# Principals' Influences on Teacher Professional Development for the Integration of Information and Communication Technologies in Schools

by

Molly Patricia van Niekerk

Submitted in partial fulfilment of the requirements for the degree

Philosophiae Doctor: Computer-integrated Education

in the

Department of Curriculum Studies

Faculty of Education

University of Pretoria

South Africa

Supervisor: Prof Dr Seugnet Blignaut

February 2009

**Certificate of proofreading and editing**

Herewith I, the undersigned, declare that I have proofread and edited the doctoral thesis

*Principals' Influences on Teacher Professional Development for the Integration of Information and Communication Technologies in Schools*

by Molly Patricia van Niekerk

PD de Kock
LLD; MA (Libr); APTrans (SATI); PSAIBI 139
Doreen Street Colbyn Pretoria pddekockl
@xsinet.co.za

October 2008

**Declaration of authorship**

**I declare that this thesis which I herby submit for the degree**

**Philosophiae Doctor: Computer-integrated Education**

**in**

**Curriculum Studies**

**at the University of Pretoria, is my own work**

**and has not previously been submitted by me for**

**a degree at this or any other tertiary institution.**

_____

**Molly Patricia van Niekerk**

**Signed on the …………… day of ………………… 2009.**

**Pretoria, South Africa.**

## Abstract

The effective and sustainable use of ICTs (Information and Communication Technologies) in education has become commonplace as it is necessary to keep up with demands of the 21$^{st}$ century. ICT in education has become a tool for the empowerment of both teachers and learners for better teaching and learning. Although various ICT strategies and initiatives are implemented across South Africa, no system-wide effective and sustainable ICT integration in schools has yet come about. The pace of integration is slow and teachers avoid using ICT in their teaching and learning practices due to insufficient training. The aim of teacher professional development (TPD) is to improve teachers' ICT application skills and knowledge, as well as to enable teachers to integrate ICT effectively in their classroom practices.

Principals play a vital role in leading school reform, implementing innovations and bringing about change. The widespread assumption that high-quality leadership is an essential dimension of successful school management, leads to the question of how principals can influence teachers' effective and sustainable integration of ICT into classrooms through TPD activities. Therefore, the purpose of this research was to determine the influence that principals have on teachers' ICT integration through TPD. As school leadership is frequently cited as an essential for the successful integration of ICT into education, the very position of the principal is associated with authority, accountability and power.

My initial research is based on Stoner's (1999) Adapted Life Cycle Model of Learning Technology Integration. I used this model to illustrate the principals' influence on teachers' integration of ICT into education. From this review subsidiary questions emerged. Qualitative research through in-depth interviews formed the basis of an interpretative perspective, allowing principals to reflect on ICT integration, as well as their influence on teachers' use of ICT. This study followed a basic grounded theory approach where I assumed an inductive stance and strived to derive meaning from the data in order to develop new theory. Pre-defined theoretical criteria determined the selection of the respondents to ensure validity of the data. The seven principals represented secondary schools across cultural and socio-economic levels. The perceptions and experiences of the principals were analysed, compared, and patterns of influence were identified.

This study indicated that principals do not only influence the integration of ICT in classrooms through their leadership and management styles, but also through their attitude toward ICT integration, knowledge on related ICT and TPD issues, as well as their strategic thinking on

ICT integration.  Emerging findings on the role of the principal lead to new insights on the empowerment of teachers.  The study resulted in a proposed theoretical framework that indicates the interrelatedness of the emerging patterns that influence the principals' role through TPD.

**My heartfelt thanks to my Lord and Saviour for the strength and insight to complete this research study**

**Dedication**

I dedicate this thesis to my mother, Pat van Niekerk.

**Acknowledgements**

I would like to express my gratitude and appreciation to the following persons:

- Prof Dr Seugnet Blignaut, who acted as supervisor for this study. Seugnet was always available, supporting and motivating. I am fortunate to be guided by her as she has extraordinary knowledge on the research topic. Although promoted to other Universities she stayed at my side till the completion of my studies, for which I am very grateful. Without Seugnet this thesis would not have been accomplished.

- Prof Dr W. J. Fraser who assisted me throughout my studies – my sincere appreciation.

- Dr Herman van Vuuren, who made a valuable contribution to this study by acting as critical reader.

- Prof Dr Piet de Kock, who edited and proofread the thesis and gave continuous support.

- The seven respondents who were willing to be interviewed and allowed me to gain a deeper understanding of the research topic.

- My family: Laurie, Santie, Nadine, Chantelle and Michael who gave me above all their love, understanding, prayers and loyal support.

- Colleagues from Laerskool Voorpos and friends who gave me the necessary support, understanding as well as motivation when most needed.

- Irma du Bruyn for the words of wisdom and continuous encouragement.

- Everyone who contributed to my academic and personal growth in the fulfilment of this thesis.

**Table of Contents**

**List of figures**

**List of tables**

**List of addenda**

**List of abbreviations**

| | |
|---|---|
| Becta | British Educational Communications and Technology Agency |
| CAQDAS | Computer Aided Qualitative Data Analysis Software (Atlas.ti™) |
| COP | Community of Practice |
| DoE | Department of Education |
| HOD | Head of Department |
| HU | Hermeneutic Unit – everything of relevance to a research project (Atlas.ti™) |
| ICT | Information and Communication Technology |
| IEA | International Association for the Evaluation of Educational Achievement's |
| IQMS | Integrated Quality Management System |
| IT | Information Technology |
| KDA | Kids Development Academy |
| NCREL | North Central Regional Educational Laboratory |
| NGO | Non Governmental Organisation |
| OFSTED | Office for Standards in Education |
| SCOPE | South African – Finnish Co-operation Programme in the Education Sector |
| SGB | School Governing Body |
| SITES | Second Information Technology in Education Study |
| SMT | Senior Management Team |
| TPD | Teacher Professional Development |

**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,

---

[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 21$^{st}$ 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<br>• To identify or discover important categories of meaning<br>• 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<br>• 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:<br>• Nature of the research<br>• Research methodology<br>• Qualitative research approach<br>• Methodology of trustworthiness<br>• Data analysis<br>• Ethical considerations<br>• 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:<br>• Synoptic overview of the inquiry<br>• Synopsis of key findings<br>• Proposed theoretical framework<br>• Limitations of this study<br>• Value of this study<br>• Recommendations<br>• Personal reflection of my research journey<br>• Proposed related research questions |

**1.12    References used in this chapter**

Akbaba-Altun, S. (2006). Complexity of Integrating Computer Technologies into Education in Turkey. [Electronic version]. *Educational Technology and Society*, *2006*(9), 367-380. Retrieved 13 April 2007, from http://www.ifets.info/journals/9_1/15pdf

Akbulut, Y., Kesim, M., & Odabasi, F. (2007). Construct Validation of ICT Indicators Measurement Scale (ICTIMS). [Electronic version]. *International Journal of Education and Development using Information and Communication Technology*, *3*(3), 1-17. from http://ijedict.dec.uwi.edu//viewarticle.php?id=359&layout=html

Albion, P. R. (1999). Self-Efficacy Beliefs as an Indicator of Teachers' Preparedness for Teaching with Technology.   Retrieved 22 September, 2006, from http://www.usq.edu.au/users/albion/papers/site99/1345.html

Ary, D., Jacobs, L. C., & Razavieh, A. (2002). *Introduction to Research in Education* (6th ed.). Belmont: Wadsworth.

Asan, A. (2003). Computer Technology Awareness by Elementary School Teachers: A Case Study from Turkey. [Electronic version]. *Journal of Information Technology Education*, *2*(2003), 153-164. Retrieved 8 August 2006, from http://www.jite.org/documents/Vol2/v2p153-164-109.pdf

Babbie, E. (2005). *The Basics of Social Research*. Canada: Wadsworth.

Babbie, E., & Mouton, J. (2001). *The Practice of Social Research*. Cape Town: Oxford.

Basinger, D. (2003). Teachers Integrating Technology: Case Studies.   Retrieved 3 September, 2006, from http://www.usca.edu/essays/vol82003/basinger1.pdf

Bass, B. M., & Avolio, B. J. (1994). *Improving Organization Effectiveness: Through Transformational Leadership*. Thousand Oaks: Sage Publications.

Becta ICT Research. (2003). What the Research Says About ICT Support for Schools. Retrieved 8 July, 2005, from http://www.becta.org.uk/page_documents/research/wtrs_aboutict.pdf

Becta ICT Research. (2004a). A Review of the Research Literature on Barriers to the Uptake of ICT by Teachers.   Retrieved 11 June, 2006, from http://partners.becta.org.uk/page_documents/research/barriers.pdf

Becta ICT Research. (2004b). What the Research Says About ICT and Continuing Professional Development (CPD) for Teachers. 2nd Edition Revised and Updated. Retrieved 8 July, 2006, from http://www.becta.org.uk/page_documents/research/wtrs_cpds.pdf

Becta ICT Research. (2004c). What the Research Says About ICT and Reducing Teachers' Workload.   Retrieved 15 August, 2007 from http://partners.becta.org.uk/page_documents/research/wtrs_workloads.pdf

Becta ICT Research. (2005). The Becta Review 2005. Evidence on the Progress of ICT in Education.   Retrieved 9 July, 2005, from http://www.becta.org.uk/page_documents/research/becta_review_feb05.pdf

Becta ICT Research. (2006). The Becta Review 2006. Evidence on the Progress of ICT in Education.   Retrieved 11 June, 2006, from http://becta.org.uk/corporate/publications/documents/The_Becta_Review_2006.pdf

Berube, W., Gaston, J., & Stepans, J. (2004). The Role of the Principal in Teacher Professional Development. [Electronic version]. *NOVAtions Journal, 2004*(1). Retrieved 22 July 2007, from http://www.novationsjournal.org/content/media/volume2004/NOVAtions2004-1.pdf

Blignaut, S., & Howie, S. (2007). *ICT Policies, Realities and Practices in South African Schools*: Tshwane University of Technology, University of Pretoria.

Bogdan, R. C., & Knopp Biklen, S. (1992). *Qualitative Research for Education. An Introduction to Theory and Methods* (2nd ed.). Boston: Pearson.

Bogdan, R. C., & Knopp Biklen, S. (2006). *Qualitative Research for Education. An Introduction to Theories and Methods* (5th ed.). Boston: Pearson.

Brand, G. A. (1997). What Research Says: Training Teachers for Using Technology. [Electronic version]. *Journal of Staff Development, 19*(1). Retrieved 10 August 2006, from http://www.nsdc.org/library/publications/jsd/brand191.cfm

Buckenmeyer, J. A. (2005). No Computer Left Behind: Getting Teachers on Board with Technology.   Retrieved 12 April, 2007, from http://center.uoregon.edu/ISTE/uploads/NECC2005/KEY_7304940/Buckenmeyer_necc2005_RP.pdf

Burbules, N. C., & Callister, T. A. (2000). *Watch IT.The Risks and Promises of Information Technologies for Education*. United States of America: Westview Press.

Burrell, G., & Morgan, G. (1979). Socialogical Paradigms and Organisational Analysis. Retrieved 9 July, 2005, from http://webpages.marshall.edu/~carter12/eda705a5.htm

Bush, T., & Glover, D. (2004). Leadership Development: Evidence and Beliefs.   Retrieved 10 October, 2007, from http://www.nesl.org.uk/media/756/EC/leadership-development-evidence-and-beliefs.pdf

Butler, J. A. (1992). Staff Development.   Retrieved 20 August, 2007, from http://www.nwrel.org/scpd/sirs/6/cul12.html

Carlson, S., & Gadio, C. T. (2002). Teacher Professional Development in the Use of Technology.   Retrieved 16 August, 2006, from http://www.schoolnetafrica.net/fileadmin/resources/Teacher_Professional_Development_In_the_use_of_Technology.pdf

Center for CSRI. (2007). Improving Teacher Retention with Supportive Workplace Conditions.   Retrieved 16 August, 2007, from http://www.centerforcsri.org/index.php?option=com_content&task=view&id=466&Itemid=5

Chen, J. C., & Chang, C. (2005). Testing the Whole Teacher Approach to Professional Development: A Study of Enhancing Early Childhood Teachers' Technology Proficiency.   Retrieved 28 July, 2006, from http://ecrp.uiuc.edu/v8n1/chen.html

Cohen, L., & Manion, L. (1994). *Research Methods in Education* (4th ed.). London: Routledge Publishers.

Cowie, B., & Jones, A. (2005). Digital Horizons: Laptops for Teachers Evaluation Study. Update on Secondary Teachers' Experiences.   Retrieved 16 August, 2007, from http://www.minedu.govt.nz/web/downloadable/dl8568_vl/laptop-leaders-report-12-9-with-edits-ds.doc

Darling-Hammond, L. (2005). *Professional Development Schools: Schools for Developing a Profession*. New York: Teacher College Press.

Day, C., & Sachs, J. (2004). *International Handbook on the Continuing Professional Development of Teachers*. England: Open University Press.

Dean, J. (1991). *Professional Development in School*. Philadelphia: Open University Press.

Demiraslan, Y., & Usluel, Y. K. (2008). ICT Integration Processes in Turkish Schools: Using Activity Theory to Study Issues and Contradictions. [Electronic version]. *Australasian Journal of Educational Technology*, *24*(4), 458-474. Retrieved 27 August 2008, from http://www.ascilite.org.au/ajet/ajet24/demiraslan.html

Denzin, N. K., & Lincoln, Y. S. (2000). *Handbook of Qualitative Research* (2nd ed.). United States of America: Sage Publications.

Di Benedetto, A. O. (2005). Does Technology Influence Teaching Practices in the Classroom?   Retrieved 22 September, 2006, from http://web.uoregon.edu/ISTE/uploads/NECC2005/KEY_6820721/DiBenedetto_NECC_Paper_RP.pdf

Dirksen, D., & Tharp, D. (1996). Utilizing CBAM to Assess the Use of Instructional Technologies in the Classroom.   Retrieved 17 April, 2000, from http://www.coe.uh.edu/insite/elec_pub/html1996/06preser.html

DoE. (2004a). ICT in Schools in Turkey. Policy Note.   Retrieved 10 February, 2008, from http://www.oecd.org/dataoecd/25/62/2736884.pdf

DoE. (2004b). *White Paper on e-Education. Notice 1922 of 2004*. Pretoria.

DoE. (2005). *Report on Provincial Visits to Gauteng, Western Cape and Northern Cape*. Pretoria.

Drago-Severson, E. (2004). *Helping Teachers Learn. Principal Leadership for Adult Growth and Development*. California: Sage Publications.

Ehman, L., Bonk, C., & Yamagata-Lynch, L. (2005). A Model of Teacher Professional Development to Support Technology Integration. [Electronic version]. *AACE Journal*, *13*(3), 251-270. Retrieved 8 August 2006, from http://www.thutong.org.za/resources/research/Model%20Teacher%20Prof%20Dev%20ICT%20Integration%202005.pdf

Everard, K. B., Morris, G., & Wilson, I. (2004). *Effective School Management* (4th ed.). London: Sage Publications.

Flick, U., Von Kardorff, E., & Steinke, I. (2004). *A Companion to Qualitative Research*. London: Sage Publications.

Foskett, N., & Lumby, J. (2003). *Leading and Managing Education. International Dimensions*. London: Paul Chapman Publishing.

Francis, H. A., & Ezeife, A. N. (2007). Integrating Information and Communication Technology into the School Curriculum: A Case for Professional Development Models.   Retrieved 16 August, 2007, from http://www.asstudents.unco.edu/students/AE-Extra/2007/4/Ezeife.html

GautengOnline. (2003). GautengOnline: Bridging the Digital Devide.   Retrieved 13 June, 2007, from http://www.gautengonline.com

Gibson, I. W. (2002). Technology, Pedagogy and Education. [Electronic version]. *Journal of Information for Teacher Education*, *11*(3), 315-334. Retrieved 14 August 2007, from http://dx.doi.org/10.1080/14759390200200140

Gillani, B. B. (2003). *Learning Theories and the Design of e-Learning Environments*. Oxford: University Press of America.

Girod, M., & Cavanaugh, S. (2001). Technology as an Agent of Change in Teacher Practise. Retrieved 5 November, 2005, from http://www.thejournal.com/magazine/vault/A3429.cfm

Gordon, G. (2003). Do Principals Make a Difference?   Retrieved 30 August, 2007, from http://www.centerforcsri.org/index.php?option=com_content&task=view&id=466&It

Guru, M., & Percy, B. (2005). *Recapturing Technology for Education. Keeping Tomorrow in Today's Classrooms*. United States of America: Rowman & Littlefield Publishers.

Han, C. (2002). Leadership Roles of a Pre-school Principal in the Use of Information and Communication Technology: A Hong Kong Experience. [Electronic version]. *Contemporary Issues in Early Childhood*, *3*(2), 293-297. Retrieved 16 August 2007, from http://www.wwwords.co.uk/pdf/viewpdf

Hatch, J. M. (2002). *Doing Qualitative Research in Education Settings*. Albany: New York Press.

Hezel Associates LLC. (2005-2006). PBS TeacherLine National Survey of Teacher Professional Development.   Retrieved 17 August, 2007, from http://www.hezel.com/PBSTeacherLine2005_2006_report.pdf

Ho, J. (2006). Technology Leadership. *IT Literature Review*   Retrieved 10 March, 2008, from http://www.moe.gov.sg/edumall/rd/litreview/techn_leadership.pdf

ICT op School. (2006). *Four in Balance Monitor 2006. Evidence on ICT in Education*. Netherlands: Kennisnet ICT op School.

Intel Education. (2003). Intel Teach to the Future.   Retrieved 13 June, 2007, from http://www.intel.co.za/education

Jamieson-Proctor, R. M., Burnett, P. C., Finger, G., & Watson, G. (2006). ICT Integration and Teachers' Confidence in Using ICT for Teaching and Learning in Queensland State Schools. [Electronic version]. *Australasian Journal of Educational Technology*, *22*(4), 511-530. Retrieved 16 August 2007, from http://www.ascilite.org.au/ajet/ajet22/jamieson-proctor.html

Jimoyiannis, A., & Komis, V. (2007). Teacher Development. [Electronic version]. *Teacher Development*, *11*(2), 149-173. Retrieved 14 August 2007, from http://www.ecedu.upatras.gr/services/people/files_publications/TD_JimoyiannisKomis.pdf

Johnson, S. M. (2004). *Helping Teachers Learn. Principal Leadership for Adult Growth and Development*. California: Sage Publications.

Kalake, M. (2007). *Factors Enabling and Constraining ICT Implementation in schools: A Multiple Case Study of Three Secondary Schools in Lesotho.* Rhodes University.

Khanya. (2001). Khanya: A Cape Education Department Technology and Education Project. Retrieved 13 June, 2007, from http://www.khanya.co.za

Knapp, L. R., & Glenn, A. D. (1996). *Restructuring Schools with Technology*. Boston: Allyn & Bacon.

Kotyk, P. (2006). Online Professional Development for Teachers. [Electronic version]. *Massachusetts Computer Using Educators. On Cue*, *2006*(Winter). Retrieved 17 April 2007, from http://www.masscue.org/publications/archive/online_PD_teachers.pdf

Kovalchick, A., & Dawson, K. (2004). *Education and Technology: An Encyclopedia*. California: ABC-CLIO.

Lal, V. (2002). The Impact of Computer-based Technologies in Schools - A Prelimary Literature Review.  Retrieved 27 August, 2006, from http://www.effectsproject.uts.edu.au/project_papers/4_vijendra_lal.pdf

Law, N., & Chow, A. (2007). *IEA SITES International Report: Pedagogical Practices in Mathematics and Science and the Use of ICT*: International Association for the Evaluation of Educational Achievement.

Law, N., Pelgrum, W. J., & Plomp, T. (2008). Pedagogy and ICT use in Schools Around the World: Findings from the IEA SITES 2006 Study.  Retrieved 10 August, 2008, from http://www.sites2006.net

Leithwood, K. (2002). Organizational Conditions to Support Teaching and Learning. In W. D. Hawley & D. L. Rollie (Eds.), *The Keys to Effective schools. Educational Reform as Continuous Improvement*. California: Corwin Press.

Lichtman, M. (2006). *Qualitative Research in Education. A User's Guide*. California: Sage Publications.

Loveless, A., & Dore, B. (2002). *ICT in the Primary School*. Philadelphia: Open University Press.

Marshall, C., & Rossman, G. B. (1999). *Designing Qualitative Research* (3rd ed.). London: Sage Publications.

Mason, J. (2002). *Qualitative Researching* (2nd ed.). London: Sage Publications.

McCain, T. D. E., & Jukes, I. (2001). *Windows of the Future*. California: Corwin Press.

McMillan, J. H., & Schumacher, S. (2001). *Research in Education. A Conceptual Introduction* (5th ed.). New York: Longman.

McMillan, J. H., & Wergin, J. F. (2002). *Understanding and Evaluating Educational Research* (2nd ed.). New Jersey: Merrill Prentice Hall.

Means, B. (1994). *Technology and Educational Reform*. California: Jossey-Bass Inc.

Merriam, S. B. (1998). *Qualitative Research and Case Study Applications in Education*. San Francisco: Jossey-Bass Inc.

