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Teachers' ICT integration challenges: a case study in Orlando East, South Africa

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RESEARCH TOPIC: **TEACHERS' ICT INTEGRATION CHALLENGES: A CASE STUDY IN ORLANDO EAST, SOUTH AFRICA**

RESEARCH QUESTION: **WHAT ARE THE CHALLENGES THAT CAN BE OVERCOME BY TEACHERS WHILE THEY INTEGRATE ICT INTO TEACHING AND LEARNING?**

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YEAR: **16 FEBRUARY 2015**

A research report submitted to the School of Education, Faculty of Humanities, University of the Witwatersrand, in partial fulfilment of the requirements for the degree of Masters of Education.

ABSTRACT

The use of ICT in education has transformed teaching and learning. This transformation has provided education systems with new challenges on how they should prepare teachers for effective ICT integration in the context of barriers that seem to restrain this worthwhile initiative. Research indicates that teachers are not integrating ICT into teaching and learning effectively. This qualitative study investigated challenges faced by teachers in schools that affect meaningful ICT integration. Thereof how can teachers triumph over the identified challenges in order to effectively integrate ICT into teaching and learning?To measure effective integration, the study uses Czerniewicz and Brown (2005) as the lenses to zoom into how teachers are integrating ICT into teaching and learning. Furthermore, the study used Ertmer's (2005) views (internal and external barriers) to view teachers' challenges. This was a multiple case study of four schools in Orlando East that are recipients of Gauteng Online Laboratory project. Participants were fourteen teachers who are using ICT for teaching and learning. The findings of this study pointed out that the challenges of schools that participated in the study vary and some can be overcome by teachers and other can only be overcome by the education authorities at different levels. The study also found that there is a relationship between challenges as they influence one another in the constraining effective ICT integration into subject teaching and learning.

Key words:

ICT pedagogical integration, Computers, Challenges, Teaching Events

DECLARATION

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

KhanyisileMbatha



.....Date:16/02/0215

DEDICATION

I dedicate this report to my late father, Mfungelwa Phillip Mbatha. I know that had you been alive, seeing your very own daughter realising her dreams,that was going to put a smile on your face.

ACKNOWLEDGEMENTS

This report would not have taken the present form without individuals who helped me to pull through the right direction. I owe you enormous gratitude.

I would like to express my profound gratitude to my supervisor Nokulunga Sithabile Ndlovu for your guidance, valuable feedback, constant encouragement and unwavering support throughout the research. Ngiyabonga kakhulu!

My gratitude is in order to my family for being the source of inspiration. A special thanks goes to my sister Lindiwe Gugu Mbatha for unmatched emotional support and believing in me. Thank you for your sisterly advice at the moments I needed it most.

I would also like to express my sincere gratitude to my mother Funani Florence Simelane for her wise advice and words of wisdom. You always tell us that “imfundo iyaphumelelisa” even though you never got the privilege to go to school. Your words of tenacity ring in my ears.

There were times where I ran out of energy and start to believe that this report was impossible but my friends, especially Tamia, Michel and Amanda were the source of my energy and they always said it is possible to complete this report. I value your support and sustainable interest towards my research that kept me going. Thank very much.

Finally I would like to thank principals who granted me the opportunity to collect data in their schools and also thank colleagues who participated in this study.

It was through support and encouragement from many that I have been able to complete this amazing journey. Thank you.

ACRONYMS

ACE	Advanced Certificate in Education
BED HONS	Bachelor of Education Honours
BED	Bachelor of Education
GoL	Gauteng on Line
ICT	Information Communication Technology
NS	Natural Science
SMT	School Management Team
SS	Social Science

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CHAPTER ONE

BACKGROUND TO THE STUDY

1.1 INTRODUCTION

The South African Government has called for the use of ICTs in schools with the aim of empowering learners with skills and knowledge that will enable them to participate in a competitive global knowledge economy. In response to the government's call for the use of ICTs in schools, the Gauteng Province in 2002 introduced the Gauteng Online laboratories. The intentions of the project were not only to provide computer literacy but to build a province-wide school computer network and also support the delivery of quality basic education to public schools in Gauteng (Isaacs, 2007).

According to Dagada(2004), the Gauteng Online project had planned to offer ICT training to its teachers to equip them with the following skills: "increased proficiency in information and communication technology (ICT); greater knowledge of educational ICT; a greater understanding of how learners can benefit from ICT; increased reflection and metacognition while working with ICT; and improved ability to engage in practices that lead to new ways of thinking, understanding, constructing knowledge and communicating" (p5). The other rationale associated with the use of computers for teaching and learning is vocational, where the use of computers in teaching and learning can prepare or equip learners with skills relevant for jobs in the market place Hawkrige,(1990).Therefore, teacher training in ICT skills became one of the professional development strategies in the education

system to improve ICT pedagogical integration and equity in the distribution and utilization of technology in schools.

Given the fact that Gauteng township schools are provided with computers, the expectation is that they are going to integrate ICT into teaching and learning effectively. However, the study carried out by Pan African Research Agenda on the ICT Pedagogical Integration (2009-2012) revealed that the level at which the township schools in Gauteng are integrating ICTs was low and this was due to challenges beyond their control. This study is interested in identifying challenges that can be overcome by teachers in order to integrate ICT effectively into teaching and learning. The conversational framework adapted by Czerniewicz and Brown (2005) will be used as a yardstick to measure effective use of ICT in schools and the teacher responses to challenges identified will be used to establish those that need to be overcome. Furthermore, this study argues that in as much as teacher-perceived challenges are capable of influencing effective ICT integration negatively, some of these can be overcome by teachers on their own.

1.2 PROBLEM STATEMENT

The Gauteng department of education has invested heavily in ICT by providing schools with project Gauteng Online (GoL) computer laboratories. This initiative was geared to providing each Gauteng school with 25 computers, and at a later stage, connecting them to the Internet. Once computers were connected to the Internet, every learner in any Gauteng province public school was to have an email address. The educational portal was going to be established to provide teachers and learners with a platform to interact and collaborate amongst themselves to enhance teaching and learning

(Dagada, 2004). After receiving GoL computers, teachers were expected to integrate ICTs into teaching and learning.

The infrastructure investment studies (Ramola, 2010; Stokes, 2004) in Hlatshwayo (2006) have been conducted with regard to ICT integration to learn about the impact of the project on Gauteng public schools. They have revealed that computer technologies are available in many schools in the Gauteng province, but there is scant evidence that it has been integrated effectively into the curriculum. Based on the South African literature covered in this study, little attention has been given by both the department of education and researchers to identify the challenges that can be overcome by teachers on their own if they were to integrate ICTs effectively. The greater focus has been on infrastructural, management and adoption challenges faced by teachers in the implementation of ICT integration. This study specifically investigates challenges that can be overcome by teachers in order to effectively integrate ICT into teaching and learning.

1.3 RESEARCH QUESTIONS

What are the challenges that can be overcome by teachers in order to effectively integrate ICT into teaching and learning?

1.3.1 Research sub questions

1. What do teachers perceive as challenges hindering ICT pedagogical integration?
2. Which challenges can be overcome by teachers if they are to effectively integrate ICT into teaching and learning?

1.4 THE AIM OF THE STUDY

The purpose of this study was to examine perceived teacher challenges that seem to hinder effective ICT integration into teaching and learning. The study sought to understand the relationship between pedagogical integration effectiveness and teacher challenges in order to provide suggestions on whichof them can be overcome.

1.5 RATIONALE OF THE STUDY

As mentioned earlier in this chapter, Gauteng Online laboratories were geared to support ICT integration across all learning areas. A number of studies (Pan African Agenda, 2009-2012; Ramolo, 2010; SAIDE, 2006) have been carried out since its inception, investigating how ICTs are being integrated into teaching and learning in schools. Based on the results, this study seeks to explore challenges faced by teachers that specifically hinder effective ICT integration in the classroom and make suggestions on how teachers can overcome some of them.

Teachers are seen as drivers of the ICT integration process yet they are being criticised profoundly for not integrating ICT effectively (Becker, 2000; Ertmer, 2005; Gobbo & Girardi, 2001; Higgins & Moseley, 2001; Jimoyiannis, 2007; Lim & Chai, 2007). Therefore, this study is valuable in that it investigates teachers' voices on challenges that hinder ICT integration. In some respects, the study is investigating whether identified challenges can be overcome by teachers on their own. This is an important dimension of the study as the findings thereof could inform educational reform at policy design and implementation level thereby facilitating the improvement of ICT integration in the classroom.

It is also hoped that by exploring challenges that need to be overcome by teachers (specifically in Orlando East) in order to effectively integrate ICT into teaching and learning will contribute to existing literature about ICT integration in the South African context. However, it is worth noting that the findings of this study cannot make generalisations about challenges that are faced by teachers in other schools in Gauteng. Focusing on a case of four schools provides a useful insight into the kind of support that is required by teachers in order to overcome challenges. The expectation is that this will contribute to future research on this area being undertaken on a wider scale.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

This literature review will provide an enhanced background to the study as guided by the research question: "What are the challenges that need to be overcome by teachers in order to effectively integrate ICT into teaching and learning?" Guided by the research question, the literature sheds light on the following features:

- Integration of ICT into teaching and learning;
- Effective ICT integration;
- Internal and External Challenges; and
- Overcoming challenges.

ICTs have been generally understood by SAIDE (2003), UNESCO (2007) and Tinio (2003) as being the diverse set of technological tools and resources used to communicate and to create, disseminate and manage information. These tools include digital cameras, video recorders, television and radio. For the purposes of this study, the term ICT is used to encompass the entire computer which includes hardware, software, related multimedia and their use in teaching and learning (Toomey, 2001, cited in Lloyd, 2005).

2.2 INTEGRATION OF ICTs INTO TEACHING AND LEARNING

This study adopts Lloyd's (2005, p6) view by using the term 'integration' interchangeably with the term 'use' in educational technology environment. In some instances in this study, the term 'use' is used instead of integration.

There is an assumption that ICT integration is usage of basic computer skills during teaching and learning. Dron (2012) and Cartwright and Hammond (2003) advance the above description by arguing that ICT integration is not just a simple application of technology in teaching, but a well-developed process that contributes to learning. However, the success of the process relies on systematic structures that would support their development. ICT integration requires teachers to come up with logical plans on how to integrate ICT effectively.

The White Paper on e-Education (2004) describes ICT integration as e-education. According to the White Paper on e-Education (2004), ICT in education in particular encourages learner-centred learning; active, exploratory, inquiry-based learning; collaborative work among learners and teachers; and creativity, analytical skills, critical thinking and informed decision-making. It advocates that ICT integration should support larger pedagogical, curricular and assessment reforms that will facilitate improved education and in that way educational goals will be achieved. Effective integration in the South African context would therefore entail ICT usage in the classroom that promotes the achievement of these educational goals.

The understanding of Haslaman, Mumcu and Usluel (2007, p1) about ICTs is that the, "convergence of pedagogical and technological points supports effective connections between suitable technology for content and pedagogical principles to design learning environments" (p1). Therefore, they acknowledge that ICT plays a significant role in creating an ideal learning environment.

It can be said that the process of integrating ICT into teaching and learning requires teachers to have knowledge domains that will help them to recognise relevant technology and how to use it to access and present content in the most effective ways (pedagogy) to enhance learners' learning. However, absence of this type of knowledge can be detrimental to the effective use of ICTs. Appropriate training could help to alleviate this challenge. These skills and knowledge can be learned by using ICT training methods that are located in their subject teaching to prepare teachers for meaningful integration.

Mishra and Koehler (2006) believe that meaningful ICT integration can be achieved if teachers have TPCK (Technological, Pedagogical and Content Knowledge). They maintain that teaching is a complex, ill-structured task requiring the application of complex domains of knowledge.

> TPCK is the basis of good teaching with technology and requires an understanding of the representation of concepts using technologies; pedagogical techniques that utilize 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 (Mishra & Koehler, 2006, p1029).

The above extract alludes to constructivism, a theory that seems to promote a flexible usage of ICTs in the classroom (Janessen, et al, 1995). According to Powell, Kathrine and Kalina (2009) in constructivist methods learners are given the opportunity create their own knowledge. Such an environment would promote interaction and communication as learners construct their understandings and construction of knowledge.

According to Lloyd (2005), ICT integration facilitates a change in the pedagogical approach by making learning more central to the student. In other words, ICT integration brings about a pedagogical shift in a classroom whereby the focus is no longer on the teacher but is learner-centred. The learner-centeredness approach is aligned with the constructivists.

Drawing from what has been articulated in this section; ICT integration provides educational terrain with new pedagogical shifts that can enhance teaching and learning. ICT has modalities that allow teachers to change their focus from teacher-centred to being learner-centred, an approach that the South African curriculum goals advocate. It is also argued that teachers who believe in constructivist teaching integrate ICT into teaching and learning.

2.3 CHALLENGES TO EFFECTIVE ICT INTEGRATION (INTERNAL AND EXTERNAL)

Literature by Pelgrum (2001), Becta (2004), Balanskat (2006) and Etrmer(1999) categorises barriers or challenges to ICT integration differently. For example, Pelgrum (2001) categorises them as material and non-material. On the other hand, Ertmer (1999) classifies them into two categories: extrinsic/external (first order)

and intrinsic/internal (second order). First order barriers include those that are often seen as the key obstacles like insufficient resources, teacher training and technical support. Second order barriers are personal such as teachers' pedagogical beliefs. This study adopted Ertmer's classification to investigate and analyse challenges that teachers face when integrating ICT in teaching and learning because challenges in the integration process can be both internal and external to the teacher.

2.3.1 Teachers' pedagogical beliefs about ICTs (internal)

Petko (2011) described beliefs as an independent element of knowledge that an individual considers true and important in relation to a specific subject or context and are bound up with a person's past or history. According to Ertmer (2005), pedagogical beliefs are focal barriers or 'final frontiers' to effective ICT integration. Moreover, Petko (2011) adds that once they are adopted it is difficult to change them. If, for instance, teachers hold the belief thatteaching of a particular subject is only effective if teacher-centred approaches are used, it might be difficult to try and make them use a teaching technology like ICTs in a different approach. In such a case ICTs would not be used for communication in or outside the classroom.

Beliefs are broad and studying them out of context to find solutions for specific education practice is not ideal (Petko, 2011). Studying pedagogical beliefs can help understand the teacher's pedagogical practice in the classroom. Khader (2012), for instance, confirms that what teachers do in a classroom is guided by their pedagogical beliefs. It could be said, therefore, that pedagogical beliefs have an influence on classroom practice decisions.

The decision of the teacher to adopt ICTs also depends on the nature of ICT beliefs he or she holds. However, Ertmer (2005) and Lui (2010) indicate that teachers who have strong constructivist pedagogical beliefs are more likely to use technology in the classroom than teachers who have traditional pedagogical beliefs. Therefore teachers' pedagogical beliefs about technology integration can influence teaching methods when using technology. Nevertheless, such beliefs can be changed if teachers' ICT perceived usefulness is changed (Ertmer, 2012).

Petko (2011) differentiates beliefs into positive and negative beliefs. He believes that,

> Common positive ICT beliefs relate to improved learning processes and better learning success, the promotion of independence and collaboration, improved work efficiency and effectiveness, improved student motivation, the importance of computer skills in society, and diverse benefits of particular ICT functions(Petko, 2011:p1353).

Teachers with such beliefs are bound to adopt the technologies to satisfy whatever their pedagogical needs are. In addition to that, they are likely to make an effort to extend their capabilities to improve on efficiency and effectiveness. The more successful the experiences teachers have in their contact with computers, the more they are prone to adopt them in their teaching (Davies, 2004) and as a result, expose themselves to various ICT affordances. By so doing they open up opportunities to use them in diverse ways. Teachers will adapt to technology if technology is going to provide what traditional methods cannot or what she or he cannot do by himself. In addition to this argument, studies(Sabzian and

Gilakjani (2013) depict that both teachers' personal theory and perceptions about teaching and learning processes and their level of competence with ICT play a major role in how they implement ICT and how they motivate themselves to use ICT in the classroom.

According to Petko,

> Common negative beliefs about ICT relate to the primary importance of hands-on experience, the risks of isolation in a virtual world and digital over-stimulation, questions about the quality of online media, media-associated disciplinary problems, lack of practicability or simply lack of priority for using ICT in the classroom(Petko, 2011:p1353).

It seems negative beliefs are mainly associated credibility and safety and with ease of use as presented in the Technology Acceptance Model (TAM) by Davies (2004). These have a strong influence on the poor adoption of ICT use even where resources are available.The negative beliefs can also influence the teachers' flexibility in using ICTs for various activities that may benefit from the integration. However, Moseley (2001) argues that the "most effective teachers not only had a positive attitude towards ICT but had good ICT skills and used computers as part of a stimulating environment favouring pupils' inquiry and collaboration" (p152). In addition, teachers who see technology integration as an add-on activity do not integrate ICT because they believe that it is going to add to their everyday heavy teaching loads. This is probably associated with limited technical skills that still have to be acquired before usage in the classroom is implemented.

