Chapter 1:   Orientation to this study

Chapter One

Orientation to this study

1.1 Introduction

We have become an Information and Communication Technological society dependent on technology for optimal daily functioning. Continuing Information and Communication Technology (ICT) integration have had an impact on education (Becta ICT Research, 2006; Dirksen & Tharp, 1996; Jimoyiannis & Komis, 2007; Knapp & Glenn, 1996; Means, 1994; Moonen & Voogt, 1998; Paul, 1999; Plomp et al., 2003; Selwyn, 2002; Stonier & Conlin, 1985; Thorburn, 2004). Promoting change has become a component with the potential to revolutionise and transform education (Becta ICT Research, 2006, p. 7; Guru & Percy, 2005, p. vi; Jamieson-Proctor et al., 2006, p. 512; Jimoyiannis & Komis, 2007, p. 150; Kovalchick & Dawson, 2004, p. 533; Phelps et al., 2004, p. 49; Selwyn, 2002, p. 40; Wang & Woo, 2007, p. 148). Although the importance of ICT has been globally acknowledged, the focus has shifted to ICT integration into teaching and learning and has become a great concern for educational leaders. Dirksen and Tharp (1996, p. 3) state: "Only when technology has advanced and become an integral part of the teacher's instructional repertoire will we see advantages that technology can provide." Selwyn (2002, p. 3) indicates that ICT has not had the far-reaching and transformatory effect on education that has been predicted over the last twenty years. As yet there is no system-wide effective and sustainable ICT integration in schools; the pace of integration is slow and teachers are still avoiding using ICT in their teaching and learning practices.

In the early 1980s the problem of integrating ICT effectively in education was the insufficient hardware and inappropriate software. In the 1990s the problem has shifted to insufficiently trained teachers and the insufficient time teachers have to integrate Information and Communication Technologies (ICTs) in their teaching and learning practices (Dirksen & Tharp, 1996; Moonen & Voogt, 1998, p. 99; Paul, 1999). Two decades of research on the integration of ICT in education has shown that although changes are taking place to integrate ICT effectively into teaching and learning, the changes are not substantial enough to bring about the required change at the required pace (Addendum 1.1) [1] (Asan, 2003; Cowie & Jones, 2005; Darling-Hammond, 2005; Ehman et al., 2005; Guru & Percy, 2005; Jamieson-Proctor et al., 2006; Jimoyiannis & Komis, 2007; Loveless & Dore, 2002; McCain & Jukes,

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[1] All Addenda are in PDF format and available on the CD-ROM

2001; Moonen & Voogt, 1998; OFSTED, 2001; OFSTED, 2002; Paul, 1999; Plomp et al., 2003; Rodrigues, 2005b; Selwyn, 2002; Somekh & Davis, 1997; Thorburn, 2004; Walsh, 2002; Zhao & Bryant, 2006). For the past two decades the prospects of using ICT in education has been debated, researched and speculated on. The debate has changed little, namely that ICT has an important role to play in education in terms of enhancing excellence in teaching and learning. The importance of teachers and principals are realised as having a determining impact on successful ICT integration. The term *ICT* is preferred t*o IT* as Vallance (2008, p. 284) states: "The '*C*' represents *communication* and this term should be recognised as communication between people 'supported by' technology. It is people who are the hub of information and technology adoption and successes, and also its failures." However, the factors that hinder the integration of ICT in education seem to be basically the same as twenty years ago: resistance to change, resources, training and time to integrate ICT effectively (Demiraslan & Usluel, 2008; Dirksen & Tharp, 1996; Guru & Percy, 2005; Kovalchick & Dawson, 2004; Moonen & Voogt, 1998).

The education system is constantly developing. Teaching and learning is never complete, never conquered, always in a developmental phase, and is always changing (Carlson & Gadio, 2002, p. 128; Day & Sachs, 2004, p. 146; Dean, 1991, p. 1; Everard et al., 2004, p. 5; Foskett & Lumby, 2003, p. 33; Theroux, 2004, p. 1). However, the planning and integration of ICT in education is becoming more complex as new ICTs develop (Conole, 2004, p. 4; DoE, 2005, p. 25; Scrimshaw, 2004, p. 15). It is necessary to keep up with demands of the 21st century by ensuring that effective and sustainable ICT integration takes place in schools, enabling teachers and learners to make use of ICT in their teaching and learning. The vast amounts of information, communication and collaboration available through ICT has provided teachers with the opportunity to become experts in their fields and to meet the demands of educational challenges for the 21st century (Becta ICT Research, 2004b*,* pp. 1 - 2; Francis & Ezeife, 2007*,* p. 1; Gillani, 2003*,* p. 9). Integration of ICT in education has become more than just a mere educational add-on to existing practices. It is now a complex and demanding challenge, opportunity, risk and necessity (Burbules & Callister, 2000*,* p. 2; Carlson & Gadio, 2002*,* p. 130; Demiraslan & Usluel, 2008*,* p. 460; Dirksen & Tharp, 1996*,* p. 1; Jamieson-Proctor et al., 2006*,* pp. 511, 524; Jimoyiannis & Komis, 2007*,* p. 169; Nolan et al., 2005*,* p. 2; Selwyn, 2002*,* p. 28; Seyoum, 2004*,* p. 2; Thorburn, 2004*,* p. 1).

Despite the research and reform design efforts, teachers are still avoiding using ICT in their teaching and learning practices (Buckenmeyer, 2005, p. 2; Jamieson-Proctor et al., 2006, pp. 523 - 524; Jimoyiannis & Komis, 2007, p. 150; Nawawi et al., 2005, p. 88; Thorburn, 2004, pp. 1 - 3; Zhao & Bryant, 2006, pp. 53 - 54). Paul (1999, p. 3) found that teachers who did

not use ICT regularly, felt inadequately prepared to use ICT resources, displayed insufficient understanding of curricular uses of ICT, were unaware of the resources ICT could offer them as professionals, and were inadequately trained. Although it is not yet the norm at all schools, ICT is capable of improving the quality of teaching and learning (Carlson & Gadio, 2002, p. 130; Loveless & Dore, 2002, p. 5). Teachers seem to be in the unique position whereby they are both the subject of change as well as the agents of change (Buckenmeyer, 2005, p. 16; Francis & Ezeife, 2007, p. 1; ICT op School, 2006, p. 10; Jimoyiannis & Komis, 2007, p. 150; Thorburn, 2004, p. 5).