Microsoft. (2007). Microsoft Education: Partners in Learning. Retrieved 12 June, 2007, from http://www.microsoft.com/education/PartnersinLearning.mspx

Moonen, B., & Voogt, J. (1998). Using Networks to Support the Professional Development of Teachers. [Electronic version]. *Journal of In-service Education*, *24*(1998), 99-110. from http://taylorandfrancis.metapress.com/media/78llrlywyhl43rjgvkwp/contributions/n/6/j/m/n6jmm4247480nl41.pdf

Nawawi, M. H., Ayub, A. F. M., Ali, W. Z. W., Yunus, A. S. M., & Tarmizi, R. A. (2005). Teachers' Perceptions on the Conditions Facilitating the Use of Computers in Teaching Mathematics. [Electronic version]. *Malaysian Online Journal of Instructional Technology*, *2*(3), 88-98. Retrieved 22 September 2006, from http://www.pppjj.usm.my/mojit/articles/pdf/Dec05/11%20-%20MATHEMATICS_TEACHERS_PERCEPTIONS-f.pdf

NCREL. (2000). Critical Issue: Providing Professional Development for Effective Technology Use. Retrieved 25 February, 2005, from http://www.ncrel.org/sdrs/areas/issues/methods/technlgy/te1000.htm

Nichols, J. (2006). Technology Integration Model for Teachers. Retrieved 29 July, 2007, from http://www.teach-nology.com/tutorials/integrate/print.htm

Nolan, K., Friesen, D., Maeers, V., & Couros, A. (2005). A Case-Study of Pre-service Teachers Learning to Teach with Technology During Internship. Retrieved 30 August, 2007, from http://www.educationaltechnology.ca/couros/publications/research/Nolan-EdMedia2005.pdf

OFSTED. (2001). *ICT in Schools. The Impact of Government Initiatives*. London.

OFSTED. (2002). ICT in Schools. Effect of Government Initiatives. Retrieved 10 April, 2005, from http://www.ofsted.gov.uk/publications/docs/19.pdf

Pandor, N. (2007). E-learning in South Africa. Address by the Minister of Education, Naledi Pandor MP, at the World Ministerial Seminar on Technology in Education. Retrieved 12 June, 2007, from http://www.education.gov.za/dynamic/dynamic.aspx?pageid=306&id=2471

Paul, J. R. M. (1999). Empowering Teachers to Use Computers Effectively Across the Curriculum. Retrieved 7 July, 2005, from http://archive.wcape.school.za/mm99/cd/conf99/proceedings/31/CTPAPE~1.rtf

Pelgrum, W. J. (2007). *IEA SITES International Report: School Conditions for Pedagogy and ICT*: International Association for the Evaluation of Educational Achievement.

Phelps, R., Graham, A., & Kerr, B. (2004). Teachers and ICT: Exploring a Metacognitive Approach to Professional Development. [Electronic version]. *Australasian Journal of Educational Technology*, *20*(1), 49-68. Retrieved 28 July 2006, from http://www.ascilite.org.au/ajet/ajet20/phelps.html

Plomp, T., Anderson, R. E., Law, N., & Quale, A. (2003). *Cross-National Information and Communication. Technology Policy and Practices in Education*. United States of America: Information Age Publishing.

Richards, J. (2004). What New Teachers Value Most in Principals. [Electronic version]. *NAESP*, *83*(3), 42-44. Retrieved 22 June 2007, from http://www.naesp.org/ContentLoad.do?contentId=1128&action=print

Ritchie, J., & Lewis, J. (2003). *Qualitative research practice. A guide for Social Science Students and Researchers*. London: Sage Publications.

Roberts, J., & Associates. (1999). Integration of Information and Communication Technologies (ICTs) Through Teacher Professional Development: Issues and Trends in Canada. Retrieved 8 August, 2006, from http://www.cmec.ca/international/forum/itr.canada.en.pdf

Rodney, D. (2001). Issues and Influences in Educational Technology. Retrieved 11 November, 2007, from http://cyberlearn.fau.edu/drodney/Issues.htm

Rodrigues, S. (2005a). *International Perspectives on Teacher Professional Development: Changes Influenced by Politics, Pedagogy and Innovation*. New York: Nova Science Publishers.

Rodrigues, S. (2005b). *A Model of Teacher Professional Development. The Partnership in the Primary Science Project*. New York: Nova Science Publishers.

SchoolNet SA. (2007). SchoolNet South Africa. Retrieved 12 June, 2007, from http://www.school.za

Schumaker, D. R., & Sommers, W. A. (2001). *Being a Successful Principal. Riding the Wave of Change Without Drowning*. California: Corwin Press.

Schwandt, T. A. (2007). *The Sage Dictionary of Qualitative Inquiry* (3rd ed.). United States of America: Sage Publications.

SCOPE. (2003). PumaScope: The SCOPE Project. Retrieved 13 June, 2007, from http://www.cs.up.ac.za/content.php?spc=fb

Scrimshaw, P. (2004). Enabling Teachers to Make Successful Use of ICT. Retrieved 7 July, 2005, from http://www.becta.org.uk/page_documents/research/enablers.pdf

Selwyn, N. (2002). *Telling Tales on Technology: Qualitative Studies of Technology and Education*. London: Ashgate Publishing Limited.

Seyoum, A. F. (2004). Key Issues in the Implementing and Integration of ICT in Education System of the Developing Countries. Retrieved 10 September, 2006, from http://edu.et/session%20IV_fullpapers/Key%20Challenges%20fators%20implementation_Abebe%20Feleke.pdf

Somekh, B., & Davis, N. (1997). *Using Information Technology Effectively in Teaching and Learning*. London: Routledge Publishers.

Soule, H. (2003). What do you Mean by ICT Integration? [Electronic version]. *Journal for Educational Reform in Namibia*, *16*(April), 1-11. Retrieved 16 August 2007, from http://www.schoolnetafrica.net/fileadmin/resources/What_do_you_mean_by_ICT_integration.pdf

Stephens, P., & Crawley, T. (1994). *Becoming an Effective Teacher*. England: Stanley Thornes Publishers.

Steyn, G. M., & Van Niekerk, E. J. (2005). *Human Resource Management in Education*. Pretoria: UNISA Press.

Stoner, G. (1999). A Conceptual Framework for the Integration of Learning Technology. Retrieved February 10, 2006, from http://www.icbl.hw.ac.uk/ltdi/implementing-it/frame.htm

Stonier, T., & Conlin, C. (1985). *The Three c's: Children, Computers and Communication*. London: Wiley.

Telkom. (2007). Current Telkom Foundation Projects.   Retrieved 12 June, 2007, from http://www.telkom.co.za/minisites/telkomfoundation

Theroux, P. (2004). Enhance Learning with Technology.   Retrieved 19 September, 2006, from http://members.shaw.ca/priscillatheroux/change.htm

Thorburn, D. (2004). Technology Integration and Educational Change: Is it Possible? Retrieved 11 August, 2006, from http://www.usask.ca/education/coursework/802papers/thorburn/index.htm

Thutong Educational Portal. (2004). *Developing an Educational Portal for the National Department of Education: Detailed Project Report*. Johannesburg: Neil Butcher Associates.

Toledo, C. (2005). A Five-Stage Model of Computer Technology Integration into Teacher Education Curriculum. [Electronic version]. *Contemporary Issues in Technology and Teacher Education*, *5*(2), 177-191. Retrieved 25 July 2008, from http://www.citejournal.org/articles/v5i2currentpractice2.pdf

Vallance, M. (2008). Beyond Policy: Strategic Actions to Support ICT Integration in Japanese Schools. [Electronic version]. *Australasian Journal of Educational Technology*, *24*(3), 275-293. Retrieved 27 August 2008, from http://www.ascilite.org.au/ajet/ajet24/vallance.pdf

Walsh, K. (2002). ICTs about Learning: School Leadership and the Effective Integration of Information and Communications Technology.   Retrieved 8 February, 2008, from http://www.ncsl.org.uk/media/1DO/CD/icts-about-learning.pdf

Wang, Q., & Woo, H. L. (2007). Systematic Planning for ICT Integration in Topic Learning. [Electronic version]. *Educational Technology and Society*, *10*(1), 148-156. Retrieved 16 August 2008, from http://www.ifets.info/journals/10_1/14.pdf

Webber, C., & Robertson, J. (1998). Boundary Breaking: An Emergent Model for Leadership Development. [Electronic version]. *Education Policy Analysis Archives*, *6*(21), 1-22. Retrieved 20 April 2007, from http://epaa.asu.edu/epaa/v6n21.html

Woodbridge, J. (2004). Technology Integration as a Transforming Teaching Strategy. [Electronic version]. *techlearning*, *2004*(March). Retrieved 27 July 2006, from http://www.techlearning.com/shared/printableArticle.jhtml?articleID=17701367

Zepeda, S. J. (1999). *Staff Development. Practices that Promote Leadership in Learning Communities*. New York: Eye On Education.

Zhao, Y., & Bryant, F. L. (2006). Can Teacher Technology Integration Training Alone Lead to High Levels of Technology Integration? A Qualitative Look at Teachers' Technology Integration after State Mandated Technology Training. [Electronic version]. *Electronic Journal for the Integration of Technology in Education*, *5*, 53-62. Retrieved 23 September 2006, from http://ejite.isu.edu/Volume5/Zhao.pdf

# Chapter Two

## Framework for integration of Information and Communication Technology in teaching and learning

---

### 2.1      Introduction

Various factors influence teachers integrating ICT into their teaching and learning practices. These interrelated factors are however often viewed in isolation.  This chapter aims to identify the different influential factors that principals have to keep in mind when planning effective and sustainable ICT integration.  An alternative approach is provided.  The pertinent question is: What is the influence that principals have on teachers' uptake and sustainable use of ICT in their teaching and learning?  In order to answer this question intensive literature review took place to determine the influential factors and indicate the interrelatedness of the determined factors.  ICT op School (2006, p. 14) maintains there is insufficient recent and systematically-collected data on ICT leadership in education.  This question forms the basis of this study on the influence of principals on teachers' ICT integration through TPD.  While Gibson (2002, p. 319) states: "It is becoming increasingly clear that the importance of administrative support in the integration of technology, curriculum, and instruction is understated and under supported", Ho (2006, p. 7) remarks that: "The literature on technology leadership is scarce, fragmented, limited in scope and more likely to be prescriptive rather than be descriptive in nature."  Kalake (2007, p. 53) indicates: "Research on what enables principals to effectively lead the implementation process and principals' perception on the challenges and preferences of training was not found."  It is therefore important to identify and clarify the specific factors that contribute to teachers using ICT effectively in their teaching and learning practices, as well as increase an understanding of how principals develop and unfold effective ICT practice in their teaching environments through TPD (Becta ICT Research, 2005, p. 5).

School leadership plays a vital role in schools in leading school reform, implementing innovations and making improvements.  West-Burnham (1992, p. 117) states that: "No school improves without being led."  The able principal has the capacity to influence, lead and motivate teachers to better performance and encourages innovative changes in teaching and learning (Han, 2002, p. 294).  Although the concept of the principals' role in ICT implementation has been acknowledged for many years, the focus has only recently been placed on the principal's contribution to the successful and sustainable implementation of

ICT in education.  School leadership is frequently cited as a critical component of education reform, revival of teachers and successful schools (Akbaba-Altun, 2006, p. 186; Bush & Glover, 2004, p. 3; Ho, 2006, p. 1; Leithwood, 2002, p. 105; Thomas, 2006, p. 31; Walsh, 2002, p. 3).  Therefore principals' involvement will determine how ICT will be used in education by teachers and learners (Drago-Severson, 2004, p. xxi; Johnson, 2004, p. xvii; Soule, 2003, p. 8; Zepeda, 1999, p. 14).  The single most important theme from many studies on the implementation of ICT is the necessity for strong, committed leadership where knowledge and commitment goes far beyond just the mere support of ICT integration.  Without extended commitment it is not possible to integrate ICT effectively into the schools education system (Walsh, 2002, p. 5).  At the centre of informed leadership is a person who has come to grips with the complexity of effective ICT integration and who exercises his or her influence to ensure that all the enabling factors are in place and addressed (DoE, 2004a, p. 4).  The SITES 2006 international comparative study confirmed that the principal holds the critical position in the effective and sustainable development of ICT integration in schools (Pelgrum, 2007, pp. 1 - 2).  While many emphasise the importance of the teacher, and professional development as important factors in ICT integration, the focus has recently been placed on the principal.  Little research is available on the relationship of critical factors for the integration of ICT in schools in relationship with the specific role of the principal in TPD.

Stoner's (1999, p. 1) adapted life cycle model of learning technology integration and Toledo's (2005, pp. 183 - 185)  five-stage model of computer technology integration illustrates that through the deployment of TPD teachers precede through five progressive stages necessary for the effective and sustainable integration of ICT within a teaching environment (Figure 2.1).  I base this literature review on Stoner's and Toledo's adapted conceptual framework. Becoming experts in the integration of ICT empowers teachers to use ICT effectively, enhancing their teaching and learning practices.  The role of the principal is seen as the main influential factor on teachers' effective integration of ICT.  From this simplistic model, it is evident that there are also additional factors (Figure 2.1) to be considered to provide a comprehensive answer to the question that underpins this study: "How do principals influence teacher professional development for the integration of ICT in their schools?"

## 2.2    Principals influence

Changes in school environments are frequent and inevitable to keep abreast with the demands of the 21st century.  All schools have a principal claiming the highest leadership position in the school.  Just the mere fact of being in the position gives the principal authority to instigate and facilitate change.  Principals are responsible for appropriate changes that

ensure an effective integrated education system. These accentuate the principals' influence on the effective and sustainable integration of ICT in their schools (Figure 2.1).

The important challenge for most principals is to know when to make significant strategic changes as well as choosing what strategic changes to make (Davies & Davies, 2005, p. 16). Principals should see the processes of teaching and learning as the prime function of the school (Davies, 2005, p. 5). They have enormous responsibilities regarding effective education and implementing appropriate change in their schools. The principal's leadership and management will influence the teaching and learning in the school (Becta ICT Research, 2005, p. 4; Butler, 1992, p. 11; Knapp & Glenn, 1996, p. 9; Vallance, 2008, p. 290; Young et al., 2005, p. 25). It is therefore important that principals have an understanding of what actions and strategies to take, and which leadership and management style to apply to have a positive influence on teachers' ICT integration into their teaching and learning practices (Walsh, 2002, p. 3). Gibson (2002, p. 330) states: "It is clear that school leadership in the 21st century will require new skills, new knowledge, new behaviours and dispositions as well as a new vision." Principals should also adapt their leadership and management styles for change to be effective.

Without an effective principal a school will stagnate. When the required change does not take place effectively, leading to practices that are unsustainable; allowing teachers to fall back to their previous teaching strategies and learning methods. An effective principal enables teachers to perform at their best and creates an environment were teachers are willing to bring about appropriate change in order to ensure that effective teaching and learning takes place. Schools with effective principals exhibit conditions and factors that create environments which have a positive influence on the teachers. As Young, Sheets and Knight (2005, p. 134) note: "Nothing effective happens in an elementary or middle level school without the endorsement and support of the principal." A principal demonstrating effective leadership and management abilities that provide continuous support enables teachers to succeed in even the most challenging environment, whereas an in-effective unsupportive principal can undermine the work of even the most able, eager and committed teachers (Johnson, 2004, p. xvii; Southworth, 2005, p. 76).

**Figure 2.1    Stoner's life cycle model of learning technology integration and Toledo's five-stage developmental model of computer technology integration***
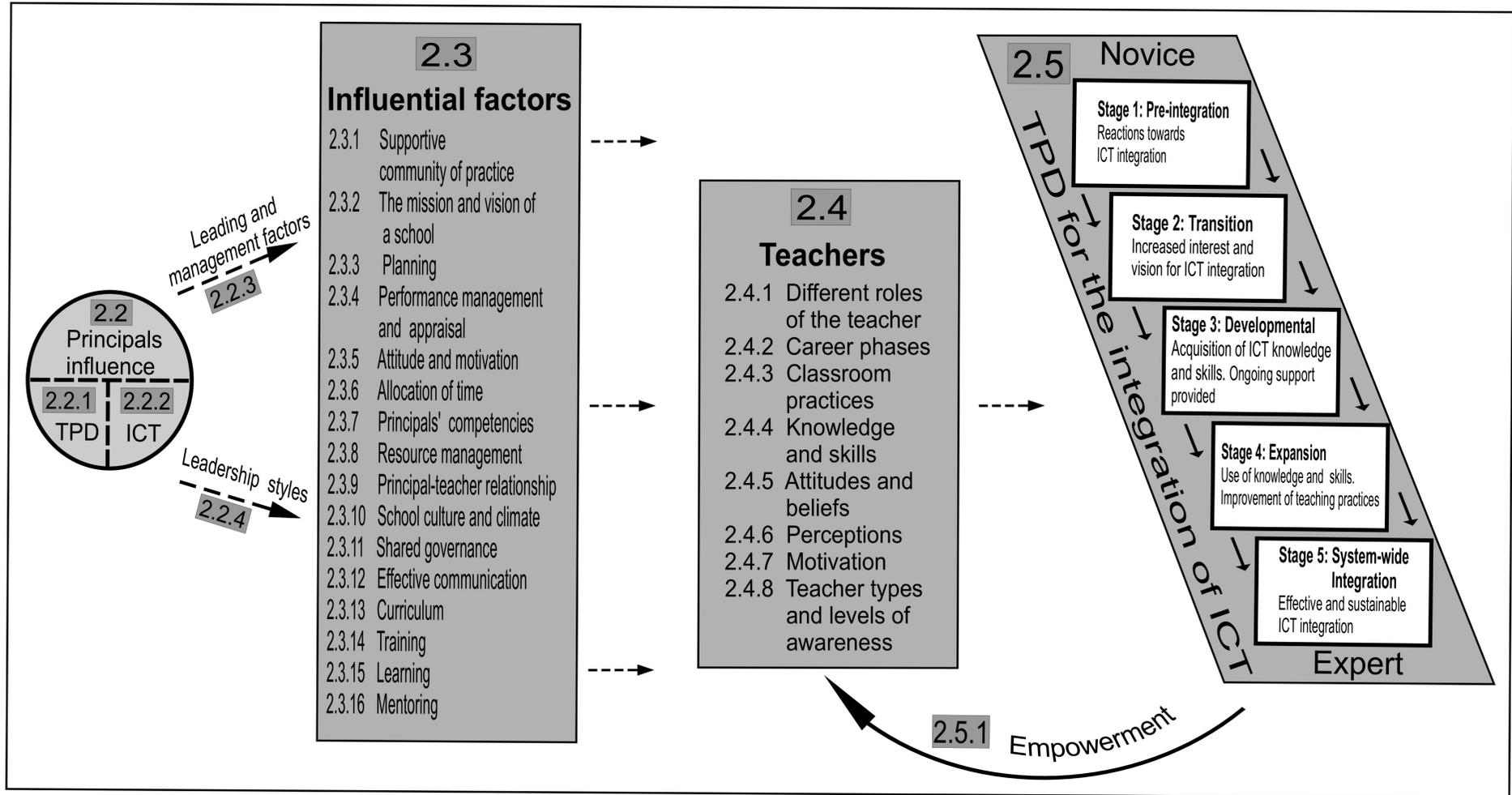
*          Adapted from Stoner (1999, p. 1) and Toledo (2005, pp. 183 - 185).

### 2.2.1 Principals influence on teacher professional development

Diaz-Maggioli (2004, p. 3) defines TPD: "As a career-long process in which educators fine-tune their teaching to meet student needs." Becta (2004b, p. 1) view TPD: "As a process by which teachers acquire and develop skills and know-how to become effective in the classroom. It is ongoing and enduring, in response to an environment which is changing." Day and Sachs (2004, p. 3) describe TPD: "As all the activities in which teachers engage during the course of a career which are designed to enhance their work." These above definitions emphasise that TPD is the various activities and opportunities that teachers engage with to better themselves in their teaching profession by improving their skills, knowledge and expertise. TPD therefore in the above-mentioned definitions refers to the participation of teachers in developmental opportunities in order to be better equipped as teachers (Steyn & Van Niekerk, 2005, p. 250). TPD entails more than the above definitions and explanations. Although very compact I believe that they are not the ideal definitions, and that most TPD activities do not achieve the attended goals. The most acceptable definitions regarding TPD adopt all the facets and concepts outlined by Schlager and Fusco (2003, p. 4). They view TPD as: "A career-long, content-specific, continuous endeavor that is guided by standards, grounded in the teacher's own work, focused on student learning, and tailored to the teacher's stage of career development. The objective is to develop, implement, and share practices, knowledge and values."

Principals' perceptions of the importance and relevance of TPD will determine to what extent they will initialise and sustain TPD (Figure 2.1). The principals should focus on improving the effectiveness of teachers. The provision and promotion of appropriate TPD opportunities can lead to the improvement of teaching and learning practices, allowing teachers to grow professionally by extending and renewing their knowledge and skills (Arnold et al., 2006, pp. 3 - 4). A way that a principal can provide and sustain supportive contexts for teachers is through TPD as it influences teachers' confidence levels, their inclination toward trying out new innovative ideas, as well as their attitude towards the teaching profession and creative classroom practices (Blase & Blase, 1994, p. 67; Center for CSRI, 2007, p. 2; Drago-Severson, 2004, pp. xxi, 38; Tallerico, 2005, p. 123). Gibson (2002, p. 320) and Theroux (2004, p. 3) point out that TPD creates a supportive environment and principals should encourage and create TPD opportunities were teachers can continuously share their expertise, success, frustrations and knowledge with one another. Although teachers should assume responsibility for their own development, principals should assist teachers by providing the necessary time, resources, support and encouragement to enable them to work towards their professional development and achieving the schools' goals (Blase & Blase,

2001, p. 78; Blase & Blase, 1994, pp. 61 - 62). Hezel Associates (2005-2006, pp. 2 - 4) indicate that principals have significant responsibilities when it comes to initiating, organising, planning and implementing TPD in their schools, especially through creating in-house training opportunities. It is important that principals support and encourage TPD activities that will enable teachers to engage in innovative practices by making use of ICTs in their teaching and learning (Becta ICT Research, 2005, p. 5; Berube et al., 2004, pp. 1 - 3; Chung, 2005, p. 2; Demiraslan & Usluel, 2008, p. 468; Drago-Severson, 2004, p. xxi; Han, 2002, p. 294; Roberts & Associates, 1999, p. 10; Scrimshaw, 2004, p. 5; Zepeda, 1999, p. 6). Clarke (2007, p. 131) emphasises that an effective TPD programme is a critical factor in a school that has to become an integral part of teachers' professional lives. This will ensure continuous improved teaching and learning, contributing to the school's excellence. Internationally, Becta ICT Research (2006, p. 41) indicates that despite the high level of training, teachers indicated that ICT was the common area in which they required more professional development. Contradictory, most principals indicate that their teachers' skills in ICT meet or exceed current requirements (Becta ICT Research, 2006, p. 38). It therefore remains a challenge for principals to provide TPD opportunities for individual teachers, and to positively influence teachers' thinking and beliefs about the importance of ICT integration into their teaching and learning practices (Ho, 2006, p. 4). Most importantly, principals have to create opportunities for TPD (Blase & Blase, 2001, pp. 14, 16, 23, 64; Blase & Blase, 1994, p. 9; Demiraslan & Usluel, 2008, p. 470; Han, 2002, p. 295; Thorburn, 2004, p. 9).

