium of communication on the internet is English, "with about 80 per cent of online content being in English, and most educational software packages being produced in English. Given that English is not the home language of the majority of the South African"; this can ruin both teachers and learners from valuably using the ICT software or hardware available. Mdlongwa (2012: 4) also discovered that the use of informal language on social networking websites was causing learners to make numerous mistakes in their academic writing.

2.5 The South African Government initiatives on ICT use in schools

There are many key ICT related projects that have been initiated throughout South Africa which act as evidence that efforts are being made to ensure that schools gain access to ICTs. Although some of these ICT initiatives are not directly linked to the e-Learning policy and others have failed, their legacy remains crucial when exploring the adoption and use of ICTs in schools (Howie & Blignaut, 2009). Some of the ICT initiatives are recent and some “have not yet reached every school or district, but even though educators’ and students’ access to ICT is still limited, these initiatives form the basis of the bulk of ICT development and practices in the country” (Draper, 2010: 15).

Howie and Blignaut (2009: 349) review the South Africa’s “framework of strategic, pedagogical and developmental facets of implementing e-education” in schools. This framework presents the following three phases in the implementation of ICTs:

Phase 1: 2004-2007

“Enhancing of a system-wide and institutional readiness to use ICTs for learning, teaching and administration”. During this phase emphasis was put on setting up an education and training scheme that would sustain ICT integration in teaching and learning and training teachers to increase self-assurance in using ICT in the curriculum, to determine the accessibility of ICT, use quality education content, and connect schools to the internet. Howie and Blignaut (2009: 349) affirm that slightly “more than 15 per cent of the South African teachers received ICT training during this first phase”, hence prompting the need to continuously address the issue of “teacher training as well as other individual targets not” achieved.

Phase 2: 2007–2010

“System-wide integration of ICTs into teaching and learning”. This phase encouraged teachers and school administrators to integrate ICT into the curriculum and management. Howie and Blignaut (2009: 349) established that ICT is extensively used in learning institutions; “schools use education content of high quality; schools are electronically connected, access the internet and communicate electronically; and local communities use and support school’s ICT facilities”.

Phase 3: 2010–2013

“ICTs should be integrated at all levels of the education system”. In this roll-out phase it was “expected that all provincial departments of education will use ICT in their planning, management, communication, monitoring, and evaluation, and all

institutions use the educational portal for teaching and learning, given that educators and students are capable of using ICT” (Howie and Blignaut, 2009: 349). Thus, most schools were provided with ICTs irrespective of whether they needed it or not.

Howie and Blignaut (2009) noted that this strategy of ICT development in South African schools had a weakness in that it did not give the South African universities any role in professional development in ICT training for teachers. They further argue that South African Universities are developing their own inside ICT policies on the way in which ICT is expected to be integrated into the learning and teaching procedure.

The **SchoolNet** led the implementation of ICT in South African School, which also provided staff development and ICT support to schools (Mdlongwa, 2012: 2). SchoolNet South Africa also “provides online, mentor-based programmes that offer in-service training to teachers on how to integrate ICT into the curriculum and its management”. It is hoped that through in-service training the teachers will gain problem-solving, critical thinking and collaboration skills (Draper, 2010: 16). A study by School Net South Africa in 2002 recorded thirty-four different programmes and projects that promote education through the use of ICT (Isaacs, 2007: 10). Some of the major programmes which are currently underway are the Kanya Project, the teacher laptop initiative, and the Gauteng online project. However, for the purposes of this study only the Khanya project and the teacher laptop initiative will be discussed.

The **Khanya project**, as a provincial programme established in the Western Cape in April 2001, serviced the public schools in the Western Cape (Isaacs, 2007) with the main objectives being to:

- “increase educator capacity and effectiveness by means of technology
- Harness the power of technology to deliver the curriculum
- Enhance the quality of the learning experience in the classroom, providing an opportunity for students to benefit from a variety of learning styles
- Integrate appropriate and available technology into the curriculum delivery process as different technologies mature
- Use technology to assist all disabled students to maximise learning
- Improve Senior Certificate and FET results, as well as student outcomes in all grades, in terms of number of passes and quality of results

- Increase the number of students qualified and competent to enter tertiary education institutions after obtaining their Senior Certificates and FETs
- Improve numeracy and literacy in lower grades in order to build a stronger foundation for future matriculants” (Draper: 2010: 17).

The Khanya project focused on two developmental stages. In the initial stage it was involved “establishing a dedicated space, room, or lab where the technologies were installed together with the educational software, Internet connectivity, and security while the second phase focused on the educational use of the technologies and included training of educators in the use of ICTs” (Isaacs, 2007). The Kanya project has achieved a lot in promoting the adoption and use of ICTs in schools as evidenced by numerous awards received for its successful achievements (Isaacs, 2007). Draper (2010: 17) also claims that almost one thousand schools within the province of Western Cape have access to ICTs and the teachers who were trained to use it due to the initiatives of the Khanya project.

Another key ICT initiative is the **Teacher Laptop Initiative** (TLI) which Naledi Pandor, the then Minister of Education, announce in May 2009 as part of the government’s measures to advance the adoption and use of ICTs in the delivery of the curriculum (DoE cited in Draper, 2010: 18). According to Draper (2010) the TLI targeted to provide each teacher in South Africa with a laptop to be used in their curriculum delivery as well as the related administrative duties. The TLI, administered by the Education Labour Relations Council (ELRC), was planned to deal with the need for a quality education systems and was part and parcel of an arrangement by the DoE and other stakeholders to promote by and large the excellence in education. This was to be achieved through ensuring that the ICT infrastructure is available to both the teachers and the learners in the public schools.

According to Draper (2010: 18-19),

“the ICT packages for teachers consist of a laptop with prescribed minimum specifications, including software for school administration, the national curriculum statements documents, as well as internet connectivity, insurance and finance, as per the requirements of Government gazette 322207. Qualifying teachers will receive a monthly allowance of R130.00 (taxable) and are required to fund the difference between this and the monthly repayments of the package. Most of the packages from the provisionally accredited suppliers cost between R250.00 and R390.00 per month and repayments are spread over a period of five years”.

Draper further claims that regardless of the passionate pronouncement of the TLI by the DoE officials in July 2009, the Initiative only began to gain the impetus after a year that is in July 2010.

In concluding this section, it is important to re-emphasise that most of the ICT initiatives in South Africa focused on the provision of ICT resources schools, and also to equip both the teachers and the learners with the necessary skills for the effective adoption and use of ICT in the delivery of the curriculum. Howie and Blignaut (2009) claim that a few of these ICT initiatives were successful in capacitating the teachers to effectively adopt and use ICTs in the delivery of the curriculum.

2.6 Theoretical frameworks

The quality of ICT use in most of the South African Schools depends on the educator's ability to integrate the new tools in their subject teaching. In order to determine and understand the factors affecting the adoption and use of ICTs in the classroom teaching this researcher adopted the South African Teacher Development Framework (DoE, 2007) and the Technological Pedagogical Content Knowledge (TPACK) framework (Mishra and Koehler, 2006). The South African Development Framework provided insight or lens on how to look at issues in the study, such as to determine the participant's (teachers and/ or principals) ability level to demonstrate the development of ICT integration in their classroom teaching. At the same time the TPACK framework furnished the researcher with an insight on the kinds of Knowledge that the same participants need to ensure successful integration. Accordingly, the application of the two frameworks in this research is likely to ensure a detailed understanding of the concerns in the study. Wilson-Strydom, Thomson & Hodgkinson-Williams (2005) argue that "increased access to ICT resources does not necessarily result in increased integration of ICT in the classroom". Thus providing ICT resources in schools (including hardware and software) as well as providing technical support to teachers and students does not guarantee ICT integration in the classroom. However, it is obvious that schools with limited ICT resources such as hardware and software have limited chances to integrate ICTs into their classrooms.

2.6.1 The Teacher Development Framework

The Teacher Development framework presents the following five teacher aptitude levels to exemplify the expansion of ICT use in the classroom teaching:

Entry; Adoption; Adaption; Appropriation; and Innovation.

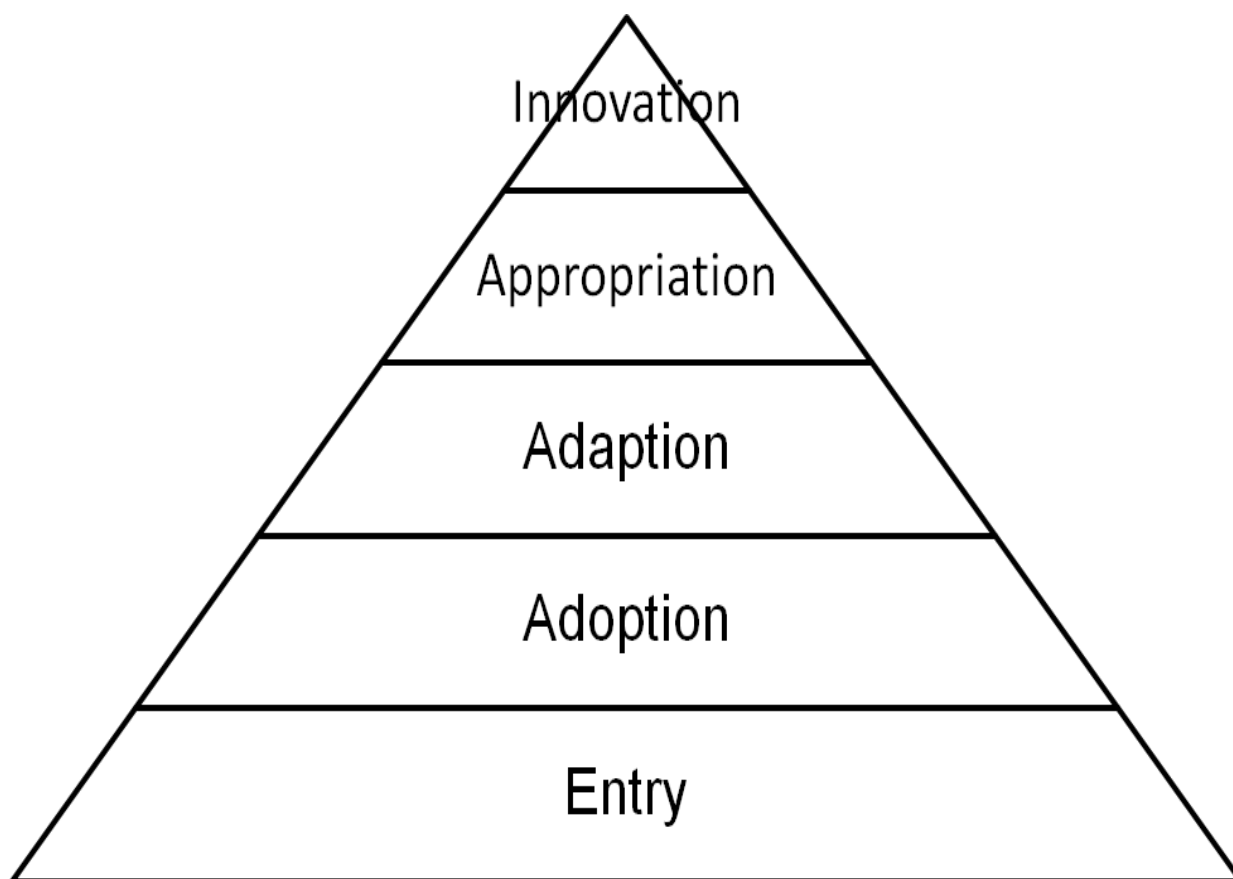


Figure 2.1 Teacher Development Frameworks (DoE-2007)

According to this framework (Figure 2.1) the *entry* and *adoption* stages indicate “teacher abilities that are constrained to using ICTs for limited interaction with knowledge” (Ndlovu & Lawrence, 2012: 4). The guidelines (DoE, 2007: 6) stipulate that at the *entry* level, the teacher is computer knowledgeable and is keen and excited to make an effort in using ICTs in teaching and learning, and at *adoption* level “the teacher is able to use various ICT, including computers, to support traditional management, administration, teaching and learning, and is able to teach learners how to use ICT”. Nevertheless, disappointments and uncertainties are frequent in the beginning of ICT use (DoE, 2007: 6). Ndlovu and Lawrence (2012: 4) suggest that the cause for teacher’s restricted use of ICTs in their classroom could “range from the teacher not having skills to tailor make learning activities that will promote advancement in learning abilities with new teaching tools or simply not having appropriate knowledge to integrate them into their teaching”. In most “South African schools teachers with limited ICTs are at the *entry* and *adoption* stages” (Wilson-Strydom and Thomson, 2005). This implies that their use of ICT is not at a stage where they are convinced to use them to enhance learning. The supremacy of ICTs is seen when learners are able to productively connect with compound issues. While

the guidelines (DoE, 2007: 6) propose that there is dissatisfaction at the *entry* stage, Ndlovu and Lawrence (2012: 5) argue that it is at the *entry* level where “quality use of ICTs is compromised as educators lack the attributes that enable them to achieve key educational goals”. They further argue “that quality use of ICTs would be a challenge if the educator is not in a position to make decisions on what and how content should be taught. The teaching tool’s affordances will not be maximized”.

The guidelines (DoE, 2007: 6) insist that efficiency boosts at the *adaptation* level as “the teacher is able to use ICT to support everyday classroom activities at an appropriate NCS level, assess the learning that takes place and ensure progression” as well as being “able to reflect critically on how ICT changes the teaching and learning processes and to use ICT systems for management and administration”. At the *appropriation* level, the educators have the “experience and confidence to reflect on how ICT can influence teaching and learning strategies, and to use new strategies”. They are able to holistically comprehend the how ICTs can add value to teaching and learning. Additionally, the teacher has an understanding of the developing nature of ICT, and awareness that it is integral to the structure and purposes of the NCS. The guidelines describe the *innovation* level as the highest level in ICT development. At this stage, according to the guidelines (DoE, 2007),

“the teacher is able to develop entirely new learning environments that use ICT as a flexible tool, so that learning becomes collaborative and interactive. ICT is integrated as a flexible tool for whole-school development through redefining classroom environments and creating learning experiences that leverage the power of technology”.

Thus, as the levels rise up to the *innovation* stage, educators are able to adjust ICT use to suit learner educational needs and are able to broaden their thinking skills.

However, the guidelines (DoE, 2007: 6) warns against seeing adaptation, appropriation and innovation stages as exclusive descriptors of teachers’ skills level. Some essential skills are suggested for the integration of ICT into the curriculum delivery. These include:

- “Basic ICT knowledge and skills. These are the knowledge and skills at a basic level, and correspond to the *entry* and *adoption* levels of the framework.
- Integrative ICT knowledge and skills. These are the knowledge, skills and values to integrate ICT into the design and practice of teaching and learning, and correspond to the adaptation and appropriation levels of the framework.

- Specialised ICT knowledge and skills. These focus on the transformational use of ICT to redefine the role of the teacher and classroom environments, and correspond to the innovation level of the framework” (DoE, 2007: 6).

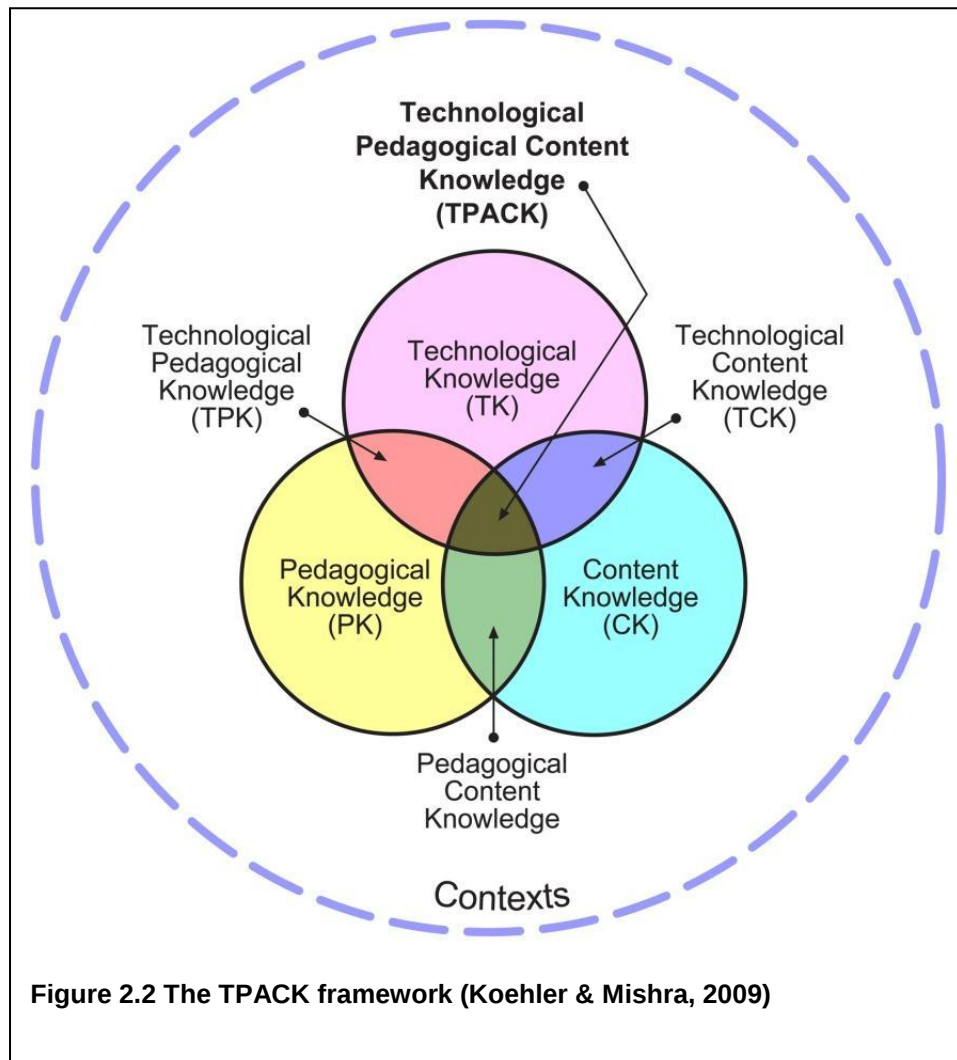
The South African Development Framework will assist the researcher in determining the participant’s ability level to demonstrate the development of ICT integration in their classroom teaching. Using this framework the researcher will be in a position to put the participants and their respective schools into various categories as propounded by the framework, that is, determine whether they are operating at the entry level; adoption level; adaption level; appropriation level or innovation level. In the end the researcher will be able to link this information to the factors affecting the adoption and use of ICTs in teaching and learning at these private high schools. Consequently, the study will reveal a comprehensive discussion of the findings.