All over the world, governments realise the potential that ICT can have on enhancing and improving the quality of education and have invested in various teacher professional development (TPD) programmes. They aim to improve teachers' ICT application skills and knowledge, to enable teachers' to infuse ICT effectively into their teaching and learning practices (Asan, 2003, p. 153; Basinger, 2003, pp. 1 - 3; Becta ICT Research, 2004b, pp. 1 - 3; Carlson & Gadio, 2002, pp. 119, 129 - 130; Day & Sachs, 2004, p. 218; Ehman et al., 2005, pp. 251 - 267; Han, 2002, p. 294; NCREL, 2000, pp. 1 - 4; Phelps et al., 2004, pp. 50 - 51; Plomp et al., 2003, pp. 23 - 26; Rodrigues, 2005b; Toledo, 2005, pp. 177, 185 - 186; Zhao & Bryant, 2006, p. 53).

1.2   Background for this study

Due to the potentially added value of ICT in education, all teachers and learners should use ICT to support and enrich their teaching and learning activities. Education is unthinkable without the assistance of ICT. Using ICT in education cannot be avoided as it is a tool for the empowerment of teachers and learners towards more efficient education. ICT can be used as a research tool, problem-solving tool, creative tool and teaching and learning tool (Akbulut et al., 2007, p. 1; Dirksen & Tharp, 1996, pp. 108 - 109; Nichols, 2006, p. 1; Paul, 1999, pp. 4 - 6). ICTs have the potential to enhance teaching and learning through: enriching the curriculum, improving delivery, extending methods of presenting information and offering new opportunities through the techniques that ICT makes possible (Paul, 1999, p. 3). Teachers should have the opportunity to disseminate good practice via the Internet, access reliable facilities, resources and support on pedagogical issues and the latest curriculum developments for their own TPD (Dirksen & Tharp, 1996, p. 2). Teachers should also use ICT to manage and reduce their administrative workloads (Becta ICT Research, 2004c, pp. 1 - 3; Becta ICT Research, 2005, p. 4; Selwyn, 2002, p. 44). Quick, easy and accurate reports and communication to and from the Department of Education (DoE) is possible via the

Internet. ICTs can overcome teacher isolation by connecting them to colleagues, mentors, curriculum experts, and the global teacher community (Carlson & Gadio, 2002, p. 119).

ICT on its own has no impact — it is the way that it is being used in teaching and learning that changes education outcomes. As ICT continues to advance, teachers should be supported to adopt processes as teachers are the key element to the successful integration of ICT (Asan, 2003, p. 153; Becta ICT Research, 2003, pp. 1 - 2; Carlson & Gadio, 2002, p. 119; Demiraslan & Usluel, 2008, p. 468; Dirksen & Tharp, 1996, p. 3; Francis & Ezeife, 2007, p. 1; McCain & Jukes, 2001, p. 9; Moonen & Voogt, 1998, p. 100; Phelps et al., 2004, p. 1; Stephens & Crawley, 1994, p. 175; Steyn & Van Niekerk, 2005, p. 250; Thorburn, 2004, p. 3). Teachers should bring about meaningful change by integrating ICT into the education system. In order to keep track with events in the 21st century, it is essential that teachers integrate ICT into the curriculum, and bring about effective teaching and learning practices (Asan, 2003, p. 153; Carlson & Gadio, 2002, p. 123; Gibson, 2002, p. 320; Jamieson-Proctor et al., 2006, p. 511; Kovalchick & Dawson, 2004, pp. 192 - 193; Nolan et al., 2005, p. 4; Roberts & Associates, 1999, p. 9; Rodrigues, 2005a, p. 2; Zhao & Bryant, 2006, pp. 53 - 54). The advances of the information age are helping to ensure that ICTs in education become an integrated part of the educational system. Teachers are faced with increasing pressure to integrate ICT effectively into their teaching and learning practices (Becta ICT Research, 2006, p. 70; Girod & Cavanaugh, 2001, p. 1; Han, 2002, p. 293; Roberts & Associates, 1999, p. iv). ICT can act as an agent of significant, and in some cases, radical change in teachers' practices, thereby significantly changing the way teachers teach and learn. Teachers should use ICT to change and enhance some of their existing practices by: preparing for lesson presentation, delivery of curriculum, continuous assessment, communication with colleagues and access to information from a variety of sources (Day & Sachs, 2004, p. 148; Dirksen & Tharp, 1996, p. 2; Wang & Woo, 2007, p. 1).

For the successful integration of ICT in education there should be specific and clear objectives, guidelines and time-bound targets, required infrastructure, curriculum framework, assessment systems as well as political and educational commitment at all levels (Means, 1994, p. 179; Plomp et al., 2003, pp. 8 - 9; Vallance, 2008, pp. 275 - 290). For many schools, ICT integration means the mere distribution of ICT and software. As a result there is no change in current teaching and learning practices. ICT is only seen as a time consuming addition to that which already exists. The potential of ICT is therefore not realised and integration does not take place effectively. According to Woodbridge (2004, p. 1) ICT integration takes place when: "Viewing technology as an instructional tool for delivering subject matter in the curriculum already in place."