Drawing from these two types of beliefs, teachers with positive beliefs are likely to influence teachers to use ICTs in their teaching and learning in different ways whereas teachers who hold negative beliefs about ICTs are constrained by their perceptions to use them for educational purposes. According to Bruner, cited in Petko (2011), these beliefs can also be informed by one's epistemological beliefs about knowledge and teaching and learning as a whole.

Each teacher holds a set of beliefs that determine priorities for pedagogical knowledge and how students acquire knowledge Lui (2010:p1012). In addition, Strydom, Thomson and Williams (2005) posit that if teachers' 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 the use of computers to representational use. Petko (2011) also found that teachers are most likely to use ICT for functions that suit their pre-existing pedagogical practices. Many teachers use technology for the reason that it maintains the current goal more effectively than the traditional method rather than that it helps to maintain a new goal.

Lui (2010, p1012) argues that regardless the inadequate resources and unsuccessful experiences, negative attitudes and beliefs are rationales accountable for ineffective ICT integration. Therefore having access to ICTs and infrastructure does not translate to effective integration if teachers hold negative attitudes towards effective ICT integration.

In overcoming barriers, Ertmer (1999) explains that first order barriers can be eliminated or overcome by providing teachers with adequate resources and training skills. However, beliefs or second

order barriers require challenging one's belief system. In her later paper, Ertmer (2012) recommends that further studies be carried out on how attitudes and beliefs can be changed through professional development. She further argues that first order barriers can be eliminated easily by allocating money to address the challenge, whereas second order (beliefs) are not easy because they are deep-seated in an individual. In a case like South African township schools, this option is a challenge as funds are not available to cover the first order barriers and yet there are teachers who are operating beyond them.

2.3.2 Challenges to effective ICT integration (external)

This section discusses literature on external challenges faced by teachers in schools that affect effective integration.

2.3.2.1 Professional development

Technology is now used in most aspects of people's everyday lives, including education. For teachers to be able to use these technologies effectively, they need to possess some technological basic skills. Maddux and Johnson (2005) refer to basic computer training as type 1 application where teachers use technology to do the same thing, only faster or easier. Hassel (1999)posits that the increase in electronic resources in schools requires teachers to be equipped with relevant ICT skills to effectively integrate technology into their instructional practice. Moreover, he argues that it is pivotal for teachers to receive professional development on how to use ICT tools such as basic applications, videos, and games in teaching. However, Pelgrum (2001) argues that teachers are not afforded enough ICT training opportunities to enable them to use ICT in the classroom effectively. This could be the reason why

teachers are not satisfied with the training as they mainly focus on basic computer skills as they do not prepare them for classroom experience.

According to Ang'ondi (2013), teachers who are already in the profession face a bigger challenge because they are expected to learn on the job. Teachers are already overwhelmed with administration and other activities that take place in schools and asking them to attend ICT training addsto their burden.

ICT training needs proper planning and follow-up so that it can show return on the investment. Becta (2004) maintains that the issue of training is certainly complex because it is important to consider several componentssuch as time for training, skills training and pedagogical training to ensure effectiveness. The assumption is that after training, teachers must go back to schools or classrooms and integrate ICT into teaching and learning. There is no follow-up to check whether they have acquired the skills to evaluate the training or to give them support with what they are struggling with(du Plessis and Webb, 2012).

Unwin (2005, p115) explains that many educational ICT initiatives in Africa focus primarily on the importance of giving pupils and teachers ICT skills rather than on using ICT to enhance their wider learning experiences. He also believes that computers have more value than teaching basic skills. Teachers have passed the stage of learning computer skills and it is a reasonable belief that they want to go beyond basic computer skills to learn techniques of how to integrate ICT into teaching and learning. In addition, Becta (2004) maintains that training should provide teachers with pedagogical training for teachers, rather than simply training them to use ICT tools. Basic computer training does not help much in helping

teachers to reach advancement and effectiveness in pedagogical integration.

Most of the ICT trainings in South Africa are offered by private service providers that train ICT facilitators and in turn, facilitators train ICT co-ordinators. In such a case, the department of education adopts the train-a-trainer strategy and there is no accommodation for every learning area. That way, ICT trainings are one-size-fits-all. Teachers are struggling to apply skills learned from general training to different learning areas. Becta (2004) advocates that when looking at the challenges that teachers face, it is important to focus on a specific subject area. Subject-specific trainings can offer teachers skills that are relevant to their practice.

Drawing from this review, there are many challenges that teachers face as a result of ICT training. South African and other studies in developing countries such as the Pan African Research Agenda on Pedagogic Integration of ICTs (www.observatoiretic.org)report that teachers need pedagogical integration skills if they use ICTs to teach. Becta (2004) posits that the increase in electronic resources such as basic applications, videos, and games in teaching in schools require teachers to be equipped with relevant skills to effectively integrate technology into their instructional practice. In line with this, Ball and Cohen, Putnam and Borko and Wilson and Berne as cited in Borko (2004) suggest that the ubiquitous changes in technology will require a great deal of learning on the part of teachers and will be difficult to make without support and guidance. Preparing teachers does not entail formal training only; for instance, South African teachers seem to prefer informal training (Howie & Blignaut, 2009). Although the concern might be

the credibility of the observed experience, teaching is an individual experience that is normally determined by the context.

2.3.2.2 Technical Support

Lack of technical support in schools seems to create a serious barrier to effective ICT integration. There is a general feeling that technical support is not given enough attention. They believe that they do not need only ICT skills but also technical skills (skills and knowledge about hardware and software). Having technical skills will assist teachers to troubleshoot minor problems they come across in their everyday use of technology. According to Sicilia (2005) cited in Bingimlas (2009), the major barrier to ICT integration is technical support; these barriers include failing to connect to the internet and malfunctioning of computers due to virus interference (software) and other technical issues (hardware). Furthermore, technical support hinders smooth delivery of the lesson or the natural flow of the classroom activity. If technical problems strike during the lesson that disrupts the delivery of the lesson and can reduce the effectiveness of the teaching.

Bradley and Russell (1997) found that recurring faults, and the expectation of faults occurring during teaching sessions, are likely to reduce teacher confidence and cause teachers to avoid using the technology in future lessons. If their self-confidence is impaired that might discourage teachers from using ICT or failing to maximise their use. Becta (2004) reports that technical faults might discourage teachers from using ICT in their teaching because of fear that equipment might break down during a lesson. If technical problems persist it impacts on the development pf teachers' negative perceptions about technology. There are some teachers who have positive beliefs and are keen to implement ICT

integration because they are keen to receive training on technical support. In such a case, given the opportunity to train, the absence of technical support would not restrict teachers from advancing in their use of ICTs for teaching.

Although Gauteng schools have Gauteng Online laboratories some of them do not have a technician who can help whenever technical problems arise. In order to resolve this challenge, research by Korte and Husing (2007) indicates that ICT support for maintenance contracts in schools helps teachers to use ICT in teaching without losing time through having to fix software and hardware problems. Having a technician to deal with technical problems would alleviate the teachers' burden because they would then only focus on teaching as they integrate ICTs, and thus have opportunities to advance their practice.

2.3.2.3 Access to technology

Teachers can be trained on how to integrate ICT and also be trained on how to troubleshoot technical problems but this will be futile if there are insufficient resources. A limited number of computers per school results in learners having limited access to ICT. That challenge results in ineffective ICT integration in schools, particularly where learners cannot all have access to technology.

Becta (2004) maintains that limited access to ICT resources is not always due to insufficient resources but as a result of a number of factors such as inappropriate management of the available resources. This is likely to happen as a result of the school not having a proper system for utilising the available computers effectively. The White Paper on e-Education (2004, p23) advocates

that access to ICT infrastructure must be made a priority in schools, where, "every educator and learner in General and Further Education and Training must have access to ICT infrastructure". The study carried out by Empirica (2006) found that lack of physical access was a prime barrier for effective ICT integration where a number of learners exceed the number of computers and as a consequence teachers have to give each other a chance to use the computer centre. The large number of learners sharing one computer discourages teachers from using ICT for teaching and learning because if the computer laboratory is full it becomes difficult for teachers to control the learners.

Most of the time schools do not lack access to hardware only but also lack sufficient number of copies of the software as Pelgrum (2001) mentions. To use software effectively for teaching and learning, teachers require skills on how to use them effectively; otherwise their presence will be as good as absent. However, Newhouse (2002) believes that poor knowledge of software and what software is appropriate for classroom teaching are among the factors affecting effective integration. Inappropriate software in schools and teachers who cannot use the software effectively promotes negative attitudes towards the use of ICT in a school. Such challenges may undermine the teachers' willingness to venture into other forms ICT use unless they are able to manipulate and create their own materials to support their teaching.

2.4 MANAGING ICT AT A SCHOOL LEVEL

The effective use of ICT requires teachers and school management to work together to achieve the stated goals. Tondeur, van Keer, van Braak and Valcke (2008) believe that school-related policy

factors might affect the integration of ICT in the classroom. Therefore schools need to have strategies in place that will guide their ICT integration. Strategies include how the school is going to utilise its resources including timetable or roster management that can be used to control the usage of the computer laboratory, when the school should revise existing ICT policy, and how to align the ICT policy with other school policies.

Kozma (2003) emphasises that teachers who are engaged in ICT planning are more likely to apply ICT in an innovative way. Teachers need to be proactive in relation to the management of ICT including taking part in the design of ICT policy in schools. Kennewell, Parkison and Tanner (2000) cited in Tondeur, van Keer, van Braak and Valcke (2008, p213) strongly believes that, "if teachers share values expressed within a school related policy and understand the implications, the policy is able to influence practice". Furthermore, Tondeur, van Keer, van Braak and Valcke (2008) explain that ICT policy reflects to a large extent what happens in the classroom.

2.5 OVERCOMING CHALLENGES AFFECTING EFFECTIVE INTEGRATION

The challenges faced by teachers have different intensity in affecting effective ICT integration. Overcoming the challenge of access is possible by maintaining what schools have and buying new resources to augment what they have. It therefore is important to note that these challenges cannot be overcome by teachers alone but the department of education needs to buy resources and teachers must take care of what is available and use these optimally. On the other hand, as already stated above, sufficient resources do not translate to effective integration

(Bingimlas, 2009). If resources are not a factor in the integration of ICTs that means there could be other factors that can override this challenge.

Pedagogical beliefs are said to be deeply rooted in one's personality and informed by previous experiences. Ertmer (1999) maintains that pedagogical beliefs are not easy to overcome because they require one to change a set of core beliefs that were adopted over the years. One can then conclude that the second order (internal) beliefs give teachers motivation to persevere and have more influence in helping them overcome other perceived challenges.

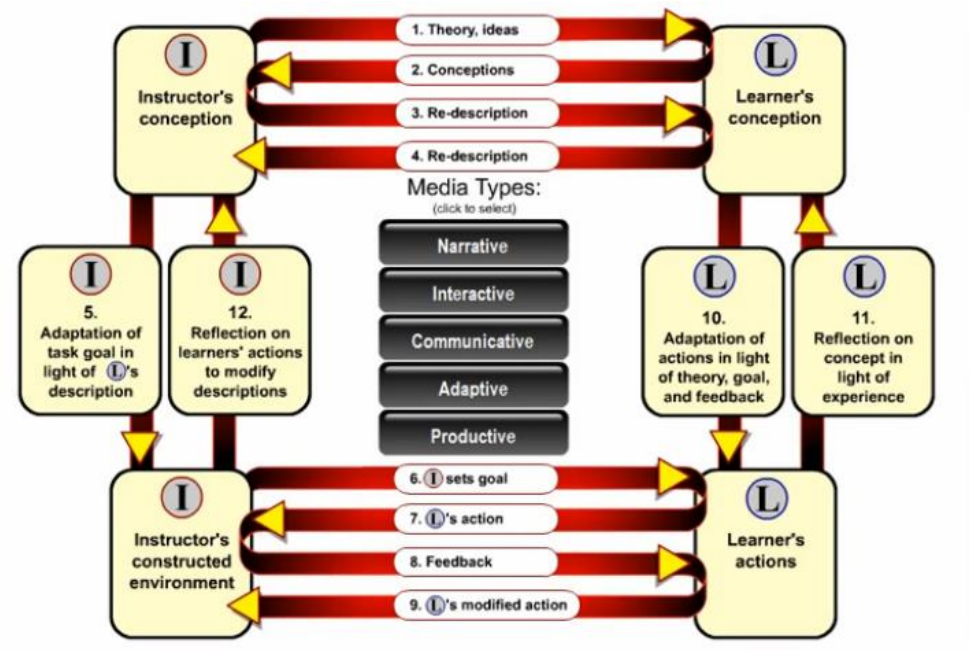
Training teachers is as important as having ICT resources in schools. To triumph over professional development challenges, teachers need to be trained not only in skills to integrate ICT but also in technical skills that will help them to integrate ICT effectively. This might help them to gain confidence in using the digital gadgets even without any technical assistance and to freely manipulate the technology in a way that will open different ways of integrating ICTs into their teaching.

2.6 EFFECTIVE INTEGRATION OF ICT

In order to determine the effectiveness of teachers' use of ICTs, this study engaged Laurillard's (2002) conversational framework as adapted by Czerniewicz and Brown (2005). Laurillard (2002) explains that the action on the part of the students is constructed around the dialogue and should be supplemented by constructive feedback from the teacher. In the process, learners are granted the opportunity for reflection.

Laurillard's conversational framework in Figure 1 below has categorised media into five types or forms that relate to the learning activities that result in the construction of knowledge by the learner as she or he interacts with the teacher. These media forms depict learning value that the learner gains as he or she uses them in the framework. These media forms are positioned in the middle on the dark back ground and will be used in this study to categorise teacher-related ICT use in the classroom. Czerniewicz and Brown (2005) adapted this conversational framework and modified it by adding teaching and learning events. They suggest that the way teacher and learner roles intersect is through specific engagements and activities which form numerous specific teaching and learning "events". Czerniewicz and Brown (2005) believe that conversational framework provides a way of describing teaching and learning in terms of the five key events that they have named after Laurillard's (2002) key learning activities (in brackets). They are acquisition (narrative), discovery (interactive), dialogue (communicative), practice (adaptive) and creation (productive).

Figure 1: Laurillards' conversational framework (2002)



According to Czerniewicz and Brown (2005), teaching and learning events include specific teaching strategies, roles or actions which interact with specific learning strategies, roles, actions and experiences. Though teaching and learning events are linked with teaching and learning media forms, they argue that none of the media forms or events has better or worse value. However, they explain that, "effective and appropriate pedagogical practice is therefore likely to be achieved through a variety of media forms balanced for their pedagogical value rather than through reliance on any one ICT activity or form"(Czerniewicz and Brown, 2005:p15). Engagement of a wider range of teaching events can be interpreted as behaviour of a teacher who uses ICTs effectively. Althoughthey argue that media forms vary as required by the curriculum and pedagogical needs of the subjects, this study argues that teachers would use more ICTs or media if they are not constrained by challenges.

By using Table 1 below it became easy to identify challenges that teachers face when integrating ICT into teaching and learning in each event. Through this table the study managed to identify challenges per teaching and learning event and also to measure the extent to which ICTs are being used in schools.