### 2.2.2 Principals role in teachers' use of Information and Communication Technology in teaching and learning

There is no turning back – the use of ICT in education has become part of the way we teach and learn. Teachers' use of ICT varies widely from no use at all to the delivery of instruction to learners, planning of lessons, communicating via e-mail, as well as personal use and keeping of records (Francis & Ezeife, 2007, p. 2). Wang and Woo (2007, p. 149) indicate that ICT integration is a comprehensive process of applying ICT to the curriculum that enhances teaching and learning. The primary factor that has an influence on the effectiveness of learning is the pedagogy design that justifies the how, why and way ICT is being used (Wang & Woo, 2007, p. 149). Teaching and learning methods change as educators increasingly employ ICT for efficient and effective education (Walsh, 2002, p. 5).

Principals are the cornerstone to promote the innovative use of ICT in their schools (Figure 2.1). Principals should encourage teachers to use ICT in their instructional practices (Ho, 2006, p. 2). Gibson (2002, p. 319) suggests that principals as the leaders in their schools,

should not underestimate the impact of integrating ICT into teaching and learning. They should be actively involved in every aspect relating to ICT integration, and attain competencies on the use of ICT to increase the chances that teachers will be successful in integrating ICT in their teaching practices. Thomas (2006, p. 41) confirms this view: "Institutional leadership in the form of the school principal and the school management team are seen as having significant influence on the integration of computers in the classroom."

Principals should pay attention to a wide array of factors that influence teachers' effective use of ICT. Principals that understand the value of ICT in education, have a positive motivation on teachers' attitude towards the use of ICT. Principals who are committed to ICT integration implement effective strategies to ensure that their schools are equipped with appropriate ICT infrastructure for teaching and learning. Gibson (2002, pp. 320 - 321) indicates attributes required for principals leading successful ICT integration. Principals themselves should use ICT. They should also attend training opportunities and be competent about every aspect of ICT integration. They should respond to specific issues in their schools and to the constant change that ICT integration demands. Principals should display sincerity and confidence, and demonstrate excellent communication skills to motivate their teachers. It is important that they have a clear vision about the goals of ICT integration that teachers can relate to. The culture and teaching environments at their schools should strive for excellence, encourage teachers to learn more about ICT integration, as well as providing the necessary and ongoing support. ICTs form an important component that can inspire teachers, assist them with the challenges of the teaching profession and promote their lifelong professional development (Dirksen & Tharp, 1996, p. 2; Jackson, 2000, p. 1; Leask, 2001, p. 61; Loveless & Dore, 2002, p. 154). ICT integration is more than just putting computers in classroom. Teachers are more likely to make use of ICTs in their teaching and learning practices if they are convinced of ICTs' effectiveness and usefulness (Jimoyiannis & Komis, 2007, p. 167).

To successfully integrate ICT into a school's education system requires a paradigm shift ─ an entire new way of thinking about teaching and learning. Principals' actions determine the attitude of teachers towards ICT integration, as well as teachers' commitment. Integration of ICT in teaching and learning demands a positive attitude towards ICT integration, as well as actions to create appropriate TPD opportunities for effective and sustainable ICT integration. The integration of innovative practices and changes do not happen without continuous involvement from the principal (Busher, 2006, p. 151; Seyoum, 2004, p. 3; Spurr, Rosanowski & Williams, 2003, p. 3; Tallerico, 2005, p. 100). From the above, it becomes

evident that principals should exhibit effective leadership and managerial skills (Vallance, 2008, p. 290; Walsh, 2002, pp. 4, 24).

### 2.2.3    Leadership and management

The nature and quality of the principal's leadership and management has a huge influence in the school's effectiveness with regard to teaching and learning (Figure 2.1).  Many regard it the determining factor for the success and sustainability of educational change (Akbulut, Kesim & Odabasi, 2007, p. 2; Bush, 2003, p. 10; Dimmock & Walker, 2005, p. 78; Southworth, 2005, p. 76; Steyn & Van Niekerk, 2005, p. 6; Wallace & Poulson, 2003, p. 229).  Many authors indicate a relationship between ineffective schools and weak leadership.  For a school to become effective, it is vital for the principal to apply strategies and changes that will guide the school towards a clear purpose and direction (Bush, 2003, p. 183; Dimmock & Walker, 2005, pp. 68 - 69; Ho, 2006, p. 1).

The term *leadership* is associated with *management* and *administration*.  Although different, they are all interrelated and of equal importance (Clarke, 2007, p. 1; Everard et al., 2004, p. 22; Green, 2000, p. 8; Prinsloo & Van Schalkwyk, 2008, p. 48).  Clarke (2007, p. 1) states: "Strong leadership and good management are both essential for the success of a school, and a good principal is skilled in both."  Everard, Morris and Wilson (2004, p. 23) and Clarke (2007, p. 2) indicate the relationship between leadership and management (Table 2.1).

**Table 2.1    Leading and management factors ***

| Leading is concerned with: | Managing is concerned with: |
|---|---|
| • vision | • implementation |
| • strategic issues | • operational issues |
| • transformation | • transaction |
| • ends | • means |
| • people | • systems |
| • doing the right things | • doing things right |
| • create the culture | • operate within the culture |

\*    Adapted from Everard, Morris and Wilson (2004, p. 23); Clarke (2007, p. 2).

Clarke (2007, pp. 1 - 3) maintains that *leading* is concerned with establishing a vision, and directing teachers to reach their predetermined goals and objectives.  *Management* focuses on ensuring efficient operating circumstances and systems to maintain direction in order to ensure the attainment of predetermined goals and objectives.  Leading is therefore concerned with creating the culture while managing operates within the culture.  Leadership and management are interrelated and should not be studied in isolation:  "Leadership is frequently seen as an aspect of management" (Prinsloo & Van Schalkwyk, 2008, p. 48).

Management is essentially about ensuring that a school runs smoothly, while leadership is about ensuring the school runs somewhere (Southworth, 2005, p. 83). It is evident from the literature that effective leadership and management are two crucial components in a principal's repertoire, necessary for successful and sustained ICT integration. It is therefore essential to determine what effective leadership and management entails.

### 2.2.3.1 Leadership

Leadership is about direction-setting, developing, influencing, inspiring, supporting and leading teachers towards the future to attain objectives and implement changes to improve teaching and learning (Bush, 2003, pp. 7 - 9; Clarke, 2007, p. 1; Davies & Davies, 2005, p. 11; Dimmock & Walker, 2005, p. 12; Ho, 2006, p. 3). "Leaders look outward and to the future. To them success is derived from future-focused change" (Clarke, 2007, p. 1). Good leadership is based on developing a vision that inspires others, establishing shared goals and objectives, setting high expectations in the quality of education, encouraging TPD, developing a framework that encourages participation and shared decision making (Chung, 2005, pp. 1 - 3; ICT op School, 2006, p. 14).

Foskett and Lumby (2003, pp. 172 - 173, 187) advocate transformational leadership where principals empower teachers. Transformational leaders promote organisational learning through a shared vision and mission; foster a collaborative climate of accepted group goals; convey performance expectations; provide appropriate models and individual support and intellectual stimulation; enhance participation in school decisions; build a productive school culture, and also ensure opportunities for TPD. Davies and Davies (2005, pp. 10 - 13) point out that strategic leadership is the critical characteristic of effective school development. Strategic principals give direction and compile a framework of the future requirements of the organisation. The function of the strategy is to translate the school's vision into reality; provide direction through a proactive transformational mindset. Without the principal's interest, enthusiasm and understanding, the school would not be strategically focused (Davies & Davies, 2005, p. 23).

Leadership does not occur in isolation. The particular setting, structure and nature of the organisation, goals, teachers, community, and resources determine the type of leadership (Davies, 2005, p. 2; Southworth, 2005, p. 77). Dimmock and Walker (2005, p. 94) point out: "Schools are complex systems of interrelated parts; to change the parts is to change the system and vice versa." Han (2002, pp. 296 - 297) adds: "Strong leadership is demonstrated by being a lifelong learner, a supporter, a change agent, a facilitator, a good role model."

Prinsloo and Van Schalkwyk (2008, p. 162) summarise aptly: "People look to the leader for clarity and direction." Principals do not only have to demonstrate strong and effective leadership they must also display various management skills.

### 2.2.3.2    Management

Management entails the managing of various activities, issues and changes that involves the effective and efficient operation of an educational organisation to achieve organisational goals (Bush, 2003, pp. 7 - 9; Clarke, 2007, p. 1; Davies, 2005, p. 2; Sapre, 2002, p. 102). Clarke (2007, p. 1) states that: "Managers look inward, and to the present. To them success is derived from improved systems of control, predictability and order." Establishing relevant aims and objectives are attainable and essential as they provide direction and underpin the management of a particular school. Effective management of teachers is crucial as they are the essential elements in the delivery of education. Everard, Morris and Wilson (2004, p. 35) state: "The key to effective management is the ability to get results from other people, through other people and in conjunction with other people. If the underlying psychology is wrong, the most carefully constructed system and techniques will fail." Institutional management and personal relationships form the key aspects of educational leadership (Everard et al., 2004, pp. 15 - 16). Organisational structures and systems create frameworks for action across the school. Structures and systems are management tools that principals use for establishing conducive conditions to ensure quality education (Southworth, 2005, pp. 83 - 84). Van Deventer and Kruger (2003, p. ii) indicate that management is the process by which educational leaders use teachers and other resources in the school efficiently to satisfy educational requirements and cultivate a culture of effective teaching and learning.

Bush (2003, pp. 37 - 175, 186 - 189) identifies management models that principals follow during leadership: formal, collegial, political, subjective, ambiguity or a cultural model (Addendum 2.1). The models present different ways of managing and leading educational institutions, offering valuable insight into the nature of management and leadership in education. Schools are complex organisations and no single framework represents the management of a school. The events, situations and problems differ considerably between schools. Although management models assist in understanding the complexity of the situations (Bush, 2003, p. 189), they all have limitations. It is up to principals to choose appropriate models to manage and lead the different situations, events and problems at a school. The use of a variety of models increases the effectiveness of school management (Bush, 2003, pp. 194 - 195). Literature indicates that principals should not only have

knowledge of the different management styles but also know the various leadership styles in order to be effective in planning and initiating TPD activities for sustained ICT integration.

### 2.2.4 Leadership styles

Principals have their own unique ways of interacting with teachers and implementing leadership styles for optimum effect (Figure 2.1). The dynamic and changing demographics of schools, development of ICT, and frequent changes in education require different leadership approaches compared to the past. Schools require leadership that brings about transformation (Bush & Glover, 2004, p. 6; Davies, 2005, p. 3; Walsh, 2002, p. 9). Although authors list a variety of leadership styles (Addendum 2.2) (Beatty, 2005, pp. 122 - 123; Davies & Davies, 2005, pp. 10 - 28; Deal, 2005, pp. 113 - 119; Everard et al., 2004, pp. 21 - 22; Harris, 2005, pp. 165 - 169; Hentsche & Galdwell, 2005, pp. 145 - 146, 149 - 152, 155 - 156; Lambert, 2005, pp. 95 - 96, 98; Leithwood & Jantzi, 2005, pp. 38 - 39; Novak, 2005, pp. 44 - 46; Southworth, 2005, pp. 75 - 77, 88 - 89; Starratt, 2005, pp. 61 - 72) three basic styles are described in management literature: autocratic, laissez-faire and democratic (Bradley et al., 1991, pp. 92 - 97; Prinsloo & Van Schalkwyk, 2008, pp. 165 - 166; Van Rooyen et al., 2005, pp. 72 - 73). Principals should choose the leadership style appropriate to their circumstances. The styles are:

- *Autocratic leadership style* is typically a top-down authority style. Leaders make all the decisions relying on power and delegates little authority and only responsibility. They are submissive towards superiors, while dominating their subordinates. Although this style demoralises teachers as they are not recognised during decision making, it is effective as decisions are made quickly.

- *Laissez-faire leadership style* is characterised by an invisible leader that avoids making decisions, and is a master at delegation. This style is successful where teachers are highly creative and work independently. It may lead to teachers having a sense of aimlessness, lack of focus and direction.

- *Democratic leadership style* fits in between the previous two. The leader treats all as equal and teachers have a say in decisions. Power and decision making flows both directions and responsibilities are respected. It leads to increased teacher morale, but may be time consuming in cases where quick decisions are required.

Prinsloo and Van Schalkwyk (2008, p. 167) point out that there is not one correct style, as each has advantages and disadvantages. *Situational leadership* refers to principals that switch between different leadership styles in different circumstances. Teachers' motivation increases when principals lead and manage according to the requirements of a specific

context (Spurr et al., 2003, p. 3). Gibson (2002, pp. 323 - 324) observes that for principals to lead effectively they have to be visionary, proactive, and informed in their leadership to create efficient learning environments and effective decision-making.

Teachers should be involved in decision-making processes. They are empowered with a sense of ownership and sharing of responsibility (Leithwood, 2002, p. 100; Means, 1994, p. 183; Steyn & Van Niekerk, 2005, p. 42). Everard, Morris and Wilson (2004, pp. 51 - 52), Prinsloo and Van Schalkwyk (2008, p. 127) indicate different styles of decision-making:

- *Autocratic*: without consultation, teachers are merely informed of what is expected of them. This style is often used for routine matters.
- *Persuasive*: decisions are taken before consultation and then sold to others. It is not open to discussion and the principal uses powers of advocacy to explain and justify his decisions.
- *Co-determinate*: decisions are made either by consensus or majority basis, and individual responsibility is usually avoided.
- *Consultative / democratic*: teachers are involved and take part in significant decision-making opportunities (Mullen, 2005, p. 4).

Knowledge of the different leadership and management styles would allow principals to utilise resources effectively. Principals being able to adapt their decision-making according to particular circumstances and individual teacher's needs will lead to successful and sustained ICT integration through TPD.

## 2.3    Influential factors

There are various influential factors that have an impact on teachers integrating ICT into their teaching and learning practices (Figure 2.1). It is the responsibility of the principal to support teachers in their endeavour. Principals must realise the importance of establishing a school setting that assists teachers through TPD. Van der Westhuizen (1997, pp. 191 - 192) indicates that many aspects influence the relationship between a principal and teachers necessary for work satisfaction and overall contentment. Kalake (2007, pp. 143 - 145), having researched multiple case studies on enabling and constraining factors for ICT implementation, indicated that minimal prior planning, unclear organisational vision, inadequate policies, insufficient budgeting, and inappropriate teacher training all impacted on teachers' integration of ICT into the curriculum. Additional hindering factors for ICT implementation were principals' insufficient knowledge about ICT integration, as well as inappropriate decisions regarding ICT infrastructure. Principals that used computers daily

demonstrated enhanced knowledge and skills about using computers in education. This also enabled them to voice an opinion on the relevance of ICT in education. Therefore, for fundamental change to take place, it is essential that principals have a clear purpose linked to a sustainable vision for the school; make informed decisions, allocate resources appropriately according to the school's vision; create inclusive decision making structures; and provide continuous training to support teachers in their daily teaching and learning practices (Blase & Blase, 1994, pp. 9 - 10; Cowie & Jones, 2005, p. 3).

### 2.3.1     Supportive community of practice

Principals, in conjunction with the senior management team (SMT) are responsible for establishing and maintaining a community of practice (COP) to enhance excellent teaching and learning at schools (Figure 2.1). The way that principals lead and manage the school will influence the COP at their schools. Principals and teachers should work together towards continuous improvement by implementing a set of structures that support school improvements. School structures include organisational arrangements, and policies that explicitly create working conditions to support and inspire work towards whole school improvement (Butler, 1992, p. 11). It is essential that the COP and structures support the professional development effort as the effectiveness of professional development is context-specific and take into account teachers' life stage and career development, along with school-identified requirements (Day & Sachs, 2004, p. 297). COP is crucial where TPD is promoted, and where teachers are willing and enthusiastic to integrate ICT into their teaching and learning practices. The COP is an important enabling support agent for the integration of innovations and change. COP enables teachers to collaborate with professionals becoming an important support element for integrating ICT in teaching and learning (Day & Sachs, 2004, p. 221; Dean, 1991, p. 10; Drago-Severson, 2004, p. 24; Nolan et al., 2005, p. 4). The COP should support teachers to take risks, be innovative and develop professionally in a positive climate of motivated and high performance teachers (Tomlinson, 2004, pp. 130, 136).

When enthusiastic teachers return from TPD sessions, ready to change their practices, the principal must ensure that the COP assist them in their integration process. If they do not receive the required support, they will fall back into their old practices (Kovalchick & Dawson, 2004, p. 32; Rodrigues, 2005b, p. 60). Such an supportive environment allows for collaborative planning and shared decision making, provides essential training, as well as policy and curriculum expertise (Blase & Blase, 1994, p. 23). Lieberman (2000, p. 77) indicates that teachers require supportive conditions to sustain change. Principals should

create a collaborative working community where teachers are encouraged to share perspectives, beliefs and work together as a team to sustain and improve successful teaching and learning (Busher, 2006, p. 137). A collaborative working community helps to move away from an autocratic leadership style to a more democratic management style. If conducted correctly it becomes a successful means of school improvement and teacher empowerment (Steyn & Van Niekerk, 2005, p. 135). Collaborative approaches provide teachers access to relevant information and alternative perspectives, promote reflective practice, give support and constructive feedback, help develop a culture that supports TPD, facilitate change through encouragement and validate change (Blase & Blase, 1994, p. 59; Busher, 2006, p. 122; Drago-Severson, 2004, p. 70). Gibson and Oberg (1999, p. 6) state: "In a collaborative environment, professional development support can be given that is accessible, time saving and context-specific." Isolation from the support of colleagues can have a negative effect on teacher satisfaction, learning and effectiveness (Center for CSRI, 2007, p. 2). Support and guidance from colleagues can influence teachers' perspectives and behaviour (Demiraslan & Usluel, 2008, p. 470; McKenzie, 1999, p. 112; Rallis & Goldring, 2000, p. 46). There are numerous benefits when teachers take part in collaboration. Collaboration allows teachers to support and motivate each other, share expertise, plan together, reflect on teaching and learning practices which in turn leads to cooperation, reduced workload, effective communication and increased teachers' efficiency and confidence (Arnold et al., 2006, p. 3; Blase & Blase, 1994, p. 19; Drago-Severson, 2004, pp. 17 - 18; Glatthorn et al., 2006, p. 19; Inger, 1993, p. 1; Leask, 2001, p. 137; Rallis & Goldring, 2000, p. 46; Rodrigues, 2005b, p. 9).

Teachers in effective schools are reported to work collegially and to collaborate and achieve shared goals (Cowie & Jones, 2005, p. 9; Day & Sachs, 2004, p. 36). Teachers working together in teams become more effective, professional and efficient. This leads to improving the quality of education and creating better learning and teaching environments (Steyn & Van Niekerk, 2005, p. 113). Collegiality cannot be forced onto teachers as it takes time to develop and establish. Collegiality is essential for effective and sustainable implementation of educational change, activities and interactions (Day & Sachs, 2004, p. 222; Selwyn, 2002, p. 135; Thorburn, 2004, p. 5).

Teachers also require financial, personal and technical support when it is expected of them to learn and integrate ICT effectively into their teaching and learning practices (Becta ICT Research, 2003, p. 1; Buckenmeyer, 2005, p. 15; Han, 2002, p. 296; Scrimshaw, 2004, p. 10; Seyoum, 2004, p. 3). Teacher collaboration is one of the strategies that educational institutions can implement to assist teachers in the process of integrating ICTs. By

continuously creating opportunities for collaboration allow teachers to be in an environment where learning and development can take place on a regular basis (Darling-Hammond, 2005, p. 12). A collaborative learning environment between teachers is of utmost importance for sustaining effective integration of ICT in education (Brand, 1997, p. 4; Moonen & Voogt, 1998, p. 103; Zheng, 2003, p. 8). Collaboration creates the opportunity for teachers to discuss issues relating to ICT integration in teaching and learning. Teachers can share their achievements with colleagues and demonstrate the benefits that ICT integration can bring to education, problems with regard to ICT can also be discussed so that future mistakes can be avoided and all teachers can experience success (Becta ICT Research, 2005, p. 40; Ehman et al., 2005, p. 261).