Decision makers' attitudes should change — they should start thinking of education first and ICT later. Money, time and manpower is wasted without the necessary effort to help teachers with effective ICT integration into education (Seyoum, 2004, p. 5; Thorburn, 2004, p. 7). The deployment and use of ICT through TPD is now central to educational reform initiatives (Becta ICT Research, 2005, p. 3; Chen & Chang, 2005, p. 1; Kotyk, 2006, p. 25). Professional development will continue throughout a teacher's professional life as it is a tool that creates the opportunity for growth and learning, helping to adapt to change, refine practice, implement innovations, increase effectiveness and decrease isolation (Becta ICT Research, 2004b, pp. 1 - 3; Borko, 2004, p. 5; Drago-Severson, 2004, pp. 38, 42; Francis & Ezeife, 2007, p. 6; Rodrigues, 2005a, p. 2; Stephens & Crawley, 1994, pp. 137, 167). Sufficient, effective, supportive and ongoing TPD for ICT integration is one of the most crucial components for teachers' successful ICT integration into their teaching and learning practices (Butler, 1992, p. 15; Carlson & Gadio, 2002, p. 125; Chen & Chang, 2005, p. 1; Demiraslan & Usluel, 2008, pp. 468, 470; Dirksen & Tharp, 1996, p. 4; Kovalchick & Dawson, 2004, p. 533; Walsh, 2002, p. 16; Webber & Robertson, 1998, p. 1; Zhao & Bryant, 2006, p. 54). However, few practising teachers know exactly how to proceed. They also do not understand what is actually meant by ICT integration (Di Benedetto, 2005, p. 2; Jimoyiannis & Komis, 2007, p. 158; Soule, 2003, p. 1; Woodbridge, 2004, p. 1).

The purpose of all leadership and management activities should be to support effective teaching and learning in the education system (Berube et al., 2004, p. 1; Center for CSRI, 2007, pp. 1 - 2; Foskett & Lumby, 2003, p. 18; Han, 2002, p. 296; Richards, 2004, p. 42). The goal is ultimately that teachers make use of ICT's full potential by integrating it effectively in their teaching and learning practices for the benefit of the learners (Nolan et al., 2005, pp. 2 - 4; Wang & Woo, 2007, p. 149). Quality leadership is widely acknowledged as the most important requirement for successful schools (Akbaba-Altun, 2006, p. 186; Bush & Glover, 2004, p. 3; Gibson, 2002, p. 322; Ho, 2006, p. 1; Leithwood, 2002, p. 105; Walsh, 2002, p. 3). School leadership is frequently cited as a critical component in implementing education reforms and the revitalisation of teachers and schools (Becta ICT Research, 2005, p. 4; Berube et al., 2004, pp. 1 - 3; Gordon, 2003, p. 1; Scrimshaw, 2004, p. 17; Vallance, 2008, p. 290). Principals' interest and involvement in ICT integration is the key in determining how ICTs will be used in schools by teachers and learners (Drago-Severson, 2004, p. xxi; Han, 2002, pp. 295 - 296; Johnson, 2004, p. xvii; NCREL, 2000, p. 6; Soule, 2003, p. 8; Toledo, 2005, p. 185; Zepeda, 1999, p. 14). Bass and Avolio (1994, p. 44) indicate that school leaders are very important as they are: "The definers and givers of culture" and they "set the tone, atmosphere and philosophy of an organisation." School leaders play a vital role in schools in leading school reform, implementing innovations and making improvements.

Becta ICT research (2005, p. 5) states: "Leaders are critical in driving change in the use of ICT." School leaders should be able to manage and initiate innovation and change. The principal has the capacity to influence and inspire teachers, encourage better performance in teaching and learning, and encourage innovative changes in teaching and learning (Han, 2002, p. 294). Gibson (2002, p. 319) states: "It is becoming increasingly clear that the importance of administrative support in the integration of ICT, curriculum, and instruction is under stated and under supported." The principal is a critical factor in the professional development of teachers and implementation of any innovation (Hezel Associates LLC, 2005-2006, p. 2; Jimoyiannis & Komis, 2007; Vallance, 2008, p. 290). Finding fresh, appropriate and inventive methods for TPD remains a problem for principals as the changing demand and circumstances in schools require a different approach to TPD (Steyn & Van Niekerk, 2005, p. 250). Strong leadership of schools is the key to the future success of education (Akbulut et al., 2007, p. 2; Gordon, 2003, p. 1; Walsh, 2002, p. 3). Without a total commitment over time from the school leadership there is no way that ICT can be integrated into the life of the school (Walsh, 2002, p. 5). Principals with insufficient ICT-related knowledge, will interpret regulations according to their own views and neglect to provide continuous support (Akbaba-Altun, 2006, p. 186). Literature on ICT leadership is scarce, fragmented, limited in scope and more likely to be prescriptive rather than be descriptive in nature (Ho, 2006, p. 7). It is only recently that research has focused on the principal's contribution to the successful and sustainable implementation of ICT in education, although the concept of principals playing a part in ICT implementation has been acknowledged for years (Vallance, 2008, pp. 275 - 290).

1.2.1 Information and Communication Technology in a South African educational context

The South African government realises that ICTs have the potential to improve the quality of education and training in the 21st Century. They have made it one of their main aims to incorporate the effective and sustainable use of ICT in education. In the White Paper on e-Education (2004b, p. 6), the Minister of Education stated that ICTs are currently central to the changes taking place in education throughout the world. ICTs have the potential to enhance lifelong learning by providing unlimited opportunities for personal growth and development for all. It will also enhance the management and administrative capacity of schools. The optimal use of ICTs in South Africa will help to address developmental challenges, help ensure quality teaching and training as well as enhance South Africa's global competitiveness (Addendum 1.2). ICT integration has become an important issue and specific strategies have been designed to implement ICT into teaching and learning. The

White Paper policy document on e-Education in South Africa is a start as it acknowledges ICTs' potential to improve the quality of education and training by providing a necessary framework for ICT integration (Addendum 1.3). To date this is the only policy document informing decision-making about ICT and its use in education (DoE, 2004b). The main goal is the equal distribution of educational opportunities to all, and it also revolves around the use of ICTs to enhance the quality of teaching and learning also assisting in whole-school development.

The rationale of the implementation of ICT in education consists of five strategic objectives (Addendum 1.4). The first objective is that ICT of professional development for every teacher, manager and administrator relating to the knowledge, skills and support they require for the effective integration of ICTs in teaching and learning. Secondly, the curriculum should be supported through effective, engaging and sustained software, electronic content and online learning resources. Teachers should, where possible, also contribute to these resources. Thirdly, every teacher and learner should have access to ICT infrastructure. Fourthly, have access to an educational network as well as the Internet. Lastly, continuous assessment of current practices should take place. Support should be given to teachers and leaders when exploring new ICTs, methodologies and techniques (DoE, 2004b, pp. 25 - 33).