2.6.2 The Technological Pedagogical Content Knowledge

The Technological Pedagogical Content Knowledge (TPACK) stems from the reasoning that teaching is an intricate practice that calls for an interweaving of several types of specific knowledge (Koehler & Mishra, 2009, 61). As such, teaching is a field that demands “teachers to apply complex knowledge structures across different cases and contexts” Mishra, Spiro, & Feltovich (in Koehler and Mishra, 2009: 61). Leinhardt and Greeno (in Koehler & Mishra, 2009: 61) concur that teachers practice their expertise in extremely multifaceted, vibrant classroom environments that demand them to persistently modify and advance their understanding. Accordingly, successful teaching rests on elastic access to wealthy, well-organized and integrated knowledge from special fields including knowledge of learner’s thinking and learning, knowledge of subject content, and most importantly, knowledge of technology (Koehler & Mishra, 2009: 61). Consequently, Koehler and Mishra (2009) present TPACK as a framework that builds on Shulman’s (1987, 1986) “descriptions of Pedagogical Content Knowledge (PCK) to explain how teacher’s understanding of educational technologies and PCK interact with one another to produce effective teaching with technology”.

The TPACK framework results from the blending of the various knowledge types as the teacher integrates ICTs into the teaching of their subjects. These types of knowledge include: Pedagogical Knowledge (PK), Content Knowledge (CK), and Technological Knowledge (TK). These three key categories of knowledge overlap and result in the following four additional types of knowledge needed by teachers for integration: Technological Content Knowledge (TCK), Pedagogical Content Knowledge (PCK), Technological Pedagogical Knowledge (TPK), and Technological

Pedagogical Content Knowledge (TPACK) (Koehler & Mishra, 2006). This can also be illustrated using a Venn diagram as shown in Figure 2.2.



Content knowledge (CK) according to Koehler and Mishra (2009: 63) refers to “teacher’s knowledge about the subject matter to be learned or taught”. The subject matter that is done in one subject is obviously not the same as the subject content that is done in another subject. Accordingly, the comprehension of subject content is of critical importance for teachers as the knowledge and the process of analysis differ significantly between subjects, and teachers should value the deeper knowledge basics of the subjects they teach. As Shulman (in Koehler & Mishra, 2009: 63) pointed, “this knowledge would include knowledge of concepts, theories, ideas, organizational frameworks, knowledge of evidence and proof, as well as established practices and approaches toward developing such knowledge”. If the teachers do not possess a remarkable content knowledge base the learners can end up receiving inaccurate information and build up fallacies (National Research Council; Pundt & Duit; in Koehler & Mishra, 2009: 63). Thus, the quality and organization of knowledge in the thought process of teachers determine the success of teaching and learning.

Pedagogical Knowledge (PK) is “the teachers’ expertise on the processes and practices or methods of teaching and learning” (Koehler & Mishra, 2009). They cover overall educational functions, principles, and aims, among other things. The theorists insist that “this generic form of knowledge applies to understanding how students learn, general classroom management skills, lesson planning, and student assessment”. Accordingly, a teacher with profound pedagogical knowledge understands how students create knowledge and attain expertise and how they extend routine of mind and positive dispositions toward learning. As such, pedagogical knowledge demands “an understanding of cognitive, social, and developmental theories of learning and how they apply to students in the classroom” (Koehler & Mishra, 2009: 64).

Pedagogical Content Knowledge (PCK) is the boundary between subject and pedagogical knowledge which, according to Koehler and Mishra (2009: 64) is “consistent with and similar to Shulman’s idea of knowledge of pedagogy that is applicable to the teaching of specific content”. PCK becomes apparent when teachers have the capacity to develop on their students’ preceding knowledge and acclimatize their teaching strategies to impart the new subject matter to the students. Therefore, PCK covers the nucleus “of teaching, learning, curriculum, assessment and reporting, such as conditions that promote learning and the links among curriculum, assessment, and pedagogy” (Koehler & Mishra, 2009: 64).

Technology knowledge (TK), according to Koehler and Mishra (2009) “is always in a state of flux – more so than other two core knowledge domains in the TPACK framework (pedagogy and content)”. This is because technology in itself is continuously changing with time. The description of TK they used in this “framework is close to that of Fluency of Information Technology (FITness), as propounded by the Committee of Information Technology Literacy of the National Research Council” (NRC, 1999). The committee argues that FITness goes further than traditional concepts of computer literacy to require that people understand information technology adequately for them to relate it effectively at work and in their everyday lives, to be aware of when information technology can support or obstruct the achievement of a goal, and to continually adjust to changes in information technology. Acquiring TK in this way enables a person to carry out a multiplicity of tasks using information technology.

Technological Content Knowledge (TCK) refers to the way content is taught using technology. Thus it is imperative for teachers to understand the way “in which technology and content influence and limit one another”. Koehler and Mishra (2009:

65) insist that “teachers need to master more than the subject matter they teach; they must also have a deep understanding of the manner in which the subject matter can be changed by the application of particular technologies”. Accordingly, teachers need to select the appropriate technologies to use when teaching specific subject matter and should be aware of “how content dictates or perhaps even changes the technology or vice versa”.

Technological Pedagogical Knowledge (TPK), according to Koehler and Mishra (2009: 65) “is an understanding of how teaching and learning can change when particular technologies are used in particular ways” and it “includes knowing the pedagogical affordances and constraints of a range of technological tools as they relate to disciplinarily and developmentally appropriate pedagogical designs and strategies”. They further emphasize that to build TPK; a profound understanding of the limitations and strengths of technologies and the disciplinary contexts within which they operate is needed. “Teachers need to reject functional fixedness” (Duncker in Koehler & Mishra, 2009: 66) and extend skills to look ahead of most common uses for technologies, reconfiguring them for adapted pedagogical functions. Thus, TPK demands a futuristic, inventive, and flexible seeking of technology use, “not for its own sake but for the sake of advancing student learning and understanding”.

Technology, Pedagogy, and Content Knowledge (TPACK) as indicated in Figure 2.2 is the juncture of all the three main elements of knowledge resulting in the emergence of a form of knowledge that forms the center of valuable teaching with ICTs. According to Koehler and Mishra (2009: 66) TPACK requires “an understanding of the representation of concepts using technologies; pedagogical techniques that use technologies in constructive ways to teach content; knowledge of what makes concepts difficult or easy to learn and how technology can help redress some of the problems that students face; knowledge of students’ prior knowledge and theories of epistemology; and knowledge of how technologies can be used to build on existing knowledge to develop new epistemologies or strengthen old ones”. Given the complexity of teaching with ICTs, the TPACK agenda advocates that “content, pedagogy, technology, and teaching or learning contexts have roles to play individually and together”. Thus, teaching productively with technology demands continuously generating, upholding, and restoring a self-motivated balance among all components.

The TPACK stresses the significance of equipping teachers with technological skills and pedagogical skills to use the technology provided. This is because “the teacher’s

ability to bring together content knowledge, pedagogy skills, and technology skills highly affects ICT implementation and integration” (Nkula & Krauss, 2014: 249). Accordingly, Nkula and Krauss (2014) suggest the early adoption of TPACK, possibly during teacher training at tertiary institutions, in order to promote training that equips the teacher with hands-on experience on the integration of technology in their teaching. While Nkula and Krauss (2014: 249) agree that the TPACK framework gives insight on the type of skills that the teachers require in facilitating meaningful integration. They argue that there is need to pay attention to the importance of “dealing with first-order and second-order barriers, aligning teacher pedagogical beliefs to practice in order to ensure integration, and the significance of considering the background when launching and integrating ICTs”.

The TPACK framework will furnish the researcher with an insight on the kinds of Knowledge that the participants have or need to ensure successful integration of ICTs in their classroom teaching. Thus, using the TPACK framework, the researcher was in a position determine which types of knowledge are present or lacking in the participants that are crucial for the development of ICTs in their schools. This will lead to a meaningful discussion of the findings.

With regard to the two frameworks explained in this section, it is imperative to reiterate that the application of both frameworks in this study enables the researcher to explore the research problem adequately. The researcher through the South African Teacher Development Framework will be able to assess the teacher’s ability levels to demonstrate the development of ICT integration in their classroom teaching. At the same time the TPACK framework provides the researcher with an insight on the kinds of Knowledge that the same participants need to ensure successful integration. Accordingly, the application of the two frameworks in this research is likely to ensure a detailed understanding of the concerns in the study. Thus, it is important to realise that the two frameworks complement each other giving the researcher enough room to explore the research problem sufficiently.

2.7 Chapter summary

Several issues linked to the factors affecting the adoption and use of ICT in schools have been outlined which provide direction to the research designs and research methodology. The literature review has also demonstrated that if ICTs are properly implemented in schools the drawbacks associated with the adoption and use of ICTs in teaching and learning can be overpowered by the benefits of integrating ICTs in education. Accordingly, in this investigation, the researcher shall explore the School-related as well as the teacher-related challenges associated with ICT adoption and

use of ICTs in private schools in the Western Cape with the aim of providing recommendations to the WCED, the private high schools registered by the WCED, the principals and the teachers of the private high schools that follow the WCED curriculum.

Chapter 3: Research design and Methodology

Introduction

In this chapter, the outline of the research designs employed to address the research questions is presented. According to Du Plooy-Cilliers (2014: 21) “the cognitive interests of the researcher determine what methods should be used”. Strydom and Bezuidenhout (2014: 175) concur that “the concept of design adherence relates to the consistent arrangement of the research question, purpose, goals and methods within a specified paradigm or tradition”, and is very crucial for ensuring the validity and trustworthiness of the research. As such, the aims and goals of this research have been taken into consideration in the selection of the most appropriate research design and methodology. With this in mind, a detailed discussion of the research methodology which focuses on data gathering, analysis and interpretation procedures is presented in this Chapter.

The rest of this chapter is organised as follows:

Section 3.1 explains the research designs used in this study

Section 3.2 presents the empirical data analysis

Section 3.3 outlines the trustworthiness and validity of the research

Section 3.4 elucidates the challenges experienced during conducting the research

Section 3.5 explicates the ethical considerations and clearance process

Section 3.6 gives a summary of the Chapter

3.1 The research designs

A research design is an approach for addressing a specific research enquiry or concern. This implies that it is imperative for the researchers to come up with a plan that outlines the conditions and procedures for collecting, analysing, and reporting data, which is guided by the research questions. Therefore, it is critical for the researcher to have a comprehensive knowledge of the methodological and analytical tools available, as well as their pros and cons (Dzansi & Amedzo, 2014).

This research project used both qualitative and quantitative research designs. This was done to exploit the strengths of both qualitative and quantitative data thus providing a comprehensive report on the findings of this study. According to Creswell (2014) mixed methods research is a good design to use for it enables the researcher to manipulate on the benefits of using both quantitative and qualitative data. This study

concur that the use of both quantitative and qualitative research methods permits researchers to benefit from what are seen as strengths of one method in a way that reimburses for what have characteristically been seen as the limitations of the other. This implies that the quantitative data collected in this research was compared to the qualitative data in order to come up with more reliable findings. It is also imperative to note that “the phenomena which are investigated in social sciences are so interrelated that a single approach will not be enough to encompass human beings in their full complexity” (Dzansi & Amedzo, 2014). Thus the two approaches used in this study complemented each other resulting in a comprehensive discussion of the findings.

Qualitative researchers “study phenomena in their natural settings in order to make sense and interpret social phenomena such as interactions and behaviour” (Creswell, 2014). Minty and Pather (2014: 48) concurs that qualitative research emphasises the “human factor and intimate first-hand knowledge of the research setting” as well as “searching for meanings and essences of experience”. Thus the researcher gained an in-depth understanding of participants’ individual subjective peculiarities that are characteristic of personal experiences as well as meanings related to a particular phenomenon. As such, the interpretive paradigm was followed to deal with data generated from both semi-structured face-to-face interviews and the survey questionnaires.

On the other hand, quantitative research design has been used in this research mainly because of its emphasis on closed-ended questions, checklists and rating scales which are very useful in simplifying and quantifying the responses since the respondents are habitually more willing to tick the boxes than responding to long open-ended questions (Du Plooy-Cilliers & Cronje, 2014: 152 & 160). Thus quantitative research results in the collection of vast amount of data from an individual respondent at any time. It is for this reason that this researcher feels the two approaches assist each other and enable a comprehensive presentation of the investigation conducted. Both qualitative and quantitative data are collected simultaneously in order to save time when visiting the schools to engage with the participants.

3.1.1 Sampling of the Schools and of the participants

Sampling is a process of selecting a team of respondents from whom information is gathered and it helps the researcher to decide what could best help to get answers to the research question or find a solution to the problem (Dzansi & Amedzo, 2014). This group of selected people or social artefacts from which information is required could either be referred to as the *target population* or the *accessible population*. Mathipa and Mukhari (2015) define a population of a study as “the total group of people or entities

[social artefacts] from whom information is required". Target population refers to everyone or everything that falls within the parameters of the study while accessible population refers only to the section of the population that one can actually include in a study. Amedzo (2007: 29) posits that frequently, it is impossible to identify all the subjects of a population of interest. Therefore, a number of considerations have to be taken into account, such as the research cost versus value, time constraints, the amount of resources available, the purpose of the research, and whether error control is of main concern or not.

In light of the above, this research was conducted in ten private high schools randomly selected from the Metro Central, Metro North, and Metro South districts of Western Cape Province. The choice of ten private high schools was seen as sufficient to address the research questions and problem. These districts were chosen simply because they are close to where the researcher is located thus making it cost effective but still providing valuable data. These districts are within a twenty-five kilometre range from where the researcher resides. Additionally, the chosen private high schools from the aforementioned districts were selected using a simple random sampling technique in order to reduce the chances of the researcher bias. To accomplish this sampling, the Head of private schools in the province was requested to provide a list of private high schools which are registered with the WCED. The list of private schools provided by the WCED was last updated on the 26th of July 2012. It is from this list that the researcher identified the private high schools in the Metro Central, Metro North, and Metro South. The names of all the twenty-six private high schools from the above mentioned districts were written on pieces of paper and put in a container from which the ten selected schools for this study were randomly drawn. The actual names of the ten selected private high schools are withheld in this research, and they are substituted by alphabetic pointers. This was done to promote confidentiality.

Similarly, a simple random sampling technique was used to select the participants of this study from the ten schools. This sampling technique was used in order to ensure that everyone who formed part of my population had a fair opportunity of being incorporated in the sample, thus increasing the trustworthiness of the research findings. The same procedure of drawing the names of the participants from the container was followed to give everybody within the population an equal chance of being selected for the study. The actual names of the selected participants are also withheld in this research, and they are substituted by false names. This was done to ensure adherence to ethical and confidentiality issues.

Ultimately, a total of seventy participants for both interviews and survey questionnaires (all educators and/or principals) were selected for this study. Out of these seventy participants selected for this study ten were scheduled for interviews while sixty were selected for the survey questionnaire. The ten participants scheduled for interviews were selected one per school by way of volunteering. The ten participants for interviews and sixty for survey questionnaires proved to be sufficient to provide the data required to address the research question. Additionally, the sample sizes for this research were determined by other considerations such as the budget, the time as well as the resources available to carry out a meaningful research. It is imperative to note that every research study operate on a budget. Moreover, the researcher was aware of the fact that time constraints are an important consideration when determining the sample size as the researcher needed time to source his sample, to contact the participants, and still collect data from them. Furthermore, the researcher considered the amount of the resources he had at his disposal in order to decide the size of his sample. While a large sample might result in vast amount of valuable data being collected, it is also important to realise that it may require a team of researchers who will be responsible for collecting data from the participants. With all this in mind, the researcher deemed the sample size for this study as manageable in terms of the available budget, time, and resources.