### 2.3.2 The mission and vision of a school

An important component for effective and successful leadership is that principals should institutionalise and communicate a clear attainable vision because it creates direction and purpose for future success (Clarke, 2007, p. 2). The process of determining the school's vision involves the compilation of a mission statement that indicates the strategies that will be implemented to achieve pre-established goals. Development of a mission statement is important as it creates opportunity to determine the principles and values that will guide progress, purpose and key features of the school. The process of mission development promotes and aids various actions necessary to enhance and sustain effective teaching and learning (Arnold et al., 2006, pp. 2 - 3; Foskett & Lumby, 2003, p. 122; Tomlinson, 2004, pp. 133, 145). The vision can inspire and motivate teachers to work towards the attainment of aims and objectives, pave the way for TPD to take place, establish a standard of excellence, allow change to take place by making use of available skills, talents and resources, and ensure that management activities and actions are purposeful and functional (Arnold et al., 2006, p. 2; Berube et al., 2004, p. 2; Bush, 2003, pp. 6 - 7; Spurr et al., 2003, p. 3; Tomlinson, 2004, pp. 143 - 144; Wallace & Poulson, 2003, pp. 220 - 222; Young et al., 2005, p. 25).

Principals involving the teachers in the vision-making process will help to develop a shared vision, allowing teachers to make decisions and to contribute their knowledge, skills and positive attitudes resulting in ownership and the active use of such a vision (Arnold et al., 2006, p. 2; Becta ICT Research, 2005, p. 28; Becta ICT Research, 2006, p. 38; Bush, 2003, p. 3; Clarke, 2007, p. 3; Davies & Davies, 2005, p. 14; DoE, 2004a, p. 3; Drago-Severson, 2004, pp. 39, 105; Leithwood, 2002, p. 98; Prinsloo & Van Schalkwyk, 2008, p. 161). It is therefore necessary that principals, in conjunction with the teachers, develop and articulate a

clear vision of how TPD should be incorporated to bring about instructional changes in teachers teaching and learning for ICT integration to be sustainable (Ho, 2006, p. 3). Bush (2003, pp. 4 - 5) states the following: "Although governments have the constitutional power to impose their will no innovation will be implemented successfully without the commitment of those who have to implement the changes."

### 2.3.3 Planning

When the mission and vision has been determined, it is necessary for planning to take place. Prinsloo and Van Schalkwyk (2008, p. 74) describe planning as: "A systematic and continuous process during which needs must be determined, realistic and obtainable objectives set, and tasks defined in accordance with predetermined standards in order to achieve the set objectives." Planning is necessary to ensure an effective and efficient school (Clarke, 2007, p. 3). Effective principals assess current situations and resources, monitor the impact of TPD programmes so that they can make informed decisions and plan ahead for improved teaching and learning (Arnold et al., 2006, p. 3; Scrimshaw, 2004, p. 5). Although teachers should be involved in such planning, in many schools they are not involved (Foskett & Lumby, 2003, pp. 124 - 125).

In planning whole-school provision there must be a clear attainable vision and understanding of how ICT can enhance teaching and learning to provide a context in which ICT can become appropriate. The ICT integration plan must be customised to the school's culture, available resources and environment; entail a detailed description of the steps and methods required; as well as proposed completion dates to translate the school's ICT vision into reality (DoE, 2004a, p. 3). Leadership and planning factors influence the access and quality of ICT infrastructure. For example, it is necessary to plan ahead as computer infrastructure is usually replaced after every few years (Becta ICT Research, 2005, pp. 14, 24; Becta ICT Research, 2006, pp. 11, 15).

### 2.3.4 Performance management and appraisal

Tomlinson (2004, p. 10) maintains: "Performance management is about planning for performance, developing to improve performance, measuring performance and rewarding performance." Performance management entails the continuous communication of expectations, and creating the opportunity to share in enhancing the organisation's mission, values and objectives (Tomlinson, 2004, pp. 130, 132). Steyn and Van Niekerk (2005, p. 277) define appraisal as: "A continuous and systematic process to help individual teachers with their professional development and career planning and to help ensure that the in-

service training and deployment of teachers matches the complementary needs of individual teachers and schools." The purpose of performance appraisal is to improve the performance of teachers through the use of positive reinforcements for teachers who perform well, and to support, coach and warn teachers whose performance does not meet expectations (Clarke, 2007, p. 158). Appraisal is a process that assesses teacher's performance and it should be approached delicately as it involves a teacher's personal qualities and beliefs. Teachers must understand that appraisal is a mechanism through which TPD can take place and has the potential to improve the quality of teaching and learning (Steyn & Van Niekerk, 2005, pp. 280, 297).

In South Africa performance management is demanded by the DoE. In South African schools the DoE uses the *Integrated Quality Management System* model for school improvement. The results of the development appraisal consequently form the basis for the development of the school improvement plan. The responsibility for developing the school improvement plan rests with the school development team of which the principal is a member (Clarke, 2007, p. 132). This offers an opportunity for the principal to aid in, develop and refine the teachers' personal growth plan. Through the inclusion of the integration of ICT into teachers' personal growth plan, teachers get the opportunity to indicate their competency relating to the effective integration of ICT into classroom practices. An entire school's results can then be analysed and used as basis for compiling a relevant TPD plan focused for the integration of ICT into the curriculum.

Individual schools can also develop internal plans and measures of rewarding performance. Principals should have the initiative and resources to reward teachers. One way of influencing and modifying teacher behaviour is through positive reinforcement (Rallis & Goldring, 2000, pp. 48 - 49; Steyn & Van Niekerk, 2005, pp. 155 - 156; Tomlinson, 2004, pp. 132 - 134). Rewards can be extrinsic or intrinsic. Extrinsic rewards include tangible rewards such as monetary compensation, less working hours, time off for TPD, allowing teachers to have a say in choosing the grades and learning areas they would like to teach; or by relieving teachers of duties, more status and power. Intrinsic rewards are subjective and focus on feelings of competence, achievement and prestige that contribute to motivated and encouraged teachers. Both types of rewards are intended to maintain energised and positive behaviour. Successful principals determine the appropriate type of reward for the particular situation and the individual teacher. Praise, recognition, encouragement and gratification also have a positive impact when it is sincere, appropriate and deserved. The simple but sincere act of praising and encouraging teachers appears to be a primary, effective and

valued form of reward for teaching (Blase & Blase, 2001, p. 123; Steyn & Van Niekerk, 2005, p. 169).

Offering of incentives and a school environment conducive to teacher learning can improve teaching and learning that results in a lasting and positive change (Akbulut et al., 2007, p. 2; Carlson & Gadio, 2002, p. 123; Drago-Severson, 2004, p. 55; Thorburn, 2004, pp. 5 - 6). Incentives should however be considered carefully. While group rewards motivate some teachers, individual rewards can increase competition among some teachers (NCREL, 2000, p. 5).

The provision of personal laptops can instigate a variety of changes. In some schools teachers are recognised with ICT hardware such as laptops. Cowie and Jones (2005, pp. 3 - 6) indicate that laptops have a positive impact on teachers' personal and professional development. However, evidence of the success of this strategy is limited as not many schools can afford this initiative (Jamieson-Proctor et al., 2006, p. 512; Scrimshaw, 2004, pp. 19 - 20).

### 2.3.5    Attitude and motivation

Principals' actions and attitudes affect teachers' empowerment and general morale. Principals should have a positive influence on teachers. Negativity is demoting and hampers the functioning of a school, attainment of objectives and opportunities for development (Blase & Blase, 1994, p. 79; Demiraslan & Usluel, 2008, p. 470; Foskett & Lumby, 2003, p. 192; Steyn & Van Niekerk, 2005, p. 23).

It is essential to keep teachers motivated towards the teaching profession. Frequently changes in the system have an influence on the school environment. Thorburn (2004, p. 5) points out: "Imposed change can lead to low morale, dissatisfaction and reduced commitment as it usually requires teachers to acknowledge their inadequacies." For principals to motivate individual teachers it is important that they should understand what motivates each individual teacher. Principals should recognise the importance of and promoting teachers motivation as it is conducive to teachers performing optimally (Everard et al., 2004, p. 25; Foskett & Lumby, 2003, pp. 79 - 80; Steyn & Van Niekerk, 2005, p. 143).

Principals are in a position to positively motivate and influence teachers' attitude towards the integration of ICT in their teaching and learning practices. By creating and ensuring that teachers take part in TPD opportunities will assist in boosting teachers' confidence levels and

attain ICT knowledge and skills.  The encouragement of ICT integration and ongoing appropriate motivation will ensure that teachers are committed to achieve the established goals (Blase & Blase, 1994, p. 75; Foskett & Lumby, 2003, p. 76).

### 2.3.6 Allocation of time

The implementation of innovative change takes time.  Time is one element that teachers never have enough of (Everard et al., 2004, p. 5).  The principal can influence the working patterns of teachers through ensuring optimal and effective utilisation of available time by eliminating time wasters that prevent teachers from improving their skills and practices (Edgerson & Kritsonis, 2006, p. 3; Steyn & Van Niekerk, 2005, p. 15; Tallerico, 2005, p. 106; Zepeda, 1999, p. 49).  It is necessary to create time for TPD (Cope & Ward, 2002, p. 10; Glatthorn et al., 2006, p. 58; Rallis & Goldring, 2000, p. 49; Tallerico, 2005, p. 119).  Insufficient time not only prohibits attendance of TPD activities, but it also leads to a stressful working environment which diminishes the quality of instruction, morale, effectiveness and commitment (Center for CSRI, 2007, p. 1).  Teachers require time to learn new technologies and integrate their newly learned skills into their teaching and learning practices (Bradley et al., 1991, p. 14; Buckenmeyer, 2005, p. 14; Carlson & Gadio, 2002, p. 124; Day & Sachs, 2004, p. 28; Knapp & Glenn, 1996, p. 222; Means, 1994, pp. 215 - 216; Theroux, 2004, p. 3; Woodbridge, 2004, p. 2; Zepeda, 1999, p. 85).  When teachers do not have sufficient time to incorporate new innovations, skills or strategies, they usually revert back to their previous teaching and learning practices.  Allocation of sufficient time is therefore a key element for teachers to successfully integrate ICT into their daily teaching and learning practices (Scrimshaw, 2004, p. 11).

### 2.3.7 Principals' competencies

Prinsloo and Van Schalkwyk (2008, p. 115) describe knowledge as: "Information, data, facts, theories and concepts that have been contextualised.  Knowledge is used to clarify and understand logic, sequences and relationships."  Principals constitute the role model in a school.  It is therefore necessary for them to practice what they preach.  Gibson (2002, pp. 321 - 322) and Han (2002, p. 295) point out that due to continuous education change, it is essential for principals to regularly update their own ICT knowledge and skills to ensure that appropriate changes are implemented.  Southworth (2005, p. 88) states: "Leadership learning is necessary because creating learning schools rest, in large measure, on the quality of leadership."  Principals should be knowledgeable about organisational strategies, planning and development processes, curriculum, instruction, assessment and TPD to be able to guide teachers to bring about real change (Arnold et al., 2006, p. 3; Berube et al.,

2004, p. 2; Busher, 2006, p. 155; Drago-Severson, 2004, p. xxi; Kalake, 2007, pp. 56 - 57). For principals to influence teachers' sustainable and effective ICT integration it is necessary that they themselves realise the impact of ICT on education (Seyoum, 2004, p. 3; Theroux, 2004, p. 3; Walsh, 2002, p. 23).

### 2.3.8      Resource management

Schools require resources to function optimally.  Foskett and Lumby (2003, p. 129) describe resources as: "The means by which the processes of education can be operationalised." They categorise resources into three groups: financial, physical and human resources (Foskett & Lumby, 2003, p. 129).  Principals should know what resources are available in order to optimally employ what is available.  They should have the necessary skills to plan, organise, control and develop the resources in order to fully meet their schools' challenges and requirements (Everard et al., 2004, pp. 6 - 7; Tomlinson, 2004, p. 165).  For teachers to be successful, principals should take the necessary steps to ensure that appropriate, flexible and instructional resources are available when teachers require them (Center for CSRI, 2007, pp. 2 - 3; Gordon, 2003, p. 3; Scrimshaw, 2004, p. 5).  Drago-Severson (2004, p. 44) points out: "If resources are scarce it will be necessary to build upon teachers' intrinsic motivation for professional development."  The retention of qualified and recruitment of expertise teachers in specific learning areas are difficult.  It has become a challenging issue for most principals to manage their teachers effectively (Foskett & Lumby, 2003, p. 63). Many principals find themselves in an environment where financial resources are not readily available.  This hampers the successful integration of ICT.  Principals then have to implement creative strategies to generate funding.  Insufficient resources negatively impact on teachers learning and teaching as it determines the frequency, quality and the number of teachers that can undergo TPD (Drago-Severson, 2004, pp. 53 - 54).

Functional technological infrastructure and facilities must be available before teachers can integrate ICT on a regular basis in teaching and learning activities (Becta ICT Research, 2004b, p. 3; Cowie & Jones, 2005, p. 10; Han, 2002, p. 296; Means, 1994, p. 177; Seyoum, 2004, p. 2).  However, the availability and access to an infrastructure for ICT does not guarantee that teachers integrate ICT effectively (Buckenmeyer, 2005, pp. 3, 9; Rodrigues, 2005b, p. 19; Seyoum, 2004, p. 3; Zhao & Bryant, 2006, p. 58).  Although many schools have been provided with sufficient computers and adequate facilities, teachers' use of these facilities and computers are limited.  This is often due to insufficient funding for TPD in the use of ICT (Carlson & Gadio, 2002, p. 125; Day & Sachs, 2004, p. 75; Guru & Percy, 2005, pp. xiii, xiv; Selwyn, 2002, p. 23; Seyoum, 2004, p. 3).  It is therefore necessary to allocate

sufficient resources to TPD.  With continuous technological advancements and limited financial resources, principals have to be creative in generating sufficient funds for effective and sustainable ICT integration and ICT infrastructure (Seyoum, 2004, p. 1; Walsh, 2002, p. 19).

### 2.3.9    Principal-teacher relationship

Leadership entails understanding and acknowledging the requirements and contributions of individual teachers to maximise their strengths and minimise their limitations for the benefit of the school (Prinsloo & Van Schalkwyk, 2008, pp. 162 - 163).  Teachers have different personalities, requirements and find themselves in different personal surroundings. Principal-teacher relationships vary considerably, even within the same school environment. Principals should know their teachers well enough to make appropriate decisions and demonstrate the correct relationship behaviour to address the individual requirements of teachers.  It is therefore necessary to not only focus on work-related issues, but also on personal issues.  This will lead to stronger approval and support for the principal's leadership style (Busher, 2006, p. 139; Steyn & Van Niekerk, 2005, p. 154).  Principals should have the ability to influence teachers positively about themselves, but also toward their teaching profession by focussing on the fundamental components inherent of quality relationships.  As a result of meaningful interactions with their principals, teachers feel appreciated and willing to perform optimally and more effective teaching and learning practices consequently result (Edgerson & Kritsonis, 2006, p. 2).  Acknowledging teachers' individuality and knowing their particular personal circumstances will guide the principal to apply appropriate relationship strategies and to develop each teacher optimally (Busher, 2006, pp. 82 - 83; Johnson, 2004, p. xviii).

### 2.3.10    School culture and climate

According to Sergiovanni and Starratt (1988, p. 106) and Kruger and Steinman (2003, p. 14) the school culture is part of the school climate and they influence one another.  The culture of the school can be reflected in its climate.  The school culture refers to a set of norms, values, beliefs, rituals and ceremonies, symbols, assumptions and stories that make up the *persona* of the school (Diaz-Maggioli, 2004, p. 5; Leithwood, 2002, p. 99).  It also refers to the *ethos* or *atmosphere* at a school (Busher, 2006, p. 84) and guides teachers and learners to behaviour that is appropriate to the school (Bradley et al., 1991, p. 41; Busher, 2006, p. 84). Every school therefore has its own particular characteristics that constitute the school's unique climate.  These characteristics are interrelated the way they function in a particular school and create a climate that will either hinder or support the teaching and learning.  This

climate also has an effect on the teachers' behaviour and the way they see themselves, their attitude towards the school and to what extent they will achieve the goals and objectives of the school.  It also informs relationships with colleagues.

Prinsloo and Van Schalkwyk (2008, p. 70) observe that: "A culture of teaching and learning in a school will influence a productive and positive classroom environment which is conducive to effective teaching and learning."  Principals are primarily responsible for determining and maintaining the climate and the culture of schools.  Therefore they also influence the teaching and learning that occur at the school (Arnold et al., 2006, p. 3; Blase & Blase, 2001, p. 97; Gordon, 2003, p. 4; Spurr et al., 2003, p. 4).  Principals shape school cultures according to particular schools' situational factors, resources and challenges (Drago-Severson, 2004, p. 41).  It is important that the principal creates and sustains an environment where teacher learning can flourish and continuous development can take place through the provision of necessary resources (Blase & Blase, 2001, pp. 16, 80; Day & Sachs, 2004, p. 36; Drago-Severson, 2004, p. 39; Sallis & Jones, 2002, p. 96; Young et al., 2005, p. 26).  It is not only the principal that has an impact on the school culture, the teachers' perception of the principal as a leader is also important (Berube et al., 2004, p. 2).

There is widespread agreement that the kind of culture required in schools is characterised by collaborative and collegial relationships, support, teacher reflection, participative decision making, shared purpose and values, continuous professional development and sustained interest in improved teaching and learning (Blase & Blase, 1994, p. 11; Diaz-Maggioli, 2004, pp. 5 - 6; Leithwood, 2002, p. 99; Southworth, 2005, p. 85).  Teachers require more than just knowledge about incorporating ICT in education.  They also require an ongoing supportive climate and culture for sustainable, effective and institutionalised change (Akbulut et al., 2007; Chen & Chang, 2005; Cowie & Jones, 2005; Dirksen & Tharp, 1996; Gibson & Oberg, 1999; Girod & Cavanaugh, 2001; Ho, 2006; Knapp & Glenn, 1996; Leask, 2001; Loveless & Dore, 2002; Means, 1994; Moonen & Voogt, 1998; NCREL, 2000; Rodrigues, 2005b; Shelly et al., 2004; Simonson & Thompson, 1997; Spurr et al., 2003; Thorburn, 2004; Webber & Robertson, 1998).  To sustain such a collaborative culture, it is necessary that the principal facilitate and support a conducive work environment (Butler, 1992, p. 12).  Principals should strive to improve teachers' working conditions and morale, develop a culture in which teachers work together for the common good and develop the capacity and commitment of teachers (Glatthorn et al., 2006, p. 56; Spurr et al., 2003, p. 3).  Although principals can determine, modify and maintain the schools culture, they can also be a product of it and in some instances also be constrained by it (Busher, 2006, p. 87).

Cultures where teachers' growth is associated with learning and development, incorporate continuous professional development activities in the workplace. This enables teachers to translate theory into practice by meeting the requirements of teachers (Day & Sachs, 2004, p. 154; Drago-Severson, 2004, p. 32; Rallis & Goldring, 2000, p. 51). It is necessary that principals should build a culture of innovation and encourage ICT use in teaching and learning practices. Principals can ensure that there is a detailed blueprint of the steps and methods needed to translate the school ICT vision into reality helping to build a culture where ICT becomes an integrated part of teaching and learning, enabling teachers to become familiar with the integration of ICT in education (DoE, 2004a, pp. 3 - 4).

### 2.3.11    Shared governance

The concept of *shared governance* may be defined in many ways: *shared leadership*, *collaborative decision making* or *distributed leadership* (Busher, 2006, p. 16; Mullen, 2005, p. 4). Principals should delegate power, authority and responsibility as they alone cannot achieve the set aims and objectives (Schumaker & Sommers, 2001, pp. 28 - 29; Tomlinson, 2004, p. 99). Although principals through delegation entrust teachers with authority and responsibility, the principal remains accountable (Prinsloo & Van Schalkwyk, 2008, p. 57). Successful shared governance principals realise by incorporating teachers in the decision-making process, it is essential to empower teachers, and that co-operative decision-making is the foundation of shared governance (Blase & Blase, 2001, p. 41). Inviting teachers to assume responsibilities creates the opportunity for teachers to learn, grow professionally, make decisions and become involved. This provides teachers with a sense of ownership in the overall operation of the school and will contribute to a positive and enthusiastic teacher corps (Blase & Blase, 2001, p. 65; Drago-Severson, 2004, p. 100). Steyn and Van Niekerk (2005, pp. 19 - 20) point out that delegation should be supplemented with the necessary resources, expectations and rewarding of performance. The authors also warn that principals should not use delegation strategies as a means to avoid responsibility. Care should be taken not to over-delegate, and also not to interfere after a task has been delegated.

### 2.3.12    Effective communication

Effective change demands effective communication. Through communication, principals can convey the required change, as well as how the change should take place. Effective communication is not reliant on the receiving or sending of information, but depends on a two-way communication which entails effective listening and feedback (Arnold et al., 2006, p. 2; Schumaker & Sommers, 2001, p. 1; Steyn & Van Niekerk, 2005, p. 42). Steyn and Van

Niekerk (2005, p. 40) indicate: "Effective communication occurs when the sender's intended meaning and the receiver's perceived meaning are virtually the same."  In order to determine if the sender's and the receiver's meaning are in agreement, it is necessary for the recipient to give feedback in the form of a reaction or response to the message.  Principals require constant communication with a wide array of people in a number of ways about various issues.  Principals require good communication skills as change in education have become complex and demanding.  Various communication media are to the avail of the principal.  ICT facilitate many of these today.  The principal should choose the appropriate medium while keeping in mind the content, importance and objective of the message as well as the intended audience (Steyn & Van Niekerk, 2005, pp. 31, 33, 36, 37).  Prinsloo and Van Schalkwyk (2008, p. 83) conclude that effective communication affects the efficient running of the school.