To attain the above objectives, DoE is implementing the following strategies (Addendum 1.5). The first strategy is a system-wide approach. ICT initiatives should reach every institution and district. e-Learning should be a mainstream activity for every institution and classroom and should be embedded in such ways that would benefit all learners and teachers across the education system. National targets will guide strategies for gradual integration of ICTs at all levels of education and training systems. The strategies are based on co-ordination and collaboration. The implementation of the e-Education policy will be monitored and managed to foster inter-governmental collaboration to ensure that institutions are supported to meet the interests of learners and communities. Development, implementation and monitoring of targets will be co-ordinated to be reflected in national and provincial ICT plans. Attention will also be given to monitoring and evaluation; and regular reviews and reports will be conducted to inform about the implementation process. Success will be measured against nationally agreed indicators and targets. Information will be aggregated at district, provincial and national levels (Addendum 1.5) (DoE, 2004b, pp. 37- 38).

The integration of ICTs at all levels of the education system by 2013 will be a long-term strategy that will provide a framework for specific priorities and actions to be implemented over a period of time by the DoE (DoE, 2004b, pp. 39 - 41).

Phase 1: 2004 - 2007.

This phase aims to build an education and training system that supports ICT integration in teaching and learning; to build educators' and managers' confidence in the use of ICTs; to create a framework for educator development for the integration of ICTs into the curriculum; to establish an ICT presence in institutions; to use high-quality education content at institutions of learning; to connect institutions to the internet via electronic communication; and to encourage local communities to support their schools' ICT facilities (DoE, 2004b, pp. 39 - 40). A report on the national targets for ICT implementation during Phase 1 expands on enabling objectives such as management and planning, professional development, institutions using high-quality electronic content resources, ICT presence in institutions, institutions' connectivity to the Internet and electronic communication and community engagement with institutions' ICTs (Blignaut & Howie, 2007, p. 6).

Phase 2: 2007 - 2010.

System-wide integration of ICTs into teaching and learning. This phase requires that educators and managers integrate ICTs into the curriculum and management. ICTs are widely present in schools; schools use education content of high quality; institutions are electronically connected, access the internet and communicate electronically; and communities use and support schools' ICT facilities (DoE, 2004b, pp. 40 - 41).

Phase 3: 2010 - 2013.

ICTs should be integrated at all levels of the education system; management, teaching, learning and administration (DoE, 2004b, p. 41). This phase aims for provincial departments of education to use ICTs in all their planning, management, communication, monitoring and evaluation. Teachers and learners must be ICT capable and all teachers must integrate ICTs into teaching and learning practises (Blignaut & Howie, 2007, p. 7). Three critical elements will determine ICTs future as an effective tool for social and economic development in South Africa, namely the cost, question of sustainability and the efficient utilisation of ICTs. The objective of the e-Education policy states: "Every South African manager, educator and learner in the general and further education and training bands will be ICT capable by 2013" (DoE, 2004b, p. 17). The sustainability of ICT initiatives is of utmost importance if they are to support the long-term goals of the e-Education policy.

TPD training in Gauteng is offered at four levels. The first level of training offers teachers 24 hours of training in computer literacy and has been provided to 20 000 teachers. Advanced training is the second level that consists of 24 hours of contact training time and assignments. Only 10% of teachers have received the training. The third and fourth levels

of training namely the intermediate and advanced levels deal with the integration of ICT into the curriculum. Unfortunately until now no training has been offered at these levels. However, training regularly takes place in the Western Cape, and is an ongoing process (DoE, 2005, pp. 7, 20). Currently there are various professional development programmes in various stages of completion (Addendum 1.6) (DoE, 2004b, p. 11):

- SCOPE (Finnish Development Support), SchoolNet SA and the South African Institute for Distance Education has developed 11 Teacher Development Modules for introducing ICTs in schools
- SchoolNet SA provides online, mentor-based in-service training for teachers on introducing ICTs into the curriculum and management
- Intel® "Teach to the Future" Teacher Development Programme provides teacher training in ICT integration into teaching and learning.

The Gauteng DoE has no dedicated departmental structures in place to provide teachers with continuous professional development to support and demonstrate to teachers how to integrate ICT effectively into the curriculum. In Gauteng the focus is still on the acquisition and upgrading of ICT infrastructure and facilities (DoE, 2005, pp. 8, 14).

A number of significant ICT initiatives that are at various stages of development across South Africa have formed the basis for sustained and effective integration of ICT into teaching and learning practices. GautengOnline aims to issue each school with a 25-workstation computer laboratory, Internet and e-mail to be used for curriculum delivery (GautengOnline, 2003). The Intel® Teach Project is an extensive training programme for educators to use ICTs in the classroom (Intel Education, 2003). The Khanya Project aims to empower every teacher in every school of the Western Cape to use appropriate and available technology to deliver curriculum to every learner in the province by 2012, eradicate the digital divide and strive towards racial and gender equity (Khanya, 2001). The Microsoft™ Partners in Learning aims to empower schools to raise the level of ICT literacy of teachers, support teachers and schools to develop a culture of digital innovation and work with schools to prepare learners for the digital workplace (Microsoft, 2007). The Thutong Educational Portal provides access to: curriculum and learner-support material, TPD resources, administration and management resources and tools, education policy documents, news and information related to current developments in South African education and an online community (Thutong Educational Portal, 2004). Telkom 1000 Schools Project aimed to supply one thousand schools with Internet access points, create hundred Super-Centres for introducing computers to schools and train teachers and learners to use ICT (Telkom, 2007). The SCOPE project (2003) aimed to install twenty-one computer networks and dialup Internet connections in hundred schools, develop teachers for the effective educational use of ICT

facilities through mentor-supported distance learning, provide appropriate technical training onsite, provide telephonic technical support to the schools and monitor and evaluate the qualitative and quantitative impact of the project. SchoolNet SA aims to stimulate ICTs in education and support the educational system via connectivity and technology, human development, online content and material based on the curriculum, promotional strategies and provision of various support services to schools (SchoolNet SA, 2007). Blignaut and Howie (2007, p. 8) point out: "That some initiatives are not directly aligned with the e-Education policy and some initiatives have lapsed, their inheritance remains important." They also state that: "Even though educators' and learners' access to ICTs is still limited, these initiatives form the basis of the bulk of ICT development and practices in South Africa."