The selected participants comprised mainly of teachers and a few principals. Most of the teachers selected teach more than one subject that is from grade 8 to 12. The subjects being taught by participants range from CAT, Mathematics, Life Sciences, Physical sciences, Geography, History, Languages, Economics and Business Studies. Out of the ten participants selected for the interviews seven participants were private high school teachers and three were private high school principals who are also teaching. For the survey questionnaires, out of a total of sixty participants forty-five were teachers and fifteen were principals. The researcher felt that both the interviews and the survey questionnaires should involve more teachers than principals because teachers are more directly linked to the adoption and use of ICTs for curriculum delivery. Thus, the teachers were seen as the most affected when it comes to the adoption and use of ICTs for curriculum delivery. At the same time, the researcher realised that it is imperative to incorporate a few principals into this study as participants so as to strike a balance. Although the principals are not as directly linked to the adoption and use of ICTs for curriculum delivery as the teachers, the researcher also selected them as participants so as to get their perceptions and experiences regarding ICT integration in their schools. The principals as managers of the schools,

they also play an important role in promoting the adoption and use of ICTs for curriculum delivery.

While the researcher acknowledges that school learners and the school governing body members form an integral part in the teaching and learning in schools they both fall outside the scope of this research. Thus they do not form part of the participants because they do not play a pivotal role in deciding when and how to integrate technology into learning and teaching programmes as the decision solely lies with the teachers and principals.

Table 3.1 shows the total number of participants selected from each selected private school.

Name of Private School	No. of participants selected for interviews	No. of participants selected for Questionnaires	Total number of participants selected
A	1	4	5
B	0	4	4
C	2	6	8
D	2	5	7
E	1	9	10
F	0	5	5
G	1	8	9
H	2	7	9
I	0	7	7
J	1	5	6

Table 3.1 Number of participants per school (Created by the researcher)

It is clear from Table 3.1 that the number of participants picked from the ten schools for both the interviews and the survey questionnaire is uneven. This reason for that is some participants who were initially selected through the simple random sampling for interviews later withdrew their participation thus forcing the researcher to look for teachers who were available for the interviews. For the survey questionnaires there were 100 names of the teachers from the ten schools and sixty participants were

randomly selected resulting in the uneven distribution of teachers picked from the different schools.

It is imperative to point out that while the researcher acknowledges that school learners and the School Governing Bodies (SGBs) of the private schools form an integral part in the teaching and learning process, they both fall outside the scope of this research. The main focus of the study was on the teachers since they play a pivotal role in the adoption and use of ICTs for classroom delivery. Thus the researcher decided not to select participants from the school learners and the SGB members.

3.1.2 Qualitative data collection method

According to Strydom and Bezuidenhout (2014: 173) qualitative research “deals with the underlying qualities of subjective experiences and the meanings associated with phenomena”, thus making it almost impossible for researchers “to measure and quantify these experiences and meanings”. They further elaborate that as a result qualitative research method allows the researcher to generate a wealth and depth of data collected from compound and comprehensive phenomena in a specific social context.

Consequently, for the qualitative research design, one-on-one, face-to-face semi-structured interviews were used in this study. This data collection method was preferred as the participants could ask the researcher to clarify specific questions in the event of a misunderstanding of the questions. Conversely, the researcher had the opportunity to ask the participants to clarify their responses in the event of a misunderstanding thus resulting in the provision of more detailed explanations of the participants' views. Another reason why individual face-to-face interviews were preferred is that they give room for flexibility in the research process. Moreover, during the face-to-face interviews the researcher could observe the non-verbal reactions of participants thus providing additional data that was used in the analysis and interpretation of the results.

For these face-to-face semi-structured interviews, the general interview approach was used in order to allow the researcher to take control of the interview in order to ensure that the discussion does not divert from the focus of the study. This approach also enabled the researcher to generate as much information as possible through probing the interviewee in questions beyond the predetermined ones. Additionally, semi-structured interviews were used in order to gain a full representation of each respondent's beliefs about or perception on the adoption and use of ICTs in the classroom.

The participants were given the opportunity to choose their preferred venue for these face-to-face interviews to ensure they would feel comfortable during the interview process. Thus the researcher concurs with Minty and Pather (2014: 49) that interviews “should be conducted in surroundings that are conducive to free speech, and that participants need to feel comfortable with the researcher and their surroundings before they can share their experiences”. All the participants preferred to be interviewed at their schools. The researcher arranged ten interviews (seven teachers and three principals) in total. However, seven teachers and two principals from the selected schools were interviewed and the researcher audio recorded the interviews and then transcribed them. The inclusion of both teachers and principals was done in order to get a full picture of both teacher-related and school-related factors affecting the adoption and use of ICTs in private high schools. One of the principals could not be interviewed as he constantly postponed the interview schedules up to a time he indicated that he was withdrawing his participation. Despite the withdrawal of one participant, a total of nine interviews (90 %) enabled the researcher to gain an in-depth understanding of how ICTs are integrated in the classroom with the focus being on the technique. Additionally, the number was manageable, both in terms of time and financial resources.

This study acknowledges that a large sample may result in gathering a lot of valuable data however, one must bear in mind that it is costly to obtain a group big enough to gather and analyse the data. Thus, it is critical for researchers to carefully choose a manageable sample size that will supply the required amount of data. Likewise, “the researcher should make sure that the sample size and the sampling method used is not too time consuming bearing in mind that a lot of time is needed to decide on the sample, contact the participants, collect data from them and then still analyse and interpret the findings” (Pascoe, 2014: 145).

This research project used a set of focused questions (Appendix A) that guided the interview process. The focused questions enabled the researcher to gain an in-depth understanding of the factors or challenges that militate against effective ICT adoption and use in private high school in the Western Cape.

3.1.3 Quantitative data collection method

Creswell (2014) defines quantitative research as “an inquiry approach useful for describing trends and explaining the relationship among variables found in the literature”. In the process, the researcher developed the instruments to collect data to answer the specific questions, and analysed numbers from the instruments, using

statistics. The researcher then interprets the available data and draws conclusion based on this data.

Accordingly, for the quantitative research design, this researcher used a cross-sectional survey with validated questionnaires on a likert scale to examine the factors that affect teachers regarding the adoption and use of ICTs in the classroom. Thus a survey questionnaire consisting of two main parts was prepared for this purpose (Appendix B). The first part dealt with the factors that influence teachers' familiarity with ICT use in the classroom and the second part dealt with the challenges experienced by teachers regarding the adoption and use of ICTs for curriculum delivery. The first part consisted of three items which were designed on a four-point Likert scale indicating teacher's familiarity with ICT use, as follows:

Item 1: 1 = never used, 2 = limited user, 3 = frequent user and 4 = regular user.

Item 2: 1 = novice, 2 = some experience, 3 = frequent user and 4 = expert.

Item 3: 1 = not familiar, 2= limited familiarity, 3 = familiar and 4 = very familiar.

The second part consisted of **eight items** which were all designed on a five-point Likert scale of agreement, where 1 = strongly disagree, 2 = disagree, 3 = undecided, 4 = Agree and 5 = strongly agree. The survey questionnaire was administered to a total of sixty teachers and/or principals from the selected schools. Thus a total of sixty respondents were deemed sufficient in providing the amount of data required to address the research question. Additionally, the number was deemed sufficient as the results are not going to be generalised to the whole population.

Following the granted permission by the principals of the selected schools, the researcher preceded to hand-deliver the survey questionnaires to each respondent at their schools. "Hand-delivering the questionnaires" was seen as more effective as it "prevented possible delays resulting from posting questionnaires and also helped to establish a good relationship between the researcher and the respondents" (Mathevula & Uwizeyimana, 2014: 1092). The researcher tried by all means possible to collect personally all the completed questionnaires directly from the participants so as to guarantee confidentiality and to stay away from circumstances in which a third-party could access this information. Despite the repeated efforts by the researcher to collect all the completed questionnaires by the participants, it was impossible to get all the sixty questionnaires back as some participants could not be located whenever the researcher visited their schools. Eventually, a total of fifty-six (about 93.3%) completed questionnaires were collected from the participants.

3.1.4 The research instruments: Questionnaires and interviews

This research used both semi-structured face-to-face interview questions (Annexure A) and survey questionnaires (Annexure B). According to Gall, Gall, and Borg (2007: 228) questionnaires “are printed forms of all individuals in the sample and for which respondents record their answers in written form”. They also define interviews as “oral questions asked by the interviewer and oral responses by the respondents”. The interviewer is largely in control of the whole process by making an arrangement with the participant on the time and place to conduct the interviews.

It must be understood that both questionnaires and one-on-one interviews have greater influence on the trustworthiness and validity of the research data. Thus, the quality of measurement is guarded by the careful construction of the instrument (Bhengu, 2009: 39). Bhengu further argue that “a well- designed research instrument (s) is a culmination of a long process of planning the research objective, formulating the problem, generating the hypothesis and many other things”. This implies, “a poorly designed research instrument (s) can invalidate any research results, notwithstanding the merits of the sample, field of workers and the statistical techniques” (Huysamen in Bhengu, 2009: 39).

In the construction of the research instruments of this study, this researcher presented questions in a simple and straightforward way, which avoided ambiguity, bias, prejudice and technical language. To check whether the research instruments were feasible a pilot study was carried out on a few educators who volunteered to respond to both the survey questionnaires and the interview questions. Thus the pilot study provided the researcher with the opportunity to consider the suitability of the research instruments.

Additionally, the appropriateness of the research instruments was achieved through considering the characteristics of good research instruments and also through consulting different research specialists in education and colleagues during the designing process. The researcher was also guided by the theoretical frameworks in the formulation of the research instruments. The South African Teacher Development framework provided the researcher with insights on how to develop questions that would reveal the participant’s ability level to demonstrate the development of ICT integration in their classroom teaching. At the same time the TPACK framework furnished the researcher with the information on the different kinds of knowledge which the participants were expected to possess for successful ICT integration to take place.

Other key issues considered during the construction of the survey questionnaire include:

- Questions were short and to the point in order to get the required data
- Each question dealt with a single idea and was phrased in a simple and straightforward way which guided the respondents to give accurate answers
- Questionnaires had clear instructions on how respondents were to complete them.

Before administering the questionnaires to the selected respondents, the researcher consulted some research specialists in education to edit and proofread the questions in order to make sure they are up to the expected standard. Adjustments were done after the editing and proofreading of the questionnaires. The researcher further explained key concepts found in the research instruments to all the participants during the course of data collection to enhance their understanding of the requirements of the questions.

3.2 Data Analysis

Data analysis is the procedure that involves presenting information in an orderly and structured way so as to provide a clear meaning to it. The process typically involves “reducing the volume of raw information, sifting significance from trivia, identifying significant patterns and constructing a framework for communicating the essence of what the data reveals” (De Vos, Strydom, Fouche and Delport in Bezuidenhout & Cronje, 2014: 232). Thus data analysis entails interpretation which suggests a researchers’ comprehension of the information gathered from the participants.

The two theoretical frameworks discussed in chapter two have been used in the analysis phase. The South African Development Framework assisted the researcher in determining the participant’s ability level to demonstrate the development of ICT integration in their classroom teaching. Using this framework, the researcher was able to determine whether educators and their respective schools are operating at the entry level; adoption level; adaption level; appropriation level or innovation level. In the end this information was linked to the factors affecting the adoption and use of ICTs for teaching and learning at these private high schools.

At the same time the TPACK framework furnished the researcher with an insight on the kinds of Knowledge that the educators in private schools need to ensure successful integration of ICT into curriculum delivery. Thus in the analysis phase the researcher was able to determine which types of knowledge are lacking in the educators that are crucial for the development of ICTs in their schools. As a result, the

researcher used both inductive and deductive approaches to analyse the data in order to come up with a comprehensive interpretation of the findings.

3.2.1 Quantitative data analysis

In the analysis phase, the data obtained from the survey questionnaires was analysed using Statistical Package for Social Sciences (SPSS). The first task was to label the variables in full and allocate an Identification Number (ID) to collected data. Once data coding was completed the researcher then collated the data into groups of less detailed categories. The next step was to place the data into their respective columns in order to make the print out of the results clear. In the process the researcher declared the missing values in the data in order to come up with valid percentages. Finally, a descriptive analysis was done to determine the frequencies, percentages range, median, mode, and means for each item and then presented in tables, graphs and pie charts.

3.2.2 Qualitative data analysis

The raw data obtained from the semi-structured interviews was first organised and transcribed into written text before the actual analysis. This process involved transcribing the full responses by participants during interviews. The transcription process assisted the researcher to gain a deeper understanding of the generated data, thus enabling the researcher to reflect on the data provided by the respondent and how this data was given.

After transcribing, the transcripts went through the three stages of analysis which are; open coding, axial coding, and selective coding. The first stage was mainly done to identify the key concepts, main occurrences or themes, where initial codes or labels were assigned in order to reduce the amount of raw data (Minty & Pather, 2014: 50). The process thus involved “breaking down, examining, conceptualising, comparing and categorising and re-categorising data” (Bezuidenhout & Cronje, 2014: 241).

The next stage was axial coding which has been defined by Strauss and Corbin (in Bezuidenhout & Cronje, 2014: 241) as “a set of procedures whereby data are put back together in new ways after open coding, by making connections between categories”. Thus the researcher had to enquire about “cause and consequences, conditions and interactions, strategies and processes” and look for “categories or concepts that cluster together” (Neuman in Minty & Pather, 2014: 50).

The final stage, selective coding involved selecting the central or essential codes that most effectively illustrate the vital concept of the research study (Bezuidenhout & Cronje, 2014: 241). Thus the process involves scanning the data and scanning

previous codes. The core concepts are then used as a guiding principle in selecting related concepts, making comparisons and contrasts leading to a thematic approach in the presentation of the findings.

During this analysis stage, the two theoretical frameworks applied in this study were used in guiding the researcher with data analysis. The South African Development Framework, for instance, assisted the researcher in determining the respondents' aptitude levels with regards to the adoption and use of ICTs in the classroom. The information obtained was then used to establish the challenges experienced by educators when it comes to effectively integrating ICTs in classroom teaching. At the same time this researcher applied the TPACK framework in the analysis phase by looking into the various types of knowledge that the participants possess and then link the information to the obstacles that are militating against successful ICT integration in their classrooms. Thus, both inductive reasoning and deductive reasoning were applied in this study in order to ensure a detailed analysis of the findings.

3.3 The trustworthiness of the research

"Validity is all about determining whether the research measures what it is supposed to measure, that is focusing on the extent to which the instrument that has been chosen actually reflects the authenticity of the constructs that are being measured" (Koonin, 2014: 256). The aim of the validity, reliability and/or trustworthiness criteria is to demonstrate that the research was conducted in such a manner to ensure that the subject was accurately identified and described. The validity of this research rest on the reliable research tools that have been used, such as the closed-ended questionnaires which have been used to determine the teachers' perceptions about their familiarity with the use of ICTs in the classroom as well as their perceptions about the challenges associated with the adoption and use of ICTs for curriculum delivery. The researcher ensured that the questionnaires were validated before they were used in this study. The questionnaire was piloted in order to check their appropriateness to the research study. The researcher also consulted the research specialist in education who assisted by refining the questions so that accurate answers could be obtained from the participants. Furthermore, in the construction of the questionnaire the key characteristics of good research instruments were considered.

Henning in Amedzo (2007: 4) points out that the weight of the study is generally determined by the soundness of the procedures which are eloquently outlined. This implies that one cannot assess procedures if they are not clearly stated. Another aspect which determines the validity or trustworthiness of this study lies on the simplicity of the construct, its comprehensive account of how data will be gathered and

processed. Additionally, the application of validation in this research increases its trustworthiness. The various data gathered from both survey questionnaires and semi-structured interviews were triangulated so as to provide a reliable and comprehensive report of the findings. Dansi and Amedzo (2014) refer to triangulation as “cross-checking the existence of certain phenomena and the veracity of individual accounts by gathering data from a number of sources and subsequently comparing and contrasting one account with another in order to produce as full and balanced a study as possible”. Thus the process of triangulation further increased the legitimacy of the study.

Member checking was also used to check the accuracy of the data collected. The transcripts of the interviews were taken back to the relevant respondents to confirm the information they had given. No changes were made by all the respondents on the transcripts. In fact, the majority of the respondents confirmed that the transcripts represented a true reflection of what had transpired during the interview session and thus were contented with the transcripts.

3.4 The challenges experienced during conducting the research

During any research process, it is very difficult for the researcher to avoid having data stained by bias of one sort or another. Koonin (2014: 257) concurs that “unfortunately, there will always be a small margin of error in all research studies regardless of how meticulous the researcher” can be. However, failure to acknowledge the possibility of such limitations is not only unethical but unprofessional as well. In order to guard against any possible bias in this research project, the researcher drew up a personal ethical code of conduct which served as a reminder of what the researcher represents.

The anticipated limitations of this study could be varied and may be viewed from different angles. There could be some unintentional errors in the research design and process. For instance, if some participants misinterpret a question in the questionnaire they will provide irrelevant answers. This obviously results in the collection of data that may fail to answer the research questions. To counteract this possible limitation, this researcher tried by all means to explain, in simple terms, all the key concepts in the research instruments to make the research participants understand clearly the requirements of the questions raised in both the interviews and the survey questionnaires. Additionally, reflecting upon these errors will accord the researcher opportunities to gain further insight into and understanding of the research processes.