Table 1: Teaching and learning events and associated media forms

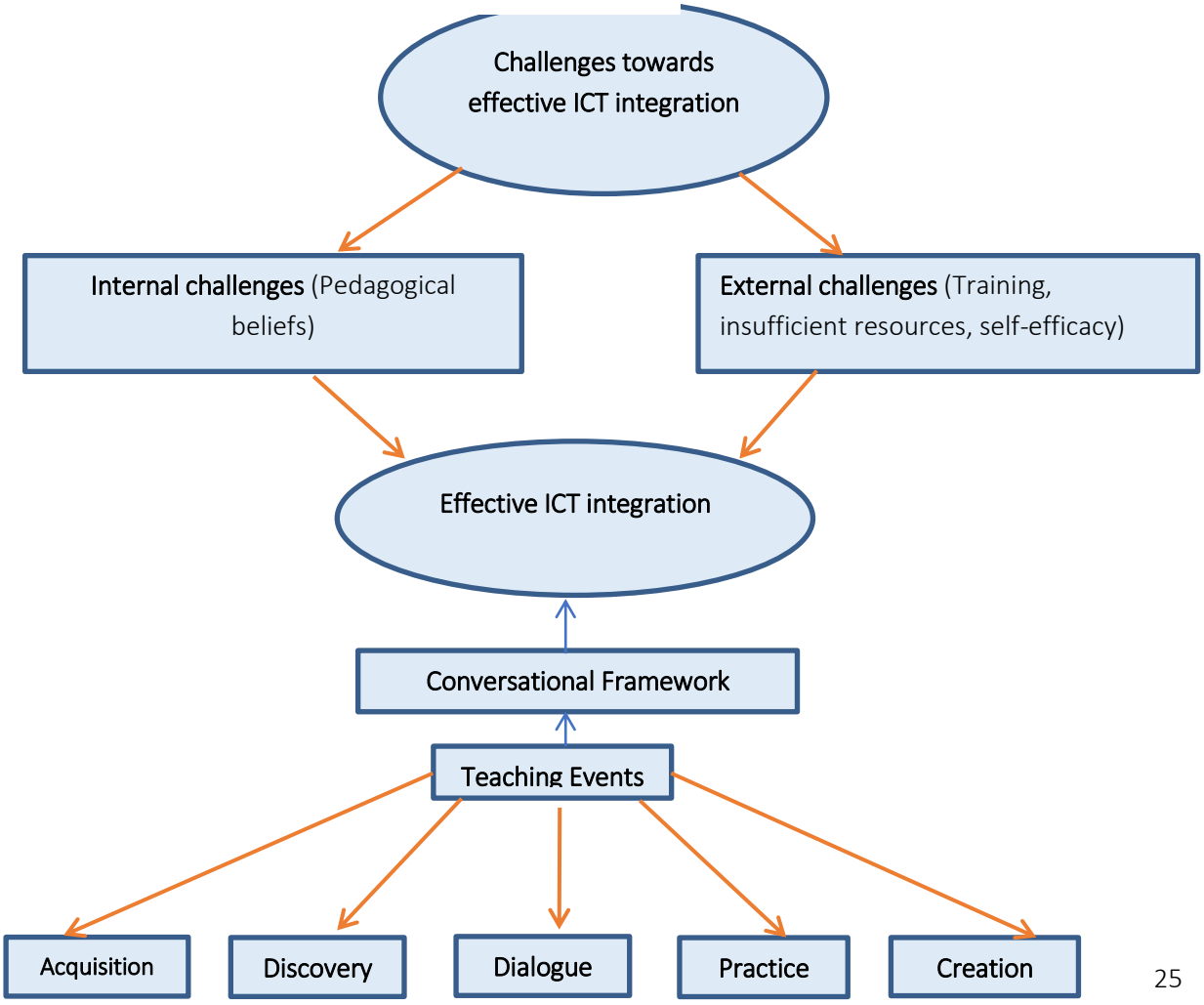
Teaching & Learning Event	Teaching action or strategy	Learning action or experience	Related media form	Examples of non-computer based activity	Example of computer based activity
Acquisition	Show, demonstrate, describe, explain	Attending, apprehending, listening	**Narrative** Linear presentational. Usually same "text" acquired simultaneously by many people	TV, video, film, lectures, books, other print publications	Lecture notes online, streaming videos of lectures, DVD, Multimedia including digital video, audio clips and animations
Discovery	Create or set-up or find or guide through discovery spaces and resources	Investigating, exploring, browsing, searching	**Interactive** Non-linear presentational. Searchable, filterable, but no feedback	Libraries, galleries, museums	CD-based, DVD, or Web resources including hypertext, enhanced hypermedia, and multimedia resources. Also information gateways.
Dialogue	Set-up, frame, moderate, lead, facilitate discussions	Discussing, collaborating, reflecting, arguing, analysing, sharing	**Communicative** Conversation with other students, lecturer or self	Seminar, tutorials, conferences	Email, discussion forums, blogs
Practice	Model	Experimenting, practising, repeating, feedback	**Adaptive** Feedback, learner control	Laboratory, field trip, simulation, role-play	Drill and practice, tutorial programmes, simulations, virtual environments
Creation	Facilitating	Articulating, experimenting, making, synthesising	**Productive** Learner control	Essay, object, animation, model	Simple existing tools, as well as especially created programmable software

Adapted from Laurillard (2002) by Czerniewicz and Brown (2005)

2.7 CONCEPTUAL FRAMEWORK

This section represents the course that this study has taken. The main aim of this research is to investigate challenges that affect effective ICT integration thereof and examine the relationship between teacher-perceived challenges and effective ICT integration. The results were used to determine which challenges can be overcome by teachers if they are to integrate effectively. In order to measure effective integration the study used Czerniewicz and Brown's (2005) framework above, developed from Laurillards' conversational framework (2002) as a lens to zoom into the level of teachers' ICT integration. The levels are used to determine the extent to which challenges influence their capacity to integrate ICTs effectively.

Figure 2: Conceptual framework



The conceptual framework above begins by depicting internal and external challenges that influence effective ICT integration. The blue arrows show conversational framework together with teaching events that were used to measure effective ICT integration. Ertmer's (2005) categorisation of challenges (internal and external)have been adopted and these were examined in conjunction with the teaching events from the adapted conversational framework to determine which challenges can be overcome by teachers in order to effectively integrate ICT into teaching and learning. This study argues that although both internal and external challenges influence effective ICT integration, internal challenges are stronger than external challenges.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter presents the research approach that was used in the process of data collection. It discusses the sample, provides justification for choosing the research method, the issue of reliability and validity, and the ethical considerations. The chapter will further discuss the instruments that were used for data collection.

3.2 RESEARCH APPROACH

Research design is the plan a researcher follows in selecting subjects, research sites and data collection procedures to answer the research questions showing 'which individual will be studied and when, where, and under what circumstances" (McMillan & Schumacher, 2001:p166). The focus of this study was teachers and their perceived challenges in relation to their capacity to integrate ICT into teaching and learning. This study adopted a qualitative approach to answer the research question. The reason for adopting a qualitative approach is that it allows for in-depth description and analysis of social phenomena of the participants. Qualitative researchers agree that the purpose of qualitative research is to explore, understand, explain and describe social phenomena from the participants' perspectives (Ploeg, 1999:p2; Key, 1997:p1). Therefore this method helped the study to gain a deeper understanding of the complexity of challenges that teachers face when they have to integrate ICT into teaching and learning. The data that was collected during this study was used to identify which challenges teachers can overcome to integrate ICT effectively.

This study relied on teachers to give an accurate account of the challenges they face in school when integrating ICT and thereof how challenges can be overcome.

3.3 A CASE STUDY

The current research constitutes a case study. Yin (1994) defines a case study as an empirical enquiry that investigates a contemporary phenomenon within its real-life context, when boundaries between phenomenon and context are not very clear. McMillan and Schumacher (1993) maintain that in a case study, a single case is studied in depth, which could be an individual, a group, an institution, a programme or a concept. In this case, the study seeks to investigate what challenges can be overcome if teachers are to effectively integrate ICTs into teaching and learning by 14 teachers in 4 township schools. The strength of a case study lies in its potential to enable the study to investigate challenges in detail. In this research, a multiple case study was used to understand challenges teachers face when they integrate ICT into teaching and learning. Yin (2003) explains that multiple case study permits the researcher to explore differences within and between cases. This study examined different cases to understand their similarities and differences in order to understand how challenges relate to effective ICT integration.

Each case was treated as a single case and its conclusion was used as information contributing to the whole study. This study is not aiming to use the findings to generalise. However, the study's' findings will add to the available literature.

3.4 LOCATION OF THE STUDY

To discover challenges that hinder effective ICT integration and also to identify challenges that can be overcome by teachers, data was collected from four schools in Orlando East. It is only schools where there are functioning computer laboratories that are used for ICT integration that were selected. To identify these schools the researcher used a list of schools in Orlando East that have functioning computer laboratories used for integration of ICT into teaching and learning in the Johannesburg North district. The researcher further identified schools that have characteristics that the study is focusing on. McMillan and Schumacher (2006) describe this as purposive sampling. They maintain that purposive sampling data is selected based on the knowledge of the population and the purpose of the study.

The main aim of choosing this site was that the researcher works in a school located in Orlando East and has easy access to the surrounding schools. Two junior secondary schools and two high schools were chosen for this study, primarily to see whether challenges in junior secondary schools are similar to those of high schools and also to explore how challenges can be overcome by teachers. Moreover, the teachers in these schools are integrating ICT into teaching and learning.

3.5 PARTICPANTS AND DATA SAMPLING

This study adopted purposive sampling for the selection of its participants. Creswell (2012:p206) maintains that purposive sampling is frequently used in qualitative sampling whereby the researcher attempts to understand the central phenomenon. Four participants per school were selected to participate in this study. Participants were teachers who use ICTs frequently for teaching and learning. However, in one junior and in one

secondary school only three teachers per institution agreed to participate in the study.

3.6 RESEARCH INSTRUMENTS

This study used multiple instruments. Using one form of instrument can raise questions of reliability so it is important for the study to use multiple instruments. Yin (2003) suggests the following: Firstly, the researcher should use multiple sources of data to assist with triangulation such as document analysis and interviewing. Secondly, a chain of evidence should be presented so that an external observer is able to follow the logic, progress, inductions and deductions made throughout the research. In the case of this study, teachers were interviewed and questionnaires were administered as part of triangulation. Data from Questionnaires were used to verify the reliability of the data collected from interviews.

3.6.1 Interviews

Most of the data was collected through interviews with semi-structured questions. This is "a specific type of in-depth interview used to study the meanings or essence of lived experience among the selected participants" (McMillan & Schumacher, 2006:353). Such interviews are valued for their probes and pauses, allowing the respondent to elicit more valid data. One-on-one interviews were chosen for this study.

The reason for using one-on-one interviews is three-fold; firstly the participant or interviewee might feel comfortable in a one-on-one interview and speak more openly and give more information in terms of open-ended questions. Secondly, one-on-one interviews may provide a relaxed, less formal environment for the interviewees and thirdly, information in a one-on-one interview is detailed and systematic. This helped the researcher to obtain in-depth understanding and information about challenges under

investigation. It is pivotal for this study to mention that the study was not focusing on gestures but was looking at social cues to identify challenges teachers face when integrating ICT into teaching and learning. The researcher conducted both interviews at the informants' place of convenience, offices and classrooms where they feel comfortable, using the interview protocol. The copies of interview questions and questionnaires were sent to teachers beforehand so that teachers could prepare themselves before the interviews.

3.6.2 Questionnaires

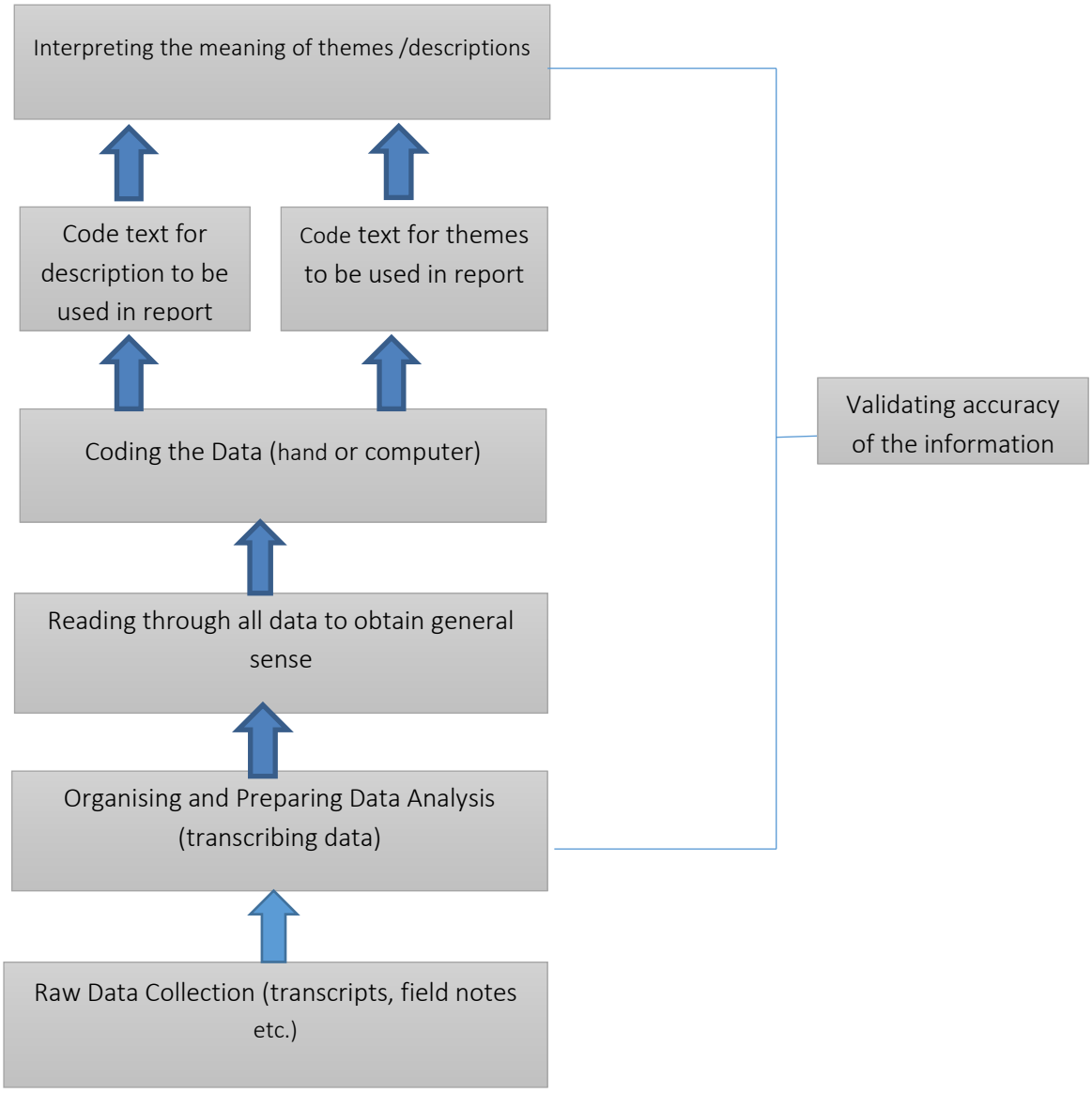
Questionnaires were adopted and administered for this study. McMillan and Schumacher (2006) define a questionnaire as an instrument with open or closed questions to which a respondent must react. Using questionnaires has the following advantages: they are relatively easy to administer, they are easy to analyse and interpret because questions are standardised, and respondents have enough time to consider questions. Though, this study used qualitative research method, the closed ended questionnaires were used to complement open-ended interview questions and to eliminate personal biases in the study. Questionnaires with closed and open-ended questions were distributed to teachers and they were expected to answer in writing. All questionnaires were collected immediately after completion. This worked to the researcher's advantage, to get back all the questionnaires for data analysis purposes.

3.7 DATA ANALYSIS

Neuman (1991) explains that social researchers systematically collect and analyse empirical evidence to understand and explain social life. Data analysis therefore entails examining, sorting, categorizing, evaluating, comparing, synthesizing and contemplating the coded data as well as raw data. According to McMillan and Schumacher (2006), qualitative data

analysis entails three steps: organisation of data, summarising data, and interpreting data. Figure 3 below was used to analyse data collected for this study.

Figure 3: Data analysis in Qualitative Research (Creswell, 2012, p237)



This study analysed data using the above figure adopted from Creswell (2012). Raw data from interviews and questionnaires was transcribed. Interview schedules were organised by identifying the most common trends

under themes. Data were transcribed by typing the text from the interviews' audio tapes to word processing documents. Data were separated into workable units while looking for themes and categorise. After transcribing, coding according to themes and categorise took place and themes were interpreted for their meaning in the current study, facilitating the response to this research questions. Thus, the relationship between events and challenges was used to determine which challenges could be overcome by teachers in order to integrate ICTs effectively.

3.8 ETHICAL ISSUES OF THE STUDY

The study was carried out within the framework of the University of the Witwatersrand ethical code of conduct. The participants were made fully aware of the purpose of this research and in what way the information is going to be used. This was made possible by participation and consent forms which highlighted the purpose of the research. All information was private and confidential and anonymity was ensured at all times.

3.9 RELIABILITY AND VALIDITY

The study aimed to obtain reliable data from the participants. Reliability is "the extent to which results are consistent overtime and accurate representation of the population under study is referred to as reliability. If the results of a study can be reproduced under a similar methodology, the research instrument is considered reliable" (Joppe, 2000, as cited by Strauss and Corbin (1990, p272). After completing this report, teachers will be granted an opportunity to check data presented in the report for accuracy purposes. This will be done to reduce or eliminate any misinterpretations of the data in order to ensure a more accurate analysis of the results.

3.10 LIMITATIONS OF THE STUDY

The researcher would have liked to research all the schools in Gauteng that have Gauteng Online computer laboratories that are used as a tool for ICT integration. However, the time constraints for the course constrained the researcher to work with only four schools.

This study aimed to interview teachers and ICT co-ordinators about challenges they face per school to verify what teachers reported as challenges; however, this was not feasible due to restrictions set by the department of education when collecting data from schools. The department of education explained that data can be collected up to the third term. It was unfortunate for this study because data analysis was completed towards the fourth term and the researcher could not go back to schools to interview ICT co-ordinators. As a result the study only reported teachers' views.

CHAPTER FOUR

DATA PRESENTATION

4.1 INTRODUCTION

This chapter presents the data obtained from this empirical research into challenges that can be overcome by teachers in order to integrate ICTs effectively into teaching and learning. It presents the challenges perceived by the teachers as being of influence on their effective ICT integration.

4.2 BACKGROUND OF SCHOOLS AND THEIR PARTICIPANTS

Four schools (School A-D) that participated in this study are located in a township in Soweto called Orlando East. Two junior secondary schools and two secondary schools were included. The reason for choosing junior secondary and secondary schools was to check whether they have the same challenges or situations since they are in the same township. In Orlando East, people face many societal problems such as unemployment, and some of them do not have basic education. Some of the parents rent small shacks and back rooms from home-owners. Not far from this township there is an informal settlement and most learners from this area attend school in Orlando East. Four schools are "no-fee paying" schools and in junior secondary schools learners benefit from the nutritional programme that provides them with meals from breakfast to lunch.