Sustainability and efficient utilisation of ICTs as well as continuous effective support are the three critical elements which will determine ICTs' future use as an effective tool in teaching and learning. The deployment of ICTs does not guarantee their efficient utilization. Capacity building and effective support mechanisms must accompany deployment. The DoE has invested in various national initiatives to increase access, boost the capacity of managers, teachers and learners, and provide electronic resources of the highest quality. Governments should not just note the importance of e-Education, but should play a visible and active role throughout the life-span of this project (DoE, 2004b, pp. 10 - 11).

Although the DoE is aiming to implement ICT in all schools, change is not taking place as fast as they had expected. As the Minister of Education Naledi Pandor (2007, p. 1) state: "The pace of delivery has to be accelerated." Ongoing sustainability, the upgrading of equipment, curriculum integration support, theft and security remains constricting factors. Many laboratories are under equipped thus not every learner has the opportunity to work on a computer. This makes the effective delivery of the curriculum through ICTs difficult. A major problem is the distance of getting to rural schools to provide support. Teachers do not have the necessary technical skills to solve problems with the system and there is insufficient technical support which led to schools becoming idle and teachers negative regarding the value of ICT integration into education (DoE, 2005, pp. 8, 14, 24). Although the South African report for the third module of the International Association for the Evaluation of Educational Achievement's (IEA) Second Information Technology in Education Study (SITES) 2006 project (Law et al., 2008) has been published in March 2008 and is not yet available, the international data suggest that in 2006, South Africa is lagging way behind other countries with ICT use in education (Law & Chow, 2007, p. 30).

1.3   Rationale

Given the increased focus society places on the use of technology, it has become evident that if schools want to keep up with developments and changes demanded from the 21st century, it is vital to ask questions about effective technology integration in education. Vast amounts of money, time and manpower is invested every year in the attempt to integrate ICT effectively into teaching and learning practice. Despite research and reform, changes are not effective. Barriers and enablers have been determined and debated for a number of years (Albion, 1999, pp. 1 - 4; Becta ICT Research, 2004a, pp. 3 - 22; Brand, 1997, pp. 1 - 7; Demiraslan & Usluel, 2008, pp. 470 - 471; Lal, 2002, pp. 1 - 6; Nawawi et al., 2005, pp. 1 - 3; NCREL, 2000, pp. 1 - 8; Roberts & Associates, 1999, pp. 7 - 14; Scrimshaw, 2004, pp. 9 - 11; Seyoum, 2004, pp. 1 - 7). It is necessary to exploit all the opportunities to incorporate technology and learn from them if ICT is to make a difference in education (Selwyn, 2002, p. 14). Literature identifies various factors that influence effective ICT integration, but they are mostly viewed in isolation (Butler, 1992, p. 15; Carlson & Gadio, 2002, p. 125; Chen & Chang, 2005; Dirksen & Tharp, 1996, p. 4; Kovalchick & Dawson, 2004, p. 533; NCREL, 2000, p. 1; Walsh, 2002, p. 16). As various authors indicate, the teachers are the key element to the successful integration of ICT (Asan, 2003, p. 153; Dirksen & Tharp, 1996, p. 3; Francis & Ezeife, 2007, p. 1; McCain & Jukes, 2001, p. 9; Moonen & Voogt, 1998, p. 100; Phelps et al., 2004, p. 1; Stephens & Crawley, 1994, p. 175; Steyn & Van Niekerk, 2005, p. 250; Thorburn, 2004, p. 3). The focus should shift to the principal as the change agent for effective and sustained ICT integration. Principals are in a position where they can make a difference and have a positive influence because principals play a vital role in leading school reform, implementing innovations and making improvements. Quality leadership is widely acknowledged as the vital requirement of a successful school. Given the widespread assumption that high-quality leadership is an essential dimension of successful schools, it seems to be imperative to have much more evidence about principals' influence on teachers' effective and sustainable ICT integration through TPD activities (Kalake, 2007, p. 53). However, research is restricted when it comes to the relationship of factors for the integration of ICT in schools in relationship with the specific role of the principal in TPD.

My study is based on the following:

- Research findings of the SITES 2006 project confirmed that the principal holds the critical position in the effective and sustainable development of ICT integration in schools (Pelgrum, 2007, pp. 1 - 2) and South Africa is still lagging way behind other countries with ICT use in education (Law & Chow, 2007).

- Teachers are the key element to successful ICT integration in classrooms. However, the focus should shift to the principal as the change agent to facilitate effective and sustained ICT integration. Leadership should facilitate the change process through being this "change agent" (Di Benedetto, 2005, p. 4; Vallance, 2008, p. 290).

- Kalake (2007, p. 53) states that: "Research on what enables principals to effectively lead the implementation process and principals' perceptions on the challenges and preferences of training was not found."

- A major theme that emerged from research on the implementation of ICT is the necessity for strong, committed leadership whose knowledge and commitment goes beyond the rhetoric of support. At the core of informed leadership is a person who has internalised the complexity of effective technology integration and who is able to exercises his or her influence to ensure that the various enabling factors are in place and being addressed (DoE, 2004a, p. 4; Vallance, 2008, p. 290).

- Various authors indicate that TPD in ICT won't be successful unless the principal is vested in the process and drives the changing process (Becta ICT Research, 2005, p. 5; Berube et al., 2004, pp. 1 - 6; Han, 2002, pp. 295 - 296; Hezel Associates LLC, 2005-2006, p. 2; Nawawi et al., 2005, pp. 98 - 90; NCREL, 2000, p. 6; Walsh, 2002, p. 5).

These above claims have lead to the in-depth study on the influence of the principals on teachers' ICT integration through TPD. ICT op School (2006, p. 14) points out that very little is known about the characteristics of good leadership as there is insufficient recent and systematically-collected data on ICT leadership in education. It is important to explore, describe and explain the factors that contribute to teachers' use of technology; as well as of how principals develop and spread effective ICT practice in the teaching environment through TPD (Becta ICT Research, 2005, p. 5).

1.4   Theoretical frame of reference for this study

I derived a theoretical framework from the orientation to the study through reviewing appropriate literature. It gave structure to the research and provided foundation on what the

study would be based, using concepts and terms unique to that orientation (Merriam, 1998, p. 46).