The extent to which the results of any research can be generalised is also very crucial. The fact that the findings of this research cannot be generalised to a wider population due to the smaller size of the sample that only covers selected schools in one

Province of South Africa presence another limitation. Another challenge was that some schools initially refused to permit the researcher to carry out the study in their schools. This forced the researcher to persuade the principals to allow the researcher to carry out the research in their schools. Some participants postponed their scheduled dates for the interviews several times while others withdrew their participation or failed to submit their completed questionnaires.

Other challenges which the researcher anticipated could be experienced during the gathering of data were time and financial constraints to cover all the targeted areas and participants. This challenge could delay the researcher to complete the data gathering process. However, the researcher had to avoid this challenge through a thorough planning and sticking to the plans as much as possible. Frequent follow-ups were done by talking to the principals in person rather than on the phone explaining in detail the purpose of the research and the impact it would bring to the community in general. Thus, the researcher was fully aware of the fact that data collection could be challenging hence needed to be proactive to overcome the possible challenges.

3.5 Ethical considerations

In research, ethics are fundamental because they potentially influence all the stakeholders involved. In this research the following stakeholders have been identified to be of paramount importance as they may have their interests in the researcher's ethics:

Research participants and their institutions: The researcher formally informed the participants of what will be required of them during their participation and therefore, were asked to sign an informed consent so as to ensure their safety and rights. In collecting data from these participants priority was given to their physical and psychological comfort. This was achieved through avoiding "situations where participants need to answer potentially embarrassing questions within the hearing of other people"; and informing them of "how their identities or sensitive personal information will be protected; and avoid wasting their time, for instance, poor organisation (making them wait while the researcher is busy with other participants) or overly long questions or interviews" (Louw, 2014: 264-269). To ensure anonymity, pseudonyms shall be assigned to each of the selected participants and alphabetic pointers to their schools. Over and above, the researcher made it very clear to the participants that participation was completely voluntary and that they had the right to withdraw at any phase of the research process without any negative penalty or incurring loss of services received (Burton, Brundrett & Jones, 2008: 52).

With the aim of conducting interviews as well as administering the questionnaires to the private high school teachers and principals, the researcher requested for the permission to conduct research in private high schools in the Western Cape, firstly from the Cape Peninsula University of Technology (CPUT) Education Faculty Ethics Committee, and Secondly from both the WCED and the selected private high schools. After obtaining the permission from the principals of the selected schools, arrangement for dates, time and venues for the interviews were agreed and finalised verbally between each participant and the researcher. The researcher proceeded to conduct interviews as well as administering questionnaires to the participants only after permission was granted.

The researcher: According to Louw (2014: 263) “the ethical principle refers to the commitment on the part of the researcher to value each participant as a person competent of making a knowledgeable decision regarding participation in the research study”. The researcher “ensured that the participants had received full disclosure of the nature of the study, benefits and alternatives, with an extended opportunity to ask questions” (Louw, 2014). The researcher’s approach to data analysis and data reporting thrived to avoid the following issues which are unethical: falsifying information, distorting results, bias, misusing information, using inappropriate research methods, and plagiarism.

In order to guard against all these tendencies of unethical behaviours, the researcher drew up a personal ethical code of conduct which served as a reminder of what the researcher stand for. Moreover, the researcher was very sensitive to “any locally established institutional policies and guidelines for conducting research” (Ary, Jacobs, Razavieh & Sorensen, 2006: 585).

Clearance process: With the aim of conducting interviews as well as administering the questionnaires to the private High School teachers and/ or principals, the researcher requested for the permission from both his Institution and the WCED. The necessary documents required for permission to be granted to conduct research in the selected schools were forwarded to the aforementioned institutions on time, resulting in the permission being granted. The researcher then proceeded to visit the principals of the selected schools with the letters of approval in order to ask for their permission to conduct interviews as well as administering questionnaires to the educators in their schools.

3.6 The summary of the chapter

This chapter has outlined in detail the research design and methodology used in exploring the research question as well as the research problem. A comprehensive

explanation of both qualitative and quantitative methods including the description of interviews and questionnaires as research instruments was given. The researcher has also given remarkable attention to the description of the participants and important ethical considerations in this research. It is the researcher's belief that a comprehensive understanding of a range of research elements and their interconnected character is fundamental in conducting a valid research.

In the following chapter, the data obtained from both the interviews conducted and the completed questionnaires will be discussed.

Chapter 4: Research findings

Introduction

The main aim of the research study was to establish some of the factors affecting the adoption and use of ICTs in selected private schools in the Western Cape. The data was analysed both inductively and deductively in order to provide a comprehensive discussion of the factors that influence the adoption and use of ICTs in curriculum delivery. Themes that emerged during analyzing the data have been used as sub-headings.

The rest of this chapter is organized into subsections as follows:

4.1 Teachers' familiarity with ICT

4.2 Teachers' experiences about the challenges associated with ICTs.

4.3 Benefits of adopting and using ICTs for curriculum delivery

4.4 Teachers' motivation on the adoption and use of ICTs

4.5 Programmes that promote the adoption and use of ICT in schools

4.6 Teacher's ability levels regarding the adoption and use of ICTs

4.7 The summary of the chapter

4.1 Teachers' familiarity with ICT use

The data collected regarding the teachers' familiarity with ICT use were a result of the responses from the first part of the questionnaire which had three items. The main focus of this part of the questionnaire, including the three items, was to find out more information about the teachers' familiarity with the adoption and use of ICTs in their classrooms.

When the respondents (teachers of the selected private high schools) were asked their about their personal experiences with the adoption and use of ICTs in the classroom, the majority of them revealed that they are limited users of ICTs in their classrooms. About 55.4 % of the respondents indicated that they are limited users and 5.4 % of the respondents indicated that they never used ICTs for curriculum delivery. About 28.6 % of the respondents registered themselves as frequent users of ICTs with only 10.7 % showing that they are regular users of ICTs in their classroom. These results clearly demonstrate that most of the teachers of the sampled private high schools are not familiar with the use of ICTs in their classroom teaching. However, this does not necessarily imply that these teachers have a negative attitude

towards the use of ICTs in their classrooms as there could be other unforeseeable reasons that hinder them from adopting and using ICTs in curriculum delivery.

The frequencies for Item 1.1 of the questionnaire are shown in Table 4.1.

Frequency

How often do you use ICTs in your classes?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never used	3	5.4	5.4	5.4
	Limited user	31	55.4	55.4	60.7
	Frequent user	16	28.6	28.6	89.3
	Regular user	6	10.7	10.7	100.0
	Total	56	100.0	100.0	

Table 4.1 How often ICTs are used in classes

In response to the second item of this part of the questionnaire, most of the respondents also indicated that they have little experience in using ICTs in their classes. About 51.8 % of the participants confirmed that they have little experience in using ICTs in their classroom in addition to 8.9 % who classified themselves as novice with regards to the use of ICT in curriculum delivery. The findings on this item clearly show that more than 60 % of the respondents experience some challenges regarding integrating technology into their classroom teaching. Only 12.5 % of the respondents confirmed that they are experts in using ICTs in their classroom in addition to 26.8 % who indicated that they have a remarkable experience. This implies that lack of experience in the use of ICTs in the classroom is one of the critical factors that affect the adoption and use of ICTs in by teachers in some of the private high schools in the Western Cape.

The frequencies of Item 1.2 in the questionnaire are presented in Table 4.2.

Frequency

How do you judge yourself in using ICT in your classes?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Novice	5	8.9	8.9	8.9
	Some experience	29	51.8	51.8	60.7
	Frequent user	15	26.8	26.8	87.5
	Expert	7	12.5	12.5	100.0
	Total	56	100.0	100.0	

Table 4.2 How teachers perceive their use of ICT in class

The same respondents (responding to item 3 in this part of the questionnaire) also confirmed that most of the teachers in their departments have limited familiarity with the use of ICTs in their classrooms. About 62.5 % of these respondents indicated that colleagues in their departments also face challenges regarding the adoption and use of ICTs. Only 7.1 % indicated that colleagues in their departments are very familiar with the use of ICTs in addition to 26.8 % who confirmed that colleagues in their departments are familiar with the use of ICTs in their classrooms. The above statistics clearly show that very few teachers (less than 34 %) in the sampled private high schools can effectively integrate ICTs in their classrooms. It is possible that the challenges being faced by the teachers regarding technology integration could both be teacher-related or school-related. Therefore, one can argue that there is need to seriously look at the challenges being faced by the teachers regarding the adoption and use of ICTs for the curriculum delivery.

The frequencies of Item 1.3 in the questionnaire are shown in table 4.3.

Frequency

How do you think of other teachers in your department					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not familiar	2	3.6	3.6	3.6
	Limited familiarity	35	62.5	62.5	66.1
	Familiar	15	26.8	26.8	92.9
	Very familiar	4	7.1	7.1	100.0
	Total	56	100.0	100.0	

Table 4.3 Teachers' familiarity with the use of ICTs

4.2. Teacher's experiences about the challenges associated with ICTs

The data regarding the teachers' perceptions about the challenges associated with ICT adoption and use was obtained from the responses to the second part of the questionnaire which consisted of eight items. The eight items focused on the perceptions of teachers about the challenges they face regarding the adoption and use of ICTs in their classes. The descriptive statistics from item 2.1 to 2.8 of the questionnaire reveal that there are four critical factors which negatively affect the adoption and use of ICTs in private schools in the Western Cape. These factors include; little access to ICTs, little ICT technical support at schools, shortage of class time, and time needed to learn using ICTs. The mean of each of the aforementioned factors is above 3 and the standard deviation is above 1 as represented in Table 4.4. On the other hand, the respondents confirmed that some factors such as requirements of qualifications to use ICTs, society's views about the use of ICTs, schools' views about ICTs use, and the colleague's views about ICT use in the classroom do not seriously prevent the effective adoption and use of ICTs in the private schools in the Western Cape. Table 4.4 provides evidence and the mean of these factors is below 2 and the standard deviation is below 1.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Little access to ICT prevents me to use ICT	56	1.00	5.00	3.5536	1.20483
Little ICT technical support at school discourages me to use ICT in the classroom	55	1.00	5.00	3.3818	1.20939
Shortage of class time hinders me to use ICT	56	1.00	5.00	3.3750	1.16872
Time needed to learn using ICT prevents me to use ICTs in the classroom	55	1.00	5.00	2.9455	1.31118
Requirements of qualifications discourage me to use ICT	55	1.00	4.00	1.9636	.79264
Society views about ICTs hinder me to use ICTs in the classroom	55	1.00	4.00	1.9091	.77633
Schools' views about ICTs discourage me to use ICTs in the classroom	55	1.00	3.00	1.8364	.56972
Colleagues' negative views about ICTs hinder me to use ICTs in the classroom	55	1.00	3.00	1.7273	.55958
Valid N (list wise)	54				

Table 4.4 Teachers' perceptions about ICT challenges

4.2.1 Limited access to ICT resources

One of the critical challenges that emerged from these findings is limited access to ICT resources. This challenge makes it very difficult for the adoption of ICTs to take place. The respondents registered a high percentage of 42.9 % in confirming that they agree with the statement that limited access to ICT prevents them to adopt ICTs in their classroom in addition to 21.4 % who strongly agreed with the same statement. Thus, a total of 67.3 % respondents are facing challenges of effectively incorporating ICTs into their classroom teaching due to little access to the ICT resources. On the contrary, about 16.1 of the respondents revealed that they disagreed with the view that little access to ICT resources prevent them to adopt ICTs in their classroom plus the 7.1% who strongly disagree with the same statement while 12.5 % were undecided. It is imperative to note that without the necessary ICT resources the private schools in the Western Cape can hardly integrate technology for curriculum delivery.

The frequencies of item 2.2 of the questionnaire are presented in Table 4.5.

Frequency

Limited access to ICT prevents me to use ICT					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	4	7.1	7.1	7.1
	Disagree	9	16.1	16.1	23.2
	Undecided	7	12.5	12.5	35.7
	Agree	24	42.9	42.9	78.6
	Strongly agree	12	21.4	21.4	100.0
	Total	56	100.0	100.0	

Table 4.5 Accessibility of ICTs in schools

The shortage of ICT resources in most of the private schools in the Western Cape has emerged as a major theme during the analysis of the qualitative data. While the teacher's ability and attitude towards the adoption and use of ICTs are key factors in determining the effective integration of technology in the classroom, the availability of ICT resources in schools remains a major factor in ensuring successful incorporation

of technology in the classroom (Mathevula & Uwizeyimana, 2014: 1091). Minty and Parther (2014: 54) concurs that the availability of sufficient ICT resources is indispensable in order to achieve the goals of the DoE which states that ICT should be incorporated in all learning areas to improve teaching and learning.

The findings of this study revealed that there is a general outcry of the shortage of ICT resources in the sampled private high schools in the Western Cape. Most of these schools experience a shortage of computers for both teachers and learners. As noted by one participant:

“in this school the major challenge is the issue of limited resources. For instance, if I want to use a laptop in my classroom I have to borrow from one of my colleagues. The few computers available in the school are mainly used for administration purposes”.

This makes it very difficult for the teachers to integrate ICTs in their teaching. This is because if the ICT resources are limited in a school surely one cannot integrate them in his/her teaching practice.

For the other schools there is a challenge in that the computers which they possess are outdated, both in terms of hardware and software, thus making it difficult for the educators to effectively implement ICT programmes in their classrooms. Additionally, the maintenance and upgrading of these computers is not done on time as most of the private schools are experiencing financial constraints. Internet and/or Wi-Fi connections present another critical challenge in private schools in the Western Cape. Another participant in this study disclosed that,

“in my school the network is in most cases slow and sometimes unavailable which further aggravate the problem of technology integration in the classroom”.

The findings about the challenges posed by the limited availability of the ICT resources in schools are supported by Wilson-Strydom and Thomson (2005) who carried out a research on ICT adoption and use in South African schools and discovered that the “the lack of access to computers in the classroom as well as the requisite software not being available were some of the factors that inhibited the integration of ICTs in teaching and learning”. Furthermore, Isaacs (2007: 9) in a survey of ICT education in Africa reported that not more than 5% of the South African Schools “can afford internet connections and are integrating internet for teaching and learning, communication, and collaboration”. However, it must also be understood that while the lack of ICT resources is regarded as a major factor that influences its

integration in the classroom, the mere availability of these resources does not necessarily mean there will be meaningful ICT adoption and use (Wilson-Strydom & Thomson, 2005; Hennessy, et al 2010).

To make matters worse, some educators in the selected private schools are expected to share ICT resources since the resources are not installed in their classrooms. For instance, one educator from School H reported that,

“there is only one overhead data projector which should be used by all the twelve educators in the school”.

So if he wants to use the data projector he has to book for it three days in advance, otherwise he will not have access to it. Worse still, it may be possible that when one teacher wants to use the data projector another teacher will be busy using it. This process discourages him from using ICTs in his classroom. Another participant from school E concurs that,

“there are no laptops for teachers to use in their classrooms. Computers are only installed in the staffroom and it is hard to implement ICTs in my classroom because going up and down looking for ICT resources is time consuming and therefore discouraging as well”.

In some private schools there are no computer labs for the learners. As a result, the educators become the only ones who have access to computers while the learners are lagging behind. Similarly, Chigona, Chigona and Davids (2014: 5) noted that a quarter of the teachers who took part in their research were not motivated to use technology in their classrooms “because their schools do not have enough computers for the learners they have”. This makes it difficult for the learners to continue from where the educator left. s to purchase the adequate ICT resources as well as to maintain the ICT infrastructure

Closely linked to the issue of the lack of ICT resources is the issue of lack of fund capital expenditure and proper financial planning must be done before ICT that is available. It should be understood that investing in ICTs involves an enormous infrastructure is put in place. Most of the teachers in the selected private high schools where this research was conducted also attributed the dysfunctional of the ICTs in their schools to the lack of funds. They called upon the business community and the parents with learners in their schools to also assist the private schools with the ICT infrastructure. One of the teachers interviewed pointed out that,

“although our school is a private school, I think the business community has a part to play regarding promoting all the activities that are done by the school because our learners are just like any other learners in a public school”

Another teacher from a different school echoed similar sentiments when she said,

“I think it’s high time that the business community should also play a pivotal role in promoting ICT integration in private schools. I think as long as the private school is registered officially with the WCED it is imperative for the WCED to include it (the school) in all its ICT programmes in order to improve the levels of ICT integration in these schools”.

The above sentiments clearly show that there is need to assist the private high schools in the Western Cape financially, if the effective adoption and use of ICT is to take place in the classrooms.

It is very clear from the above that the availability of ICT resources plays a very crucial role as a factor that promotes the effective adoption and use of ICTs in the classroom. However, it should also be noted that the availability of ICT resources is closely linked to other factors such as the availability of teachers who are well-equipped with ICT skills, and the availability of the finances to upgrade and maintain the ICTs that are in place. The realization of the relationship between these different factors is important as it is not wise to put emphasis on one at the expense of the other. The same argument is posed by Minty and Pather (2014: 54) who postulate that “it is not possible to have one without the other, such as having resources and a lack of trained personnel or having a trained personnel and a lack of resources”. Thus, one has to consider a combination of factors that influences the adoption and use of ICTs in order to attain meaningful curriculum delivery.