## 2.3.13     Curriculum

Shelly, Cashman, Gunter and Gunter (2004, p. 6.08) state that: "The key to successful ICT integration is identifying what you are trying to accomplish within your curriculum." Curriculum can be described as an interrelated set of plans and experiences that a learner accomplishes under the guidance of a learning institution (Marsh, 1997, p. 5), that results in learning (Diaz-Maggioli, 2004, p. 5).  It is the responsibility of the teachers that the curriculum reaches the learners and that the outcomes of all the different learning areas are met and to promote the intellectual, personal, social and physical development of learners (Busher, 2006, p. 106; Jacobs et al., 2004, p. 26).

Shelly, Cashman, Gunter and Gunter (2004, p. 6.05) point out that the curriculum should drive ICTs. Teachers should use appropriate ICTs for the particular learning content to enhance learning.  ICTs should not be seen as a separate discipline.  It must enhance the existing curriculum areas through integration as a resourceful tool to teach, rather than as a separate subject to teach about (Guru & Percy, 2005, pp. 5 - 6; Wang & Woo, 2007, p. 149). ICT is not transformative on its own.  ICTs require teachers to integrate it successfully into the curriculum and instructional framework, align it with teaching and learning outcomes and use it for engaged learning projects (Kovalchick & Dawson, 2004, p. 33; NCREL, 2000, p. 1). Shelly, Cashman, Gunter and Gunter (2004, p. 6.05) state that ICT: "... cannot enhance learning unless teachers know how to use and integrate ICT into curriculum-specific or discipline-specific areas."  The computer is a tool for generating and modifying curricula, enabling teachers to incorporate the latest approaches into their teaching and learning (Albion, 1999, p. 1; Di Benedetto, 2005, p. 2; Leask, 2001, p. 181; Somekh & Davis, 1997, p.

100; Wikipedia, 2006, p. 3). Plomp, Anderson, Law and Quale (2003, p. 16) point out that learning with ICT indicates the use of various computer applications that enhances teaching and learning practices. Learning through ICT means that ICT is integrated so completely as an essential tool in the curriculum that the teaching and learning of that curriculum is no longer possible without it. Curriculum support involves providing continuous assistance and guidance to teachers in their use of ICT in the curriculum as well as the provision of TPD activities that focus on ICT training and integration (Becta ICT Research, 2003, p. 1).

South African teachers experience difficulty in effectively integrating ICT into the curriculum (Brand, 1997, p. 1; Jamieson-Proctor et al., 2006, p. 523; Kalake, 2007, p. 147; Paul, 1999, pp. 6 - 7; Zhao & Bryant, 2006, p. 53). There is also little evidence of teachers integrating ICT into the curriculum on a regular basis (Di Benedetto, 2005, p. 2). The curriculum often lacks explicit indication of how to integrate ICT into the curriculum (Di Benedetto, 2005, p. 2; Guru & Percy, 2005, pp. 4 - 5; Loveless & Dore, 2002, p. 99; Zheng, 2003, p. 5). TPD on the integration of ICT in the curriculum is required (NCREL, 2000, p. 1; Seyoum, 2004, p. 7). Learners do better when teachers have received training on ICT integration, than those learners whose teachers did not have the training on ICT integration (Thorburn, 2004, p. 7). Teachers should participate in professional development activities where the emphasis falls on intensive curriculum-based ICT training (Zhao & Bryant, 2006, p. 53). Day and Sachs (2004, p. 242) maintain: "There is no curriculum development without teacher development."

### 2.3.14 Training

Inadequate training and experience is one of the main reasons why teachers have negative attitudes toward ICT and therefore do not use ICT in their teaching and learning practices (Asan, 2003; Gillani, 2003; Jimoyiannis & Komis, 2007; Seyoum, 2004; Stephens & Crawley, 1994; Tenbusch, 1998; Thorburn, 2004; Woodbridge, 2004; Zhao & Bryant, 2006). A training strategy for ICT integration should become part of the school culture. Every school should have its own particular training strategy to support teachers to achieve pre-determined goals and objectives (Tomlinson, 2004, p. 47). Teachers then realise the importance of training to guide them in achieving educational objectives and to make use of every possible training opportunity (Stephens & Crawley, 1994, pp. 81 - 82; Tomlinson, 2004, p. 47). Infrastructure and teacher support is not enough to ensure effective ICT integration. When teachers believe they do not have the necessary skills or knowledge to use ICT effectively, they tend to feel uncomfortable in an ICT-enabled environment (Thorburn, 2004, p. 6; Zhao & Bryant, 2006, p. 57). Teachers should be provided with training that will boost their confidence and their abilities (Brand, 1997, p. 7; Scrimshaw, 2004, p. 10; Thorburn, 2004, p. 2). Although

novice teachers often have the knowledge and skills in using computers when they enter the teaching profession, they are rarely equipped with skills to integrate ICT into their teaching and learning practices (Guru & Percy, 2005, pp. 3 - 4; Roberts & Associates, 1999, p. 8; Woodbridge, 2004, p. 2). Teacher training should be a continuous process that provide regular updates on ICT development and integration in education (Seyoum, 2004, p. 5).

Most ICT-related TPD comprises passive sessions with no opportunity to practice the presented material (Rodrigues, 2005b, p. 6; Schlager & Fusco, 2003, p. 1). TPD in ICT requires more than what the traditional training approaches can offer (Phelps et al., 2004, p. 2). It must be ongoing and an integral part of TPD (NCREL, 2000, p. 2). Long-term involvement starts from the teachers' perspectives and provide ongoing support to enable them to take ownership of the process (Berube et al., 2004, p. 4; Rodrigues, 2005b, p. 87; Zhao & Bryant, 2006, p. 54). Teachers feel frustrated and overwhelmed when too much information and too many programs are introduced within a limited time frame, and when no attention is given to their previous ICT abilities (Drago-Severson, 2004, p. 34; McKenzie, 1999, p. 79; Zhao & Bryant, 2006, p. 57). Means (1994, p. 18) states: "There is a tremendous need for teacher training that will demonstrate to teachers the potential of various technologies; and of technical assistance that would help them to identify particular technologies and applications to serve their purpose; and show teachers how to use these technologies in instruction." The reappraisal of training activities require establishing the training requirements of the teachers, the design and delivery method of the training activities, as well as post-training assessment and support (Tomlinson, 2004, p. 97).

Kante (2003, p. 1) indicates the number of teachers who require training usually exceeded financial, human and technical capabilities. The complexity and content of training, as well as the expectations of what teachers should know and be able to do are constantly increasing. Most national decision-makers presume that as soon as teachers have been trained to use ICT, success will follow. Cox, Preston and Cox (1999, p. 4) indicate training alone is not effective to sustain the use of ICT in their teaching and learning practices. They indicate that more attention should be given to factors that motivate teachers to adopt new behaviour. Training can be one way of motivating teachers to use ICT in their teaching practices, but training does not guarantee that teachers will integrate ICT more effectively. Other factors such as teachers' perception and attitude also contribute to the success of ICT integration (Albion, 1999, p. 2; Zhao & Bryant, 2006, p. 58).

### 2.3.15    Learning

Over the years teachers have become reluctant to attend any activity that has to do with training due to the fact that they are forced to attend TDP that they deem unnecessary.  They often regard training sessions as time wasted, or that the training ultimately entails more work.  Learning in education usually involves teachers discovering that they do not know something, or that they have been doing something wrong.  These factors tend to make teachers negative towards development and they resist any indication of change that will follow (Schumaker & Sommers, 2001, pp. 47 - 52).  Change and learning are like the opposite sides of a coin: whenever there is change, learning must follow; and when learning takes place, it leads to change (Tomlinson, 2004, p. 48).  Change is a process that takes time and it can not be expected of teachers to immediately incorporate the change into their current teaching and learning practices.  Change entails individual growth and development in terms of the change itself, as well as the acquisition of new skills and knowledge.  Effective training takes into account the nature of learning and the fact that learning requires change (Butler, 1992, p. 2).  TPD involves learning.  When TPD takes place, teachers engage in meaningful interaction with the content and through the interaction, learning takes place.  This eventually leads to visible changes in the teachers' attitudes towards their professional teaching and learning practices (Day & Sachs, 2004, p. 220).

Day and Sachs (2004, p. 13) point out that teachers have to engage in direct learning (workshops and conferences), learning in schools (mentoring, colleagues, research, teamwork and appraisal), as well as learning out of school (reform networks and professional development centres) if they want to keep up with change in education.  Learning is a complex process as it encompasses a person's knowledge, skills, insight, beliefs, values, attitudes and habits and requires inner learning (intrapersonal sense-making), as well as outer learning (relating to and collaborating with others) (Day & Sachs, 2004, p. 36; Tomlinson, 2004, p. 48).  The collaborative approach is advocated for teacher learning, because it helps to develop a culture that supports learning and development (Drago-Severson, 2004, p. 39).  Teacher learning is most likely to occur when teachers focus on relevant issues in the specific learning areas which they teach; have sustained opportunities to study; when they can experiment with innovations and receive appropriate feedback; when they have opportunities to collaborate with colleagues; and have access to expertise knowledge (Day & Sachs, 2004, p. 47).  Young, Sheets and Knight (2005, pp. 4 - 5) indicate that adults learn best when they are goal orientated, internally motivated, self-directed, involved in their own learning and seek out learning experiences when faced with change.

### 2.3.16    Mentoring

Mentoring is a way of supporting teachers to ensure that they acquire the necessary knowledge and skills (Cowie & Jones, 2005, p. 9; Steyn & Van Niekerk, 2005, p. 266).  A mentoring programme focuses on learning.  The mentor usually has more knowledge and experience in a specific area, and also has the ability to transfer the acquired knowledge and skills to another person.  Through this process a relationship is formed that often involves a long-term goal (Drago-Severson, 2004, pp. 123 - 124; Mullen, 2005, p. 2; Tomlinson, 2004, p. 104; Young et al., 2005, p. 2).  Mentoring is commonly used interchangeable with coaching, assisting, guiding, advising, leading, teaching, learning, readiness, support, compensation, counselling and socialisation (Mullen, 2005, p. 2; Tomlinson, 2004, p. 104).  A mentor should be able to communicate effectively, build relationships, encourage and motivate, solve problems, handle conflict, guide and set goals (Young et al., 2005, p. 12). Mentoring creates a supportive learning environment where teachers can modify their current practices and get the opportunity to enhance their self-development (Busher, 2006, pp. 142 - 143; Drago-Severson, 2004, pp. 18, 138; Zepeda, 1999, p. 111).  Principals usually employ mentors for new teachers to help them to become familiar with the environment and culture of the school (Glatthorn et al., 2006, p. 86).  For mentorship to have a positive and lasting effect, it should be part of the school culture (Mullen, 2005, p. 6; Zepeda, 1999, p. 78).  A mentoring programme assists in the development of committed and competent teachers, establishing a school environment that strives for excellence in teaching and learning (Clarke, 2007, p. 128).

Mentoring can aid teachers who are reluctant ICT users.  Mentors should support teachers on different ICT levels, skills, preferences and abilities; helping them as individuals to integrate ICT effectively into their teaching and learning practices (McKenzie, 1999, p. 111; Shelly et al., 2004, p. 6.16; Zhao & Bryant, 2006, p. 60).  A mentor can also help teachers locate applicable ICT resources or tools for a specific learning area (Massachusetts Department of Education, 2002, p. 17).  Effective mentors share the responsibility of integrating ICT effectively as they assist and support teachers with planning and attainment of the necessary confidence, knowledge and skills.  Teachers are empowered to apply newly acquired strategies, knowledge and skills into their teaching and learning practices.  Mentors should through continuous assessment keep track of the teachers development (McKenzie, 1999, pp. 112 - 115).

The identification and knowledge of the influential factors for teachers' effective ICT integration is important for principals as it will enable principals to identify and pay attention

to the factors that restrain effective ICT integration. Principals should apply their leadership and management skills to ensure that the influencing factors are in place to ensure optimum utilisation of TPD opportunities that could lead to sustained ICT integration. It is not only the various influential factors (§ 2.3) that principals have to consider but also various teacher factors.

## 2.4 Teacher factors in professional Information and Communication Technology development

Teachers tend to react to ICT according to the factors indicated in Figure 2.1. These factors will determine the effective and sustainable use of ICT. Effective teachers are the determining factor in quality education and change in education ultimately rely on teachers (Borko, 2004, p. 3; Chen & Chang, 2005, p. 1; Jacobs et al., 2004, p. 24). Teachers have different important roles to fulfil in education. Principals should therefore focus on influencing teachers positively to integrate ICT effectively. Some change has lasting effect while others having no impact at all. Change as such is very difficult for most teachers, especially when they are in a situation where everything is going well, or they have been teaching for quite a long time, and when they do not see the necessity for change (Rodrigues, 2005b, p. 56; Schumaker & Sommers, 2001, p. 41). The effect that change has on teachers' will differ according to individual teachers and their particular circumstances. Change because of its very nature, is a difficult concept for teachers to accept as change includes the acceptance of new beliefs or altering existing beliefs. Change is a process not an event (Walsh, 2002, p. 5) and teachers must adapt to change personally and developmentally. Teachers' personal concerns are pivotal to their ability and willingness to adapt and change (Lieberman, 2000, p. 77). Constant changes in education make teachers reluctant to take part in any action that involves change and therefore makes the integration of ICT a complicated innovation (Guru & Percy, 2005, pp. 2 - 3; Moonen & Voogt, 1998, p. 99). Butler (1992, p. 11) indicates that effective innovative change goes through three stages: change often starts through TPD (initiation); used in classrooms (implementation), and then becomes part of the school (institutionalisation).

The way teachers see themselves as professionals and identify with other professionals, will have an influence on their teaching practices and their behaviour. Diaz-Maggioli (2004, p. 6) indicates: "That a true teaching professional is a teacher who is engaged with a career path that encourages, fosters, and rewards constant professional growth that reflects directly and positively back on classroom practice." Teacher development is also a process of personal

development and factors concerning personal development may hinder the achievement of professional development goals.

Teachers should perceive ICT integration as practical and beneficial before real integration will take place (Moonen & Voogt, 1998, p. 100). Educational ICT is not, and will never be transformative on its own. Teachers are required to integrate ICT appropriately and effectively into education (Carlson & Gadio, 2002, p. 1). To integrate ICT effectively teachers should make two radical changes: they must learn how to use ICT, and fundamentally change how they teach (Scrimshaw, 2004, p. 13).

### 2.4.1    Different roles of the teacher

Prinsloo and Van Schalkwyk (2008, pp. 110 - 111) indicate seven significant roles of teachers in the education environment. Teachers' have various roles that they have to fulfil in their teaching professions. Teachers can integrate ICT in all the roles to enhance the roles:

- *Learning mediator:* Teachers are learning mediators and have to be sensitive to the diverse requirements of learners. They construct learning environments; are knowledgeable of subject content and they apply various principles, strategies and resources.
- *Interpreter and designer of learning programmes and materials:* Teachers interpret, plan and design learning programmes and decide on the most suitable learning materials.
- *Leader, administrator and manager:* Teachers are the leaders, administrators and managers in their particular classrooms and are responsible for their learners.
- *Scholar, researcher and lifelong learner:* Due to numerous changes in the education system, teachers remain scholars, researchers and life long learners.
- *Community, citizenship and pastoral role:* Working with learners from different communities and social environments signifies that the teacher also has a community, citizenship and pastoral role to fulfil for the learners placed in their care.
- *Assessor:* Teachers are responsible for the continuous assessment of learners' progress, as well as the assessment of current teaching and learning practices in their specific learning areas.
- *Learning area / subject / discipline / phase specialist:* Teachers should be specialists in their particular learning areas, and to make optimal use of the teaching and learning time allocated for that particular learning area while implementing the most suitable approaches to particular situations.

Teachers can use ICT in all the seven roles to empower them and lead to whole school improvement. TPD can assist teachers in attaining the required skills and knowledge to make optimal use of ICT in all seven roles.

### 2.4.2 Career phases

It is necessary for the principal to have knowledge of the different phases teachers find themselves in over time in their teaching profession. By identifying the phase that the individual teacher is in, will assist the principal to apply the most appropriate strategy to support the teacher in integrating ICT effectively. Steyn and Van Niekerk (2005, p. 255) distinguish between the following phases:

- *Survival phase* (first year in teaching): Most teachers are hesitant to try out new approaches and welcome guidance and support from experienced teachers.
- *Adjustment phase* (two to four years experience): Teachers are now more confident and ready to experiment with new approaches.
- *Adult phase* (more than four years experience): During this phase teachers are more receptive to change and ready to take on new responsibilities. They also become more aware of TPD.

Teachers in different phases have different requirements with respect to their personal growth and development. Their orientation to change and development also differ. Teachers seek different sources of knowledge and learn in different ways at different times in their careers (Day & Sachs, 2004, p. 155). These aspects make it difficult for the principal to cater for individual teachers and to ensure that individual teachers benefit from TPD activities (Johnson, 2004, p. xviii). The teachers' individual histories and life experiences shape their interactions with the environment they find themselves in. Their personal development, as well as their professional life cycle affects their choices. Teachers at different phases of career and personal lives want different goals and they are able to achieve different qualities of performance (Busher, 2006, p. 30). The career phase that the teachers find themselves in will determine to what extent they will integrate ICT into their teaching and learning practices. Teachers' current classroom practices will also affect their attitude towards ICT integration and to what extend they will go to integrate ICT effectively.

### 2.4.3 Classroom practices

Classroom practices are an indication of how teachers go about in their daily teaching and learning activities. Classroom practices also refer to teachers' behaviour or the way teachers perform in the classroom (Diaz-Maggioli, 2004, p. 3). Teachers apply and exhibit particular

individual learning and teaching styles in their classrooms. These individual classroom practices have an influence on the manner in which teachers attend to their daily classroom activities.

TPD must be applicable and relevant to teachers' current classroom practices and experiences (Rodrigues, 2005b, p. 75). One of the goals of TPD is the integration of ICT effectively into classroom practices. ICT can assist teachers in their classroom practices, allowing for individual creativeness. Through implementing new practices, teachers can adapt and apply their skills and knowledge to fit their particular classroom environment (Chen & Chang, 2005, p. 4). Teachers should use ICT as an effective tool for curricular instruction. Integrating ICT implies that the teacher should create a ICT rich environment where ICT gets used to infuse the teaching and learning practices. This implies that measurement of success will not be determined on how well the learners use the computers, but how well they learned the subject matter (Nichols, 2006, p. 1). Teachers use ICT mainly for administrative tasks such as lesson planning, communicating with parents and doing assessment, but rarely is ICT used to enhance teaching and learning practices (Soule, 2003, p. 8).

### 2.4.4    Knowledge and skills

Teachers should have the necessary strategies, knowledge and skills to be able to teach effectively in a particular learning area. As teachers sometimes have to teach various learning areas and different grades in their teaching careers for which they did not receive the appropriate training, they have to regularly take part in professional development activities to increase and update their knowledge and skills. Teachers should keep track of the latest curriculum developments and use the best teaching and learning strategies to maintain a high standard in education. Changes in teacher knowledge and skills can be addressed through professional development (Albion, 1999, p. 1).

The vital skills to use ICTs with confidence and efficiency are of utmost importance for education in the 21st century (Akbulut et al., 2007, p. 1). Effective ICT integration in education requires that teachers have the relevant ICT knowledge and skills (Albion, 1999, p. 1; Asan, 2003, p. 154; Chen & Chang, 2005, p. 4). Teachers have to learn ICT skills in context. Skills learned in isolation do not lead to the motivated use of the skills (Thorburn, 2004, p. 2). Many teachers do not have the knowledge or skills to recognize the potential for ICT in teaching and learning. Just knowing how to use ICT is not enough (NCREL, 2000, p. 1). Enthusiasm increases as a teacher gains more computer skills and knowledge, which in

turn fosters a positive attitude towards computer use (Zheng, 2003, pp. 4 - 7). The integration of ICT in teaching and learning depends on knowledgeable, confident and enthusiastic teachers who are motivated and are prepared to integrate ICT effectively (NCREL, 2000, p. 1; Rodrigues, 2005b, p. 58).

Teachers are at different levels when it comes to skills and knowledge about ICT integration into the education system. Kovalchick and Dawson (2004, pp. 27 - 30) describe the different changes that teachers go through in the use of ICT in five progressive levels: entry, adoption, adaptation, appropriation and invention. The *entry stage* is characterised by teachers having little or no experience in ICT use and show little inclination to change instruction. During the *adoption stage*, teachers are more interested to integrate ICT, but insufficient experience leads them to replicate their traditional instructional strategies. ICT is thoroughly integrated into traditional classroom practice in the *adaptation stage*. The *appropriation stage* is the turning point where there is a change in attitude and the value of ICT is understood, and integration becomes effective. During the final *invention stage,* teachers start experimenting with new teaching approaches and ICT integration becomes effective and sustainable.