1.4.1 Theoretical framework for the integration of Information and Communication Technology

I based the literature review on Stoner's (1999, p. 1) adapted life cycle model of learning technology integration conceptual framework and Toledo's (2005, pp. 183 - 185) five-stage developmental model of computer technology integration. The adapted model illustrates the principals' influence on teachers' integration of ICT through the use of various leadership and management models as well as different leadership styles. Chapter 2 (Figure 2.1) illustrates that there are also additional influential factors that the principal has on teachers' effective and sustainable integration of ICT in teaching and learning practices. This framework indicates the five progressive levels that teachers pursue to become expert users of ICT use. Through professional development activities teachers proceed through the five levels for the effective and sustainable use of ICT. This, in turn, will lead to teachers' empowered use of ICT in their teaching and learning practices. The role of the principal is seen as the main influential factor on teachers' effective integration of ICT (Chapter 2 Figure 2.1).

1.5 Research problem

The identification of research problems lead to the realisation that there is insufficient knowledge on the issue of the principal's influence regarding teachers' professional development in ICT integration in schools.

The following aspects guide the identification of the knowledge gap regarding principal's influence on teachers' professional development in ICT integration that lead to the research questions of this study:

- The DoE policy document on e-Education indicates that ICT has to be integrated effectively into education to enhance the quality of teaching and learning (DoE, 2004b).
- Despite all the research and reform design efforts teachers still avoid and distrust the integration of computers into their teaching and learning practices (Buckenmeyer, 2005, p. 2; Jamieson-Proctor et al., 2006, pp. 523 - 524; Jimoyiannis & Komis, 2007, p. 150; Moonen & Voogt, 1998, pp. 99 - 102; Nawawi et al., 2005, p. 88; Nichols, 2006, p. 1; Thorburn, 2004, p. 10).
- While literature and research discuss the importance of the teacher and professional development for ICT integration, focus has recently shifted to the role of the principal.

Research can explore and describe principals' influences on teacher professional development for the integration of ICT.

- Research is scarce, fragmented and limited in scope on what enables principals to effectively lead the implementation process. This is also true about principals' perception of the challenges, teachers' preferences for training, as well as on technology leadership (Kalake, 2007, p. 53).

- Although school leadership is frequently cited as the critical component in the successful integration of ICT education, just the mere position of the principal is associated with authority, accountability and power. This indicates the principal's influence.

1.6 Research question

A research question is designed to address and express the essence of the inquiry. Research questions should be clearly formulated, intellectually worthwhile, researchable (epistemological position and practical terms), and used as means to move from broad research to specific research (Mason, 2002, p. 19). This research is aimed to address the following compelling question:

How do principals influence teacher professional development for the integration of ICT in their schools?

To fully address this question, subsidiary questions are posed to provide additional insight to the main question:

- **Sub-question 1:** How do principals' influences differ with regard to ICT integration in their schools?

- **Sub-question 2:** How does principal's strategic thinking of TPD influence ICT integration?

- **Sub-question 3:** What are the enabling strategies that principals follow to develop and sustain teachers' integration of ICT in teaching and learning?

1.7 Research paradigm

Many definitions are associated with the concept of "paradigm". It is necessary to indicate the use of paradigm in this study as "how the world is ordered, what we may know about it, and how we may know it" (Hatch, 2002, p. 11). This research is approached according to the interpretive paradigm as people, and their interpretations, perceptions, meanings and understandings will form my primary data source (Mason, 2002, p. 56). Individuals form their own perspectives and construct realities differently. Individual constructions of reality

compose the knowledge of interest to the researcher. Researcher and participant are joined together in the process of co-constructing understandings. I spent extended periods of time interviewing respondents in their natural settings in an effort to reconstruct the constructions respondents use to make sense of their worlds. Knowledge produced is presented in the form of rich narratives that describe the interpretations constructed as part of the research process. Accounts include enough contextual detail and sufficient representation of the voices of the representations in order to make the data credible, transferable, confirmable and dependable (Hatch, 2002, pp. 15 - 16).

1.7.1 Epistemological and ontological assumptions

A paradigm encompasses four concepts: ethics, epistemology, ontology and methodology (Denzin & Lincoln, 2000, p. 157). The basic set of beliefs that guides the actions contains the researcher's epistemological, ontological, and methodological premises and forms the researcher's interpretive framework or paradigm (Denzin & Lincoln, 2000, p. 19). The methods used for generating relevant data will depend upon researcher's ontological and epistemological positions (Mason, 2002, p. 26). The qualitative research methods listed in Table 1.1 are the most appropriate for addressing the research question. The table also indicates the philosophical reasons for selecting them.

Table 1.1 Philosophical reasons for choosing research questions*

Research methodology (How knowledge is gained?)	Ontology (What is the nature of reality?) Beliefs about nature of social world and what can be known about it	Epistemology (What can be known? What is the relationship of the knower to what is to be known?) Nature of knowledge and how it can be acquired
Interviews	Principals' knowledge, interpretations, perceptions, views, experiences and understanding are meaningful properties to explore	Interviewing is a legitimate and meaningful way to generate data by talking interactively with principals, to: ask questions, listen and gain access to the accounts and articulations of respondents

*   Adapted from Hatch (2002, pp. 11 - 13); Mason (2002, pp. 63 - 106).

Epistemology guides the generation of knowledge and explanations about the ontological components such as attitudes, actions and discourses of the social world (Mason, 2002, p. 16; Ritchie & Lewis, 2003, p. 13). Mason (2002, p. 16) describes epistemology as: "The researcher's theory of knowledge which is concerned with rules and principles in order to determine whether and how social phenomena can be known and how knowledge can be demonstrated." Lichtman (2006, p. 218) indicates that epistemology is a branch of philosophy that deals with the theory and nature of knowledge, or how we know what we

know. The epistemological questions that are usually asked; "What can be known, and what is the relationship of the knower to what is to be known?" (Hatch, 2002, p. 11). Epistemologically this research will analyse social phenomena within an Interpretive paradigm which according to (Burrell & Morgan, 1979) views the social world as an emergent social process that is created by the individuals concerned and sees social reality as little more than a network of assumptions and inter-subjectively shared meanings. The epistemological position of this study indicates that talking to principals interactively is a meaningful way to generate data that have depth, richness and context (Flick et al., 2004; Mason, 2002) in order to analyse and explain the meaning of social phenomena from the perspective of human respondents in a natural setting (Ary et al., 2002; McMillan & Wergin, 2002).