The junior secondary schools have grades 7 – 9 and they are feeder schools for the secondary schools in this study. Secondary schools start from grade 10 to 12. Three schools (Schools A, B, D) have 95 gadgets: 25 computers from GoL, 30 laptops from Telkom Foundation and an unnamed company and 40 tablets from the department of education. School C only has 24 computers. The teachers in this school mentioned that they have 40 tablets

but they are not using them because they are still waiting for training; furthermore, the laptops that were donated to them were stolen and that left them with only 25 computers.

Computer average ratios per school vary because of the number of the learners per school. School A has ± 870 learners that gives a ratio of 1:9, School B has ± 1020 learners and the ratio is 1:11, School C has ± 866 learners with a higher ratio compared to other schools of 1:36 and School D has ±870 learners with the ratio being 1:9.

4.3 TEACHER PROFILE

Table 2 below presents profiles of the teachers in the four schools. This data was collected through questionnaires. Table 2 depicts teachers' profiles from Schools A –D, Teacher 1 to teacher 4, which will be referred to as A (for School A) and T1(for Teacher 1) – AT1, A - T2 and teachers in school B will be B - T1, B - T2 and so on. There were two female teachers and two male teachers. Their age ranges from 28 to 50 and they are integrating ICTs. It was noted that most teachers who participated in this study are Maths and Science (7) teachers.

Table 2: Teachers' profile

Participants	Age and Gender	Experience	Subject(s)	Qualifications
A T1	28 Male	2	Maths and Natural Science	B Ed
A T2	37 Female	2	Natural Science(NS)	Advance Certificate in Education (ACE)
A T3	43 Female	5	Social Science(SS)	Diploma in Education
A T4	45 Male	25	Maths	Diploma in Education
B T1	29 Female	1	Life Science and	PGCE
B T2	30 Male	4	Maths	BED
B T3	40 Female	2	Maths	BED
B T4	50 Male	20	Maths	Diploma in Education
C T1	39 Female	13	Maths and NS	ACE
C T2	32 Male	6	English	BED
C T3	33 Female	6	EMS	BED Hons
D T1	47 Male	25	Geography	BED Hons
D T2	40 Female	17	Maths	BED
D T3	43 Female	17	NS	ACE

4.3.1 Effective integration and challenges

It was explained in chapter two that this study used Czerniewicz and Brown (2005) to measure the level of ICT integration effectiveness into schools. Their lenses were used to determine whether the usage of ICTs by the schools is effective or ineffective. They used media forms and teaching and learning events (Acquisition, Discovery, Dialogue, Practice and Create) to measure effectiveness. This study is only using teaching events and these were explained before completion of the questionnaire. Data in table 3 was analysed in chapter five using graphs.

Table 3 below presents the teaching and learning events that teachers engage in their pedagogical integration of ICTs. It also shows the challenges experienced by teachers per school.

Table 3: Teaching and Learning Events and School Challenges

Schools	Cases	ICT Training	Teacher and Learning Events used	Challenges experienced by schools	Computer based Activities
A	A T1	University Degree (BED)	Acquisition, Discovery, Practice	Training, Technical Support, Insufficient resources, Theft, Internet, management of ICT at a school level	Digital videos, Web sites, software
	A T2	University Degree (ACE)	Acquisition, Discovery, Dialogue,		Video, social network
	A T3	Self-training	Acquisition, Discovery, Dialogue, Creation		Web sites, software
	A T4	University Degree (ACE)	Discovery, Dialogue, Practice,		Hypertext, Web sites, software
B	B T1	University Degree (PGCE)	Acquisition, Discovery, Dialogue,	Self-efficacy, Training, Technical support, insufficient resources, management of ICT at a school level	Web sites, discussion forums ,digital videos
	B T2	University Degree (BED)	Discovery, Practice		Web sites and software
	B T3	University Degree (BED)	Acquisition, Discovery, Dialogue		Web sites discussion forums
	B T4	Self-training	Acquisition, Discovery, Dialogue		Web sites, software, audio clips
C	C T1	University Degree (ACE) But self-trained	Acquisition, Discovery, Practice,	Management of ICT at school level, Self-efficacy, Theft, Training	Web sites, software
	C T2	University Degree (BED)	Discovery, Dialogue		Discussion forums, web sites, simulations, audio clips
	C T3	University Degree (BED Hons)	Acquisition , Dialogue, Practice,		Tutorial programmes, Web sites
D	D T1	University Degree (BED Hons)	Acquisition, Discovery, Creation	Self-efficacy, Training, Access	Web sites , digital videos
	D T2	University Degree (BED)	Acquisition, Discovery, Dialogue, , Creation		Discussion forum, web sites , digital videos
	D T3	University Degree (ACE)	Acquisition, Discovery, Dialogue, Practice		Web sites, Discussion forums, simulation

Figure 4 below shows how teachers are using teaching and learning events in School A. In this school the highest used event is 'discover' and the least used is 'creation'.

Figure 4: Teaching and learning events in School A

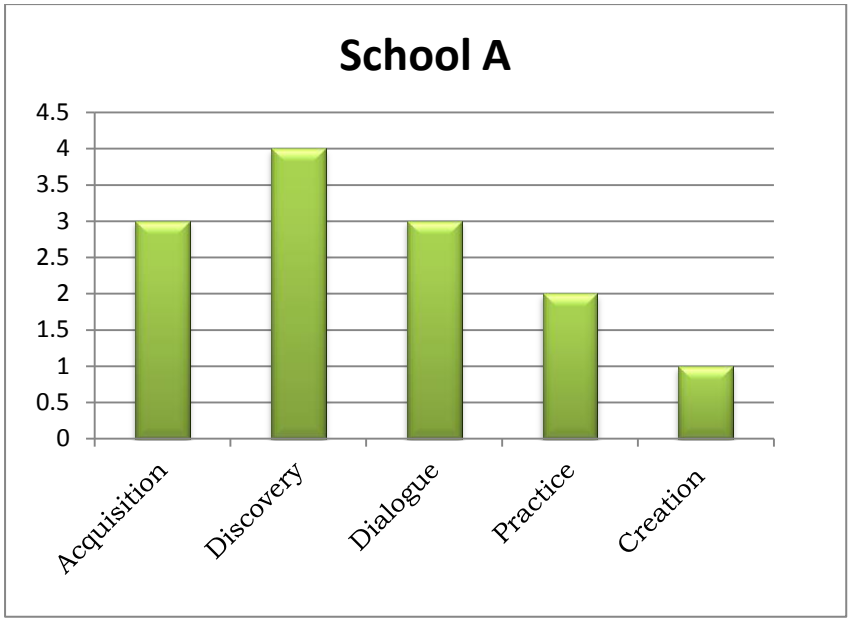


Figure 5 below presents how teachers in School B are using ICT for teaching and learning. In this school 'creation' event is not used at all whereas 'discovery' is used by every teacher.

Figure 5: Teaching and learning events in School B

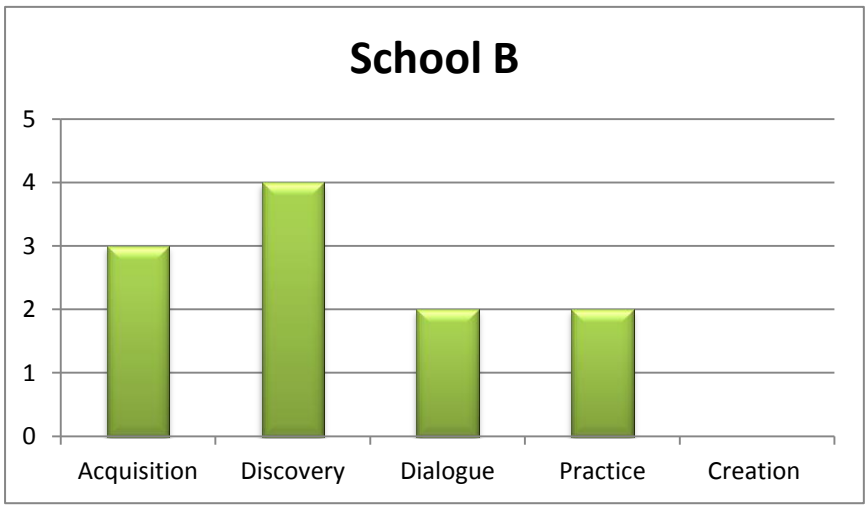


Figure 6 below presents how teachers are using teaching and learning events in School C. School C seems to use more events than other schools.

Figure 6 Teaching events schoolC

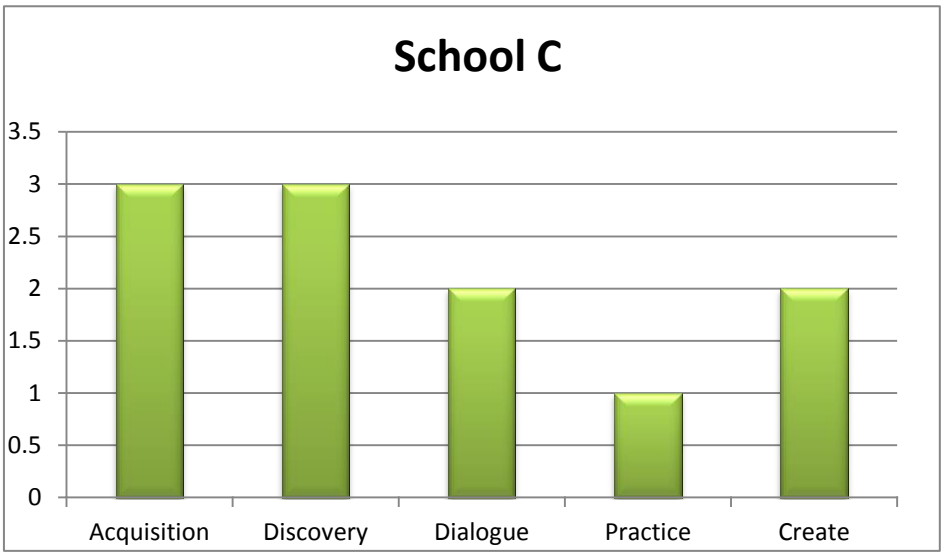
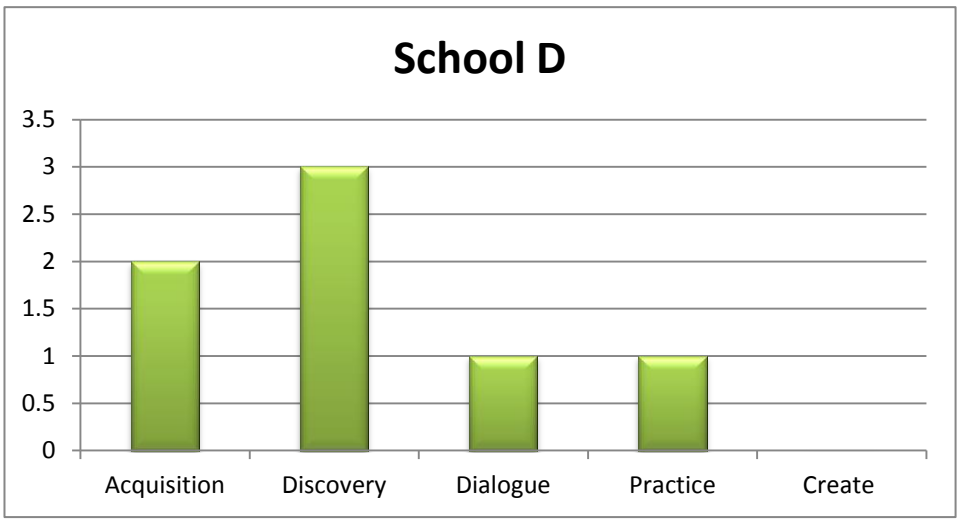


Figure 7 below shows how teachers are using teaching and learning events. School D like School B does not use 'creation' events.

Figure 7: Teaching and learning events in School D



4.4 TEACHERS' PEDOGICAL BELIEFS ABOUT ICT INTEGRATION (INTERNAL BARRIERS)

All participating teachers expressed positive beliefs about ICTs. They use ICT to enhance their teaching and learning and also for administration purposes. They believe that their pedagogy has improved because of the use of ICTs. Some of the benefits of ICTs in their teaching were as follows:
A T1 mentioned that:

> *…ICTs integration makes my work easy I don't have to worry about presentation anymore, ICT does that for me, …because when using the traditional way of teaching (teaching without using technology) you worry yourself on how are you going to present your lesson in an interesting way….*

A T4 and B T4 shared the same view about ICTs. They believe ICTs enhance teaching and they use them in almost every aspect of their teaching. They explained that,

> *ICTs help to simplify teaching activities (delivering curriculum and assessment) and assist in time management. It is also a powerful administration tool.*

B T2 reported that ICTs enrich his subject matter by saying,

> *"I use ICT in my teaching for several purposes such as; searching teaching and learning materials, It helps me for preparing notes, to prepare different materials for teaching and learning and to access different software for mathematics".*

B T3 demonstrated how she takes advantage of the available internet to enhance her learner understanding.

... when I get difficult questions from learners I do simply visit Wikipedia or google search the answer and get good, enough and satisfactory answers, my students praise me by calling me a competent teacher.

ICT is thus useful for her to boost her self-confidence as a teacher.

Teachers applauded the ability of ICT to cater for learner-centeredness. C T3 and C T 1 explained that,

ICT enables learners to become effective independent learners. …and it'also has affordance of personalising learning for instance the Maths software they use in schoolC, it pace learners learning and also give feedback…

As for D T2, ICT, enables learners to collaborate in various ways that would not be possible without them. He mentioned that,

…it assists in extending the classroom boundaries. Learners can communicate (collaborate) with one another and also with teachers even after school hours. That has led to improvement of our school results.

D T3 supported this view, alluding to the fact that,

ICT empowers teachers, if it was not ICT we will be still sitting in the sixties but now our school produces eighty percent in Maths.

Teachers in School D in most cases use the Maths centre for curriculum delivery. The teachers perceive ICTs as a good tool which assists to improve the learners' level of understanding and to clear up misconceptions that learners normally have when it comes to Mathematics. They believe that

ICT has models that help them to deliver curriculum effectively and eventually improve the Maths results.

Though, A T3 feels that ICT integration is not properly planned at a school level. She emphatically expresses her belief about ICT integration by saying,

> *I strongly believe that ICT is a good thing, it just that it is not well planned… I wish every teacher can buy into this idea of using ICTs in their teaching and learning so that government (department of education) can see that teachers are interested and come up with proper planning for ICT.*

The responses from teachers seem to suggest that their positive attitudes toward ICT use are based on the benefits ICT has in teaching and also the usefulness of ICT in their practice. This relates to the Technological Acceptance Model (TAM) (Davies, 1989) that advocates that people adopt technology if they perceive it to be useful. Teachers have also experienced a pedagogical shift since the use of ICT in their teaching and learning.

Even though teachers perceive ICT integration as positive their integration of ICT varies, Tables 4 – 7 below provide further information on the challenges that teachers face in Orlando East in achieving effective ICT integration.

4.5 CHALLENGES TO EFFECTIVE INTEGRATION (EXTERNAL BARRIERS)

4.5.1 Training

All teachers who participated in this study had ICT training but at different levels. There are teachers who had their teaching qualification long before ICT were introduced to schools and those who are newly graduated.

The new graduates got ICT training from university. They believe that universities have equipped them with relevant ICT skills, according to A T1, who said,

> *… I got training from university and I benefited a lot from that course because I was taught how to integrate ICT in my lessons, especially Mathematics. All I need now is a refresher course.*

On the other hand, older graduates depend on self-training and on the ICT trainings offered by the department of education to acquire ICT skills. Although the Gauteng Department of Education has offered ICT training to teachers they feel that these trainings are not adequate for effective ICT integration.

For instance, A T4 says the following about his ICT training from the department of education,

> *Most of the ICT trainings they offer if not all are irrelevant or not properly planned and I waste my time by going to those trainings that are offered by the department of education.*

To indicate his determination to advance his integration skills, A T4 said,

Once I have money I'm going to register in a university where I can get a proper ICT training.

B T4 further explained that,

B T4 training that we receive from department of education is not helping us to integrate effectively because in this age they are still offering training in basic computer skills thus make it irrelevant in the 21st century.

D T1 had a problem with ICT trainings being too general by saying,

… ICT trainings are designed to be one-size-fits-all and we find it difficult to apply to our different learning areas.

D T2 and D T3 agree with teacher D T1 and added that,

ICT trainings are too short and are not tailored to cater for individual learning areas.

D T3 reported that,

Maths needs special training. You cannot combine its training with other learning areas because the context of Maths is totally different.

Teachers feel that they are expected to make a significant shift after ICT training but the training they have received does not match the enormous change. C T1 mentioned that,

Normally we attend training for two days, but you cannot grasp everything in two days.