4.2.2 Lack of ICT technical support

Another major challenge that was shown by the respondents regarding the adoption and use of ICTs in the classroom is the limited ICT technical support available in their schools. About 45.5 % of the respondents confirmed that they agree with the view that limited ICT technical support at school discourages them to adopt and use ICTs in the classroom and 14.5 strongly agree with the same statement giving a total of 60 % of the respondents who are discouraged to adopt and use ICTs due to limited ICT technical support that they receive in their schools. On the other hand, 18.2 % of the respondents disagree while 9.2 % strongly disagree with the aforementioned statement. About 12.7 % of the respondents were undecided.

The frequencies of item 2.3 of the questionnaire are presented in Table 4.6.

Frequency

Limited ICT technical support at school discourages me to use ICT in the classroom					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	5	8.9	9.1	9.1
	Disagree	10	17.9	18.2	27.3
	Undecided	7	12.5	12.7	40.0
	Agree	25	44.6	45.5	85.5
	Strongly agree	8	14.3	14.5	100.0
	Total	55	98.2	100.0	
Missing	System	1	1.8		
Total		56	100.0		

Table 4.6 ICT technical support at schools

4.2.3 Time allocated to teach using ICT

In response to item 2.1 of the questionnaire most of the participants agreed with the statement that the time allocated to learn using ICTs is too little and this in turn hinders them to effectively use ICTs in their classrooms. About 41.1 % of the respondents confirmed that they agree with the statement that the time allocated to learn using ICTs is too little such that it hinders them to use ICTs in their classrooms and 16.1 % of these respondents strongly agreed with the same statement. This means more than half of the respondents (57.2 %) are facing challenges to integrate technology due to the little time allocated to learn using ICTs. Contrary to this, about 28.6 disagreed plus 3.6 % who strongly disagreed with the statement that the time allocated to learn with ICTs is too little. This means the allocated time to learn using ICTs does not in any way hinder them to use ICTs in the classroom. While the above statistics suggest that more time should be allocated for lessons that require technology integration in order for effective use of ICTs in the classroom it should also be noted that the same challenge could be emanating from poor planning by the

teachers or limited resources in the laboratories to cater for different class sizes or it could be that the teachers just lack confidence to use the ICTs.

Table 4.7 present the frequencies for item 2.1 in the questionnaire.

Frequency

Limited class time hinders me to use ICT					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	2	3.6	3.6	3.6
	Disagree	16	28.6	28.6	32.1
	Undecided	6	10.7	10.7	42.9
	Agree	23	41.1	41.1	83.9
	Strongly agree	9	16.1	16.1	100.0
	Total	56	100.0	100.0	

Table 4.7 Allocated time for teaching using ICT

4.2.4 Time for preparing lessons that integrate technology

It was also clear from the findings that the time required for preparing lessons which integrate technology discourage a lot of teachers from incorporating it in their classroom teaching. The majority of the participants agreed with the statement that time needed to prepare for lessons that integrate technology into their classroom discourage them from using ICTs for curriculum delivery. About 41.8 % of the respondents confirmed that they agree with the statement that time needed to prepare of lessons that integrate ICTs into their curriculum delivery discourage them from using ICTs in their classroom and 7.3 % of these respondents revealed that they strongly agree with the same statement. This means almost half of the respondents (49.1 %) are finding it difficult to integrate ICTs in their classrooms due to time needed prepare for lessons which demand the integration of technology. This challenge could be attributed to lack of motivation. It is important for teachers to be motivated so that they can carry out their duties effectively. Literature support the above evidence as it was discovered that the majority of the teachers “complain about time required to prepare for using ICTs, i.e. they need time to review websites,

content, etc.” (Nkula & Krauss, 2014: 245). On the other hand, about 25.5 % disagreed with the above statement while 18.2 strongly disagreed. About 7.3 % confirmed that they were undecided on the statement.

Table 4.8 present the frequencies of item 2.7 of the questionnaire.

Frequency

Time required to plan lessons which integrate ICT discourage me to use ICTs in the classroom					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	10	17.9	18.2	18.2
	Disagree	14	25.0	25.5	43.6
	Undecided	4	7.1	7.3	50.9
	Agree	23	41.1	41.8	92.7
	Strongly agree	4	7.1	7.3	100.0
	Total	55	98.2	100.0	
Missing	System	1	1.8		
Total		56	100.0		

Table 4.8 Time required for preparing lessons which integrate ICTs

4.2.5 Lack of ICT skills

The results also showed that most of the respondents do not believe that the lack of ICT qualifications discourage teachers from adopting and using technology in their classes. The majority of the participants disagreed with the statement that the lack of ICT qualifications discourages them to use ICTs in their classes. About 49.1% of the respondents have shown that they disagree with the above statement while 29.1 % strongly disagree with the same statement. Thus, a total of 78.2 % of the respondents do not see the lack of ICT qualifications as a barrier for them to use ICTs in their classrooms. Only 3.6 % of the respondents agree with the above statement while 18.2 claimed to be undecided on the statement. The above statistics could mean that the majority of the teachers who responded to this questionnaire do have ICT

qualifications which boost their confidence in the integration of technology in the classroom. Thus they do not see the issue of ICT qualifications as a barrier to the use of ICT for curriculum delivery. Alternatively, these teachers have acquired some technological skills at their work places or during their tertiary education (despite not having formal ICT qualifications) that give them the confidence to integrate technology in their teaching.

Table 4.9 gives the frequencies of item 2.8 of the questionnaire.

Frequency

Lack of ICT qualifications discourage me to use ICT					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	16	28.6	29.1	29.1
	Disagree	27	48.2	49.1	78.2
	Undecided	10	17.9	18.2	96.4
	Agree	2	3.6	3.6	100.0
	Total	55	98.2	100.0	
Missing	System	1	1.8		
Total		56	100.0		

Table 4.9 Lack of ICT qualifications

Teachers' knowledge of integrating ICTs also emerged as a key theme during the analysis of qualitative data. It is important to point out that for the effective adoption and use of ICTs in schools to take place, there is need to ensure that teachers have the necessary knowledge of how to use the ICT resources at their disposal. As mentioned in chapter 2, this Technological knowledge (TK) is of paramount importance in order to have effective technology integration. This TK involves understanding the different types of ICT resources that the teacher can use. If the technological knowledge of teachers is of high level it is most probable that they will adopt and use ICTs in their classroom since they will be confident to use them. Teachers with higher self-efficacy are often willing to try and experiment new ideas in their classrooms (Sang cited in Nkula & Krauss, 2014: 247). Such teachers with high

confidence in themselves and their abilities to teach “are most likely to adopt, and integrate ICTs in their classrooms” (Nkula & Krauss, 2014: 247).

In this study, the majority of the participants confirmed that they possess only limited ICT skills as most of them only attended a computer literacy course. These participants claimed that they possess the following ICT skills: word processing; power point presentation; use of excel spread sheets; internet; use of E-mails; use of overhead data projectors; photocopying; and scanning. Most of these teachers acquired their ICT skills at university when they were completing their tertiary education. The same participants expressed that in order for them to fit in very well in this dawn age of information technology there is need for them to be exposed to continuous training.

Only two out of the nine (22%) participants interviewed reported to be advanced users of ICTs as they claimed that they effectively apply their skills in the classroom and in the society at large. This further confirms that the teacher’s knowledge of using ICTs is of paramount importance if successful technology is to take place in schools. These two participants reported that they have completed various computer courses such as International Computer Driving License (ICDL), Web design, Graphic design, Microsoft Certified Information Technology Professional (MCITP), Network and Line-X Plus, hardware and software, and maintaining the computer network. However, it must be noted that this low percentage of teachers who can be regarded as advanced users of ICTs supports the call by many educators for continuous and intense ICT training for educators.

Additionally, it must also be emphasized that technological skills on their own do not guarantee that teachers can teach effectively with ICTs. Teachers need the skills to interlink the different types of knowledge explained in chapter 2 in order to teach effectively with technology. The key types of knowledge that are required for the effective technology integration in the classroom to take place include: Pedagogical Knowledge, Content knowledge, and Technological knowledge. Thus possessing technological skills only do not necessarily mean that one can effectively integrate technology in the classroom.

Responding to the question that required the participants to explain whether the ICT skills they possess are sufficient to fully integrate technologies in their classrooms, one educator said,

“no, not at all, training and workshops should be organized to help teachers with the skills needed to integrate technology properly”.

Another educator from a different private school echoed the same sentiments when he said,

“definitely not, there is always room for improvement and I think it is very important for teachers to try to improve their skills all the time. They (the teachers) should realize that when it comes to ICT skills it’s not something stagnant – it is continuously changing”.

The above responses from the educators clearly confirm that the teacher’s knowledge of using ICTs is a key factor that influences the level of ICT integration in the classroom.

Additionally, these participants felt that while they possess the basic ICT skills which could be used as a good starting point regarding the adoption and use of ICTs in the classroom, it is still imperative to search for new technological skills in order to ensure successful ICT integration in the schools. Nkula & Krauss (2014: 245) outlines the need for teachers to be exposed to various kinds of ICT training where pedagogical and technological needs are addressed. This is because the teacher’s willingness to adopt and use ICTs in the classroom is greatly influenced by his/her ability to use them. However, it is not very easy to establish the ICT competencies that are lacking in teachers as this depends mainly on the situations of their particular school (Hennessy, et al, 2010: 42). Davis, Preston, and Sahin (cited in Hennessy, Harrison, and Wamakote, 2010: 42) claim that the idea of “one size fits all does not usually work”. Ndlovu and Lawrence (2012) advocate for a teacher ICT training approach that is likely to prepare teachers for effective adoption and use of ICTs in the classroom, especially a training approach that results in the understandings around Technological Pedagogical Content Knowledge (TPCK) as it encourages the adoption and use of ICTs in a more effective way.

This study revealed that proper ICT training is lacking in most of the private schools in the Western Cape. There are no initiatives by the school authorities to engage teachers in such ICT skills training. This study also revealed that some few private high schools from the selected ones expose their educators to a once-off ICT training session, yet the educators require continuous and passionate training support in order to effectively use technology in the classroom.

Teacher professional development training is therefore very important and should address teacher’s perceptions and attitudes towards the adoption and use of ICTs in their classrooms. The training approaches should also try to address the fear that ICTs can reduce the important role of teachers. Moreover, one needs to understand

that training teachers in ICT adoption and use on its own may not be a universal remedy as there could be other challenges that may be beyond the teacher's control such as the lack of ICT resources in Schools. Nkula and Krauss (2014: 245) claim that literature has revealed that although some of the teachers have received professional development training on the adoption and use of ICTs and thus possess the required skills to integrate, they may still not show interest in incorporating technology in their curriculum delivery. This, therefore, indicates that there is need for one to establish the other factors that influence ICT adoption and use in the classroom.

2.4.6 The community's views about the integration of ICT in the classroom

At the same time, most of the participants dismissed the assumption that society's negative views about ICT use in the classroom hinder them from integrating technology in their classes. The statement is based on the assumption that the school's community could see the integration of technology in the classroom as a sign of teacher's inability to teach. Technology might be viewed as taking over the role of teachers if not carefully integrated. In view of this, about 56.4 % of the respondents disagreed with the statement that society views about ICTs hinder them from using ICTs in their classroom and 29.1 % confirmed that they strongly disagree with the same statement giving a total of 85.5 % of the respondents who feel that the views of the society do not negatively affect them to incorporate ICTs in their curriculum delivery. On the opposite, only 5.5 % agreed with the statement while 9.1 showed that they are undecided. These results clearly indicate that the teachers selected for this study are not influenced negatively by the school community regarding the integration of technology in teaching and learning.

The frequencies of item 2.4 of the questionnaire are presented in Table 4.10.

Frequency

Community's negative views about ICTs hinder me to use ICTs in the classroom					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	16	28.6	29.1	29.1
	Disagree	31	55.4	56.4	85.5
	Undecided	5	8.9	9.1	94.5
	Agree	3	5.4	5.5	100.0
	Total	55	98.2	100.0	
Missing	System	1	1.8		
Total		56	100.0		

Table 4.10 Community's negative views about ICTs

4.2.7 The school policies on ICT integration in the classroom

Additionally, the majority (a total of 91 %) of the participants disagreed with the statement that school's policies on ICT integration discourage them to use ICTs in their classroom. It is important to note that each and every school has its policies regarding the use of ICTs in the classroom. Teachers may therefore, interpret these policies differently thus impacting on their decision to use ICTs in the classroom. In response to this part of the questionnaire about 65.5 % of the respondents disagreed with the statement that school's policies on ICT integration discourage them to use ICTs in their classroom and 25.5 % strongly disagreed with the same statement. This implies that schools policies on the adoption and use of ICTs are mostly positive and may encourage the teachers to incorporate technology in their classrooms. Only 9.1 % of the respondents were undecided on the statement.

The frequencies of item 2.6 are presented in Table 4.11.

Frequency

Schools' policies on the use of ICTs discourage me to use ICTs in the classroom					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	14	25.0	25.5	25.5
	Disagree	36	64.3	65.5	90.9
	Undecided	5	8.9	9.1	100.0
	Total	55	98.2	100.0	
Missing	System	1	1.8		
Total		56	100.0		

Table 4.11 Schools' policies on the use of ICT

4.2.8 Educators' attitude towards the integration of technology in teaching

In response to the last item in the second part of the questionnaire, the majority (a total of 94.5 %) of the participants rejected the assumption that colleague's negative views about ICTs hinder them to use ICTs in their classes. About 61.8 % of the respondents confirmed that they disagree with the statement that colleague's negative views about ICTs hinder them to use ICTs in the classroom in addition to the 32.7 % who claimed that they strongly disagree with the statement. Similarly, colleague's views on the adoption and use ICTs in classrooms do not negatively affect the teachers regarding technology integration in their classrooms. Conversely, only 5.5 % showed that they were undecided on the statement.

The frequencies of item 2.5 are presented in Table 4.12.

Frequency

Colleagues' negative views about ICTs hinder me to use ICTs in the classroom					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	18	32.1	32.7	32.7
	Disagree	34	60.7	61.8	94.5
	Undecided	3	5.4	5.5	100.0
	Total	55	98.2	100.0	
Missing	System	1	1.8		
Total		56	100.0		

Table 4.12 Colleagues' views about ICTs

The above information is supported by the data that was gathered from the interviews conducted in this study. The teachers' beliefs about the role of ICTs in enhancing teaching and learning emerged as one of the major themes during the analysis of qualitative data. It is imperative to point out that in the majority of cases the teachers join the teaching profession with preconceived beliefs of teaching based on their previous experiences. Nkula and Krauss (2014: 247) echo the same sentiments when they state that a teacher's previous teaching practice and his/her professional background influences his/her beliefs. In this study the majority of the educators that were interviewed revealed that they support the adoption and use of ICTs for curriculum delivery because they believe that technology enhances effective communication between learners and the teachers thus promoting a learner-centred approach. One of the participants noted that,

“the use of ICTs in the classroom eliminates the teacher the centred-approach as the learners can be more actively involved in the lessons which may end up improving their understanding of the concepts being taught”.

Therefore, the teacher's beliefs about teaching and learning in general plays a crucial role in determining whether the teacher will adopt and use the available ICT resources in the classroom. Literature records that the teachers who strongly believe

in teacher-centred approach are most likely to adopt and use ICTs in a representational way whilst the teachers who strongly believe in learner-centred approach are most likely to adopt and use the ICTs in a generative way (Nkula and Krauss, 2014: 247).

The teachers who believe in teacher-centred lessons are understood as having little interaction with their learners simply because it is believed that they pass on knowledge through “chalk and talk” approach (Naicker cited in Nkula and Krauss, 2014: 247). Thus the teacher-centred approach is linked to traditional methods of teaching which focuses on information reproduction rather than knowledge construction where the teacher is the main transmitter of knowledge to the learners in the classroom.

On the other hand, the constructivist teaching practice gives the teachers an opportunity to present themselves as facilitators in the classroom. Thus the teachers with constructivist beliefs encourage their learners to acquire knowledge independently and also encourage them (learners) to use the available ICT resources to construct knowledge and discourage them from becoming passive learners (Wilson-Strydom and Thomson, 2005).

In this study, the majority of the participants acknowledged that the adoption and use of ICTs in teaching and learning is of paramount importance for ensuring effective teaching and learning. One of the participants (an educator) from School C pointed out that,

“the 21st century learners are technologically equipped such that the use of ICT resources to enhance teaching and learning is rather effective in my classroom”.

This positive attitude towards the adoption and use of ICTs in teaching and learning was shown by educators of different age groups. This shows that the majority of the teachers are willing to move away from the traditional teaching approach of teacher-centred learning to a learner-centred approach which enhances the teaching and learning process in the classroom. However, in order to promote these constructivist beliefs in teachers it is very crucial to emphasize the need by all stakeholders in the field of education to ensure that schools make use of ICT resources available to them effectively.