Ontology is a branch of metaphysics and raises basic questions about the nature of reality and the nature of the human being in the world (Denzin & Lincoln, 2000, p. 157; Lichtman, 2006, p. 219). The ontological question usually asked is "What is the nature of reality?" (Hatch, 2002, p. 11). The ontological perception of this research suggests that principals have certain experiences regarding their influence on the teacher professional development for the integration of ICT in their schools and those experiences are meaningful components in determining the effective integration of ICT.

1.8   Research approach

Qualitative mode of inquiry is used in this research. This type of inquiry is ideally suited for this research as Merriam (1998, p. 1) indicates that the focus of qualitative inquiry is based on meaning in context that requires a data collection instrument such as interviewing that will be sensitive to underlying meaning when the data is gathered and interpreted. Qualitative research is an umbrella concept covering several forms of inquiry (Merriam, 1998, p. 5) where the researcher describes, explores and interprets phenomena in their natural setting in order to produce data which are credible and verifiable (Lichtman, 2006, p. 22; McMillan & Wergin, 2002, p. 6). Mason (2002, p. 1) states that: "Qualitative research has an unrivalled capacity to constitute compelling arguments about how things work in particular contexts and is capable of producing very well-founded cross-contextual generalities." The open-ended nature of this approach allows the principals to answer from their own frame of reference rather than from one structured by prearranged questions. Because of the detail, most studies have small samples (Bogdan & Knopp Biklen, 2006, p. 3). Qualitative research uses a wide range of interconnected interpretive practices and is concerned with how the researcher interprets, understands, experiences, produces or constitutes the social world

(Denzin & Lincoln, 2000, p. 3; Lichtman, 2006, p. 22; Mason, 2002, p. 3). Qualitative research is interested in understanding the meaning people have constructed, in other words how they make sense of their world and the experiences they have in the world. Qualitative research can reveal how all the parts work together to form a whole. It is assumed that meaning is embedded in people's experiences and that this meaning is mediated through the researcher's own perceptions (Merriam, 1998, p. 6).

The researcher is the primary instrument for data collection and analysis. Research involved fieldwork where the researcher made appointments with the principals and visited their schools; observing their behaviour in a natural setting. An inductive research strategy was employed where theory was formed from observations and intuitive understandings gained from the field.

1.8.1 Rationale for using qualitative research

Qualitative research is ideally suited to this study because the researcher will be the primary instrument to collect and analyse, being in close contact with respondents. The sample selection of principals was small, non-random and purposeful. Interviews took place in natural settings familiar to the principals. It leads to interaction between the researcher and principal. Field notes were compiled. The generated data were descriptive, detailed and extensive in order to enhance the validity and reliability of research. The analysis could give direction to future research, or lead to improved educational practice. Babbie and Mouton (2001, pp. 79 - 81), Marshall and Rossman (1999, p. 3) describe the three purposes for research (Table 1.2).

Table 1.2   Matching research questions and purpose*

Purpose of this study		Research Questions
Exploratory	• To investigate little-understood phenomena • To identify or discover important categories of meaning • To generate hypotheses for further research	How do principals' influences differ with regard to ICT integration in their schools?
Explanatory	• To explain the patterns related to the phenomenon in question • To identify plausible relationships shaping the phenomenon	How does principal's strategic thinking of TPD influence ICT integration?
Descriptive	• To document and describe the phenomenon of interest	What are the enabling strategies that principals follow to develop and sustain teachers' integration of ICT in teaching and learning?

*   Adapted from Babbie and Mouton (2001, pp. 79 - 81); Mashall and Rossman (1999, p. 33).

Using the philosophical areas (Table 1.1) and the research purposes (Table 1.2) as a guide, reasons were identified to conduct qualitative research in this study.

Summary of the research rationale and procedure:

- Sample selection is small and purposeful
- The researcher is the primary instrument for data collection and analysis and the researcher will be in close contact with participants and therefore in a position to adapt techniques according to the circumstances
- Interaction between the researcher and participants takes place
- Theory and understanding is built from data that is rich, detailed, extensive and descriptive
- The generating of data will be descriptive and analytic to enhance the validity and reliability of research data
- Analysis of research data may lead to data that can be used in other areas of research or give directions for future research
- The result of this study can lead to educational practice improvement.

1.8.2   Respondents in this study

The sampling strategy used in this study is purposive sampling. Purposive sampling implies the selection of information-rich cases which one can study in depth and learn a great deal about issues of central importance for the purposes of the research (Merriam, 1998, p. 61). Pre-defined criteria determined the selection of the respondents to increase the validity of the represented data. The respondents comprised secondary school principals. I used maximum variation and snowball sampling and purposive sampling in this study.

1.8.3   Data collection method

Interviewing is the most common form of data collection used in qualitative studies and can be defined as a conversation with a purpose. Interviewing is also seen as the best-suited technique to use when conducting intensive case studies of a few selected individuals (Merriam, 1998, p. 72). Qualitative research paves the way for an interpretative perspective, allowing principals to give their opinion on ICT integration and the influence they have as principals on teachers in their schools.

1.8.4   Analysis of data

Data analysis is the process of making sense and meaning from the data that constitute the findings of the study. Making sense from the data involves consolidating, interpreting and

reducing the selected data. Merriam (1998, p. 180) refers to data analysis as: "category construction." Computer Aided Qualitative Data Analysis Software (CAQDAS) application Atlas.ti™, a computer-based qualitative analysis program, was used due to its unique network building capacity. The data were coded, categorised and grouped together according to themes that were identified on having an impact on the research topic. These meanings constitute the findings of the study (Merriam, 1998, p. 178).