C T2 believes that ICT facilitators from the district are not sure what to do when it comes to ICT training. He explained that,

> *… most of the time they come not prepared and ask from the trainees to help one another. Attending ICT workshops is waste of time.*

If facilitators are not properly trained by service providers then it will be difficult for them to provide proper ICT training to teachers.

What was discovered is that although A T3 has not received any ICT training as indicated above, she seems to be engaging in most of the teaching events. However A T3 seems to believe that training offered by the department would offer her more skills and yet almost every teacher feels that ICT trainings are not well organised. She says,

> *I wish department can organise training for us not to train only ICT co-ordinators and rely on them to train us.*

It is clear from teachers' reports in the 4 schools that ICT training seems to present challenges to effective ICT integration in this district. Teachers are not happy about the organisation of the training and suggest that it is not properly organised. The department of education after training ICT co-ordinators depends on them to train other teachers at their respective schools. It is not clear whether the department of education does the follow-up to check whether co-ordinators are training teachers.

What is interesting is that the new graduates teachers seem not to integrate more teaching and learning events (as indicated in Tables 4-7 below) and teachers who have engaged in self-training use more teaching and learning events.

4.5.2 Technical support

Technical support was reported as one of the challenges that affect ICT integration in Schools A and B. The teachers identified the following challenges that emerged as a result of lack of support.
A T1 reported that,

> *… in this school there is no-one who is giving us technical support if there is a need for technical support the school calls a private service provider. Service providers are normally called when the department of education is taking forever to respond. When technical problems strike ICT integration has to stop.*

The respective teachers believe that technical support is not given enough or special attention that it deserves. A T3's views are,

> *…if I try to use the computer and it does not respond I just go back to my class and do the normal (traditional) teaching because getting someone (from the district office) to assist you with technical is a process that sometimes takes the whole term and if the school feels that the process is taking forever is then the private service provider is called.*

On one hand, A T2 feels that,

> *… the department of education is relying on co-ordinators to do the magic because when we call them they ask us whether we reported to a co-ordinator so that he or she can troubleshoot the problem but the co-ordinator does not know the technical stuff.*

A T4 also feels that they,

> *…need someone who is qualified (qualified technician), who is going to be based in our location or school, the one that we can easily access, someone who is just a phone call away because we are struggling to solve technical challenges.*

Although teachers in School A advocate for a technician, B T2 wants to empower himself with technical skills, by saying,

> *Technical problems discourage me. I wish I can learn how to fix computers.*

B T3 does not completely rely on ICTs when there is delays in fixing computers. He says,

> *… if you rely on using GoL computers alone in your teaching you will end up not finishing the syllabus. People who are support to offer technical support take time to fix computers.*

B T4 shows his determination towards ICT integration, and mentioned that,

> *At times I try to troubleshoot the basic (lower level) technical problems. I have basic technical skills but I'm afraid to do it openly because should anything wrong happen I will be liable. We were told that if there is a problem, we must lock the computer laboratory and wait for technicians.*

It is clear that teachers in Schools A and B are very motivated to use ICT for teaching and learning. When technology does not work, they become frustrated and some use their own technologies. As T4 mentioned, *"I use my laptop if technical problem strikes".*

It can be deduced from this that teachers need to be equipped with technological knowledge so that they are able to troubleshoot the minor technical problems without having to wait for outsourced service providers. Technical challenges might compel teachers to resort to traditional teaching.

4.5.3 Insufficient resources

Sufficient resources are a prerequisite for ICT integration, even though having sufficient resources do not necessarily translate into effective ICT integration as mentioned in the literature review. Although schools have a maximum of 95 ICT gadgets at their disposal it was reported by teachers that they are not using tablets that were supplied by the department of education. They are still waiting for the training. This results in schools having fewer gadgets.

Teachers have strong feelings that these resources are inadequate when looking at the number of learners in School A. A T1 explained that,

> *…Most of my Maths classes are overcrowded with approximately 47 learners and learners are sharing computers, two or more per computer.*

Most of GoL were initially ordinary classes that were converted to computer laboratories. It is possible that they might not be fully equipped as computer laboratories because of their size.

A T2 mentioned that she cannot move between aisles because there is always congestion in the computer laboratory. She reported that,

I can't even check what learners are doing on their computers because learners are sharing computers, two per computer or in other instances three learners sharing one computer.

A T3 explained that,

> *Learners become squashed in this computer lab… remember this class initially was not a computer laboratory but an ordinary class. It is not big enough to be a computer laboratory.*

Limited computers cause obstruction to teachers and not functioning air conditioners make things worse especially when classes are overcrowded. Sometimes teachers revert to traditional teaching because of the environment at the computer laboratory. A T4 mentioned that,

> *I become frustrated especially in summer because its hot and learners become squashed in this computer lab, so you find that air conditioners are not working and learners become disturbed because the environment is not conducive for them. The whole lesson becomes a disaster.*

The number of computers available in schools in GoL compels teachers to give one another chances in the computer laboratory.

B T1 explained that,

> … "*we are a big staff, and we all want to use technology in our pedagogy, so we have to wait or take some turns in using them.*

B T3 prefers to use her own ICT and she mentioned that,

> …*because I want to do things in time I use my laptop and overhead projector in my class as I cannot wait for ever.*

D T1 explained that,

… we are pleased to have a Maths centre but the resources in the centre are insufficient.

C T 3and D T2 explained the inconvenience they experience when sharing resources by saying,

I wish we can have these resources in classes. Even though we have about 95 gadgets we are only allowed to use one set of computers, for instance, if you use computers (desktop) you cannot add with laptops you can only use one kind.

B T4 and C T2 suggest that the

School has other technology they must give us so that we can add in Maths centre because learners sometimes get irritated if they share computers.

Data presented in this section on access to ICT resources clearly demonstrates that lack of resources prevents teachers from integrating ICT into their pedagogy. This is aggravated by a very high ratio of learners per teacher.

4.5.4 Theft in the area

Since the introduction of computers in schools, there have been a number of schools reporting that computers are being stolen. Orlando East schools have also been victims of these circumstances. Teachers in School A and C reported that most of the community members are unemployed and the crime rate is very high in this area. As a result, school resources including

computers are being stolen repeatedly. Teachers in School A and C mentioned that,

> *…in 2009 we were victimised by the crime of this area, they took +-10 computers and early last year (2013) they took all computers (A T3)*

While A T1 is sceptical about the new tablets that they received from the department of education:

> *Even now I'm worried because of these new tablets. If all computers are stolen ICT integration does not take place altogether affected and Gauteng Online took some time before replacement.*

Teachers reported that,

> *…computers that were removed from the computer lab before they install these ones were stored in the storeroom and burglars took all of them. If it was not that by now we should have two computer laboratories*(C T1);

> *… Once we plan to have two computer laboratories something happens. Before Gauteng Online project we had computers that were donated by a certain company, all those computers were stolen.*(C T3).

Out of four schools, School C seems to experience a high level of theft of computers. This is the reason why School C has less resources compared to the other three schools.

4.5.5 Internet

Internet is at the heart of ICTs. Most teachers prefer to use a computer laboratory because of the internet. Internet allows teachers to have access

to a pool of resources available online. However, if the internet is very slow it poses challenges for teachers. Teachers commented that internet in the school is a serious challenge.

A T2 feels that internet is very slow in the Orlando East area and not in their school only. She noted that, "*We struggled even with phones in this area.*"

Internet being very slow discourages teachers, and as a result they may not often use internet to acquire resources online. A T4mentioned that,

> *…internet in this school is very bad. I use it but sometimes it takes the whole day to open one web site - I'm not exaggerating you can even ask other teachers.*

A T1 compares internet from School A with internet from other institutions, and notes that,

> *I'm new to this school but I haven't seen a very slow internet like this one. The internet from the university where I come from is ten times faster than this one. Internet here is very slow.*

The speed of the internet seems to be a challenge in this school. It discourages teachers from using computers to get resources or for teaching and learning.

4.5.6 Self-efficacy

The teachers' positive attitude toward ICT integration determines the way they are using ICT in the classroom. Literature has pointed out those teachers who feel that they do not have adequate skills to integrate ICT into teaching and learning are likely to be limited in the use of ICT. This is the

case with teachers in School C. They explained the way in which their confidence affects effective ICT integration.
C T1 mentioned that,

> *…technology is forever changing then it's become difficult for me to keep up with the changes. I know there is new software that I can used to teach EMS but I'm not confident to try them.*

D T1 has a similar view and explained that,

> *…the software that we are using is good but you can also modify it to suit individual learners. I have been using this software for a very long time but I'm afraid that I will corrupt it if I try to something new.*

D T 3 reported that,

> *I tried to advance the use of this software in Maths centre and the software let me down to an extent that everything was deleted so I do not want to try again. I do not want disappointments.*

It is surprising that C T2 and C T3 use four out of five events yet they still feel that they can do even better than what they are doing.

C T3 mentioned that,

> *I want to be the best teacher when it comes to integrating ICT and I strive for that, just that sometimes technology fails you in front of learners.*

Teachers explained that their self-confidence is low and they are frightened of the unexpected that might happen if they try something new. As a result,

they stick with what they do best which can undermine their chances of growth in their use of ICT.

4.5.7 Managing ICT at school level

The way in which schools manage ICT might have an influence in effective or ineffective ICT integration. Teachers classify the following challenges: moving learners from class to computer laboratory, booking system to use computer laboratory, school policy, and school timetable as school-based challenges.

4.5.7.1 Moving learners from classroom to computer laboratory

Learning areas are allocated certain time as per curriculum requirements and teachers have a duty to honour time. Moving learners from classroom to computer laboratory consumes time that can be used to deliver curriculum. In School A there are three blocks A –C and the computer laboratory is situated in block A. In this school teachers remain in their working station and learners move around as they change periods. A T1's class is situated in block Con the second floor. Taking learners from class to computer laboratory for A T1 is challenging, as he explains,

> *I must wait for my learners to come to my class so that they can leave school bags and we walk together to the computer laboratory and make sure that learners are not disturbing other classes. Ten minute before the lesson ends I must tell them to log off so that we can rush to class to fetch school bags for the next period. This consumes time that can be used for effective integration.*

A T4's class is located in block B on the third floor, and he explained,

I waste time for lessons on my way to and from the computer laboratory…when I get to the computer laboratory I must arrange seating because learners share computers and I always make sure that they take some turns in operating the mouse and other activities.

For teacher A T2, movement of learners when changing periods causes extra traffic and it becomes chaotic in the school corridors. She noted that,

> *Traffic in passageways delays me and my learners; it's not easy to access the computer laboratory as early as you will want to…*

B T1 believes that the issue of moving learners was not taken into consideration from the inception of GoL project. She said:

> *Putting computers in block B was inconsiderate from the side of Gauteng Online because they only think about the safety of the media centre. They never ponder about the movement that was going to take place as a result of mounting computers in Block B.*

B T3 believes that she wastes more time in moving learners than in teaching. She reported that,

> *We have 45 minutes per period and in this school learners are to move when changing periods - that means we must wait for them to come to class then escort them to the media centre. In 45 minutes we end up using 20 minutes or less.*

B T4 felt that logistics that have to take place before using the computer laboratory in School B is what discourages some of the teachers from using ICT in their pedagogy. He explained,

Learners like to talk and make jokes so when you are moving them you must make sure that they are all quiet so that you do not disturb other classes. Other than that sometimes you will find that there is someone who is still in the laboratory and you have to wait. Moving from class to media centre wastes time for integration and for curriculum. We are so concerned about the time to deliver curriculum.

The places where computers are situated in the school environment also contribute toward effective or ineffective ICT integration. Organisation that has to take place before the actual teaching and learning places teachers in a predicament where they have to choose to deal with the situation or resort to traditional teaching.

4.5.7.2 Computer laboratory booking system

Most of the schools in Soweto have only one computer laboratory. That means teachers must take turns if they want to use the computer laboratory. Most of technology is found in computer laboratory. Even if teachers can book way in advance to use the computer laboratory only 7- 8 teachers can use the computer laboratory a day. Teachers feel that the booking system delays them and in the worst scenarios, discourages teachers from using ICT in their teaching and learning.
A T1 explained,

Every time you go to book the lab is always booked, usually it takes two to three days to get the lab. Bookings make me to think twice if I want to use the computer laboratory.

A T3 and A T4 believe that the booking system for the computer laboratory makes them procrastinate and they are not able to complete the syllabus

and at times their lessons do not have sufficient coherence. They mentioned that,

> *In this school you cannot use computers every day, sometimes you feel that a certain topic is well delivered if you use ICT (integrate computers), then if it's not your turn to use computers you don't have a choice but to postpone that lesson.* (A T3)

> *The booking system that is used in this school allows us to use the computer laboratory once a week or once in two weeks. I'm teaching Maths and I like to drill my learners and sometimes it's not possible. Booking the computer laboratory inconveniences us.* (A T4)

The booking system also creates challenges around effective integration.
B T1 felt that the booking system is the way in which the school is trying to manage the use of the computer laboratory. However, it does not assist teachers in achieving daily outcomes. She explained that,

> *Sometimes you book and when you are supposed to use the laboratory you find that there is a power cut and the following day they don't entertain you. Similarly if you didn't finish what you were supposed to cover for a day, the following day you cannot get a chance again because you have to give other people a chance.*

While B T1 blames it on the booking system, B T2 blames it on the ICT co-ordinator and teachers. He explained that,

> *If one books the computer laboratory and for some reason decides not to use it, the ICT co-ordinator does not replace that person - instead the laboratory will be vacant the whole period. The reason for that is the teacher cannot regain their slot the following day.*

According to B T4, the booking system helps to access the media centre in an orderly way. However, it also creates some challenges towards effective integration that can be solved at a school level, noting that,

> *The system is good, it just that we do not communicate well in advance. For instance, if the teachers are being absent, usually they do not inform the ICT co-ordinator so that he can make changes in the timetable. We teachers create problems for this booking system.*

If the booking system is not well organised it contributes to problems for teachers and affects effective ICT integration.

4.5.7.3 School policy

ICT policy designed by the school and other school policies should correlate to promote effective ICT integration because if they do not, this contributes to creating misunderstandings in an institution. A T1 feels that school policies are the blockage to effective ICT integration. He explains,

> *…in my class almost every learner has a smartphone and I would like to use them for teaching and learning but the school policy does not allow learners to bring cell phones to school.*

A T3 believes that the ICT policy document needs updating, noting that,

> *…the ICT policy of this school was designed seven years ago. Since then it has not been updated. I think the school policies and ICT policy in particular have lost the vision of ICTs in the twenty-first century.*

A T4 feels the same as A T1, in that the school policy creates confusion. He explains that,

…school policy contradicts what I think ICT should be integrated to teaching and learning because we should encourage learners to use any technology that they have for teaching and learning, not to restrict them to use computers only.

Teachers in School B feel that school policies in their school do not complement the ICT policy to enhance effective ICT integration. Teachers reported that,

…policies of this school are so rigid … if you want to try something new that has to do with the latest technology all the time they will refer you to the school policy. (B T1)

… usually in this school we take 3-4 years to revise school policies of which I think it's a long time because if we want to keep up with the changes that we bring about by technology we need to revise policies every six months. (B T2)

… we are not allowed to use computer laboratories during weekends because we must use the computer laboratory in the presence of the school management team (SMT) to make sure that the laboratory is safe and locked.(B T3)

B T4 explained that,

…school policy sometimes limits our teaching and creativity because every time you must make sure that you are within the borders of the school policy.

It is clear from the participants' statements that they are determined and they also want to work, even during weekends. However, their determination is hindered by school policy that is not flexible. It becomes worse if the

school policy is outdated and does not correspond with other school policy like the ICT policy.

Table 4 below depicts the teachers' perceptions about benefits of ICT in teaching and learning and the challenges that affect effective ICT integration in schools.

Table 4: Positive and negative perceptions on ICT integration per school

Schools	Positive	Negative
A	Useful Arouse learners interests Help to deliver curriculum	Training Technical support Insufficient resources Theft Internet Managing ICT at a school level
B	Access resources Respect Assessment and feedback	Self-efficacy Training Insufficient resources Managing ICT at school level
C	Improve learner performance Self-efficacy	School management Theft Training
D	Extend classroom boundaries Learner performance	Self-efficacy Training Access

Themes that are presented in Table 4 above will be grouped into three categories for analysis purposes: professional development, access, and management of ICT at school level. In order to understand challenges the study has categorised the themes as shown in Table 5 below.