### 2.4.5 Attitude and beliefs

There are various factors that determine teachers' attitude towards TPD. The culture, ethos and environment of the school, resources available, quality of leadership and management will have an influence on teachers' attitude towards TPD. There are various significant factors that influence teachers' use of ICT in education and it will be a challenge for any TPD programme to ensure sustained effective ICT integration. TPD should be more than the mere training of teachers to acquire the necessary skills in the use of ICT. Effective TPD takes into consideration various factors that are crucial for teachers to have confidence for ongoing learning. ICT integration varies according to individual teaching beliefs, perceptions and attitudes towards ICT uptake, prior experience and how the teachers incorporate ICT into their practices (Ajzen, 1988; Asan, 2003; Basinger, 2003; Bradley et al., 1991; Buckenmeyer, 2005; Busch, 1995; Day, 1999; Ehman et al., 2005; Francis & Ezeife, 2007; Jimoyiannis & Komis, 2007; Kovalchick & Dawson, 2004; Lieberman, 2000; Moonen & Voogt, 1998; Nolan et al., 2005; Phelps et al., 2004; Woodbridge, 2004). When teachers implement ICT in their teaching practices, they are not only required to make use of ICT but also exhibit positive attitudes and beliefs towards ICT in education (Seyoum, 2004, p. 5). Webber and Robertson (1998, p. 3) confirm this: "Successful learning manifests itself in alterations to beliefs and practices." Studies on the uptake of ICT by teachers have revealed that teachers exhibit a wide range of obstructive behaviours that lead to resistance to the use

of ICT (Jimoyiannis & Komis, 2007, p. 150; Leask, 2001; Selwyn, 2002; Somekh & Davis, 1997; Zheng, 2003).  Leask (2001, p. 226) states: "Teachers do not adopt computer ICT in emotionally neutral ways."  Teachers' attitudes towards ICT have an influence on their uptake, integration and sustainability of ICT into their learning and teaching practices.  The attitude and beliefs of teachers towards ICT has an influence on the sustained use of ICT in classrooms (Asan, 2003, p. 154; Buckenmeyer, 2005, pp. 11, 14; Busch, 1995, p. 148; Chen & Chang, 2005, p. 7; Gibson & Oberg, 1999, p. 2; Thorburn, 2004, p. 2; Zhao & Bryant, 2006, pp. 53 - 54).  Some teachers may not want to use computers for teaching even when they are available (Nawawi et al., 2005, p. 88).  Teachers should have a positive attitude towards ICT for effective implementation and integration of ICT in education (Asan, 2003, pp. 153 - 154; Seyoum, 2004, p. 6; Zepeda, 1999, p. 80).  Teachers' prior knowledge or experience with computers will have an influence on their attitude towards ICT use. Teachers who have confidence in their ICT abilities will exhibit a positive attitude towards the use of computers (Busch, 1995, p. 152; Zheng, 2003, pp. 6 - 7).  Teachers should be comfortable when using ICT and have confidence in their ICT ability are two important components for the successful integrating of ICT in education (Chen & Chang, 2005, p. 3).  Ajzen (1988, p. 120) maintains: "People's attitudes influence their adoption of certain behaviours and that their attitudes are determined by salient beliefs about that behaviour."  Applying Azjen's theory to teachers' uptake and integration of ICT in their daily teaching and learning practices will depend upon their positive intention to use ICT.  Cox, Preston and Cox (1999, p. 6) indicate that particular attitudes and beliefs perceived by the teacher can be categorised into three components to determine the uptake of ICT in education (Table 2.2).

**Table 2.2        Beliefs and attitudes***

| Attitude towards the behaviour | Subjective norm | Perceived behavioural control |
|---|---|---|
| • The effects on their role as a teacher<br>• The impact on pupils' motivation<br>• The impact on the teachers' influence<br>• How the behaviour might affect other teachers<br>• Information they have about the value of ICT<br>• Previous experiences in using ICT<br>• Expertise in using ICT<br>• Expectation that it will contribute to the learning process | • Perceived social pressure<br>• Pressure from colleagues<br>• Pressure from requirements of the national curriculum<br>• Pressure from educational reforms, parents, pupils and the media | • Extent to which teachers believe themselves to be capable of using ICT in their teaching<br>• Influenced by past experience as well as anticipated impediments and obstacles |

\*     Adapted from Cox, Preston and Cox (1999, p. 6).

According to Cox, Preston and Cox (1999, p. 6) (Table 2.2), teachers' prior believes and attitudes will have an influence on their integration of ICT into their teaching and learning practices.  Attitude towards the behaviour are determined by teachers' previous experience,

attained knowledge and skills, expectations and value of ICT, the impact that ICT will have on the school, learners, colleagues and themselves.  Subjective norms are an indication of pressure perceived by the teacher from people or organisations to use ICT.  Perceived behavioural control refers to teachers' past experiences, anticipated obstacles and beliefs in their capabilities of using ICT.

Teachers also do not have the same attitude towards and experience of integrating ICT into their teaching and learning practices.  Some will grasp at every opportunity to make use of ICT, while others have little interest in ICT and will even avoid every opportunity.  Roger's Adoption Innovation Curve model (Figure 2.2) classifies adopters of innovations into various categories.

**Figure 2.2    Roger's Adoption Innovation Curve***
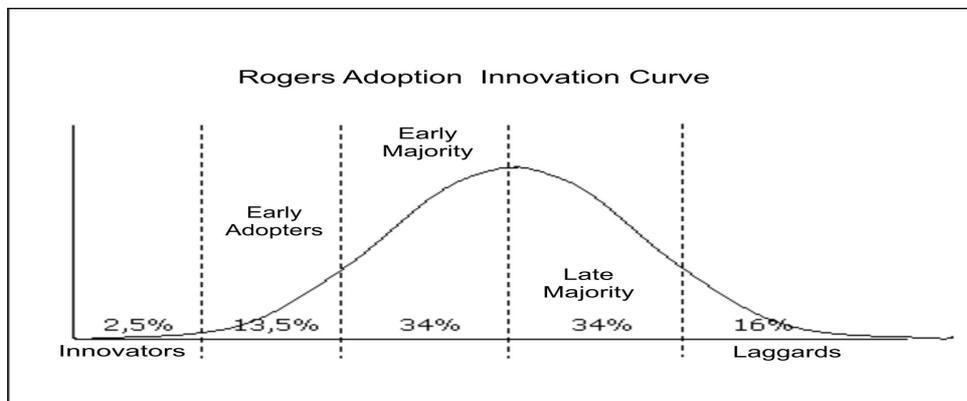


*        Adapted from Waters (2008, p. 1).

Knowledge about the adoption stages provides background for the principal on how to choose appropriate strategies for effective ICT integration (Sallis & Jones, 2002, p. 109; Scrimshaw, 2004, p. 15; Theroux, 2004, p. 3; Thorburn, 2004, p. 2):  These different levels and categories should be considered when implementing teacher training.

- *Innovators* (first 2.5%): the risk-taker willing to take the initiative and time to try something new
- *Early adopters* (next 13.5%): tend to be respected group leaders, the individuals essential to adoption by whole group
- *Early majority* (next 34%): the careful, safe, deliberate individuals unwilling to risk time or other resources
- *Late majority* (next 34%): those suspect of or resistant to change. Hard to move without significant change

- *Laggards* (last 16%): those who are consistent or even adamant in resisting change, pressure required to force change (Berglund Center Summer Institute, 2002, pp. 1 - 2; Latina, 2000, p. 1; Waters, 2008, pp. 1 - 2).

Teachers near retirement often do not see the necessity to become knowledgeable in the use of ICT.  They are often sceptical, unenthusiastic and show little commitment, while beginner teachers are often computer literate and eager to use ICT in their classes (Day & Sachs, 2004, pp. 11 - 12; Roberts & Associates, 1999, p. 10).  Training should be flexible to suit all the teachers and also be comprehensive enough to provide skills and knowledge for all levels and categories (Tenbusch, 1998, p. 4).

Davis, Bagozzi and Warshaw (1989) investigated the reasons why people use computers and their attitudes towards them.  In their technology acceptance model (Figure 2.3) they linked the perceived usefulness and ease of use with attitudes towards using ICT and actual use.

**Figure 2.3    Technology acceptance model\***
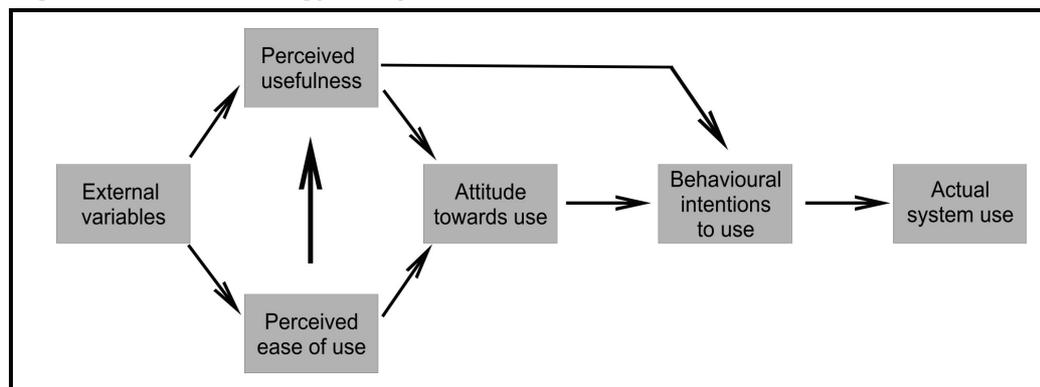


\*    Adapted from Davis, Bagozzi and Warshaw (1989).

Davis, Bagozzi and Warshaw (1989) found that people's computer use was predicted by their intentions to use it and that perceived usefulness was also strongly linked to these intentions.  Glatthorn, Jones and Bullock (2006, p. 22) indicate: "The key to success lies in how technology is experienced and applied."  Teachers' beliefs are a significant factor when integrating ICT successfully as beliefs determine how teachers handle tasks and problems and is a strong predictor of behaviour (Albion, 1999, p. 2; Asan, 2003, p. 154; Bajares, 1992, p. 311).  It is also important to take teachers beliefs into consideration when implementing TPD.  Teachers are more willing to change when their beliefs are aligned with new teaching and learning practices (Ehman et al., 2005, p. 257).  Teachers with appropriate experiences of ICT view the relevance of integrating ICT in teaching and learning (McCain & Jukes, 2001, p. 113; Zheng, 2003, p. 8).  Teachers should personally experience the advantages of ICT

and become committed users before they can effectively integrate ICT into their classrooms (Knapp & Glenn, 1996, p. 31).

Perceived self-efficacy and attitudes go hand in hand and are important predictors when it comes to the uptake of a task, the effort put into the task and the persistence to accomplish the desired outcomes of that task (Busch, 1995, pp. 147, 151; Chen & Chang, 2005, p. 7; Eastin & LaRose, 2000, p. 5; Francis & Ezeife, 2007, p. 5; Webber & Robertson, 1998, p. 10).  Self-efficacy is essential to overcome the fear many novice users experience (Eastin & LaRose, 2000, p. 3).  Self-efficacy represents a person's beliefs about being able to organise and execute the courses of actions required to manage prospective situations (Albion, 1999, p. 3; Busch, 1995, p. 147; Eastin & LaRose, 2000, p. 2; Tomlinson, 2004, p. 3; Wikipedia, 2006a, p. 1).  Albion (1999, p. 2) maintains: "Self-efficacy beliefs are important, and measurable, component of the beliefs that influence technology integration."  According to Albion (1999, pp. 3 - 4) self-efficacy beliefs can develop in response to four sources of information or experiences.  The first type and most powerful influence, is when self-efficacy increases when behaviour is successfully performed.  The second influence is when similar people are seen to perform particular behaviour successfully and the saying *if they can do it, I can do it as well* applies.  Another source of influence if it is realistic and positive is verbal persuasion that can encourage efforts that lead to increased efficacy through success.  Self-efficacy beliefs can also be effected by a person's physiological and affective state such as stress.  It is therefore necessary through TPD to increase teachers' self-efficacy beliefs in their ability to use computers in order for teachers to effectively incorporate ICT in their teaching strategies, as a lack of confidence for teaching with ICT will have an influence on the levels of ICT usage (Albion, 1999, p. 3).

The provision of TPD activities is an important way of improving teachers' competence and confidence in using ICT in their teaching.  The SITES 2006 study indicate that teachers' willingness to participate in ICT professional development is influenced by the perceived relevance to their current teaching and learning practices.  Attendance was influenced by teachers' willingness to participate, but a determining factor was availability.  Attendance at pedagogically oriented ICT-related professional development activities contributed positively to the likelihood that the teachers would use ICT in their teaching.  It was also found that teachers are generally much more willing to attend pedagogically oriented rather than technically oriented ICT-related professional development activities (Law & Chow, 2007b).

### 2.4.6    Perceptions

To integrate ICT successfully in education it is important that teachers have the appropriate perceptions of ICT usefulness as it has an impact on their instructional practice (Cope & Ward, 2002, pp. 1, 10; Zhao & Bryant, 2006, p. 55).  Teachers' perceptions and practices change as they become more comfortable with using ICT (Asan, 2003, p. 154; Francis & Ezeife, 2007, p. 4; Lal, 2002, p. 2; Webber & Robertson, 1998, pp. 9 - 10; Zheng, 2003, p. 8). Jimoyiannis and Komis (2007, p. 152) indicate five interrelated factors which influence teachers' perceptions about ICT and TPD aimed at integrating ICT in their teaching and learning practices.  Interrelated factors are: continuous ICT support and coordination, ICT pedagogical development that enables teachers to use ICT in their everyday classroom practice, collaboration with colleagues and specialist teachers, availability of educational software and ICT infrastructure development.

Incorporating ICT in education can be perceived as just another burden and therefore teachers can resist the opportunity for the uptake of ICT (McCain & Jukes, 2001, p. 5). Although there is an increase in teachers willing to incorporate ICT in their teaching practises, there is still room for improvement (Loveless & Dore, 2002; OFSTED, 2001; Thorburn, 2004).  Examining and identifying teachers' perceptions of using ICT in education, can help to determine specific factors in order to develop an effective TPD programme with the appropriate conditions and requirements (Zheng, 2003, p. 3).

### 2.4.7    Motivation

It is important to investigate the motivation of teachers towards ICT integration in teaching and learning as it has an impact on the successful integration of ICT (Woodbridge, 2004, p. 1).  Motivation refers to a person's desire to pursue a goal or perform a task and has an effect on learning and performance outcomes.  Motivation is influenced by internal factors: perceptions and personal goals as well as external factors: opportunities and rewards (Kovalchick & Dawson, 2004, p. 34).  Teachers' motivation forms an important part of TPD activities.  Strategies on how teachers can be motivated and what can be done to keep them motivated have to be considered as it increases the effectiveness of TPD activities (Butler, 1992, p. 4; Carlson & Gadio, 2002, p. 122; Dean, 1991, p. 16).  Steyn and Van Niekerk's (2005, p. 141) motivation model (Figure 2.4) indicates how teachers' motivation to engage in a activity can be influenced by various factors.

**Figure 2.4        Motivational model\***
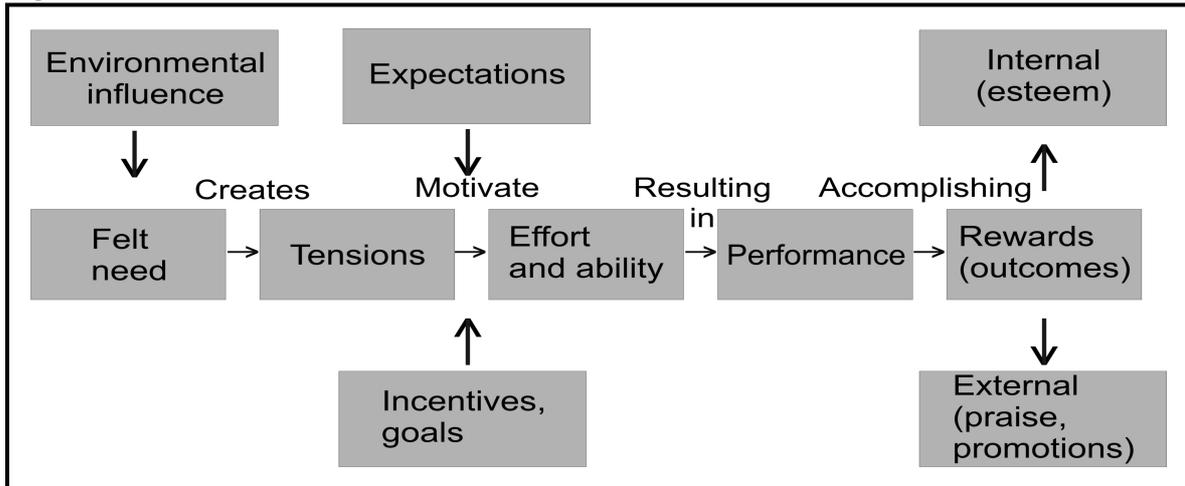
\*        Steyn and Van Niekerk (2005, p. 141).

The motivation process can be regarded as an incentive for action.  Figure 2.4 indicates that the process usually starts with a real need that creates tension.  Tension is created by insufficiency in teaching experience.  Personal or environmental tensions motivate a teacher to attempt to reduce or eliminate this tension.  A teacher's past and present environmental experience influence the direction these efforts will take.  Expectations also influence the effort the teacher will make.  If a teacher believes that the desired outcomes are unlikely or impossible to attain, he or she may not make any further attempts to accomplish the goals. Performance alone does not enable individual teachers to satisfy their needs, especially if they have insufficient or inappropriate skills.  Rewards or outcomes result from the motivated activity.  Outcomes may come from the external environment in the form of praise, promotions and/or financial rewards.  Outcomes can also come from the internal environment in the form of a positive feeling, gained self-esteem and/or a sense of achievement as a result of accomplishing the desired goal.

Cox, Preston and Cox (1999, p. 1) point out that attention should be paid to factors that motivate teachers to use ICT that will focus on the sustainable use of ICT, and not the burdening aspects.  There are several ways in which ICT can be used to motivate teachers in their professional lives.  Collaboration, support, easy access to policies, procedures and resources, curriculum planning and professional development can all act as examples of applications that motivate (Jackson, 2000, p. 1).  Teachers are often reluctant to change their teaching strategies that they are familiar with and are consequently cautious of new time consuming activities.  Some require additional motivation and incentives to actively participate in professional development activities and embrace technological driven innovations (Carlson & Gadio, 2002, p. 122).  Self-efficacy is an aspect of motivation that

helps to determine whether a teacher continues with or avoids computer use (Zheng, 2003, p. 3).

As effective TPD is influenced by motivators, it is important to pay attention to the different intrinsic and extrinsic factors that motivate teachers to engage in learning activities (Day & Sachs, 2004, p. 226; Rodrigues, 2005b, p. 74). Recognition from colleagues and leaders in the teachers' working environment may provide the necessary extrinsic motivation for teachers to take part in professional development. As TPD activities provide opportunities for collaboration, it will act as an intrinsic motivation for teachers to take part. Teachers who realise the potential of using ICT to enhance their teaching and learning practices will also be intrinsically motivated to learn new skills and knowledge in the effective use of ICT(Francis & Ezeife, 2007, p. 11). Additional financial and professional opportunities may also motivate teachers to participate in professional development activities (Carlson & Gadio, 2002, p. 123).

### 2.4.8 Teacher types and levels of awareness

If principals are knowledgeable about the individual teachers' level of awareness they will be able to determine the most suitable TPD activities that will fulfil teachers' individual requirements. The principals will also be able to determine which teachers are experts in particular fields and getting them involved in TPD by assigning them as mentors or giving teachers opportunities to give training workshops to their colleagues. By using expert teachers to help novice teachers will strengthen the learning community at a school. Daiz-Maggioli (2004, p. 8) distinguishes between four awareness-levels (Figure 2.5). Most teachers fall into one of the awareness-level categories.

**Figure 2.5    The quadrants of teacher's choice framework***
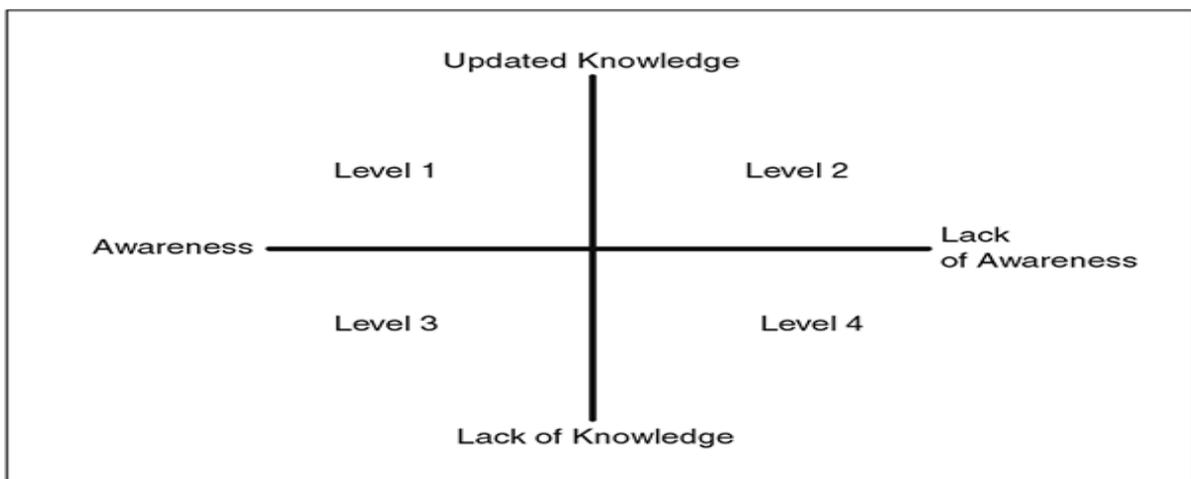


\*    Adapted from Diaz-Maggioli (2004, p. 8).