In concluding this section, it is imperative to reiterate that the data gathered in this study revealed that the private schools that were selected for this study experience some critical challenges regarding the adoption and use of ICTs in the curriculum

delivery. These challenges include; limited access to ICTs, limited ICT technical support at schools, little time allocated for lessons which require technology integration, and lack of preparation time for lessons which require ICT integration. Additionally, as the participants registered their learner-centred pedagogical beliefs during the data collection process they were also able to highlight some of the key benefits of ICT integration in teaching and learning.

4.3 Benefits of using ICTs

There was a general consensus among the participants that ICTs can make a huge difference in promoting the teaching and learning process in the classroom as they perceived that the integration of ICTs in the classroom can improve learners' interaction, thus keeping them alert. The majority of the participants claimed that this will consequently improve the learners' understanding of concepts or issues being discussed. For instance, if the learners are exposed to internet they can do their research on a topic before they meet with their teacher in class and this will certainly improve their understanding of issues being discussed during the lesson delivery since they have prior knowledge on the topic. Mikre (2011: 4) echo the same sentiments by saying that the adoption and use of ICT is making a big difference in the teaching and learning process as many studies show that learners exposed to ICT recourses mostly display higher learning gains than those who do not incorporate ICTs into their learning programmes. Literature reveals that the incorporation of ICTs in the curriculum delivery promotes learner-centred learning such that learners' thinking can be enhanced in a well-organized manner than traditional teaching approaches (Bester and Brand cited in Chigona, Chigona, & Davids, 2014). This confines the role of the teacher to "supporting, advising, and coaching students rather than merely transmitting knowledge" (Mikre, 2011: 4).

It also emerged from the findings that the participants acknowledged that ICTs help learners who are more **visually orientated** to excel in their school work as they may become bored with the conventional chalk and talk methods of learning. Some participants argued that learners tend to remember better the actual images and the phenomena that take place around them. A participant from school E noted,

"I try to make use of visual media and presentations to sort of lay out things where learners can see everything at once, for example, video clips for Life Science which allows them to see visual representation of what is happening – so that it's not such an abstract idea. In this way it becomes something tangible or something they can associate with".

Thus visual learners as well as learners with learning barriers can be stimulated through the use of ICTs in teaching and learning. As a result of this benefit the teachers are influenced to integrate ICTs in their classrooms.

Another benefit identified by the participants was that ICTs allow the teacher to be **more creative**. They believe that the teacher can change the classroom from being a learning centre into being a research centre. This eventually makes teaching and learning more interesting and exciting for both the teacher and the learners.

Mdlongwa (2012: 4) concurs with this by pointing out that the adoption and use of ICTs in the delivery of the curriculum encourages the learners to become architects of new knowledge. Consequently, learners will develop “cognitive skills, critical thinking skills and information accessing, evaluation and synthesising skills” (Chigona, et al., 2014).

Moreover, it was discovered that the adoption and use of ICTs in the classroom serves time. A participant from school D noted,

“instead of having a script and writing on the chalk board, the use of computers and data projectors can provide the same information on the screen within a few seconds”.

Thus, it becomes possible to regulate the information to make it very clear to the learners. Additionally, a participant from School H echoed,

“using power point presentations can enable me to easily go back and forth when presenting information which makes learners understand better. My information will be readily available and I can easily edit or copy and paste information for whatever reasons. I can easily add more information or retrieve information. Also if a learner doesn’t understand something, he/she can go back and verify for himself/herself at a later stage”.

Consequently, ICTs serve time when it comes to teacher’s curriculum delivery as well as in planning and carrying out other administrative duties.

Some participants claimed that with ICTs, it is possible for them to send tasks directly to the learners so that even when learners are at home they can use their ICT resources such as computers to do their exercises or assignments. Additionally, they argued that considering that some of the learners are lazy to write, a teacher can send lesson materials via e-mails. In this way it is possible for learners to practice their skills and can also be tested on line.

Furthermore, it was highlighted by the majority of the participants that ICTs help learners to **improve in word processing** which can later help them when they are enrolled at tertiary institutions. In a study conducted by Mdlongwa (2012) at Pearson High School in Port Elizabeth the learners claimed that the adoption and use of ICTs in the delivery of the curriculum will help them to acquire a multiplicity of skills, particularly typing skills and skills in word processing, power point, Access and Excel programmes. This results in higher quality of information presentation by learners. Thus, it can be argued that the adoption and use of ICTs in the delivery of the curriculum will improve learner's skills of presenting and representing of information.

The other participants felt that ICTs decrease the workload for teachers and increase the learning capabilities for learners. Consequently, teachers can manipulate data through the use of ICTs and can set and provide content for effective discussions. As noted by a participant from school G that,

“instead of the teacher providing all the answers to the learners, the learners can actually find answers for themselves by using Google. The teacher can then just add to the answers that they get through individual research”.

By doing this learners will be trained to solve problems thus becoming active participants in the learning process rather than being passive recipients of information from the teachers.

The participants clearly revealed the positive impact that ICTs may have on the delivery of the curriculum. Therefore, teachers' attitudes and beliefs about the role of ICTs in enhancing teaching and learning are an important factor that affects the adoption and use of ICTs in Schools. Based on the findings of this study, one can conclude that the majority of the teachers in the private high schools in the Western Cape Province support the constructivist teaching approach that accommodate the integration of ICTs in the curriculum delivery rather than the instructivist approach.

Despite outlining the numerous benefits of integrating ICTs in teaching and learning, the participants also explained the critical factors that are negatively affecting the effective adoption and use of ICTs in their schools.

4.4 Teachers' motivation on the adoption and use of ICTs

Teachers in the Western Cape and across the country are being encouraged to adopt and use ICTs in modern ways in order to promote the delivery of the curriculum. However, Chigona, et al (2014: 1) claims that the successes of such innovation can only be achieved if the teachers adopt and use the available ICTs in their curriculum delivery. Therefore, it is imperative to establish the factors that can

either motivate or demotivate the teachers from adopting and using ICTs in their classrooms. The concept of **motivation** has been defined as “the characteristic that pushes an individual toward acting, performing actions and achieving” (Chigona, et al 2014: 2). This then implies that if an individual does not have motivation to accomplish a task, it is very unlikely that the person will achieve the intended results whereas, if the person is motivated to perform a task, it is most likely that he/she will get the intended results and achievements (Chigona, et al. 2014: 2).

This study also revealed that it is important to motivate teachers in different ways in order to encourage them to adopt and use ICTs in their curriculum delivery. One of the participants noted that,

“... there is no one in the school who speaks about the importance of integrating ICTs in our teaching – there is no encouragement at all”.

Another participant echoed the same sentiments:

“... first of all there is need to create awareness amongst the teachers regarding the benefits of technology integration in their classroom and then find ways of motivating them to practice this”

The above statement requires great commitment from both the principals and the teachers in the private schools in order to

The majority of the participants indicated that there is lack of **technical support** in their schools when it comes to ICT adoption and use in their classrooms. This technical support is of paramount importance if successful ICT integration is to take place in schools. Bingimlas (2009: 241) echoes the same sentiments by pointing out that the absence of technical support in schools prevents teachers from overcoming the challenges experienced in the adoption and use of ICTs in the curriculum delivery. The technical challenges faced by the teachers could be poor internet connections, websites taking long to open, broken computers, teachers having to work on outdated computers, printing problems, etc. Such technical issues obstruct the smooth delivery of the curriculum, resulting in teachers being demotivated to use ICTs in their classrooms.

Another important motivational factor that discourages the teachers from adopting and using ICTs in curriculum delivery in the selected private high schools is the lack of clear ICT policies as well as the ineffective administration. There was no single participant in this study who could confirm that there are clear ICT policies in their schools that direct how the adoption and use of technology should be developed.

Thus, it is the argument of this researcher that the absence of proper ICT policies in the private schools result in teachers not developing any interests in the adoption and use of ICTs in their curriculum delivery. Worse still, some participants in this research confirmed that the school authorities did not give them full support when they show an interest in technology integration.

Thus it is important for each and every school to put in place proper ICT policies which are well supported by the school authorities in order to achieve effective adoption and use of ICTs in the classroom.

4.5 Programmes that promote the adoption and use of ICT in schools

Programmes that are meant to promote the adoption and use of ICTs in schools are numerous in South Africa. However, most of these programmes and projects seem to focus more on the public schools rather than the private schools.

Most participants in this study confirmed that there are very few programmes in their schools that are geared towards promoting the adoption and use of ICTs. They pointed out that when it comes to organizing or taking an initiative in promoting the adoption and use of ICTs, their hands are crippled as it is the responsibility of the school directors or owners. One of the participants (a principal) echoed,

“.... being a private school, I as the principal of the school do not have much power over ICT development in the school. The director is the one responsible for decision-making when it comes to such matters”.

Worse still, their suggestions which are meant to improve technology integration in their classrooms are not seriously considered as ICT resources are seen as an excess expenditure. Consequently, the participants felt that most of the private school directors are only concerned about making a huge profit at the expense of both the learners and the teachers.

While the WCED may not have a direct responsibility of ensuring that ICT development in the private schools take place, it is this researcher's argument that the WCED has a role to play in making sure that all the private schools registered with them especially those that follow the South African school curriculum are supported in whatever way that will promote the learner's achievements. Hence the participants in this study revealed that the private schools are in most cases left out in programmes that are initiated by the WCED. They claimed that the WCED generally focuses more on public schools than private schools regarding the initiatives and projects that promote effective teaching and learning in schools. This is worsened by the fact that there is no effective communication between the WCED and the private

schools in Western Cape. The participants reiterated that sometimes information is not sent to them in time such that they miss out on programmes that are initiated by the WCED. For instance, the private schools may receive information about ICT development workshops way after the workshop is completed or when it's already in progress.

Thus, it is clear that the lack of initiatives and projects that promote ICT adoption and use in schools is another important factor that hinders the successful integration of technology in the curriculum delivery.

4.6 Teacher's ability levels regarding the adoption and use of ICTs

The Teacher Development framework comprise of five teacher ability levels that exemplify the expansion of ICT use in the classroom teaching. These levels are entry, adoption, adaption, appropriation, and innovation. The guidelines (DoE, 2007: 6) stipulate that at the *entry* level, the teacher is computer knowledgeable and is keen and excited to make an effort in using ICTs in teaching and learning and at *adoption* level "the teacher is able to use various ICT, including computers, to support traditional management, administration, teaching and learning, and is able to teach learners how to use ICT". The guidelines (DoE, 2007: 6) claim that efficiency boosts at the *adaptation* level as "the teacher is able to use ICT to support everyday classroom activities at an appropriate NCS level, assess the learning that takes place and ensure progression" as well as being "able to reflect critically on how ICT changes the teaching and learning processes and to use ICT systems for management and administration". At the *appropriation* level, the educators have the experience and confidence to reflect on how ICT can influence teaching and learning strategies, and to use new strategies. The guidelines describe the *innovation* level as the highest level in ICT development. At this stage the "teacher is able to develop entirely new learning environments that use ICT as a flexible tool, so that learning becomes collaborative and interactive".

The results of this study clearly revealed that most of the educators in the sampled private schools have limited abilities when it comes to integrating ICTs in their classrooms. One of the participants openly admitted that she has limited skills to efficiently integrate technology for curriculum delivery. She stated that,

"my ICT skills are definitely not sufficient to fully integrate technology in my classroom. Even my colleagues are not sufficiently equipped to integrate ICTs in their classrooms. Training and workshops should be organized by the schools to help us improve in ICT adoption and use for curriculum delivery".

Another participant echoed,

“I would not say that I possess sufficient ICT Skills. I still need more skills in hardware and I think the only way to improve is through constant training”.

These educators could be classified under the **entry** level of the Teacher Development Framework (DoE, 2007) as 60.8 % of the participants who responded to the survey questionnaire identified themselves as limited users or never used ICTs in their curriculum delivery. The reason for this could be lack of confidence among the teachers to use ICTs in their classrooms on a regular basis. “Teachers’ confidence also relates to their perceptions of their ability to use computers in the classroom, particularly in relation to their learners’ perceived competences” (Ali, et al, 2013: 4063). Minty and Pather (2014: 57) in their study on ICTs integration in schools in Gauteng also confirm that teachers lack the knowledge and skills to incorporate ICTs in the classroom.

The majority of the participants that were interviewed (approximately 78 %) also confirmed that they only possess limited skills regarding the use of ICTs in their classrooms. The guidelines (DoE, 2007: 6) stipulate that at the *entry* level, the teacher is computer knowledgeable and is keen and excited to make an effort in using ICTs in teaching and learning. Thus according to the Teacher Development Framework (DoE; 2007), the *entry* stage shows teacher abilities that are constrained to using ICTs for limited interaction with knowledge (Ndlovu & Lawrence, 2012: 4). Therefore, the findings of this study confirm that while teachers appreciate the value of integrating ICTs in their classrooms the reality on the ground is that they are facing serious challenges in living up to their dream of effectively using ICTs in their classrooms.

This study also revealed that only a few of the educators in the private high schools could be classified either under **adoption** or **adaptation** level of the Teacher Development Framework since they revealed that they are frequent or regular users of ICTs in their classrooms. According to this framework, at adoption level the educator is able to integrate ICTs in a way that supports traditional teaching and learning while at adaptation level the teacher is able to critically reflect on how the use of ICTs transform the teaching and learning processes resulting in the rise of productivity level. None of the participants in this study could be classified under either **appropriation** or **innovation** level as they could not demonstrate a holistic understanding of the ways in which ICT contributes to teaching and learning. Moreover, they revealed that they lack the ability to “develop entirely new learning

environments that use ICT as a flexible tool, so that learning becomes collaborative and interactive” (DoE, 2007: 6).

It is therefore, imperative to point out that while some participants confirmed that they have a vast knowledge on computer applications it was discovered, on the other hand that they lack the skills to amalgamate their technological content knowledge with the other crucial types of knowledge that are required for successful ICT integration in teaching and learning.

4.7 The summary of the chapter.

In this chapter some critical factors that affect the adoption and use of ICTs in classrooms have been outlined. It is clear from the findings that while the level of appreciating the importance of ICT integration in learning and teaching is improving among the teachers and the school administrators, there are still factors that continue to militate against the effective integration of technology in the classroom. For instance, the limited access to ICT resources, the lack of ICT technical support, and the lack of ICT skills among the teachers are some of the critical factors that influence the adoption and use of ICT for curriculum delivery.

In the following chapter, conclusions drawn from the research findings are presented leading to some recommendations.

Chapter 5: Conclusions and recommendations

Introduction

The focus of this study was to establish some of the factors that affect the adoption and use of ICTs in selected private schools in the Western Cape. It is clear from the research findings that have been discussed in chapter 4 that the majority of the teachers strongly believe that ICTs play a crucial role in promoting teaching and learning. The participants were able to identify numerous benefits that can be derived from the effective adoption and use of ICTs. It is imperative to put emphasis on the fact that to effectively instigate and apply ICTs into teaching and learning in schools there should be adequate ICT resources because without these resources the adoption and use of ICTs for curriculum delivery cannot take place. Additionally, teachers need to develop positive beliefs and attitudes towards the use of ICTs. The attitude towards the use of computers has been seen to be “a major predictor of teacher’s technology use in instructional setting” (Ali, et al 2013: 4063). Therefore, the positive attitudes expressed by the teachers, in this study, towards ICT integration in their classrooms are a clear indication that given the adequate ICT resources and ICT skills development opportunities teachers can effectively adopt and use ICTs in teaching and learning. The findings of this study, therefore, have implications for the need to come up with solutions that can result in the effective adoption and use of ICTs in the classroom by teachers.

The rest of this chapter is organised into subsections as follows:

5.1 present the conclusions drawn from the study

5.2 outline recommendations based on the findings of the study

5.3 Chapter Summary

5.1 Conclusions

The adoption and use of ICTs in the classroom is seen by many stakeholders in the field of education (including the government) as of paramount importance if any country is to produce a generation of young people who are geared towards developing the society. South Africa, as a country in conjunction with the department of education has also embarked on a number of projects to make sure there is effective incorporation of ICTs in schools. A lot of success stories about initiatives that were geared towards enhancement of ICT adoption and use in schools throughout the country have been told. In line with this is the assumption that ICT integration in private schools is even at a more developed stage compared to the public schools.

While this could be true in some cases, it should not be taken for granted that it is always the case. The research findings expressed in the previous chapter were based on data collected from the sampled teachers in the private schools in the Western Cape. According to the findings of this study, most of the private schools in the Western Cape still face some challenges with regards to ICT adoption and use in their schools. Factors such as limited access to ICT resources, lack of technical support, and shortage of class time appeared to be the most critical factors that affect the adoption and use of ICTs in the classroom. Based on this and other data collected during the study and supporting literature various conclusions about the factors influencing the adoption and use of ICT for curriculum delivery have been reached.