Table 5: Categories for Schools A to D

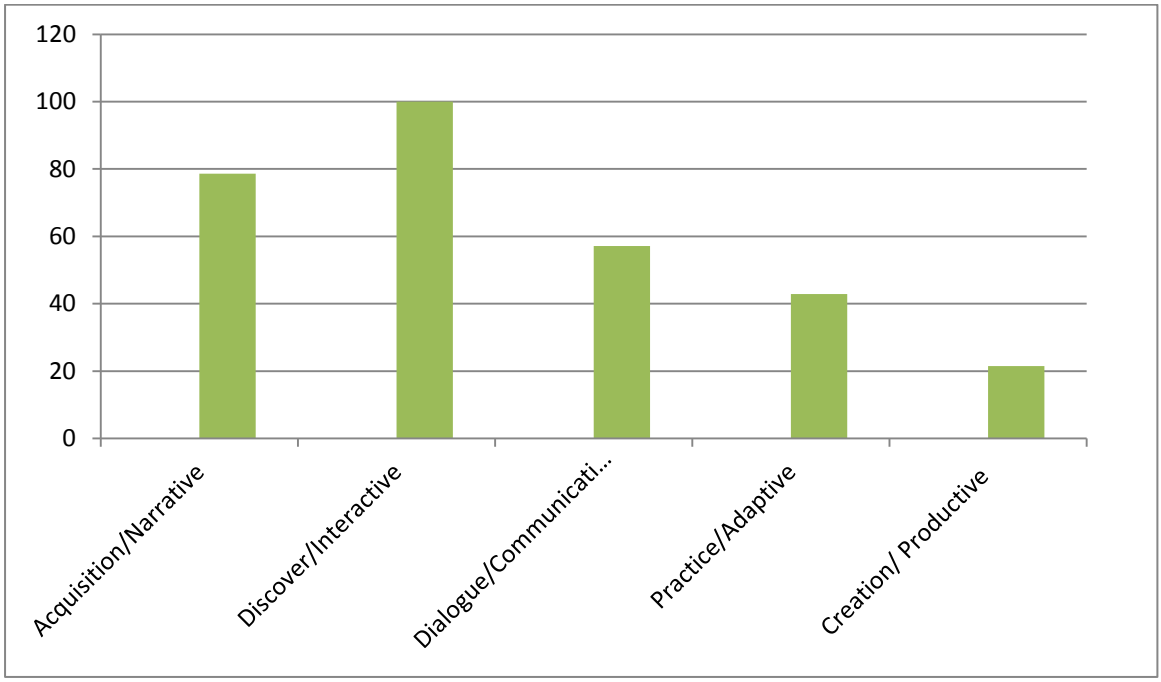
Benefits/ Advantages of using ICT	Professional Development	Access	Management of ICT at school level
• ICT benefits towards teachers teaching • ICT benefits towards learners learning	• ICT teacher training • Technical support	• Insufficient resources • Internet • Theft	• School timetable • School policy • Moving learners for classroom to computer lab

4.5.7.4 Teaching events

Teachers from School A to School D use teaching events differently. Their usage seems to be partly influenced by the subjects they teach, training they have received, and the available resources at schools. However, the most commonly used event is the 'interactive' and the lowest is 'creation'.

Figure 8 below depicts how schools overall are using teaching and learning events.

Figure 6: Overall use of teaching and learning events by Schools A -D



An in-depth analysis of this information will be provided in the next chapter.

CHAPTER FIVE

DATA ANALYSIS AND FINDINGS

5.1 INTRODUCTION

This chapter provides analysis of data from which the findings of the research are drawn. This chapter is divided into three sections that are based on themes that emerged from the data. Section **A** focuses on teachers' perceptions, attitudes and beliefs about ICT integration. Section **B** deals with the extent to which teachers are using teaching events in their teaching (events distribution). Section **C** focuses on the challenges that must be overcome by teachers in order to effectively integrate ICT.

Section A

5.2 TEACHERS' PEDOGICAL BELIEFS ABOUT ICT INTEGRATION (INTERNAL)

Teachers' perceptions/beliefs about ICT integration are noted in literature (Ertmer, 2005) as being the main challenge towards effective ICT integration. This study found it important to investigate teachers' challenges and how they influence the extent to which they integrate ICTs into their teaching. This study found that all teachers have positive perceptions toward ICT integration and that seemed to be a strong motivator for their use of digital technology regardless the external challenges they faced. Hu, et. al. (2003) and Jimoyiannisa and Komisb (2007) confirmed that teachers' perceptions on ICT usefulness are significant in determining their intentions to use ICT in their teaching.

Positive beliefs (Ertmer, 1999) and attitudes (Petko, 2011) play an integral part in the adoption of ICT integration over school strategies that might be

put in place to integrate ICTs effectively. Data in this study confirm that negative elements about the schools' policies that have potential to constrain teachers' effectiveness in the integration process have been overridden. This seems to be a result of their positive beliefs and perceptions about ICTs. It is therefore evident that policies are simply a guide to the process, but it is not responsible for what teachers decide to do in their classrooms.

Pelgrum (2001) and Becta (2004) suggest that those teachers' attitudes and skills levels remain an obstacle for teachers to adopt and make effective use of ICTs. In the case of this study, this view was refuted in the context of positive beliefs. Senior teachers for instance, elucidated that they used to have negative perceptions about ICT in education because at the time of the introduction of ICT, teachers were sceptical about the change and there were so many myths about ICT in education. However, after some workshops and in-service training they started to develop interest in ICT and now they perceive ICT positively for its pedagogical value.

Regarding junior teachers, they have not had negative perceptions towards ICT integration as they have been exposed to them at an early age. This could also be because they graduated more recently and in universities they were trained on basic ICT skills. However, their integration levels do not necessarily exceed that of teachers who have not been trained. For instance, Teacher A T3 did not attend any formal ICT training and yet she is engaging more teaching events (4). Senior teachers like B T4 is the oldest teacher (50 years old) and yet he engages 3 events while C T2 and C T3 who are in their early thirties also recorded 3 events and yet they claim to have received ICT training at university. For that reason, age or exposure to ICTs does not seem to give extra privileges to the extent to which they are used in the classroom.

5.2.1ICT benefits towards teachers' teaching

BECTA (2003a) contends that teachers who do not realise the advantages of using technology in their teaching are less likely to make use of ICT. The findings of this study revealed that teachers appreciate the role that ICT is playing to assist them with lesson presentation and the ICT which they use to deliver lessons in various ways, as A T2 pointed out. It is also clear from the data that the teachers' positive perceptions about the affordances of ICT in education give them the propensity to integrate ICTs even in the absence of ICT training and support for instance. The overall average usage of these teachers is 3 events, which is fair considering the constraints they have and this is lightly caused by the fact that they realise the pedagogical value they have.

The view above is also consistent with the Technological Acceptance Model (TAM) that indicates that users accept technology if they perceive it to be useful and if they perceive it as being easy to use. Furthermore, the findings of this study reveal that ICT came to their rescue to lighten their burden. It has helped them with curriculum delivery as well as classroom administration. Furthermore, teachers in this study, whether trained or not did not express any inadequacy in their ICT use proficiency. This contradicts Ropp (1999), cited in Jimoyiannisa and Komisb (2007), who maintains that most teachers have a positive attitude toward technology but they do not consider themselves qualified to effectively integrate ICT into their teaching.

All mathematics teachers, except one, prefer to drill their learners and for that reason they have reported engaging the 'practice' event. This could be related to the nature of the discipline that demands practice for enhancing understanding of concepts or it could be their pedagogical beliefs they hold

about teaching and learning. Jimoyiannisa and Komisb (2007) confirm that personal theories about teaching and learning processes and their level of competence with ICT play a major role in how they implement ICT and how they motivate themselves to use ICT tools in the classroom. Based on the data, subject structures or teacher beliefs on how it should be learned are lightly to influence the decision or the extent to which teachers integrate ICTs into their teaching.

5.2.2ICT benefits towards learners' learning

Teachers were quite certain about affordances of ICT and believe that ICT can help to improve learners' learning. They mentioned benefits of ICT such as enhancing teaching and learning (A T3), while A T1 praised ICT for arousing interest for learning in learners, which thereby facilitates a sound learning atmosphere.

Teachers in this study reported that ICT provides them with opportunities to personalise learners' learning. This is aligned with Lloyd (2005) as that promotes learner-centred approach to teaching. Mathematics teachers for instance, used software which provided learners with the opportunity to move at their own pace. The learner is presented with a question which he or she has to answer, for example, related to addition. Once the learner has answered the question he or she gets an immediate feedback and can progress to the next level if the answer was correct. If the learner does not give the correct answer, he or she is given several extended opportunities to practice until the correct answer is achieved. It is clear that ICT has made it easy for learners in the schools under study to understand Mathematics. However, it was found that these schools have limited access to ICT resources. In this regard, teachers had to develop strategies of using the limited resources they have so that learners can benefit from the experience even if only for a short time, or it means they share access to the technology.

5.2.3 Conclusion

Although teachers had some negative points to make about their experiences and environment that could restrict them from integrating ICTs to their satisfaction, these seemed to be on the periphery. What seemed to matter above all else was that they were aware of the benefits of ICT use to their learners and teaching and that motivated them to implement the new teaching approaches.

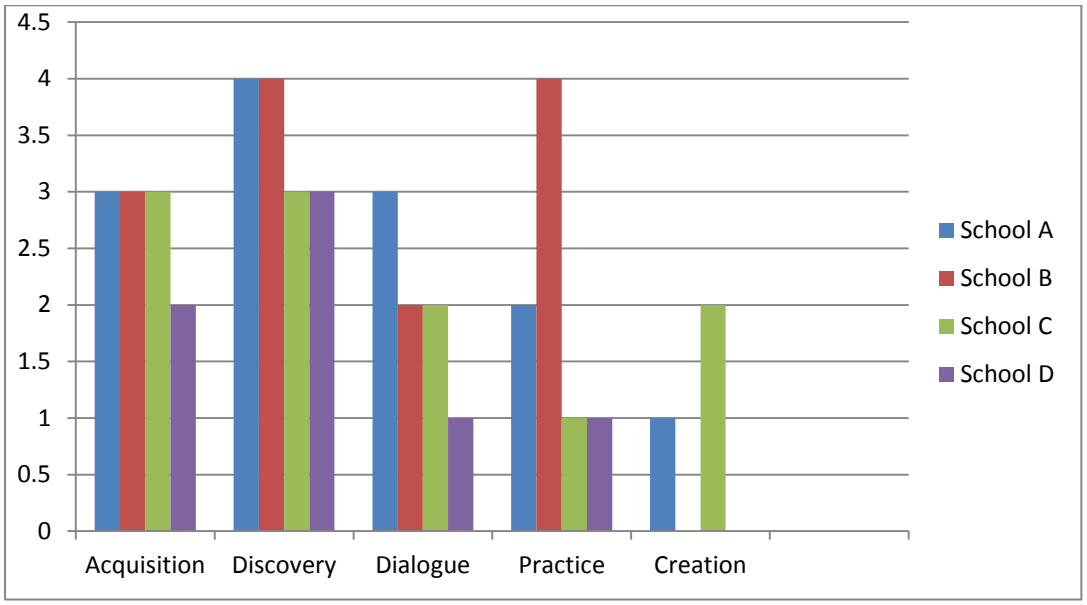
Section B

5.3 Events Distribution

This section discloses responses from the close-ended questionnaires and it discusses how teachers are using teaching and learning events. It also looks at the challenges each school has and how they affect effective use of teaching and learning events.

The figure (9) below depicts how each school is using teaching and learning events.

Figure 7: Teaching and Learning Events as per school



In the four schools that participated in this study it was found that in School C teachers recorded all teaching events. It was also noted that the creative event that is not used by the rest of the schools except School A was mostly used by its teachers. Their usage is unexpected because the school only has 24 computers that are used by 866 learners. Computers for School C are minimal by far when compared to the other schools who participated in this study. Teachers in School C showed more enthusiasm towards ICT

integration andyet they mentioned more or less the same challenges as other schools. Furthermore, they have overcome the perceived challenges and are integrating more widely than schools with 95 gadgets at their disposal.

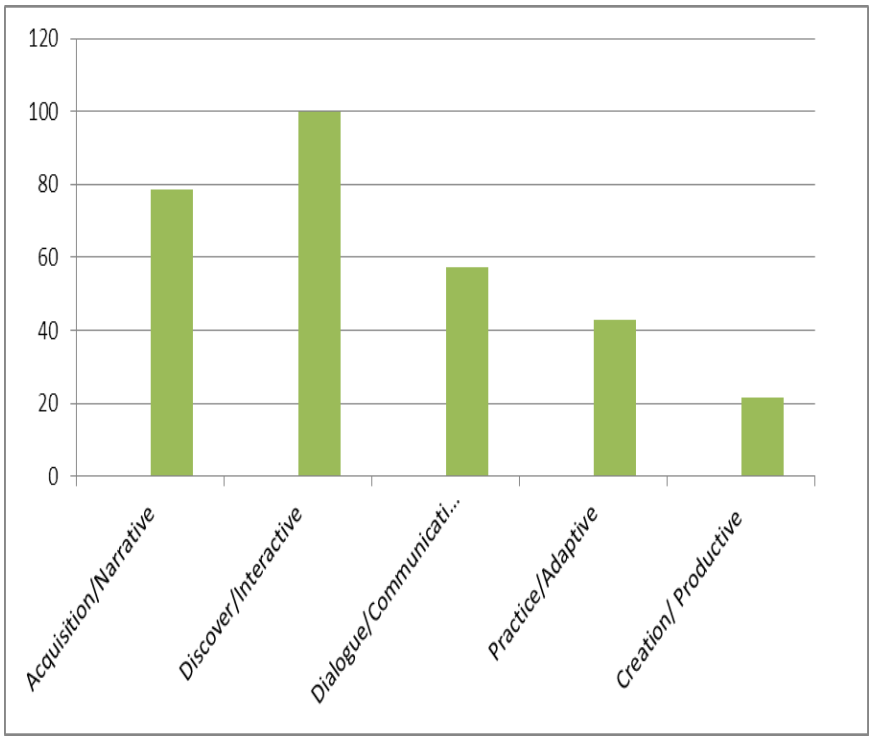
School B reported using four out of five events. This school seems to excel in practice events. The reason for excelling in practice events could be that most teachers from School B who participated in this study were Mathematics teachers. It was mentioned earlier in this chapter that Mathematics teachers use more practice events to drill learners with Mathematics. In a case like this, it can also be concluded that the nature of effectiveness depends on the nature of the subject (Czerniewicz& Brown, 2005).

This study reveals that School A uses dialogue events, and three out of four teachers are using dialogue events to enhance teaching and learning. The school has more gadgets than any other school; however, their use is superseded by School C. This is in line with Selwyn (2004) who argues that access to resources does not translate into effective use. On the other hand, School A seems to report more challenges towards effective integration. It seems to have more resources but this does not necessarily reduce challenges as perceived by teachers.

School D has 95 gadgets and yet they used fewer teaching events when compared to School C with 24 computers. School D does not use creation event at all. The three teachers in the school are in the 40 years age range and they all have seventeen years of experience. It is possible that their teaching and learning theories are well established and as Jimoyiannisa and Komisb (2007) asserts, these are difficult to change. Nevertheless there could be other factors that influence their decision making in terms of which events to engage.

Figure (10) below, presents the overall teaching and learning events for the four schools.

Figure 10: Overall teaching and learning events



The most common event that is used by the four schools is 'Discovery' and this is probably because all teachers reported that they use web resources for teaching and learning. Considering the findings of Czerniewicz and Brown (2005), the discovery event is mostly used by students and lecturers for research purposes and teachers in this also use it for the same purpose. The second most used is 'Acquisition' and this is evident in that they use ICTs to present content and that the technology used has affordances for doing so, for example, PowerPoint and videos. The least used event is 'Creation' which apparently was used by 1 out of 14 teachers participating in this study. This is teacher A T3 who is self-trained. What can be concluded about this teacher is that in as much as she is innovative, this quality is probably a reflection of her teaching approach that she has

enhanced with the use of ICTs. All the four teaching events, (Acquisition, Discovery, Dialogue, and Creation) that she engages are typical of constructivists' characteristics (Ertmer, 2005).

The following challenges were reported that seem to constrain each teaching event. For acquisition, B T3 explained that in their school they do not have enough overhead projectors and this could undermine the engagement of the acquisition event. It was also found that all teachers are using discovery events but reported that internet is very slow across the schools. C T2 is the only teacher who uses the dialogue event. He mentioned that he is struggling to use this event effectively due to some learners who do not have access to internet or cell phone at home. It may be said that others are not using this event due to the same challenges. Mathematics teachers were the only teachers reported using practice events. These teachers use Mathematics software to drill and practice Maths. However, other teachers do not have software for their learning areas. It is also possible that they do not have enough skills and knowledge to design their own teaching and learning activities which learners can use for practice. It was noted that one teacher (A T3) used creation while other teachers are not using this event. A T3 engages learners in learning activities that require higher order thinking where learners are expected to create podcasts and collages, for example, to tell stories. Other teachers did not appear to know how to use this event.

The usage of dialogue events appears to contradict the current study, in that Czerniewicz and Brown (2005) study found that students and lecturers mostly use dialogue events to communicate whereas in this study learners only use this event in the English classroom. In most classes communication is face-to-face. The reason could be the nature of the subject that has an open structure and the teacher's approach to teaching the subject.

All the schools are located in the same township and the same district and yet their teacher performance seems to vary. This is probably due to various reasons mentioned above that relate to what influences teacher decision on what events to engage in the classroom.

Section C

5.4 CHALLENGES THAT TEACHERS CAN OVERCOME IN ORDER TO PEDAGOGICALLY INTEGRATE ICT EFFECTIVELY

In this section challenges that can be overcome by teachers in schools in order to integration ICT into teaching and learning will be discussed. Three categories, namely professional development, lack of access and managing ICT at a school level that emerged from the data were used in this section.