Figure 2.5 provides the four levels or quadrants of the differences in awareness. Level 1 teachers are aware of the fact that they possess up-to-date knowledge and that it would be to the benefit of their school if they partake in the professional development of teachers. By sharing their knowledge they are in a position to help their colleagues that are in other levels by providing training, expert coaching and/or being mentors. Level 2 teachers are not aware that they possess updated knowledge. Colleagues can observe their classroom practices and identify the areas of strength that the teachers in level 2 have. Teachers in level 3 are aware that they require development in specific knowledge areas. Teachers in level 4 are unaware of the necessity to expand their knowledge in specific areas. Appropriate professional development for teachers in levels 3 and 4 can include using teachers in level 1 to facilitate their development. Teachers enter a cycle of continuous professional development as there are always changes to be made in education. Teachers can have different awareness levels for different types of knowledge which means that in some areas they are experts, while in others they are still novices. This type of climate could assist in fostering collaboration as teachers will not be scared to admit that they have particular weaknesses or lack specific knowledge as they can be both an expert and a novice depending on their knowledge in particular fields (Diaz-Maggioli, 2004, pp. 7 - 9). TPD is always going to be a challenge no matter what the context, purpose, process or outcomes are as each individual teacher has various development requirements which are influenced by personal, school and environmental factors. What is learnt from a learning activity or experience may be different from that which is intended to be learnt (Day & Sachs, 2004, p. 293). For that reason it is advisable to monitor a teacher's subsequent performance to determine the success of the training.

In TPD is it necessary that teachers are willing and positive towards the process. By engaging on an authentic level teachers can see the relevance of that which they are being learned and correlate it to their current experiences and practices. TPD has to have intrinsic value for the individual teacher' otherwise it will not have any influence on their teaching and they will not be prepared to change their current teaching practices (Rodrigues, 2005b, pp. 5, 60, 74).

## 2.5    Teacher professional development

It usually rests on the shoulders of principals to initiate and implement appropriate TPD activities that will ensure that teachers effectively integrate ICT into their teaching and learning practices (Figure 2.1). TPD is instigated through the impact of innovation, politics and research (Rodrigues, 2005b, p. 55). The primary way in which principals can ensure

that teachers are supported in their personal and professional growth is through sustained effective TPD activities (Drago-Severson, 2004, p. xxi). TPD deals with changes that teachers experience throughout their teaching careers in their skills, teaching methods, disciplines and techniques, curricula, lesson plans, rules and procedures, attitudes, beliefs, expectations and concerns about the teaching profession (Day & Sachs, 2004, p. 48). TPD creates opportunity for teachers to reflect on current practices enabling them to improve their performance, knowledge, skills, and use continuous assessment methods to determine the success thereof (Borko, 2004, p. 5; Carlson & Gadio, 2002, p. 120; Clarke, 2007, p. 132; Day & Sachs, 2004, pp. 7, 10; Drago-Severson, 2004, p. 105; Francis & Ezeife, 2007, p. 2; Nolan et al., 2005, pp. 3 - 4; Rodrigues, 2005b, p. 1). TPD should not be intended for remedial purposes or to fix errors, but should be aimed at building a climate of professional teachers in the school system (Zepeda, 1999, pp. 3, 4) where ideas, challenges, successes and practices can be shared (Center for CSRI, 2007, p. 2; Darling-Hammond, 2005, p. 8; Nolan et al., 2005, pp. 2 - 4). High quality TPD forms the key to sustained teacher effectiveness and continuous growth (Chen & Chang, 2005, p. 1).

In using ICTs effectively teachers will be able to access high quality and diverse content, create content of their own, communicate, collaborate and integrate ICTs into teaching and learning (Dirksen & Tharp, 1996; DoE, 2004b, p. 14). Most teachers want to learn to use ICT but due to insufficient conceptual frameworks, time, computer access, and support, they often do not acquire the necessary skills (Carlson & Gadio, 2002, p. 120). TPD is the forming of collaborative and constructive approaches to ICT integration, accompanied by consistent support that incorporates ICT with curriculum projects and teachers' choice (Ehman et al., 2005, p. 251; Nolan et al., 2005, pp. 2 - 3). A well-resourced model of TPD helps teachers to take risks and allows them to see the relevance thereof and provide them the opportunity for recognition and reward. Teachers will then take responsibility for their professional development and use it to achieve and maintain best teaching and learning practice (Rodrigues, 2005b, p. 92).

There is a common requirement among teachers that ICT should form part of their TPD (Becta ICT Research, 2006, p. 38; Francis & Ezeife, 2007, p. 3). A well-planned, ongoing TPD programme, grounded in a theoretical model, linked to curricular objectives, incorporating formative evaluation activities, and sustained by sufficient financial and staff support is essential if teachers are to use ICT effectively to improve teaching and learning (Carlson & Gadio, 2002, p. 120). TPD can create the opportunity for teachers to collaborate, explore and evaluate the integration of ICT in their pedagogical practices and strategies (Massachusetts Department of Education, 2002, p. 18; Seyoum, 2004, p. 4).

Day and Sachs (2004, pp. 22, 148) refer to three interconnected purposes of TPD: extension, growth and renewal.  Extension takes place through the introduction of new knowledge or skills of ICT, growth takes shape through the development of greater levels of expertise in the integration of ICT, and renewal is achieved through transformation and change of knowledge and practice through the effective integration of ICT.  TPD is influenced by constantly changing contexts and consists of many facets that indicate the complexity of TPD (Day & Sachs, 2004, pp. 33 - 34).  TPD differs from school to school and situation to situation because of the huge diversity of culture and different settings in which teachers work.  TPD is no longer an option but an expectation for all professionals (Day & Sachs, 2004, p. 4).  Despite recognition of its importance, the professional development currently available to teachers is inadequate.  Each year schools, districts and the government spend millions financing in-service training and other forms of TPD that are fragmented, intellectually superficial, do not take into account adult learning and provide insufficient follow-up support (Borko, 2004, p. 3).

## 2.5.1     Teacher empowerment

Principals can empower teachers by creating TPD opportunities according to the specific requirements of the teachers regarding the effective and sustainable integration of ICT (Figure 2.1).  Principals can ensure that TPD activities at school are aimed on empowering teachers to develop positive attitudes and beliefs towards ICT integration, become more effective and competent teachers and support teachers in the process of adapting successfully to a changing environment.  Teacher empowerment is an essential component to be considered in the developmental process of teachers.  Through empowerment teachers get a renewed feeling that they are part of the education system and can still make important contributions to the education process.  In most traditional schools the only teachers who take part in any decision-making processes are those in leadership positions.  Empowerment means that teachers are given the authority to partake in decisions affecting their professional development and through this process deepen their knowledge and improve their teaching and learning practices.  According to Steyn and Van Niekerk (2005, p. 160) empowerment is:  "The process by which teachers are entrusted with the power (authority) to make decisions and take actions regarding assigned tasks, and are involved in devising ways to maintain a productive and satisfying work environment and in daily problem-solving and decision-making."  Teachers become empowered when they are involved in decisions concerning school governance, working conditions, content of the curricula, salaries and professionalism (Blase & Blase, 1994, pp. 2 - 5).  Empowerment also includes expanding teachers' knowledge and skills through training and development, enabling them to reflect on

best practices through collaboration and giving them confidence to make a difference in the school's education system (Blase & Blase, 1994, p. 7). It is important that teachers are empowered to be involved in bringing about change in their schools. In allowing teachers to gain a share in the ownership of change, encourages teachers and makes them more positive to implement change because it allows them to implement some of their values in the process of constructing successful learning and teaching situations (Busher, 2006, p. 151). Empowerment has been associated with positive teacher morale and job satisfaction (Blase & Blase, 1994, p. 9). Teachers taking part in a study of Blase and Blase (2001) overwhelmingly indicated that principal leadership is the most important factor contributing to teachers' empowerment.

### 2.5.2    Constrictions for teacher professional development

Informed and knowledgeable principals are in a better position to make informed and effective decisions (Table 2.3). Principals who are informed on the constrictions of TPD can assist in the process by avoiding the identified stumbling blocks. It is rare to find a TPD environment where teachers are recognised as being both learners and experts. Recognising teachers' skills, strengths, experiences, expertise and limitations place them in the position of novice and expert where an opportunity is created to view each other as peers, tutors and learners (Rodrigues, 2005b, p. 78). In most TPD courses on ICT integration, the potential is usually explored but its strategic implementation is assumed (Rodrigues, 2005b, p. 6). If principals can eliminate the factors that prevent TPD from being effective it will lead to an increased number of teachers making appropriate changes to their current teaching practices. There are various factors that will have an influence on the effectiveness of TPD. Table 2.3 indicates the stumbling blocks and corrective actions that can be taken for effective TPD.

Table 2.3        Constrictions for TPD*

| Stumbling blocks | Description | Corrective actions that can be taken |
|---|---|---|
| Top-down decision making | • Planning of strategies are made by administrators and consultants<br>• Teachers are not involved and programmes become a burden instead of a solution | • Collaborative decision-making<br>• Teachers are involved in the design of the training<br>• Knowledge shared and developed by teachers |
| The idea that teachers require to be "fixed" | • Too often professional development is guided by the fact that the problem lies with teachers who don't know how to teach<br>• Numerous teaching approaches have surfaced claiming to be the ultimate solution for teaching problems | • A growth-driven approach driven by strategic plan<br>• Perceived as an essential component<br>• Teachers are aided in the ICT integration process and not seen as a problem |
| Lack of ownership of | • Teachers have little or no say during the process of professional development | • Teachers give their opinions of different practices |

**Table 2.3 Constrictions for TPD***

| Stumbling blocks | Description | Corrective actions that can be taken |
|---|---|---|
| the professional development process and its results | • Teachers question programmes that were built without them, yet are aimed at changing the way they do things | • Inquiry-based ideas<br>• School based programmes<br>• Include collaboration |
| The technocratic nature of professional development content | • Teachers are taught techniques that they are expected to replicate in the classroom<br>• Most of these methods serve the requirements of teachers and learners in specific contexts<br>• In attempting to transfer these practices into their classrooms, teachers require more time and effort than what was originally anticipated | • Context-specific programmes<br>• Integrate ICT into the curriculum<br>• Integrate ICT into specific learning area<br>• Allocate sufficient time |
| Universal application of classroom practices | • Same professional development programmes are applied to all teachers regardless of subject, student age, or level of cognitive development<br>• Although a one-size-fits-all approach is economical it is not very effective | • Tailor-made techniques<br>• Varied and timely delivery methods<br>• Individual ICT abilities are considered |
| Lack of variety in the delivery modes of professional development | • Usually the cheapest format of professional development is chosen<br>• Differentiated instruction in the classroom is important but when it comes to instruction for teachers, undifferentiated approaches usually prevail | • Combination of generic and subject specific skills<br>• Appropriate format is chosen |
| Inaccessibility of professional development opportunities | • Professional development seldom reach teachers when they are really required<br>• Teachers requirements are unmet if they do not help plan and deliver professional development<br>• Only a small percentage of teachers seem able to transfer the content to the classrooms | • Collective construction of programmes<br>• Provide training differentiated by teacher expertise<br>• Teachers are aided throughout the process |
| No ongoing support in transferring ideas to the classroom | • Transferring new ideas to the classroom is an obstacle for most teachers<br>• There is little or no ongoing support for in-service teachers in helping to bridge the gap between theory and practice | • Adequate support systems<br>• On-going support after course is finished<br>• Collegial opportunities are created to aid each other |
| Disregard for the teachers' varied requirements and experiences | • Teachers go through specific developmental stages as they progress in their careers, each having particular requirements and crises<br>• TPD is standardised assuming that all teachers should perform at the same level, regardless of their individuality | • Individual development promoted in the context of organisational development<br>• Teachers who are in the same career stage, have the same requirements are grouped together |
| Lack of systematic evaluation of professional development | • No evaluation of the impact that the programme has on current practices<br>• A learning organisation should determine the effectiveness of established programme and use results for improvement | • Proactive assessment<br>• Assess current levels of ICT use<br>• Determine effectiveness of professional development |
| Little or no recognition of the learning characteristics of teachers | • Teachers have their own unique learning characteristics that have to be taken into account if the professional development is to be successful | • Andra-gogical (adult-centred) instruction<br>• Adapt and correct TPD to cater for individual learning characteristics of teachers |

\* Adapted from Diaz-Maggioli (2004); Scrimshaw (2004); Glatthorn, Jones and Bullock (2006); Valli and Hawley (2002).

TPD decisions are usually made top-down and prescriptive ideas leave teachers with no say. Planning and TPD strategies should be developed in conjunction with the teachers. They are often viewed as novices and it is rarely recognised that teachers have vast amounts of

applicable experience that can be used (Rodrigues, 2005a, pp. 5 - 6). TPD is often aimed at fixing problems and the average perspective is that the fault lies with the teacher. Numerous teaching approaches have come about, claiming to be the ultimate solution. Teachers are taught methods, contents and skills without keeping in mind that teaching and learning takes place in different contexts. Most TPD are standardised and the one-size-fits-all approach is taken without considering teachers' individual requirements (Becta ICT Research, 2004b, p. 3; NCREL, 2000, p. 3; Roberts & Associates, 1999, p. 10; Zhao & Bryant, 2006, p. 60). Little ownership develops among teachers as the individual requirements of the teachers are not taken into consideration. It is difficult for teachers to implement as it takes extra effort and time to make that which they learned applicable to their specific situation as they have to adapt the learning content.

Training takes place once every few years and minimum or no support or follow-up is provided to implement the suggested training (Darling-Hammond, 2005, p. 4; Glatthorn et al., 2006, p. 41; Loveless & Dore, 2002, p. 22). The universal application of classroom practices that are prescribed and the undifferentiated approaches in TPD leads to little or no change in teachers' current teaching and learning practices. The programmes are de-contextualised and when the teachers return to their schools, they do not know where to start due to insufficient and non-existent follow-ups. Most TPD approaches do not keep up with new and ever-changing developments in education (Carlson & Gadio, 2002, p. 128; Chen & Chang, 2005, p. 1; Jimoyiannis & Komis, 2007, pp. 151 - 153; McCain & Jukes, 2001, p. 114; Schlager & Fusco, 2003, p. 4). Once-off training sessions about ICT do not provide ongoing learning experiences and support that is essential for teacher change to take place effectively (Berube et al., 2004, p. 4; Carlson & Gadio, 2002, p. 119; Chen & Chang, 2005, p. 1; Cope & Ward, 2002, p. 4; Jackson, 2000, p. 7; Jimoyiannis & Komis, 2007, pp. 152 - 153; Kovalchick & Dawson, 2004, p. 536; Thorburn, 2004, p. 4; Viadero, 2005, pp. 1 - 2; Woodbridge, 2004, p. 2). They should be replaced by ongoing programmes that are related to the school's curriculum goals, designed with built-in evaluation, and sustained by adequate ongoing support (Thorburn, 2004, p. 8; Viadero, 2005, pp. 2 - 3).

There are various corrective actions that can be taken to avoid apparent stumbling blocks for effective ICT (Table 2.3). Teachers should be involved in determining appropriate strategies, as well as in the design of their own TPD. TPD should make use of teachers that are experts in their fields. TPD must cater for teachers' individual requirements by making use of tailor-made techniques, adult-centred instruction and a variation of delivery methods (Basinger, 2003, p. 3; Carlson & Gadio, 2002, p. 120; Center for CSRI, 2007, p. 2; Ehman et al., 2005, p. 260; Kotyk, 2006, p. 26; Lieberman, 2000, p. 78). This includes that opportunities are

created for collaboration, teachers can share experiences, discuss possibilities, reflect on their learning, apply new strategies, and evaluate their learning (Carlson & Gadio, 2002, p. 121; Schlager & Fusco, 2003, p. 4). Assessment should take place beforehand to determine the teachers' current knowledge and skills, as well as at the end to determine the impact of the TPD. A teacher's professional development is a process that is inseparable from the construction and expression of the teacher's personal identity (Day & Sachs, 2004, p. 157). There should be adequate and on-going support so that the new knowledge and skills can be effectively incorporated into teacher's teaching and learning practices (Foskett & Lumby, 2003, p. 84). Teachers should have the opportunity to repeatedly practice their newly attained skills and knowledge to enable and achieve teachers' full integration of the new strategies into their teaching repertoire (Darling-Hammond, 2005, p. 6; Francis & Ezeife, 2007, p. 6; Schlager & Fusco, 2003, p. 4). Follow-up is critical to the integration of new knowledge and skills (Butler, 1992, p. 10).

### 2.5.3 Information and Communication Technology integration through teacher professional development

TPD is necessary for effective and sustainable ICT integration (Figure 2.1). Introduction of any innovatory practice has to be accompanied by significant TPD (Rodrigues, 2005b, p. 19). The dilemma that most educational institutions have with ICTs is the transformation of new applications into current practices (Akbulut et al., 2007, p. 1). Teachers require the opportunity to develop skills and gain experience of incorporating ICT into their teaching and learning (Basinger, 2003, p. 2; Rodrigues, 2005a, p. 1). TPD programmes can help teachers to address the impact of ICT and make appropriate decisions about the role that ICT will play in their teaching practices (Roberts & Associates, 1999, p. iv), and by learning how to integrate ICT built-up communities of practice (Sallis & Jones, 2002, p. 108). TPD becomes the key element in the implementation plan for any educational change involving ICT being implemented as a tool for teaching and learning across the curriculum (Carlson & Gadio, 2002, p. 1; NCREL, 2000, p. 1; Plomp et al., 2003, p. 23).

TPD in the 21st century should have clear goals and purposes that focuses on the individual requirements of the teachers and makes use of different delivery methods to aid the process of ICT integration in teacher's teaching and learning practices (Day & Sachs, 2004, p. 27; Francis & Ezeife, 2007, p. 6; Glatthorn et al., 2006, p. 42; Soule, 2003, p. 8; Steyn & Van Niekerk, 2005, p. 251). TPD for the successful integration of ICT should focus on how ICT can support the teaching and learning of specific learning areas paying special attention to

the curriculum and strategic thinking (Massachusetts Department of Education, 2002, p. 18; McKenzie, 1999, p. 81).

Teachers are required to stay abreast with the latest curriculum and ICT developments. Teachers should integrate ICT effectively in their teaching methods and they will be able to do so if they attain the necessary knowledge and skills. This indicates that TPD should take place continuously due to changes in the education system and the rapid developing pace of ICT (Day & Sachs, 2004, p. 55; Glatthorn et al., 2006, pp. 41 - 43; Rodrigues, 2005a, p. 1). Teachers are therefore expected to become lifelong learners through TPD (Akbulut et al., 2007, p. 1; Bradley et al., 1991, p. 14; Day & Sachs, 2004, pp. 48, 49, 150; Dean, 1991, p. 7; Drago-Severson, 2004, p. 105; Jacobs et al., 2004; Leask, 2001, p. 45; McCain & Jukes, 2001, p. 89; Rodrigues, 2005a, p. 3; Thorburn, 2004, p. 4; Zepeda, 1999, pp. 4, 19, 76).

Innovative practices depend on the provision of effective TPD fostering learning communities for ICT integration (Plomp et al., 2003, pp. 11 - 12). Before implementing a TPD programme for effective ICT use the school's current level of ICT use should be determined and each individual teacher's level of ICT competency should be assessed (NCREL, 2000, pp. 2, 3). Teachers' knowledge, skill, confidence, motivation and beliefs regarding ICT integration must be heightened (Ehman et al., 2005, p. 256).

### 2.5.4 Strategies for Information and Communication Technology integration through teacher professional development

Implementing appropriate strategies and activities brings the action necessary for appropriate changes into motion. The principal can implement many TPD strategies to assist teachers to increase their skills and knowledge with regard to the effective integration of ICT. Ensuring that specific factors, opportunities and conditions are present in the school environment will foster teachers' ICT integration and ensure sustainability. In order to apply the appropriate strategies effectively it is necessary that the principal is knowledgeable about influential factors to ensure sustainability of changes. A principal should act as a facilitator and support TPD for the process of change. Providing appropriate support and ensuring conducive working conditions will positively affect teachers' attitude for the implementation of change into their teaching and learning practices (Gordon, 2003, p. 2; Tomlinson, 2004, pp. 101 - 102).

Insufficient TPD for ICT use has become an obstacle to successfully integrate ICT into the curriculum. Strategies have to be implemented in order to sustain the effective use of ICT to

enhance teaching and learning. To effectively change the whole school environment, TPD programmes should coincide with institutional development. All teachers should be involved in in-house TPD opportunities as it can lead to improvement of the whole school (Francis & Ezeife, 2007, pp. 1, 6, 7; Glatthorn et al., 2006, pp. 35, 40; Spurr et al., 2003, p. 4). The most important prerequisite for success is that the whole school's committed to a policy of efficient ICT use. Using ICT should be part of a comprehensive plan for instructional improvement. This calls for cautious planning and extensive and continuous teacher training (Paul, 1999, p. 7). TPD ought to include actions or activities that will lead to the improvement of teaching and learning practices having an effect on the development of the whole school (Zepeda, 1999, pp. 5 - 7). Whole school alignment enables teacher collaboration, reflection and other synergies for improved teaching and learning (Spurr et al., 2003, p. 4). Whole school strategies which focus on how ICT can enhance teaching and learning and required resource allocation can help to support and sustain schools' use of ICT effectively in learning (Becta ICT Research, 2006, p. 38). The principal is central to implementing whole school strategies that will support effective and sustained ICT integration into teachers' learning and teaching. TPD should therefore be an integral part of the school ICT plan or whole-school improvement plan and contain all the vital components that research has found to be important, such as time, flexibility, accessibility, convenience, and considering the varying requirements of the teachers (Brand, 1997, pp. 1 - 3; Day & Sachs, 2004, pp. 226 -227; Joiner, 2002, p. 1).

Scimshaw (2004, pp. 5 - 6) suggests that there are various strategies to support TPD in the use of ICT. These strategies can be divided into three categories: teacher-based strategies, school-based strategies and external-based strategies (Table 2.4). Integrating ICT through professional development will lead to change in individual teachers, as well as the school as an organisation. Teacher-based strategies and school-based strategies are therefore interrelated. The commitment of individual teachers to integrating ICT should correlate to the commitment of the school as any discrepancies may have an impact on the degree to which the teachers integrate ICT in their teaching and learning. It is therefore vital that both teacher-level and school-level factors be addressed in order to increase ICT use (Scrimshaw, 2004, pp. 5 - 6).