5.1.1 Teacher's aptitude levels on the use of ICTs in their classrooms

The results of this study clearly revealed that most of the educators in the sampled private schools have limited abilities regarding the adoption and use ICTs in their classrooms. These educators could be classified under the **entry** level of the Teacher Development Framework (DoE, 2007) as 60.8 % of the participants who responded to the survey questionnaire identified themselves as limited users or never used ICTs in their curriculum delivery. There could be varied reasons for the low aptitude level for the teachers in these private schools when integrating technology in their curriculum delivery. The majority of the participants that were interviewed (approximately 78 %) also confirmed that they only possess limited skills regarding the use of ICTs in their classrooms. The guidelines (DoE, 2007: 6) stipulate that at the *entry* level, the teacher is computer knowledgeable and is keen and excited to make an effort in using ICTs in teaching and learning. Thus according to the Teacher Development Framework (DoE; 2007), the *entry* stage show teacher abilities that are constrained to using ICTs for limited interaction with knowledge (Ndlovu & Lawrence, 2012: 4). Therefore, the findings of this study can make lead one into concluding that while teachers appreciate the value of integrating ICTs in their classrooms the reality on the ground is that they are facing serious challenges in living up to their dream of effectively using ICTs in their classrooms.

The quantitative data collected also revealed that teachers only 22 % could be classified either under **adoption** or **adaptation** level of the Teacher Development Framework since they revealed that they are frequent or regular users of ICTs in their classrooms. The evidence from qualitative the data collected showed that while they use ICTs in their classroom teaching they still lack the experience and confidence to reflect on how ICT the teaching and learning processes. This also

shows that there is need to work with teachers so that they can improve their ICT skills. According to the Teacher Development Framework, at adoption level the educator is able to integrate ICTs in a way that supports traditional teaching and learning while at adaptation level the teacher is able to critically reflect on how the use of ICTs transform the teaching and learning processes resulting in the rise of productivity level.

The analysis of the data collected in this study also confirmed that none of the participants in this study could be classified under either **appropriation** or **innovation** level as they could not demonstrate a holistic understanding of the ways in which ICT contributes to teaching and learning. No one among the interviewees claimed that he/she was able to develop a completely new learning atmospheres integrating technology in their teaching. Instead, they revealed that they lack the ability to “develop entirely new learning environments that use ICT as a flexible tool, so that learning becomes collaborative and interactive” (DoE, 2007: 6). It is imperative to point out that while some participants confirmed that they have a vast knowledge on computer applications it was discovered, on the other hand that they lack the skills to amalgamate their technological content knowledge with the other crucial types of knowledge that are required for successful ICT integration in teaching and learning. Therefore, it is this researcher’s contention that teachers should be furnished with the skills that will enable them to combine their TCK with the other key types of knowledge that are necessary for the effective adoption and use of technology in curriculum delivery.

5.1.2 Traits for teacher effective ICT use in the classroom

The adoption and use of ICTs as an approach in teaching and learning entails the adjustment of the selected tools into the educator’s practice in order to achieve the desired results. Therefore, the educator’s competence to choose and administer the teaching and learning process and activities by making use of a variety of technology has a great influence in the development of skills that are fundamental to promoting the performance of the learners (Ndlovu & Lawrence, 2012: 12). The findings have revealed that there is lack of the aforementioned competencies amongst the teachers in most of the private schools selected for this study. Most of the interviewees admitted that they needed more training regarding in order to improve selection and use of appropriate technologies in their teaching. Otherwise quality ICT adoption and use is unlikely to take place if teachers cannot match the tools to the content they want to deliver to the learners. Ndlovu and Lawrence (2012: 13) argue that the selection of the tools “should be based on how and when it will be used as the lesson progresses, and not much on what looks exciting to the learners at the expense of

learning” because decisions like that have a major control in determining whether teaching and learning will be promoted or not.

The adoption and use of ICTs in the private schools in the Western Cape is still at lower levels since the teachers restrict themselves to power point presentations and a few other basic computer literacy skills. Effective ICT integration entails combining of the “three principles that make the implementation process legitimate to develop higher levels of thinking” (Ndlovu & Lawrence, 2012: 10). These principles include; the lesson content, the teaching and learning (pedagogy) as well as the use of ICTs (technology) and are similar to what the TPACK framework advocates for. This implies that ICTs can be effectively used in the classrooms when they are “incorporated into the well-structured lessons; most powerful explanations; demonstrations and examples a teacher gives that make it easy for learners to understand new knowledge and skills, and manipulate them to extend their learning independently” (Ndlovu & Lawrence, 2012: 10). “This requires a very different set of classroom management skills to be developed, together with innovative ways of using technology to enhance learning and encourage technology literacy, knowledge deepening and knowledge creation” (Hennessy, et al, 2010: 43). It is at this stage that teacher development becomes a crucial component. The quality of these traits indicates the height at which learners engage with knowledge.

5.1.3 The availability of ICT resources in private schools

One of the most critical factors that militate against the successful adoption and use of ICTs in private schools in the Western Cape is the lack of ICT resources in these schools. In order to fulfill the obligations of the DoE which advocates that the ICTs should be used across all learning areas to augment teaching and learning, sufficient resources are indispensable (Minty & Pather, 2014: 54). Thus, the 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 (Ali, et al, 2013: 4065). While most of the public schools have been provided with computers through programmes initiated by the WCED, the findings of this study revealed that most of the private schools in the Western Cape experience a shortage of computers for both teachers and learners. Wilson-Strydom & Thomson (2005), in their study regarding ICT integration in South African schools discovered that the lack of access to computers in the classroom as well as the requisite software not being available were factors that inhibited the integration of ICTs in teaching and learning. A total of about 64.3 % of the participants who responded to the survey questionnaire in this study confirmed that little access to the ICT resources prevent them from using ICTs in their classrooms. Some teachers in these private schools are expected to share ICT

resources since the resources are not installed in their classrooms. It was discovered that the sharing of ICT resource also amounts to another problem as it may cause some conflict between teachers over the use of such resources. This process therefore, discourages teachers from adopting and using ICTs in their classroom.

In general, it is believed that most private schools are well equipped with resources and learners can afford to buy their own ICT resources such as laptops and tablets. But this was not the case with most of the private schools that were selected for this study. Instead, it was revealed that in some cases computers are only installed in the staffroom and it is hard for teachers to integrate ICTs in their teaching and learning process because going up and down looking for ICT resources may be time consuming and discouraging as well. Howie and Blignaut (2009: 355) point out that while in developed countries most of the teachers are using ICTs in their classrooms, the same is not happening in most of the developed countries. This makes the location of the ICTs in schools a key aspect when it comes to accessing technology for teaching. In some private schools there are no computer labs for the learners. As a result the educators become the only ones who have access to computers while the learners are lagging behind. This makes it difficult for the learners to continue from where the teacher left.

To make matters worse the few computers available in these schools there are outdated, both in terms of hardware and software, thus making it difficult for the teachers to effectively implement ICT programmes in their classrooms. There is no doubt that access to computers; updated software and hardware are key elements to successful adoption and use of technology in teaching and learning because without these resources it is almost impossible to integrate technology in curriculum delivery. According to Becta (2004) the

“inaccessibility of ICT resources is not always merely due to the non-availability of the hardware and software or other materials within the school. It may be the result of one of a number of factors such as poor organization of resources, poor quality hardware, inappropriate software, or lack of personal access for teachers”.

Therefore, it is crucial to point out that schools should ensure that all the necessary ICT resources are in place before trying to seek for solutions related to ICT integration in the classroom.

Additionally, it was noted that the maintenance and upgrading of these computers is not done on time as most of the private schools are experiencing financial

constraints. The situation is aggravated by internet and/or Wi-Fi connections which present another serious challenge in the private schools in the Western Cape. The participants indicated that the network is in most cases slow and sometimes unavailable. Mathevula and Uwizeyimana (2014: 1093) echo the same sentiments when they say “in an era where schools and teachers should be communicating electronically, the absence of internet poses a serious problem”. Therefore, one can conclude that without proper maintenance of the available ICT resources as well as the continuous upgrading of the hardware and software, effective ICT adoption and use in the classroom will be hard to achieve. At the same time, without efficient internet and/or Wi-Fi connections it is difficult to achieve successful technology integration in curriculum delivery.

5.1.4 The ICT policies and technical support available to teachers

It is imperative to emphasise the importance of policy and planning in determining the aims of ICT adoption and use in education (Ali, et al 2013: 4066). Some of the participants in this study complained about the lack of well structured ICT policies in their schools. This may be attributed to the fact that the owners and/or directors of most of these private schools are not willing to give the School Management Teams the mandate to draw up working ICT policies as they may be scared of the financial implications involved. Worse still, their suggestions which are meant to improve technology integration in their classrooms are not seriously considered as ICT resources are seen as an excess expenditure. The participants pointed out that when it comes to organizing or taking an initiative in promoting the adoption and use of ICTs, their hands are tied up as it is the responsibility of the school owners and/or directors. Chigona (2015) emphasise that the institutional management plays a key function in the adoption of ICTs in Schools and in situations where there is “a top-down style with little consultation between levels, staff members feel coerced into using ICT and therefore do not use it effectively”. They further point out that teachers feel embarrassed by the lack of organizational support and vision and many feel uncertain of the way forward and the purpose that the use of ICT is meant to serve. Consequently, the teachers develop a negative attitude towards ICT integration as they realize that most of the private school directors are only concerned about making a profit without looking at how it affects the teaching and learning process taking place in the classroom.

Technical support is of paramount importance in order to achieve effective adoption and use of ICTs in the classroom. It should be emphasized that the adoption and use of ICTs does not end with the availability of ICT resources but rather making sure that the ICT resources in place are working effectively. Amedzo (2007: 74) points out that

“problems such as electrical spikes, viruses, dust, heat, trouble shootings, upgrading, maintenance, and repairs are bound to crop up every now and then”. He further suggests that technical support is required both at school level and the Education Department level. Most of the participants in this study indicated that they receive very little or no support regarding the use of ICTs in their classrooms. This is actually a sad situation because the participants are eager to integrate ICTs in their classroom as they realize the benefits of it. Bialobrzaska & Cohen (2005) argue that the possibility for the malfunction of ICT adoption and use in schools is because the management teams are not aware of the significance of ICTs and as a result do not support ICT integration in teaching and learning.

Furthermore, most of the participants in this study confirmed that ICT training is lacking in their schools. The participants also felt that the private schools are, in most cases, left out in training support programmes that are initiated by the WCED. In most of the private schools selected for this study, ICT training provided is just basic computer literacy and not specific to the available ICTs. Bingimlas (2009: 239) agrees that lack of proper training is one of the key issues contributing to the lack of ICT adoption and use in teaching and learning. He further argues that “inadequate or inappropriate training leads to teachers being neither sufficiently prepared nor sufficiently confident to carry out full integration of ICTs in the classroom”. The participants of this study claimed that the WCED generally focuses more on public schools than private schools when it comes to training support programmes that promote effective teaching and learning in schools. This is worsened by the fact that there is no effective communication between the WCED and the private schools in Western Cape. The participants reiterated that sometimes information is not sent to them in time such that they miss out on programmes that are initiated by the WCED. For instance, the private schools may only receive information about ICT development workshops only when the workshop is completed already or when it’s already in progress. This makes it difficult for the schools to benefit from any support programmes organized by the WCED.

While the researcher has noted that most of the private schools look up to the WCED for support regarding ICT development in their schools, it must however be pointed out that since they are private they should take much of the responsibility to develop their schools. It is important for private schools to source funds from the business community in order to fund ICT projects in their schools.

5.1.5 The motivation of Teachers to adopt and use of ICTs

It has come to the realization of the DoE as well as the WCED that the adoption and use of ICTs in the classrooms should be one of the top priorities in the schools across the country. However, Chigona, et al (2014: 1) have always emphasized that the successes of such innovation can only be achieved if the teachers adopt and use the available ICTs in their curriculum delivery. Therefore, it is imperative for all the stakeholders in the field of education to ensure that some incentives are provided in order to encourage the teachers to take up the various initiatives that promote the integration of ICTs in their curriculum delivery.

This study also revealed that teachers need to be motivated in different ways in order to encourage them to adopt and use ICTs in their curriculum delivery. One important motivational factor that discourages the teachers from adopting and using ICTs in curriculum delivery in the selected private high schools is the lack of ICT resources. In this regard the private schools could take advantage of being private and encourage their learners to buy their own ICT resources such as laptops and tablets.

Additionally, clear ICT policies and an effective administration should be established in order to motivate teachers to successfully integrate technology in their classrooms. It is the responsibility of the school authorities in conjunction with the DoE to ensure that teachers get a clear direction on how they can best integrate the different types of technology in their classrooms. There was no single participant in this study who could confirm that there are clear ICT policies in their schools that direct them on how the adoption and use of technology should be developed. Worse still, some participants in this research confirmed that the school authorities did not give them full support when they show an interest in technology integration. Thus, this researcher can safely conclude that the lack of ICT resources coupled with the absence of proper ICT policies in the private schools result in teachers not developing any interests in the adoption and use of ICTs in their curriculum delivery.

Thus, it is important for each and every school to provide the necessary incentives for the teachers in order to achieve the effective adoption and use of ICTs in the classroom. Although providing such incentives that motivates teachers to integrate technology in their curriculum delivery has financial implications, it must also be noted that it is a worthwhile investment.

5.1.6 The use of ICTs versus the time available in private schools

The majority of the participants in this study pointed out that limited class time prevent them from integrating ICTs in their classrooms. Bingimlas (2009: 2390) points out that a lot of researchers have identified time limitations and the difficulty in scheduling

enough computer time for classes as barrier to teacher's use of ICT in their teaching. In response to the survey questionnaire about 41.1 % of the respondents confirmed that they agree that shortage of class time hinders them to use ICTs in their classroom in addition to the 16.1 % who strongly agreed with the same statement. This is a clear indication that most of the teachers are discouraged by the little time allocated to them to learn using ICTs.

In the same survey about 28.6 % disagreed plus 3.6 % who strongly disagreed that shortage of class time hinders them to use ICTs in the classroom while 10.7 % of the respondents were undecided.

Therefore, one can conclude that the teachers require more class time in order to effectively implement ICTs in their Classroom. This time may be required to prepare the resources they may need to use for a specific subject or lesson topic. It is common that in most schools, especially private schools, teachers teach more than one learning area or more than one grade. Therefore they need more time to prepare when they switch from one learning area to the other or when they switch from one grade to the other.

5.1.7 Teachers versus external views on the use of ICTs

The survey questionnaire used in this study contained items that required the participants to provide the extent to which external views affect them in the adoption and use of ICTs in their classrooms. These items in the questionnaire focused on the society's views, the school's views, and the colleague's views about teachers' adoption and use of ICTs for curriculum delivery. The data gathered in response to these items reveal that external views to the teachers about the adoption and use of ICTs negatively affects the teacher's in their decisions to integrate technology in their classrooms, to a limited extent.

The statistics show that about 85.45 % of the participants who responded to the survey questionnaire either disagree or strongly disagree that the society's views about ICTs hinder them to adopt and use technology in the curriculum delivery; about 90.9 % also either disagree or strongly disagree that the school's views about ICTs discourage them to adopt and use ICTs in the classroom; and about 94.55 % either disagree or strongly disagree that colleague's views about ICTs hinder them to adopt and use ICTs in their classroom. Only 5.45 % of the respondents agreed that the society's views about ICTs hinder them from adopting and using them in class. No single participant agreed that both the school's views and the colleague's views negatively affect them not to integrate technology in their classrooms. However, some respondents confirmed that they were undecided, resulting in a 9.09 % who were

undecided on whether both the society's views and school's views about ICT affect them; and a 5.45 % confirmed that there were undecided on whether their colleagues' views negatively affect them not to integrate technology in their curriculum delivery.

It is therefore, clear from the above statistics that external views about the adoption and use of ICT in the classroom do not negatively affect the teachers. Instead, the statistics leaves one with the assumption that the society, the schools, and the colleagues of teachers, all have strong beliefs that the adoption and use of ICTs in the classroom enhances the teaching and learning process.

5.2 Recommendations

Change is essential and key in promoting the teaching and learning process and all stakeholders should be encouraged to embrace it and make sure the adoption and use of ICTs in the classroom is enhanced. While the adoption and use of ICTs in the curriculum delivery has great financial implications this should not limit the efforts by the private schools in the Western Cape to keep on working towards achieving the effective technology integration in the classrooms.

This research has revealed that there are various factors that are affecting the adoption and use of ICTs in the private schools in the Western Cape. Now it is important to provide suggestion as to how these factors can be dealt with in order to achieve successful ICT integration in these schools.

Therefore, the following recommendations are made:

5.2.1 Training programmes

As the global village is putting more emphasis on the use of ICTs in every sphere of life, it is important for the School authorities to continuously organize programmes that will equip the teachers with the necessary skills in order for them to be at par with technological developments. While the findings of this study revealed that most of the private schools look up to the WCED for assistance regarding the training of teachers on the effective adoption and use of ICTs in teaching, it is this the researcher's view that since these schools are private they should take the initiative to promote ICT programmes in their school.

The adoption and use of ICTs in the curriculum delivery is more than just the use of computers as it demands the knowledge of how to incorporate these technologies in their specific learning areas. Thus, ICT professional development programmes should take place in a workplace setting and it should be done as a component of lifetime and peer learning. This researcher also concurs with Amedzo (2007: 66) who posits that the training initiatives should "address the fear that ICTs will diminish the

importance of educators”. This can be done by ensuring that the teachers remain the main point of contact even when ICT integration is promoted. Additionally, the training initiatives should be organized in such a way that they cater for all the teachers including the novice teachers. In order to motivate the teachers to partake in the training initiatives the organizers of the training should consider issuing professional development certificates to all the teachers who attend the workshops or the training sessions.