5.4.1Professional development

The findings of this study reveal that teachers have ICT training but it is at different levels. On one hand, there are teachers who received ICT training from the universities or by the department of education while on the other hand there are teachers who are self-trained. Baylor and Ritchie (2002) argue that ICT training plays an important role in influencing how ICT is well integrated into teaching and learning. Therefore, if teachers are to integrate ICT into teaching and learning they need to have ICT training on how to integrate ICT into their subject teaching if it will be relevant. This is in line with Becta (2004), who advocates that ICT training should be designed to fit specific subjects. The approach used for training, for instance, just-in-time or just-in-case could determine the rate at which they adopt and implement the learnings from the training (Kester et al., 2001).

Although university trained teachers expressed satisfaction in the way they were trained, their usage of teaching and learning events was very low as

already been mentioned. It may be that their training did not prepare them enough to integrate ICT effectively. Kohler and Mishra (2005) argue that the teachers' professional training needs to acquaint teachers with the dynamic transactional relationship between the technology, the content and pedagogics. It is possible that university training does not necessarily equip students with the relevant knowledge and skills as it might not adequately incorporate the three domains that Koehler and Mishra refer to. Training or advancing on the job as the untrained teachers seems to help overcome this anomaly. Junior teachers for instance feel that there is a need for refresher courses. It is possible that teachers' integration is limited to what they have learned from university, hence they advocate for a refresher course that would then involve authorities at different levels.

Reverting to those teachers who have trained themselves, this study found that self-trained teachers integrate more teaching and learning events regardless of their training. Though they are doing reasonably well compared to their colleagues, they still feel that they need professional training. This indicates that these teachers are enthusiastic about ICT integration and are keen to learn more. For instance, A T3 explained, "*Once I have money I'm going to register in a university where I can get a proper ICT training".* This is ironical because A T3 seems to use more teaching and learning events compared to teachers who are newly graduated from the university yet she wants to be trained by the university. However, the fact that she is able to advance herself is evidence that training challenges can be overcome by teachers on their own.

The reasons why teachers are not satisfied with ICT trainings offered by the department of education relate to the length of training; for example, C T1, D T2 and B T3 feel that two days of training is not enough to grasp everything yet they are expected to implement major changes in the classroom. This concurs with Becta's (2004) views that the issue of ICT

training is certainly complex and requires thorough consideration in terms of time for training, skills training and pedagogical training to ensure the most effective ICT training. Such an intervention would not relate to teachers directly but the trainers.

It is evident from this study that teachers have passed the stage of learning basic computer skills. However, they strongly believe that they want to move beyond basic computer skills to learn techniques around how to integrate ICT effectively into teaching and learning. Becta (2004) maintains that training should provide teachers with pedagogical training for teachers, rather than simply training them to use ICT tools. Unwin (2005, p115) emphasises that many educational ICT initiatives in Africa focus primarily on the importance of giving pupils and teachers ICT skills rather than training them how to use ICT to enhance their broader learning experiences. What can be learned though from this study is that although basic skills training seems to be a barrier to integrating ICTs, successful advancement from these skills depends on the teacher's initiative.

According to Lai and Pratt (2004), ICT co-ordinators are in a good position to successfully guide integration at a school level. This study, however, contradicts this view, in that ICT co-ordinators do not do very much when it comes to ICT training and support of effective ICT integration at a school level. ICT co-ordinators, after receiving training from the department, do not train teachers because it is possible that co-ordinators are not confident enough to train teachers due to the poor training that they received. Teachers have no control over the implementation of this strategy and based on the data fir this study; teachers make it a personal choice to advance themselves.

Deducing from the discussion presented in this section, it can be said that there are so many challenges that teachers face as a result of ICT training.

Looking at the teachers from the four schools that participated in this study, ICT training stood out as the main challenge across the four schools. This may be because they all fall into the same district and they are provided with the same training opportunities. However, these teachers have taken steps to infuse ICTs at levels that seem to relate to their subject and classroom needs.

5.4.2 Technical Support

Lack of technical support to Orlando East schools seems to have serious challenges toward effective ICT integration. Based on the data, teachers feel that technical support is not given enough attention. They believe that they do not need only ICT skills but also basic technical skills. Having technical skills will assist teachers to troubleshoot basic problems they come across every day. It was noted that whenever there is a technical problem, ICT integration does not take place. A T3 observed,

> *…if I try to use the computer and it does not respond I just go back to my class and do the normal teaching because getting someone (from the district office) to assist you with technical is a process that sometimes takes the whole term.*

According to Sicilia (2005) cited in Bingimlas (2009), a major barrier to ICT integration is technical support and these barriers include failing to connect to the internet and malfunctioning of computers. Furthermore, she explains that lack of technical support hinders the smooth delivery of the lesson or the natural flow of the classroom activity. This is the reality revealed by the study, where teachers mentioned that technical support delays curriculum delivery because if there are technical problems they do not use computers. Technical support thus affects ICT integration in terms of the frequency of possible use.

Bradley and Russell (1997) found that recurring faults, and the expectation of faults occurring during teaching sessions, are likely to reduce teacher confidence and cause teachers to avoid using the technology in future lessons. This was supported by B T2, who mentioned that *"technical problems discourage her".* Much as this is discouraging, teachers in this study do not seem to give up regardless this challenge. They still use ICTs whenever possible.

Research by Korte and Husing (2007) indicates that ICT support of maintenance contracts in schools helps teachers to use ICT in teaching without losing time through having to resolve software and hardware problems. Having a technician to deal with technical problems will lighten the teachers' burden because they will only focus on ICT integration rather than technical support. William *et. al.* (2000) emphasises that mechanisms need to be put in place to ensure that teachers have adequate access to support. It can be deduced from this discussion that teachers are keen to use ICT in their teaching. B T4 mentions that,

> *At times I try to troubleshoot the basic (lower level) technical problems. I have taught myself basic technical skills but I'm afraid to do it openly because should anything go wrong happen I will be liable. We were told that if there is a problem, we must lock the computer laboratory and wait for technicians.*

It was surprising to see that B T4, who does not have professional ICT training but he has basic technical skills, does not consider his skills as unprofessional but has tried to use these to do what he can to solve technical problems. Teachers can to some extent resolve this challenge, depending on the technical knowledge and skills and courage they have.

5.4.3 Lack of accessibility to resources

The White Paper on e-Education (2004) advocates that access to ICT infrastructure must prioritise giving ICT infrastructure access in schools to every educator and learner in General and Further Education and Training. Having access to ICT resources forms the basis for ICT integration. This means that schools need to have access to resources (computers, laptops, tablets, software, and internet) to begin to integrate ICT into teaching and learning. This study found that theft that is taking place in schools, insufficient computers allocated to the school, and very slow internet all contribute towards the lack of accessibility of resources.

These findings disprove the UNESCO (2013) findings where they argue that the number of computers worldwide has increased and as a result the ratio of learners has decreased from 1:9 to 1:5. This study found that schools have the following number of computers per school: School A 95, with a ratio of 1:9; School B 95 with a ratio of 1:11; School C 24 with a ratio of 1:36; and School D 95 computers that add up to a ratio of 1:9 of gadgets available to them for teaching and learning. These computer resources (hardware and software) are insufficient for teachers and learners to have effective ICT integration. However, this has not prevented teachers from using this technology for the different events which means there are teaching strategies they are using to curb this situation.

While Ertmer (1999) argues that internal beliefs or perceptions are the frontier barriers to effective ICT integration, in this study it was found that insufficient resources is one of the key external challenge towards ICT integration. Numbers of computers available at schools does not appear to be increasing due to the fact that whenever they receive new computers they do not install them in the new computer laboratory but they disassemble the

old ones to give space to the new ones. The schools do that simply because there is no other safe place than the Gauteng Online computer laboratory where they can install new computers. Teachers mentioned that the Gauteng Online laboratory is the safest place at the school. The challenge is that the allocated space is very small and cannot accommodate more than twenty-five computers.

Based on the findings of this study teachers are using ICT for teaching and learning. However, their use is limited due to factors such as accessibility to physical resources. For instance, B T2 explained that,

> *We are a big staff, and we all want to use technology in our classroom, so we have to wait or take some turns in using them.*

This is similar to the study by Empirical (2006) where lack of physical access was a prime barrier for effective ICT integration where the number of learners is higher than the number of computers; as a consequence teachers have to give each other a chance to use the computer centre. The large number of learners sharing one computer discourages teachers from using ICT for teaching and learning because if the computer laboratory is full it becomes difficult for teachers to manage the learners. This internal challenge distances teachers from adopting the use of ICTs, especially those who are not prepared to go a step further and make arrangements involved with sharing resources. The teachers in this study are determined to go through the negotiations involved as long as they can benefit from the access they and their learners get whenever.

The internet is seen as the information gateway that enables teachers to access necessary web resources. If the school is not connected to internet it becomes a challenge to teachers because their use will be limited to what they can access without internet. The study found that internet access is a challenge in Orlando East as an area. Teachers complained that internet is

very slow. As a result it is difficult to access web resources. There is an urgent need for the school to have enough bandwidth so that schools can be connected to a faster network. If the network is very slow it discourages teachers from using ICT because they feel that it is time-consuming to use the internet and they rely on using textbooks alone.

While the challenge of access in schools is beyond what teachers can do at school level to overcome, teachers can, however, utilise what is available to them whenever, to the maximum level.

5.4.4 Managing of ICT at school level

School ICT policy is developed with the aim of giving teachers guidance on how to go about integrating ICT in the school. In other words, school ICT policy serves as a map to ICT integration. Likewise, two schools in Orlando East have developed ICT policy to intensify their use of ICT in teaching and learning; and two schools did not have school ICT policy.

One school mentioned that they are planning to design such a policy for the forthcoming year but for the time being they are drawing on the White Paper on e-Education to guide their integration. It was not clear from the other schools why the school does not have ICT policy in place. This study reveals that ICT integration in these two schools is lagging behind as compared to the two schools which participated in this study. Schools A and C reveal that they are integrating more than Schools B and D. The reason could be that these schools do not have ICT policy to guide their integration. Nevertheless, it should be noted that the policy does not seem to determine what teachers decide to do in their classrooms.

Reverting to the two schools that do have ICT policy, this study reveals that effective ICT integration is limited by the school policies. It could be said that ICT policy and other school policies are not aligned to promote effective

integration. Tondeur, van Keer, van Braak and Valcke (2008) believe that school related policy factors might affect the integration of ICT in the classroom. Teachers feel that they want to resort to other ICT media such as cell phones and tablets but the school policy is not flexible enough to allow them to do so. Cell phones can be used for education purposes and can also support some of the teaching and learning events. Other than that, these schools are experiencing insufficient resources and cell phones can be used for teaching and learning. Tondeur, van Keer, van Braak and Valcke (2008) emphasises that school policy may work in favour of some individuals and hardly in others due to school factors.

It was found that some schools have ICT policies which are outdated. A T3 mentioned that their ICT policy is more than seven years old and has not undergone revision because the teacher who was responsible for ICT policy left the school. Technologies are rapidly changing so it is imperative that schools revise policies to keep up with changes. If the policy is older than seven years it is likely that there are omissions and that it will not aligned with the latest trends in technology.

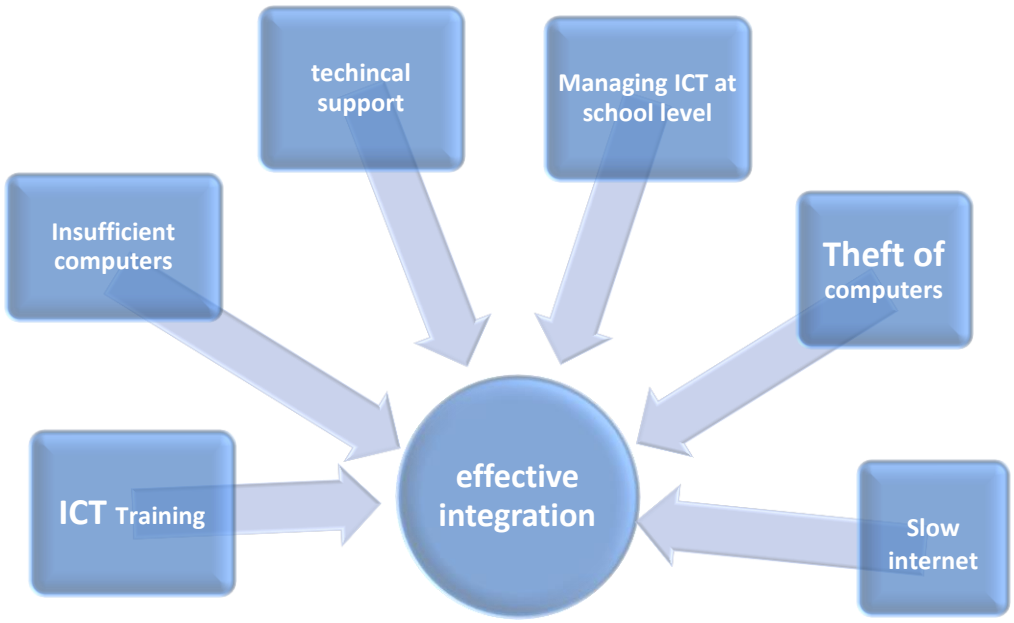
Drawing on the data, this study noted that teachers distanced themselves from the school ICT policy. It appeared that schools are using top-down strategy where teachers receive orders from the school management team. As B T1 noted, *"policies of this school are so rigid".* This indicates that teachers were not involved when ICT policy and other school policies were designed. As a consequence they see policy as something imposed on them. Kozma (2003) emphasises that teachers who are engaged in ICT planning are more likely to apply ICT in an innovative way. Therefore, it could be said that teachers' vision of effective ICT integration are different from those in the ICT policy. Kennewell, Parkison and Tanner (2000) as cited in Tondeur, van Keer, van Braak and Valcke (2008,p213) strongly believe that, "if teachers share values expressed within a school related policy and

understand the implications, the policy is able to influence practice". Furthermore, Tondeur, van Keer, van Braak and Valcke (2008) explain that ICT policy does reflect to a large extent what happens in the classroom.

School policy is designed according to the school needs, and policy challenges can be solved at a school level. In overcoming this challenge, teachers need to form part of ICT planning so that their views and values are expressed in the school policy.

The figure (12) below show how external challenges influence effective ICT integration.

Figure 8 Challenges that affect effective ICT integration



Literature by Ertmer (2005) and Bingimlas (2009) argue that challenges as depicted in Figure 11 above affect effective integration. Even this study presumed that external challenges affect effective integration. Conversely, the study found that these challenges exist within the schools in Orlando

East but do not always constrain teachers like A T3 and B T4 who seem to work against all-odds. There is no one strong challenge that overrules others but all these challenges influence effective ICT integration. It is worth noting that even in the presence of these challenges teachers can integrate ICT effectively as it has been observed with the senior and untrained teachers who manage to integrate effectively regardless of these challenges. Challenges such as insufficient resources, slow internet and high levels of theft cannot be overcome by teachers on their own.

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.1 CONCLUSION

The aim of this study was to investigate challenges that can be overcome by teachers in order to integrate ICT effectively into teaching and learning. To get to the root of these challenges the study commenced by investigating teachers' ICT pedagogical beliefs towards ICT integration to assess whether perceived teacher challenges hinder effective ICT integration into teaching and learning.

It is explained that internal beliefs (pedagogical beliefs) are stronger than external beliefs and are frontier barriers towards effective ICT integration. Therefore, if teachers hold negative ICT pedagogical beliefs they are most likely not to integrate ICT into teaching and learning. It was found that while all teachers who participated in this study had positive perceptions regarding ICT integration their integration differs depending on how they respond to the challenges they face per learning event.

In answering the first question, "Which barriers seem to constrain effective ICT pedagogical integration?", the study indicated that challenges such as ICT training, technical support, insufficient resources, theft, management of ICT at school level (which includes school policy, moving learners for class to computer laboratory and school management) hinder effective ICT integration. Teachers perceive them as barriers, but some of the teachers seem to operate successfully in their presence.

Regarding the second research questions, "Which barriers can be overcome by teachers if they are to effectively integrate ICT into teaching and

learning?", this study revealed that challenges like training teachers can be overcome by self-training or training each other to eliminate issues around inappropriate ICT training. Teachers like A T3 trained herself and is integrating very well compared to other teachers who participated in this study. Teachers who are not engaging all teaching events need to learn from such a teaching example, because she integrates well even in the presence of challenges. This teacher uses available resources up to her best ability.

Regarding managing ICT at a school level as a challenge to effective ICT integration, teachers can take control of the situation by discussing it with the school management and proposing solutions that will promote effective ICT integration. Moreover, the study found that most challenges (insufficient resources, theft, and technical support) that teachers face cannot be overcome by them on their own because they are complex and beyond the jurisdiction of the teachers.

The study also noted that teachers embrace ICT enthusiastically and integrate it into their teaching at different levels of effectiveness. However, some teachers have positive beliefs about the role of technology and also hold progressive pedagogical beliefs, yet do not integrate ICT effectively. The reason for ineffective ICT integration could be their learning theories, the training they have received, as well as the nature of the subject they teach.