1.9   Value of this research

In a technological society, valid information is necessary for educational decisions. Educational leaders increasingly use research for policy design and decision making. If one plans to improve education, the first step is to use valid information and knowledge about the system and acquires new perspectives about the education system or educational processes that generate ideas on how to approach ideas or problems (Schumaker & Sommers, 2001, p. 25). In such a context, the outcomes of this study will provide:

- confirmation that principals do have considerable influence on TPD for the integration of ICT in their schools
- a set of guidelines that will aid principals in the successful and sustainable integration of ICT by teachers that will enhance the quality of teaching and learning practices.

The ultimate goal of this study is to provide information to the different sectors of education with justifiable data concerning the effective integration of ICT in education.

1.10   Defining the concepts used in this study

The terms used in this qualitative study are provided in Table1.3. These definitions aim to clarify terms and concepts included in the design of this study.

Table 1.3   Definition of concepts

Term	Definition	Reference
Analysis	The process of sorting, arranging, coding, and in other ways looking for patterns in data for the purpose of coming up with findings	(Bogdan & Knopp Biklen, 2006, p. 271)
Coding	Is a procedure that disaggregates the data, breaks them down into manageable segments and identifies or names those segments	(Schwandt, 2007, p. 32)
Data	The rough material that the researcher collects from the world being studied, the particulars that form the basis of analysis	(Bogdan & Knopp Biklen, 1992, p. 106)
Data saturation	The point in data collection where the information the researcher gets becomes redundant	(Bogdan & Knopp Biklen, 2006, p. 272)
Educational practice	Refers to a programme, a curriculum, a policy or administrative regulation, an organisational structure, or a product	(McMillan & Schumacher, 2001, p. 529)

Table 1.3   Definition of concepts

Term	Definition	Reference
Educational technology	The application of technology to accomplish learning or to construct knowledge	(Rodney, 2001, p. 1)
Field notes	The written account of what the researcher hears, sees, experiences, and thinks in the course of collecting and reflecting on the data in a qualitative study	(Bogdan & Knopp Biklen, 1992, p. 107)
Generalisability	Extent to which wider claims can be made on the basis of the research and analysis that has taken place	(Mason, 2002, p. 39)
In-depth interview	Use of a general interview guide with a few selected topics and probes; a conversation (of at least an hour) with a fixed goal	(McMillan & Schumacher, 2001, p. 592)
Information and Communications Technology (ICT)	Telecommunication and information technologies used for education	(Roberts & Associates, 1999, p. 5)
Interpretive paradigm	Is characterised by the concern for the individual wanting to understand the subjective world of human experience	(Cohen & Manion, 1994, p. 36)
Methodology	Refers to a design whereby the researcher selects data collection and analysis procedures to investigate a specific research problem	(McMillan & Schumacher, 2001, p. 10)
Non-probability sampling	Units are deliberately selected to reflect particular features of or groups within the sampled population	(Ritchie & Lewis, 2003, p. 78)
Open coding	The initial classification and labelling in qualitative data analysis. The codes are suggested by the researcher's examination and questioning of the data	(Babbie, 2005, p. 486)
Purposeful sampling	Strategy to choose small groups or individuals likely to be knowledgeable and informative about the phenomenon of interest; selection of cases without needing or desiring to generalise to all such cases	(McMillan & Schumacher, 2001, p. 598)
Qualitative interview	Essentially a conversation in which the interviewer establishes a general direction for the conversation and pursues specific topics raised by the respondent	(Babbie & Mouton, 2001, p. 289)
Qualitative methods	Address research questions that require explanation or understanding of social phenomena and their context	(Ritchie & Lewis, 2003, p. 5)
Qualitative research	Focuses on understanding social phenomena from the perspective of the human respondents in the study. The data are collected in natural settings, and the research aims at generating theory	(Ary et al., 2002, p. 22)
Reliability	Quality of measurement method that suggests that the same data would have been collected each time in repeated observations of the same phenomenon	(Babbie & Mouton, 2001, p. 646)
Research	Is a systematic process of collecting and logically analyzing data for some purpose	(McMillan & Schumacher, 2001, p. 9)
Research design	Describes the procedures for conducting the study, including when, from whom, and under what conditions the data will be obtained	(McMillan & Schumacher, 2001, p. 31)
Research methods	Range of approaches used in educational research to gather data which are to be used as basis for inference and interpretation, for explanation and prediction	(Cohen & Manion, 1994, p. 38)

Table 1.3   Definition of concepts

Term	Definition	Reference
Respondent	Person from whom information is gathered to answer the research question	(McMillan & Wergin, 2002, p. 9)
Snowball sampling	A non-probability sampling method often employed in field research. Each person interviewed may be asked to suggest additional people for interviewing	(Babbie & Mouton, 2001, p. 647)
Theoretical framework	Is derived from the orientation or stance that you bring to your study. It is the structure, the scaffolding, the frame of your study	(Merriam, 1998, p. 45)
Theory	A set of interrelated concepts, definitions and propositions that presents a systematic view of phenomena by specifying relations among variables with the purpose of explaining and predicting the phenomena	(Cohen & Manion, 1994, p. 14)
Triangulation	A process of using multiple perceptions to clarify meaning, verifying the repeatability of an observation or interpretation	(Denzin & Lincoln, 2000, p. 443)
Validity	Extent to which theory and evidence support the proposed interpretations of test scores for an intended purpose	(Ary et al., 2002, p. 267)

1.11   Outline of chapters

The outline of the chapters in this study is indicated in Table 1.4.

Table 1.4   Outline of chapters

Chapter 1	**Orientation to this study**	This chapter gives an orientation of what this study entails
Chapter 2	**Framework for integration of ICT in teaching and learning**	This chapter provides insight to relevant concepts
Chapter 3	**Research design and methodology**	This chapter provides an in-depth description of: • Nature of the research • Research methodology • Qualitative research approach • Methodology of trustworthiness • Data analysis • Ethical considerations • Limitations of this study
Chapter 4	**Data analysis and findings**	Presentation, analysis and discussion of collected data
Chapter 5	**Conclusions and recommendations**	This chapter concludes the research and provides the following information: • Synoptic overview of the inquiry • Synopsis of key findings • Proposed theoretical framework • Limitations of this study • Value of this study • Recommendations • Personal reflection of my research journey • Proposed related research questions

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