The school managers can also expose teachers to ICT training that enables them to solve some minor technical issues that may arise when they are integrating technology in the classroom. For instance, teachers can be provided with the skills to clean or manage the viruses, install and maintain new software on the computers. There is no doubt that such skills will go a long way in equipping the teachers with life-skills which they can use even after they retire from the field of teaching. In addition, by providing teachers with such skills the schools can save a lot of time and money.

The private school authorities should ensure that all the teachers are exposed to a standardized training programme in order to make sure they are at the same level of literacy when it comes to ICT adoption and use in the classrooms. These standardized training sessions will also promote unity among the teachers which will in turn encourage them to assist one another.

Furthermore, there is need to decentralize the provision of technical support for ICT needs in order to ensure that teachers receive quick solutions to the technical challenges they may be experiencing. This can be achieved through providing more IT specialists in all the districts of the province so that teachers can access them and receive the necessary support that they need. In this process, the WCED should take cognisance of the needs of teacher who are interested in adopting and using ICTs in their classrooms and give the required support and training for those teachers. In this way they can create a huge awareness on how the adoption and use of ICTs in the classroom can enhance teaching and learning.

Conclusively, the training of teachers in the adoption and use of ICT resources in the curriculum delivery has a significant role “as the modeling or instruction will either promote poor use of the resources particularly where they are limited” (Ndlovu & Lawrence, 2012: 21). The focus should rather be on providing them with dependable and appropriate experiences with the resources available to deal with issues in specific learning areas, instead of equipping them with the skills that restrict the adoption and use of ICTs to “reproduction of old methods that do not develop higher

levels of thinking to enhance learning” which “are no longer relevant in this emerging information society” (Ndlovu & Lawrence, 2012: 21).

5.2.2 The role of tertiary institutions and the DoE in ICT development

The tertiary institutions in South Africa responsible for training teachers in conjunction with the Department of education should seriously consider training teachers on how to integrate ICTs in their classrooms. The kind of training required is not just basic computer literacy but rather training that focuses on “giving them authentic and relevant experiences with the available tools in their subject teaching contexts” (Ndlovu & Lawrence, 2012: 21). Salehi and Salehi (2012: 43) concurs that “teacher training institutions should provide appropriate and sufficient support for the teachers”. Thus the teacher training institutions should take the responsibility of equipping teachers with TPACK.

Probably these training institutions can assign the tutors to supervise the student teachers on a continuous basis to make sure they are always on the right track. This will help teachers to develop the necessary skills which enable them to select the ICT resources that are in line with the subject content they are teaching in order for effective learning to take place. The private school authorities should, therefore, take the responsibility of encouraging the teachers to acquire the necessary skills in order to successfully integrate ICTs in their classrooms.

5.2.3 The role of Wi-Fi in communities

Teachers and the principals of the private schools should take the responsibility of encouraging the learners to maximize the installed Wi-Fi in communities, in public libraries or in the commando halls. This will go a long way in motivating learners to continue with their learning activities after school. It is a well-known factor that through internet both the teachers and the learners can access a wealthy of educational resources. While it may be too expensive for the private schools to install Wi-Fi connections in their schools it is imperative to point out that all the stakeholders in the field of education should come on board to alleviate the challenge. This researcher believes that if the majority of the people in the communities become computer literate, they will be in a better position to give constructive support for the adoption and use of ICTs in schools.

5.2.4 The availability of ICT resources

The private school authorities should work hard in ensuring that ICT resources are available in their schools. I think it is of paramount importance to note that the school

authorities has a great responsibility of ensuring that all the learners attending in private school receive equal opportunities regarding their education.

Moreover, the teachers should maximize on every ICT resource that is at their disposal. In this regard the teachers should desist from the mentality that schools are the ones responsible for providing ICT resources as they can make use of their smart phones and tablets to enhance teaching and learning in their classrooms. The aim should be to maximize the use of the inadequate ICT resources in the schools. This researcher concurs with Mdlongwa (2012: 6) who postulates that teachers are supposed to “make more use of ICT resources and technology, not seeing them as a threat to their profession but rather using them in their teaching practice to improve the efficiency and productivity of both teaching and learning”.

Additionally, ICTs can be gradually introduced in the curriculum delivery. It can take some time for the teachers to adjust to technology integration in their curriculum. However, the private schools in the Western Cape can draw lessons from the Khanya Project that has been outlined in chapter 2. The project provides nine major objectives and a comprehensible execution structure. The execution structure has three key aspects which have been referred here as points of recommendations to the stakeholders. The need to carry out a complete needs analysis of each school before the adoption and use of technology in schools was identified as the first step. This implies that each school is evaluated for its willingness to accept technology. In the event that the school has been identified as unwilling to accept technology, some preliminary work will be done prior to the installation of technology. Such an execution structure can also be used in the private schools in order to ensure the effective adoption and use of ICTs in the curriculum delivery.

Furthermore, the curriculum goals should direct the process of adopting and using ICTs in the classrooms. If the ICT infrastructure evidently support the curriculum, the teachers are most likely to effectively incorporate the technology in their curriculum delivery. With the provision of the curriculum-linked ICT resources, it is not surprising that even the teachers with low TPCK will be in a position to integrate technology in their classrooms to the benefit of the learners.

5.2.5 The role of teachers in promoting ICTs integration in their schools

For a successful implementation of ICT programmes to take place in schools teachers should be the main motivator and initiator. Chigona, et al (2014: 6) claim that “the success of ICT initiatives in the schools depends on educators who are motivated to integrate the technology in their teaching job”. There is no doubt that teachers play a key role when it comes to quality adoption and use of ICTs in their

classrooms. Ndlovu and Lawrence (2012: 20) concur with these sentiments when they say, “teachers are critical in facilitating learning and making it more efficient and effective; they hold the key to success of any educational reform”. As such ICT resources on their own, no matter how meticulous they may appear or how many are installed in a classroom or a laboratory; they cannot improve teaching and learning on their own.

Thus, it takes the teachers’ effort to incorporate the available ICT resources in a way that will assist to achieve the set goals. It is imperative for the teachers to be aware of the social change in the teaching and learning process and therefore should act as the agents “of change from the classical method into the modern one” (Meenashi, 2013: 5). The same sentiments are echoed by Salehi and Salehi who posit that “teachers should be aware of what is happening in the classroom and what changes are occurring” so that they can implement the ICT programmes that will eventually improve the teaching and learning process.

It is also imperative to point out that the teachers in the private schools should be prepared to take part in any ICT programme, either organized by the WCED or by the school management. This researcher also discovered that some teachers in the private schools are unwilling to attend the ICT training sessions that are organized for them to improve their ICT skills. The reasons could vary from one teacher to the other, for instance, some teachers may feel that being robbed of their time to relax or to attend to their personal issues if they attend a training session after school hours or during the weekends. For others, it could be that they are demotivated to improve their ICT skills as this may not have direct financial benefits. Therefore, the training programmes should be tailor-made to change the teachers’ attitudes towards ICT professional development training. The ICT training programmes should make the teachers aware of the far-reaching benefits of developing their technological skills.

5.2.6 The role of School Governing Bodies (SGBs)

The private Schools should be encouraged to establish working School Governing Bodies (SGBs) that should look into promoting the teaching and learning processes in schools. These SGBs can assist by sourcing out funds to purchase the ICT resource for their private Schools. There is need for proper planning to be in place for ICT adoption and use to be successful in the private schools. This is because the adoption and use of ICT requires a lot of capital expenditure. So the SGB members will have to take the initiative and make sure that proper planning take place in order to avoid the possibility of unnecessary wastage and the buying of irrelevant resources. Thus a pragmatic budget that dependably supports the adoption and use

of ICTs in the curriculum delivery must be drafted and approved by all the stakeholders as part of the planning.

The SGBs of the private schools should also think about forming joint ventures with the private business companies. The private business companies can support the private schools' efforts by availing the funds that can be used in promote the adoption and use of ICTs in the schools. In South Africa, various companies seem to have interest in promoting the education of learners in the public schools. The same can happen in the private schools that are prepared to demonstrate show proper planning and clear policies on what they intend to do.

5.2.7 The attitude of the private school authorities on ICT integration

The owners and/or the directors of the private schools should be encouraged to take heed of the proposals made by the school managers and teachers regarding ICT development in these schools. While private schools may be run as business entities it should come to the knowledge of the owners of these schools that they have a duty to ensure that learners receive their education in the manner they are expected by the education department. Thus, the school authorities should keenly involve the teachers in making key decisions regarding the adoption and use of ICTs in their classrooms. Involving teachers will certainly lead to the success of the ICT programmes in schools as they will feel that they are part and parcel of the initiators of the programmes.

The private school authorities can go an extra mile by requesting the student teachers from the different tertiary institutions who possess the expertise in ICTs to share their skills with the teachers who require the technological skills in their schools. While this can work very well in schools that are located closer to the tertiary institutions, the schools that are located relatively far from the tertiary institutions can arrange transport for the student teachers to come to their schools and to return after offering their services.

The private school authorities can also decide to partner with some public schools in their circuits or districts especially those that have effectively incorporated ICTs in their curriculum delivery so that they can learn from them. By doing so, these private schools will gain a lot of practical knowledge on how best they can promote the adoption and use of ICTs in their schools.

This study has revealed that there are immense benefits that can be derived from the adoption and use of ICTs in curriculum delivery. Therefore, it is very important to stress the fact that all the key stakeholders in the field of education such as the DoE,

the private sector, the teachers, the learners, the school authorities, the members of the SGBs, the parents, and the members of the society in general, work together in order to make sure that the effective adoption and use of ICTs in the curriculum delivery is achieved.

5.2.9 The researcher's final remarks

The adoption and use of ICTs in South African schools can result in the promotion of the effective teaching and learning in the classroom. It is also the researcher's belief and trust that gradually the adoption and use of ICTs in schools will improve if all the stakeholders continue to identify the factors that militate against the effective integration of ICTs in the classrooms. This is an important step to take as it allows people to come up with possible solutions to the challenges being faced. It is also imperative for the teachers to realize the strong relationships between the various challenges that prevent effective technology integration in the curriculum delivery. Therefore, the presence of all important factors such as the availability of ICT resources, high competence and high confidence levels among the teachers will increase the chances of outstanding technology integration in teaching and learning.

5.3 Chapter Summary

In this chapter, various conclusions have been drawn that are in line with the aims and objectives of the research study. There is clear evidence from the findings of this study that teachers are eager to incorporate ICTS into their lessons despite some critical challenges that they are facing. Based on the conclusions drawn in this chapter, the researcher was able to suggest recommendations to all the stakeholders in the field of education to ensure that the adoption and use of ICTs in the private schools becomes successful.

It is also important to note that since this research was conducted in a few private schools in the Western Cape its results cannot therefore, be generalized across all the schools in the province. Hence continuous research on the factors that affect the adoption and use of ICTs in the classroom is of paramount importance since new factors are always coming into play.

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Appendices

Appendix A: Data collection instrument 1

This interview schedule is for educators and is aimed at establishing factors or challenges that militate against effective Information and Communication Technology (ICT) adoption and use in private high schools in Western Cape (South Africa).

Main question: What are the factors affecting the adoption and use of ICTs in your school and/or in your classroom?

1. How does the use of ICT as a resource enhance teaching and learning in your classroom?
2. What do you think is the perception of other teachers in your school about the use of ICTs in their classroom?
3. Can you please mention some of your ICT skills, and state where and how you apply these skills?
4. How did you acquire your ICT skills?
5. Do you think your ICT skills are sufficient to fully integrate ICTs in your classroom? If not, what do you think can be done to improve your ICT skills?
6. How do you think one can motivate teachers who lack the necessary ICT skills to take interest in improving these skills?
7. What type of ICT resources are you exposed to in your school?
8. What are some of the critical challenges that you and other teachers encounter in your school with regard to the use of ICTs in the classroom?
9. What have you done to try and deal with the challenges you have mentioned?
10. Is there anything you think your school can do to overcome these challenges?
11. What is the WCED doing to support ICT programmes in your school?
12. What would you like to bring to the attention of the school, WCED and/or your community regarding the use of ICTs in your classroom?

Thank you for taking your time with me during this interview session, I really do appreciate. May God Bless You!

Appendix B: Data collection instrument 2

QUESTIONNAIRE FOR EDUCATORS

This questionnaire is aimed at determining the critical challenges associated with the adoption and use of Information and Communication Technology (ICT) in the classroom in private high schools in Western Cape, South Africa. It consists of two main parts. The first part deals with teachers' familiarity with ICT use in the classroom and the second part deals with the challenges experienced by teachers regarding ICT integration in the classroom.

First Part: Teachers' familiarity with ICT

Please indicate your perception regarding your familiarity with the use of ICT in the classroom by putting a tick in the appropriate box.

Items	Never Used	Limited user	Frequent user	Regular user
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1. How often do you use ICTs in your classes? ☐ ☐ ☐ ☐

	Novice	Some Experience	Frequent user	Expert
--	--------	-----------------	---------------	--------

2. How do you judge yourself in using ICT? ☐ ☐ ☐ ☐
- in your classes?

	Not familiar	Limited familiarity	Familiar	Very familiar
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3. How do you think of other teachers in your department about their familiarity with ICTs? ☐ ☐ ☐ ☐

Second Part: Barriers preventing teachers to use ICT?

Please indicate your perception regarding barriers preventing you from using ICT in your classroom by putting a tick in the appropriate box.

Statements	Strongly disagree	disagree	undecided	Agree	Strongly Agree
1. Shortage of class time hinders me to use ICT.	☐	☐	☐	☐	☐
2. Little access to ICT prevents me to use ICT.	☐	☐	☐	☐	☐
3. Little ICT technical support at schools discourages me to use ICT in the classroom.	☐	☐	☐	☐	☐
4. Society views about ICTs hinder me to use ICTs in the classroom.	☐	☐	☐	☐	☐
5. Colleagues' negative views about ICTs hinder me to use ICTs in the classroom.	☐	☐	☐	☐	☐
6. Schools views about ICTs discourage me to use ICTs in the classroom?	☐	☐	☐	☐	☐
7. Time needed to learn using ICT prevents me to use ICTs in the classroom	☐	☐	☐	☐	☐
8. Requirements of qualifications discourage me to use ICT.	☐	☐	☐	☐	☐

Thank you for your kindness in responding to this questionnaire, I really do appreciate. May God Bless You!



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REFERENCE: 20160824 – 3531

ENQUIRIES: Dr A T Wyngaard

Mr Peter Madoda

18 Galileo Road

Belhar 23

7493

Dear Mr Peter Madoda

RESEARCH PROPOSAL: ADOPTION AND USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES IN PRIVATE HIGH SCHOOLS IN THE WESTERN CAPE

Your application to conduct the above-mentioned research in schools in the Western Cape has been approved subject to the following conditions:

1. Principals, educators and learners are under no obligation to assist you in your investigation.
2. Principals, educators, learners and schools should not be identifiable in any way from the results of the investigation.
3. You make all the arrangements concerning your investigation.
4. Educators' programmes are not to be interrupted.
5. The Study is to be conducted from **15 September 2016 till 30 September 2016**
6. No research can be conducted during the fourth term as schools are preparing and finalizing syllabi for examinations (October to December).
7. Should you wish to extend the period of your survey, please contact Dr A.T Wyngaard at the contact numbers above quoting the reference number?
8. A photocopy of this letter is submitted to the principal where the intended research is to be conducted.
9. Your research will be limited to the list of schools as forwarded to the Western Cape Education Department.
10. A brief summary of the content, findings and recommendations is provided to the Director: Research Services.
11. The Department receives a copy of the completed report/dissertation/thesis addressed to:

The Director: Research Services

We wish you success in your research.

Kind regards.

Signed: Dr Audrey T Wyngaard

Directorate: Research

Appendix D: Ethics Certificate



***For office use only	
Date submitted	19 July 2016
Meeting date	n/a
Approval	P/Y/N
Ethical Clearance	EFEC 1-

DATE: 24 August 2016

FACULTY OF EDUCATION

RESEARCH ETHICS CLEARANCE CERTIFICATE

This certificate is issued by the Education Faculty Ethics Committee (EFEC) at Cape Peninsula

University of Technology to the applicant/s whose details appear below.

1. Applicant and project details (Applicant to complete this section of the certificate and submit with application as a Word document)

Name(s) of applicant(s):	Peter Madoda
Project/study Title:	Adoption and use of Information and Communication
Is this a staff research project, i.e. not for degree purposes?	No
If for degree purposes:	Degree: Master's Supervisor(s): Dr A. Chigona
Funding sources:	Self

2. Remarks by Education Faculty Ethics Committee:

This Master's research project is granted unconditional ethical clearance by the Education		
Faculty Ethics Committee at Cape Peninsula University of Technology. This certificate is		
Valid till 1 August 2018.		
Approved: ✓	Referred back:	Approved subject to adaptations:
Chairperson Name: Chiwimbiso M Kwenda		
Chairperson Signature: 		Date: 2 August 2016
Approval Certificate/Reference: EFEC 1-8/2016		