It was also found that challenges influence one another and thereafter influence effective ICT integration. For example, if teachers are trained to integrate ICT into teaching and learning but there is limited or no access to resources that will lead to ineffective ICT integration. Moreover, the findings reveal that school that has very limited resources seems to integrate more than schools that have more resources. For example, in School C less than ten teachers are using GoL for teaching and learning and that gives teachers

in School C, an advantage in accessing GoL more frequently as compared to peer schools.

The previous chapter indicated that challenges that teachers face in schools are complex and teachers alone cannot overcome these. This study acknowledges that there are challenges such as training, and managing ICT at a school level that can be overcome by teacher son their own. However, there are challenges that are beyond the teachers' ability and they need the support of the communities around the schools and the department of education. There was also a strong indication that teacher pedagogical beliefs about learning in general and learning of their specific subjects could be key influence on the decisions teachers make on how to integrate ICTs into their subjects.

6.2 RECOMMENDATIONS

This study recommends that teachers must advance themselves and consult colleagues whenever they need help or train one another, to minimise challenges resulting from ineffective ICT trainings and other restraining issues. In this way teachers can design their ICT usage according to specific subjects they teach and classroom needs rather than waiting for the department of education to offer them training.

The challenge of inadequate technical support needs to be addressed by either training teachers on technical skills or deploying a qualified technician to be based in one of the schools and all schools in the area can have access to a technician rather than have a technician based in the district office. Teachers may also have technical skills that will enable them to troubleshoot the minor technical challenges to avoid wasting time while they wait for help from technical experts.

Schools need to have ICT policies that will guide the ICT integration. Schools should involve teachers in designing ICT policies so that they can have a shared vision in the planning and implementation of ICT in schools. Furthermore, ICT policy needs to map the way in which teachers are expected to integrate ICTs into teaching and learning. It also needs to be updated in line with new developments in technology. ICT policy must not constrain ICT integration at a school level by imposing rules that are not flexible and do not open spaces for innovative utilisation of ICTs in the classroom.

It is recommended that the department of education needs to investigate teachers' needs related to the use of ICT in teaching and learning and thereafter design ICT trainings that will meet teachers' needs because if trainings are not well designed they do not serve any purpose. Moreover, the department of education should provide access to resources such as hardware and software because adequate resources are a prerequisite for ICT integration. It has, however, been indicated in this study that access to resources does not necessarily translate into effective integration but as a starting point, teachers must have access to necessary resources. It is noted that teachers in School C have more access to GoL and their integration is better than teachers who have limited access to GoL.

This study recommends further research that will investigate how theories of learning and pedagogical beliefs influence whether negatively or positively the levels of effective ICT integration. Further research should examine why junior teachers (newly graduated) are not integrating ICT effectively because there is an assumption that these teachers are trained in the use of ICT from the university where in fact this may not be the case to the fullest extent.

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APPENDIX

WITS SCHOOL OF EDUCATION

27 St Andrews Road, Parktown, Johannesburg, 2193•Private Bag 3, Wits 2050, Johannesburg, South Africa Telephone: +27 11 717 3007 • Fax: +27 11 717 3009 • Website: www.wits.ac.za

Student Number: 512377

Protocol Number: 2014ECE012M

20 May 2014

Dear KhanyisileMbatha

Application for Ethics Clearance: Master of Education

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

Teachers and ICT Integration: A case study in Orlando East

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

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

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

All the best with your research project.

Yours sincerely

MMabeta

Matsie Mabeta
Wits School of Education

011 717 3416
Cc Supervisor: Ms. N Ndlovu

GAUTENG PROVINCE
Department: Education
REPUBLIC OF SOUTH AFRICA

For administrative use:
Reference no: D2015 / 003

GDE RESEARCH APPROVAL LETTER

Date:	**3 April 2014**
Validity of Research Approval:	**3 April to 3 October 2014**
Name of Researcher:	**Mbatha K.**
Address of Researcher:	**13 Darragh House**
	Corner Plein and Wanderers Street
	Johannesburg
	2000
Telephone Number:	**011 342 3161 / 073 428 4264**
Fax Number:	**011 945 2291**
Email address:	**mbathakhanyisile1@gmail.com**
Research Topic:	**Teachers and ICT integration: Case Study in Orlando East**
Number and type of schools:	**FOUR Secondary Schools**
District/s/HO	**Johannesburg North**

Re: Approval in Respect of Request to Conduct Research

This letter serves to indicate that approval is hereby granted to the above-mentioned researcher to proceed with research in respect of the study indicated above. The onus rests with the researcher to negotiate appropriate and relevant time schedules with the school/s and/or offices involved to conduct the research. A separate copy of this letter must be presented to both the School (both Principal and SGB) and the District/Head Office Senior Manager confirming that permission has been granted for the research to be conducted.

2014/04/04

The following conditions apply to GDE research. The researcher may proceed with the above study subject to the conditions listed below being met. Approval may be withdrawn should any of the conditions listed below be flouted:

Office of the Director: Knowledge Management and Research
9th Floor, 111 Commissioner Street, Johannesburg, 2001
P.O. Box 7710, Johannesburg, 2000 Tel: (011) 355 0506
Email: David.Makhado@gauteng.gov.za
Website: www.education.gpg.gov.za

1. *The District/Head Office Senior Manager/s concerned must be presented with a copy of this letter that would indicate that the said researcher/s has/have been granted permission from the Gauteng Department of Education to conduct the research study.*
2. *The District/Head Office Senior Manager/s must be approached separately, and in writing, for permission to involve District/Head Office Officials in the project.*
3. *A copy of this letter must be forwarded to the school principal and the chairperson of the School Governing Body (SGB) that would indicate that the researcher/s have been granted permission from the Gauteng Department of Education to conduct the research study.*
4. *A letter / document that outlines the purpose of the research and the anticipated outcomes of such research must be made available to the principals, SGBs and District/Head Office Senior Managers of the schools and districts/offices concerned, respectively.*
5. *The Researcher will make every effort obtain the goodwill and co-operation of all the GDE officials, principals, and chairpersons of the SGBs, teachers and learners involved. Persons who offer their co-operation will not receive additional remuneration from the Department while those that opt not to participate will not be penalised in any way.*
6. *Research may only be conducted after school hours so that the normal school programme is not interrupted. The Principal (if at a school) and/or Director (if at a district/head office) must be consulted about an appropriate time when the researcher/s may carry out their research at the sites that they manage.*
7. *Research may only commence from the second week of February and must be concluded before the beginning of the last quarter of the academic year. If incomplete, an amended Research Approval letter may be requested to conduct research in the following year.*
8. *Items 6 and 7 will not apply to any research effort being undertaken on behalf of the GDE. Such research will have been commissioned and be paid for by the Gauteng Department of Education.*
9. *It is the researcher's responsibility to obtain written parental consent of all learners that are expected to participate in the study.*
10. *The researcher is responsible for supplying and utilising his/her own research resources, such as stationery, photocopies, transport, faxes and telephones and should not depend on the goodwill of the institutions and/or the offices visited for supplying such resources.*
11. *The names of the GDE officials, schools, principals, parents, teachers and learners that participate in the study may not appear in the research report without the written consent of each of these individuals and/or organisations.*
12. *On completion of the study the researcher/s must supply the Director: Knowledge Management & Research with one Hard Cover bound and an electronic copy of the research.*
13. *The researcher may be expected to provide short presentations on the purpose, findings and recommendations of his/her research to both GDE officials and the schools concerned.*
14. *Should the researcher have been involved with research at a school and/or a district/head office level, the Director concerned must also be supplied with a brief summary of the purpose, findings and recommendations of the research study.*

The Gauteng Department of Education wishes you well in this important undertaking and looks forward to examining the findings of your research study.

Kind regards

.....

Dr David Makhado
Director: Education Research and Knowledge Management

DATE: 2014/04/04

Office of the Director: Knowledge Management and Research
9th Floor, 111 Commissioner Street, Johannesburg, 2001
P.O. Box 7710, Johannesburg, 2000 Tel: (011) 355 0506
Email: David.Makhado@gauteng.gov.za
Website: www.education.gpg.gov.za

Information sheet for the Principal

25 May 2014

Dear Principal

My name is KhanyisileMbatha. I am a Masters in Education student in the School of Education at the University of the Witwatersrand.

I am doing a research on the topic, Teachers and ICT integration: A Case study in Orlando East.

My research investigates perceived challenges that need to be overcome by the teachers in order to integrate ICT into teaching and learning. The aim of the study is to find out the barriers that are hindering ICT integration into teaching and learning. The study is purely for academic purposes. The research will use two data collection instruments: Interviews that will be audiotaped and questionnaires. The study will take approximately one hour.

I kindly request the ICT Coordinator and four teachers to participate in this study. The study focuses on schools in Orlando East that have functioning computer laboratories that are used to integrate ICTs into teaching and learning. The reason for choosing your school is because your school is located in Orlando East and has a functioning computer laboratory that is used for teaching and learning.

The research participants will not be advantaged or disadvantaged in any way. They will be reassured that they can withdraw their permission at any time during this project without any penalty. There are no foreseeable risks in their participation in this study. The participants will not be paid for their participation.

The names of the research participants and identity of the school will be kept confidential at all times and in all academic writing about the study. The school and the participants' individual privacy will be maintained in all published and written data resulting from the study. The data and results of the study may be used in future for other academic purposes such as conference presentation, journal article or development of policy.

All research data will be destroyed between 3-5 years after completion of the project.

Please let me know if you require any further information. I look forward to your response as soon as it is convenient to you.

Yours sincerely

SIGNATURE: 

NAME: KhanyisileMbatha

ADDRESS: 33 Darragh House,CnrPlein and Wanderes Street, Johannesburg 2000

EMAIL: mbathakhanyisile1@gmail.com

TELEPHONE NUMBERS:0734284264

Principal's Consent Form

Please fill in and return the reply slip below indicating your willingness of your school to participate in this study. The research project is called, Teachers and ICT integration: A Case Study in Orlando East.

I, _____ give my consent to the research project called Teachers and ICT integration: A Case Study in Orlando East to collect data in my school.

Informed Consent

I understand that:

- Participants do not have to answer every question and can withdraw from the study at any time.
- The name of the school and information will be kept confidential and safe.
- Conference presentations and publications on this research will not use the name of the school or any participant in this institution.
- All the data collected during this study will be destroyed within 3-5 years after completion of my project.

Sign_____ Date_____

Information Sheet for the Teachers 25 May 2014

Dear Teacher

My name is Khanyisile Mbatha and I am a Masters in Education Degree student in the Wits School of Education at the University of the Witwatersrand.

I am doing research on the topic, Teachers and ICT Integration: A Case Study in Orlando East.

My research investigates perceived challenges that need to be overcome by teachers in order to effectively integrate ICTs into teaching and learning. The reason why I have chosen your school is because the study focuses on schools in Orlando East that have functioning computer laboratories that are used to integrate ICT into teaching and learning and yours does.

I kindly request your participation in this study. The study is purely for academic purposes. The research will use two data collection instruments: Interviews that will be audiotaped and questionnaires. The interview and completion of the questionnaire will take approximately one hour.

Your name and identity will be kept confidential at all times in all academic writing and conference presentations about this study. Your individual privacy will be maintained in all published and written data resulting from the study. The data and results of the study may be used in future for other academic purposes such as conference presentation, journal article or development of policy. All research data will be destroyed between 3-5 years after completion of the project.

You will not be advantaged or disadvantaged in any way. Your participation is voluntary, so you can withdraw your participation at any time during this project without any penalty. There are no foreseeable risks in participating and you will not be paid for this study.

Please let me know if you require any further information.

Thank your for your assistance in this regard.

Yours sincerely

SIGNATURE 

NAME: KhanyisileMbatha

ADDRESS: 33Darragh House, CnrPlein and Wanderes Street, Johannesburg 2000

EMAIL: mbathakhanyisile1@gmail.com

TELEPHONE NUMBERS: 0734284264

Teacher's Consent Form

Please fill in and return the reply slip below indicating your willingness to be a participant in my voluntary research project called Teachers and ICT integration: A Case Study in Orlando East.

I, _____ give my consent for the following:

Please Circle one

Permission to be audiotaped

I agree to be audiotaped during the interview or observation lesson YES/NO

I know that the audiotapes will be used for this project only YES/NO

Permission to be interviewed

I would like to be interviewed for this study. YES/NO

I know that I can stop the interview at any time and don't have to answer all the questions asked. YES/NO

Permission to fill questionnaire

I agree to fill in a questionnaire for this study. YES/NO

Informed Consent

I understand that:

- My name and information will be kept confidential and safe and that my name and the name of my school will not be revealed in all writing and conference presentations about this study.
- I do not have to answer every question and can withdraw from the study at any time.
- Data and results of the study may be used in future for other academic purposes such as conference presentation, journal article or development of policy.
- All the data collected during this study will be destroyed within 3-5 years after completion of my project.

Sign_____ Date_____

Teachers' Consent Form for Audio Taping

Please could you kindly fill and return the reply slip below and indicate your willingness to have your interview audiotaped for my research project: Teachers and ICT integration: A case study in Orlando East. The reason for audio taping the interviews is to ensure that your exact words, ideas, comments, and conceptions are clearly captured and I want to make sure that I do not misinterpret, misquote or misunderstand what you have said.

Permission to be audio taped

I_____give my consent to have the interview recorded.

- I know that I can stop the audiotaping of the interview at any time without repercussions.
- I know that I may withdraw from the study at any time and will not be advantaged or disadvantaged in any way.
- I know that the data and results of the study may be used in future for other academic purposes such as conference presentation, journal article or development of policy.
- I know that the tapes will be destroyed within 3-5 years after completion of the project and will be kept safe until then.

Signature_____Date_____

Thank You

KhanyisileMbatha

0734284264

Mbathakhanyisile1@gmail.com

Teacher's Questionnaire

Topic: Teachers and ICT integration: A case study in Orlando East

This questionnaire is used as a means to collect data for the above study. It is not intended to test your knowledge or understanding of ICTs in teaching and learning. Kindly answer this questionnaire by ticking in where it requires you to tick and write answers in the spaces provided.

1. Personal Details

1.1 Age ☐ **1.2 Gender: Female**☐ **Male**☐

1.3 Experience ☐ **1.4Grade** ☐**1.5Subject/s**: _____

1.6 Qualifications

☐Diploma in education ☐Advance Certificate Education

☐Honours in Education ☐Post Diploma in Education

☐Master's in Education ☐ Other

Specify_____

2. Where do you get access to ICTs for lesson preparation and presentation?

_____

3. What kind of technology do you use in your teaching? And how often do you use it?

_____
_____
_____
_____

4. How do you use technology in your learning area or subject?

_____
_____
_____

5. Does the use of ICTs assist you in achieving the CAPS aims for your subject?

6. This table will be used to help understand the way you use ICTs in your teaching. Please tick the box that is applicable in your teaching with ICTs. The last column is for highlighting the challenges you have in accomplishing each teaching event as explained during the briefing.

Teaching and learning events	Teaching action/Strategy	Learning action/Strategy	Examples of non - computer based activity	Examples of computer based activity	Challenges
1.Acquisition/ attain knowledge	☐Show ☐Demonstrate ☐Describe ☐Explain	☐Attending ☐Listening	☐Television ☐Video ☐Books ☐Other print	☐Online notes ☐Digital videos ☐Audio clips ☐Animations	
2. Discover	☐Set up ☐Provide guidelines ☐Create	☐Investigate ☐Explore ☐Browsing ☐Searching	☐Libraries ☐Galleries ☐Museums	☐Cd, Dvd ☐Web resources e.g. hyperlink ☐Multimedia resources	
3. Dialogue	☐Set up ☐Moderate ☐Lead ☐Facilitate discussion	☐Discussing ☐Collaborating ☐Reflecting ☐Arguing ☐Analysing	☐Seminar ☐Tutorials ☐ Conferences	☐Email ☐Discussion forum ☐Blogs	

4.Practice	☐Model	☐ Experimenting ☐Practising ☐Repeating ☐Feedback	☐Laboratory ☐Field trip ☐Simulation ☐Role play	☐Drill and practice ☐Tutorial programmes ☐Simulation ☐Virtual environment	
5. Creation	☐Facilitating	☐Articulating ☐ Experimenting ☐Making ☐Synthesising	☐Essay ☐Object ☐Animation ☐Model	☐Simple existing tools as well as ☐Specifically created programmable software/s	

Teacher Interview Schedule

1. What ICT training do you have?

_____
_____
_____

1.2 Do you think the training you received prepared you adequately for the use of ICTs for teaching and learning?

_____
_____
_____

1.3 If not, what do you think should have been included in the training?

_____
_____
_____
_____

2. Do you get any (internal/external) technical support or assistance during your pedagogical use of ICTs?

_____
_____
_____

3. Do you think technology can help to improve curriculum delivery in your learning area?
   3.1 If yes. How?
   3.2 If not. Why not?

_____
_____
_____
_____

What do you consider as challenges when using ICTs for teaching and learning in your subject?

_____
_____

4. How do you know if you have been successful in using ICTs for teaching and learning?

_____
_____