Table 2.4       Strategies for supporting TPD in the use of ICT*

| Teacher-based strategies | |
| --- | --- |
| Connection to student learning | • Improve teaching and learning<br>• Use ICT effectively in instruction and help learners develop higher-order thinking and problem-solving skills<br>• Implement new teaching techniques to encourage and assist learners |

**Table 2.4    Strategies for supporting TPD in the use of ICT***

|  |  |
|---|---|
|  | • Expose learners to information and experts |
| **Hands-on ICT use** | • Receive continuous ICT training<br>• Initially acquire core ICT competencies and skills<br>• Use ICT to enhance teaching and learning in different learning areas<br>• Regular use of ICT leads to confidence and boost own productivity |
| **Involved in the planning** | • For teachers to develop ownership of professional development they must participate actively in its construction shaping the programme accordingly to their requirements and motivations |
| **Variety of learning approaches** | • Professional development must be in a variety of forms such as mentoring, ongoing workshops, special courses, structured observations and practical demonstrations<br>• Relevant to individual teachers as teachers differ from one another in terms of their theoretical and professional knowledge and the stages in their careers<br>• Concrete experience with adequate support, appropriate feedback and long-term follow-up |
| **Curriculum-specific application** | • Link ICT with curriculum<br>• Integrate ICT into content<br>• Provide activities in the context of practice<br>• Be able to select digital content based on requirements and learning styles of learners and infuse in curriculum |
| **New roles for teachers** | • Coach or facilitator in class<br>• ICT supports collaboration outside class<br>• Must be able to adapt to different roles |
| **Sufficient time** | • Teachers must prioritise and organise according to the time required to integrate ICT successfully |
| **School-based strategies** ||
| **Principal and decision making** | • Central in enabling teachers to engage in innovative practice<br>• Create incentives for ICT use |
| **Whole school planning** | • Create a vision statement and development plan for school<br>• Requirement assessment to establish current levels of ICT use and staff preferences for the future |
| **Built-in evaluation** | • Determine requirements of teachers, goals and strategies<br>• Evaluation during and after professional development activity<br>• Determine if professional development promotes effective ICT integration |
| **Ongoing process** | • Continued practice throughout teachers' careers be seen as a career-long endeavour<br>• Takes time conducted over several years for significant change in educational practices |
| **Collegial learning** | • Require time to discuss ICT with other teachers and support each other<br>• Follow-up discussions, teacher networks and collegial activities are necessary<br>• Teachers possess a wealth of knowledge that must be explored and shared |
| **Sufficient time** | • Time to plan, practise skills, try out new ideas, collaborate, and reflect on ideas<br>• Requires additional time in teachers' daily schedule; they should not be expected to devote more of their own free time |
| **Technical support** | • On-site technical support personnel giving assistance to teachers<br>• ICT must be easy to access and implement |
| **Administrative support** | • Administrators and leaders must have clear vision of ICT integration and have knowledge of how ICT is used in schools<br>• Networked computers used for daily tasks |
| **Adequate resources** | • ICT in class should be the same used for professional development<br>• Funds available for technical equipment, professional development, and networks |

**Table 2.4    Strategies for supporting TPD in the use of ICT***

| Continuous funding | • School budgets<br>• Make use of funding strategies, community organizations and projects<br>• Costs for ICT is an ongoing expense |
|---|---|
| **External-based strategies** | |
| Working together | • Work closely with local community and interacting with one another<br>• Knowledge about teaching and learning only makes sense when considered in the context of a teacher's own school culture and climate<br>• Working with local schools leads to sustained teachers' motivation and identification of successful practices |
| Participation | • Participate in national ICT developments, projects and initiatives and local-based training |
| Support | • Linking with peers both within the local and the external community through electronic networks and forums may lead to necessary support |

*    Adapted from NCREL (2000, pp. 3 - 8); Scrimshaw (2004, pp. 5 - 6); Diaz-Maggioli (2004, p. 7); Becta (2005, pp. 3, 8).

Teacher-based strategies are intended to aid teachers in the integration process. Indicated in Table 2.4 TPD should use a variety of learning approaches and activities where teachers can integrate ICT into student learning and infuse it into the curriculum. Teachers must be able to develop ICT integrated lessons or units that can be implemented in their own learning areas and they must be provided with ongoing support until they are able to integrate ICT effectively into the curricula of their specific learning areas. For effective ICT integration in everyday teaching and learning is it essential to consider ICT, content and pedagogy not in isolation, but rather in the complex relationships. There has to be knowledge about the applicable pedagogy of that specific content, knowledge of how a subject can be transformed by the application of ICT and knowledge of how ICT can support pedagogical goals. Knowledge on these different aspects are important in order to make TPD ready and appropriate for ICT integration (Becta ICT Research, 2005, p. 40; Ehman et al., 2005, pp. 252 - 264; Jamieson-Proctor et al., 2006, p. 512; Jimoyiannis & Komis, 2007, p. 153; NCREL, 2000, p. 1). For teachers to take ownership of professional development they have to be involved in the planning or involved as facilitators. For any ICT innovation to be implemented successfully in schools, sufficient time must be allocated to teachers to come to terms with implementing ICT in their instruction. Effective professional development provides authentic tasks in collaborative settings and the time to do the tasks well (Means, 1994, p. 185).

Principals apply school-based strategies (Table 2.4) in the planning and decision-making process to deploy the required resources to ensure sustainable and effective ICT integration. As the costs of ICT integration is an ongoing expense there should be strategies in place to ensure that there are sufficient funds for professional development, appropriate hardware and software, and sustained technical support. Teachers experience the use of incentives

positively and this can motivate them to sustained ICT integration. The incentives do not only have to be the provision of laptops, it can be by merely giving the appropriate recognition in a form that the principal decides on such as certificates or even trophies.

Schools can incorporate external strategies to support or improve their use of ICT (Table 2.4). It is important that schools involve the community in their activities as the schools are situated in specific communities with regard to equity, language, culture and in most cases are dependent of community support. Teachers from local schools can work together in developing lessons that integrate ICT in the different learning areas to alleviate the workload of the teachers. Teachers can get together face-to-face or use networks to collaborate about best practices and give each other the necessary support. Teachers should participate in national ICT projects and initiatives and local-based training where they can share their knowledge and expertise.

### 2.5.5 Stages of Information and Communication Technology integration in teacher professional development

Toledo (2005, pp. 177 - 191) indicates a five-stage developmental model for the integration of ICT (Figure 2.1). Each stage in the model has distinctive characteristics, tasks and actions that occur as teachers move toward the system-wide integration of ICT.

- *Pre-integration*: teachers show limited professional and personal ICT use
- *Transition:* increased interest and vision for the use and integration of ICT
- *Developmental:* acquisition of ICT knowledge through experts. Planning and implementation of new ICT programmes
- *Expansion*: creation of an environment in which teachers are encouraged to risk trying new technologies. Strengthening of the relationships between support personnel and teachers
- *System-wide integration:* ICT being embedded into curriculum. Enthusiasm for integration increases. Evidence of the integration of standards and proficiencies for teachers indicated.

This five-stage model provides a template for principals to assist them to meet the demands of teaching and learning in a technology-rich world. TPD can use the five-stage model to describe teachers' ICT integration.

### 2.5.6 Barriers to Information and Communication Technology integration

Research on the barriers to ICT integration have been conducted over a number of years and suggests that there are various interrelated and complex factors that have an influence

on the successful implementation and integration of ICT in education (Albion, 1999; Becta ICT Research, 2004a; Han, 2002; Jamieson-Proctor et al., 2006; Seyoum, 2004; Thorburn, 2004). Key factors are: staff development, attitude, infrastructure, consensus and support, knowledge and skills, lack of commitment, inadequate feedback, lack of time and money, sustainability and transferability, resistance to change, vested interest in the status quo, fear of new situations and inadequate expertise for solving problems arising during initiation and implementation have an determining influence on the effective and sustainable use of ICT (Blase & Blase, 1994; Fabry & Higgs, 1997; Scrimshaw, 2004; Seyoum, 2004). Zepeda (1999, pp. 121 - 123) indicates other barriers such as insufficient resources, competing requirements and visions, traditions, under-representation in the decision-making process, poor preparation, interrupted sequence of leadership and the view that change is unmanageable. Most commonly cited barriers for teachers to integrate ICT effectively are that teachers do not have time to effectively incorporate ICT outside their normal working hours, insufficient access, confidence, support and effective training (Asan, 2003, pp. 153 - 160; Becta ICT Research, 2004a, p. 28; Gibson & Oberg, 1999, pp. 5 - 7; Nawawi et al., 2005, p. 88; NCREL, 2000, pp. 1 - 2; Roberts & Associates, 1999, pp. 8 - 14; Thorburn, 2004, p. 2; Zhao & Bryant, 2006, p. 58; Zheng, 2003, pp. 2, 5). Most of these barriers have existed for a long time and have not yet been successfully overcome. As Shelly, Cashman, Gunter and Gunter (2004, p. 6.10) state: "For more that two decades, several barriers have hindered technology integration in many schools." This may be an indication why ICT integration has not progressed as quickly as expected (Thorburn, 2004, p. 1). Jamieson-Proctor, Burnett, Finger and Watson (2006, p. 512) maintain: "The fact that there are so many factors that have an influence on the uptake of ICT in education, requires close scrutiny, analysis and responses to capitalise upon the affordances of ICT for improving teaching and learning." The different schools do not experience the same barriers, and the impact of the various barriers on ICT integration will also differ (Becta ICT Research, 2004a, p. 23). Cowie and Jones (2005) add: "It is not sufficient to consider the various factors that contribute to effective ICT integration in isolation it is however the convergence of various factors." The factors manifest in different ways as both enablers and barriers act in different circumstances and at different times as the use of ICT evolves and develops in that particular school environment.

Although there are different classifications for the different barriers such as external or first-order barriers and internal or second-order barriers, I selected to categorise the barriers in two categories namely institution barriers, an indication of barriers at school level and individual barriers, referring to teacher-level barriers. Even though they are differentiated as two main categories they remain interrelated, any factors influencing one barrier are likely to

have an influence on other barriers (Becta ICT Research, 2004a, pp. 19,20).  Gender differences is not regarded as a barrier or as an enabler as most of the teachers in today's schools, especially in a South African context, are female and it would give an unrealistic view of gender as an influence on teachers' use of ICT in education.  According to the SITES 2006 data, age and gender has no significant influence on teachers' pedagogical adoption of ICT (Law & Chow, 2007a).  The SITES 2006 study indicates the barriers that teachers experienced when using ICT in their teaching.  The barriers that relate to school-level and teacher-level barriers are indicated in Table 2.5.  The school-related barriers are mostly related to insufficient access and infrastructure, while teacher barriers relate to competence, confidence and time available.

**Table 2.5      The barriers experienced by teachers in their use of ICT ***

| Category of barrier | Specific obstacle included within each category |
|---|---|
| School-related barriers | • ICT is not considered to be useful in my school<br>• My school does not have the required ICT infrastructure<br>• My school lacks digital learning resources<br>• I do not have the flexibility to make my own decisions when planning lessons with ICT<br>• I do not have access to ICT outside school |
| Teacher-related barriers | • Insufficient ICT-related skills<br>• Insufficient ICT-related pedagogical skills<br>• Insufficient confidence to try new approaches alone<br>• Insufficient time to develop and implement ICT-using activities<br>• Unable to identify which ICT tools will be useful |

*      Adapted from Law and Chow (2007b, p. 17).

The highest percentages of reported barriers in South Africa were teacher-related.  There was an indication of the large diversity across systems in terms of the contextual factors influencing ICT adoption in South Africa due to the large percentage of schools that do not have effective access to ICT usage.  School-related barriers as experienced by teachers had a negative connotation with teachers' possibility to use ICT in their teaching.  The results indicated that school-related barriers are also important factors influencing ICT use.  Teacher-related barriers had a significant negative connotation with teachers' use of ICT (Law & Chow, 2007b).

### 2.5.6.1      School-level barriers

Teachers require access to good quality computers at times when it suits them best.  Many schools only have one computer centre used for learners to improve their ICT skills.  The computers should be connected to the Internet so that teachers can search for additional resources and also be networked so that teachers have opportunities to collaborate (Becta ICT Research, 2004a, pp. 11-14).  The benefits of ICT integration are not realised unless

there is adequate access to a technological infrastructure (Day & Sachs, 2004, p. 75; Kovalchick & Dawson, 2004, p. 33). Funding for schools to provide the necessary infrastructure for ICT integration is slow to realise, particularly in disadvantaged, inner-city schools, and rural areas (Asan, 2003, p. 160; Gibson & Oberg, 1999, p. 5; Roberts & Associates, 1999, p. 9; Thorburn, 2004, pp. 3 - 4).

Schools require technical support. It is frustrating for teachers when there is no immediate support available. Technical support represents an ongoing problem in schools. Schools that do not have technical support won't be able to do preventive technical maintenance and this, in turn, will lead to more frequent breakdowns and teachers that avoid the use of computers (Becta ICT Research, 2004a, p. 16; Becta ICT Research, 2006, pp. 14 - 15; Kovalchick & Dawson, 2004, p. 32). Reliability can also be seen as a barrier. Hardware failures, poor or slow internet access, incompatible software or out-of-date software can be frustrating for all users (Thorburn, 2004, p. 2). Environmental stability is also a key factor in the school when it comes to integrating innovations or making appropriate changes. Frequent or unexpected changes in leadership, policies, curricula, planning, government demographics make implementation difficult and teachers negative (Thorburn, 2004, p. 7). Pressure to prepare learners for examinations and tests can discourage teachers from integrating ICT in the different learning areas as some principals and teachers view the integration of ICT as a distraction from their usual teaching activities (Soule, 2003, p. 7). It is necessary to eliminate the school-level barriers and this will help to minimize the barriers that teacher's experience.

### 2.5.6.2    Teacher-level barriers

ICT integration does not occur naturally. There will always be some critical barriers to overcome. Identification of barriers is one of the first steps towards removing them. Once the barriers to change have been removed, teachers' beliefs and practices are more readily open to change. Teachers require ongoing support and time to develop their own technological knowledge and skills, support is required that goes far beyond the once-off workshop or training session (Brand, 1997, pp. 1 - 5; Buckenmeyer, 2005, p. 3; Gibson & Oberg, 1999, pp. 5 - 6; Knapp & Glenn, 1996, p. 21; Roberts & Associates, 1999, p. 12; Woodbridge, 2004, p. 2; Zhao & Bryant, 2006, p. 58). Teachers require time to learn new skills. Availability of time in education has become a major barrier for effective teacher development. In the teaching profession, it is difficult for teachers to allocate time to practice ICT in their busy schedules. It takes time to allocate suitable resources and to integrate ICT use effectively into teaching and learning practices. By expecting teachers to practice during

their own time makes them reluctant to make the effort and the uptake of ICT becomes slow (Becta ICT Research, 2004a, pp. 9, 15; Becta ICT Research, 2006, p. 19; Massachusetts Department of Education, 2002, p. 15; Schumaker & Sommers, 2001, p. 106).

Teachers who consider themselves low-skilled often feel anxious about using ICT in front of the class for fear that the learners will actually know more than they do.  Teachers fear that they will show learners that they lack some skills and knowledge in the use of ICT when they find themselves in a situation not knowing the solution.  These teachers do not have the confidence of using ICT in their teaching and learning practice.  Some teachers even fear they might damage the computer with their inappropriate actions (Becta ICT Research, 2004a, pp. 7 - 8, 15; Roberts & Associates, 1999, p. 7; Thorburn, 2004, p. 6).  Teachers' competency levels are related to their confidence and is a major factor in determining whether they will make use of ICT (Jamieson-Proctor et al., 2006, p. 523).  Some teachers are using the same teaching strategies day after day.  Resistance leads to barriers to proposed change.  Some teachers are comfortable with their current teaching methods and are reluctant to change and adopt new teaching methods (Jamieson-Proctor et al., 2006, p. 512; Means, 1994, p. 57).  Teachers who are reluctant to make use of ICT usually have negative attitudes towards ICT.  Care should be taken to influence them positively to make use of ICT (Becta ICT Research, 2004a, p. 17).  For teachers to become positive towards the use of ICT, they should understand the benefits of integrating ICT in education (Becta ICT Research, 2004a, p. 17; Jamieson-Proctor et al., 2006, p. 512).

### 2.5.7    Enablers for the uptake of Information and Communication Technology

Han (2002, p. 294) points out that there are various factors that may have an influence on the effective and sustainable integration of ICT.  Enablers for the effective and sustainable uptake of ICT are a supportive environment characterised by the following: availability of quality TPD, supportive and visionary leadership, collaboration, a climate of using ICT which is both encouraged and rewarded, the ease with which teachers integrate ICT, availability of resources and having on-site ICT support. Seyoum (2004, p. 7) and Nawawi, Ayub, Ali, Yunus and Tarmizi (2005, pp. 89 - 90), indicate two types of conditions that have to present for any innovation to be transferred and sustained in a school: essential conditions and contributing or supporting conditions.  Essential conditions are the availability of teachers' professional development and ICT resources, and perceived value of innovation.  Essential conditions are necessary but contributing or supporting conditions help to ensure the sustainability of the innovation.  Contributing conditions are: support within and outside the schools, funding, supportive plans, access to ICT resources, the desire to change, strategies

and policies that facilitate the sustainability of an innovation. Principals should assess the presence of specific conditions in schools and then take appropriate steps to strengthen the conditions that are already present while taking steps to rectify or improve those that are not present in order to facilitate and enhance the integration of ICT in teaching and learning (Nawawi et al., 2005, p. 96).

DoE designed various strategies to encourage the use of ICT. Planning contact time for collaboration with colleagues, initiating just-in-time ICT training, develop instructional ICT-based materials for teaching and learning and peer-teaching of ICT related skills. Collaboration with other schools to share expertise and experiences on ICT integration, equipping teachers with personal laptops so they would be able to make ICT use a part of their lives and not be constrained by the unavailability of ICT facilities, and by employing more ICT assistants to support teachers in ICT use. There are elements that affect the acceptance of new ideas and have an influence on the speed by which ICT will be successfully integrated into schools. Teachers' perceptions of the advantages of using ICT should be increased and the effective use of ICT must be visible. Teachers' ICT use will be determined by the compatibility of such ICT with their existing educational beliefs and values. The complexity of the task of planning, instruction and training has an influence as well as the fact that there should be sufficient opportunity for hands-on experience (Theroux, 2004, p. 2). The presence of incentives will motivate teachers to implement ICT in their teaching and learning. Leaders actively involved in the different activities for ICT integration are seen as role models that provide support and encouragement to teachers. Commitment from the teachers is crucial and can be obtained by involving them in the decision-making process and by leaders who expect and encourage their involvement. Leadership especially at school level make a considerable difference in terms of improvements in teaching and learning practices and it is the responsibility of that leadership to establish explicit ICT policies, goals, strategies and specific implementation plans for the current school year and in future (Plomp et al., 2003, p. 9).

## 2.6    Summary

Various studies indicate that many attempts have been made for teachers to integrate ICT successfully into their teaching and learning practices. However, unfortunately most of these attempts were not very successful. I have identified a number of barriers and enablers that influence teachers' successful integration of ICT, as well as factors concerning knowledge about teachers' individuality, community of practice and professional development. Although these factors are encountered in combination to contribute to teacher's effective

implementation of ICT into their teaching and learning practices, the role of the principal seems to be a prime determinant for the successful implementation of ICT.  Principals that want the education of learners at their schools to be in line with required 21st century skills will have to ensure that their teachers receive appropriate TPD on the effective integration of ICT in their teaching and learning practices.

While Thomas (2004, p. 41) states that "The fact that the dynamic interrelatedness of all of the identified influences might affect the implementation and sustainability of such projects, in the form of integrated systematic processes, is not considered in the literature at all."  Foskett and Lumby (2003, p. 193) indicate that: "There are not yet satisfactory tools for measuring leadership and its effect."  From this review of the literature it becomes clear that there is insufficient research on the relationship of critical factors for the integration of ICT in schools in relation to the specific role of the principal in TPD (Akbulut et al., 2007).

## 2.7    References used in this chapter

Ajzen, I. (1988). *Attitudes, Personality and Behaviour*. England: Open University Press.

Akbaba-Altun, S. (2006). Complexity of Integrating Computer Technologies into Education in Turkey. [Electronic version]. *Educational Technology and Society*, *2006*(9), 367-380. Retrieved 13 April 2007, from http://www.ifets.info/journals/9_1/15pdf

Akbulut, Y., Kesim, M., & Odabasi, F. (2007). Construct Validation of ICT Indicators Measurement Scale (ICTIMS). [Electronic version]. *International Journal of Education and Development using Information and Communication Technology*, *3*(3), 1-17. from http://ijedict.dec.uwi.edu//viewarticle.php?id=359&layout=html

Albion, P. R. (1999). Self-Efficacy Beliefs as an Indicator of Teachers' Preparedness for Teaching with Technology.   Retrieved 22 September, 2006, from http://www.usq.edu.au/users/albion/papers/site99/1345.html

Arnold, M., Perry, R., Watson, R., Minatra, K., & Schwartz, R. (2006). The Practitioner: How Successful Principals Lead and Influence.   Retrieved 16 August, 2007, from http://cnx.org/content/ml4255/latest/

Asan, A. (2003). Computer Technology Awareness by Elementary School Teachers: A Case Study from Turkey. [Electronic version]. *Journal of Information Technology Education*, *2*(2003), 153-164. Retrieved 8 August 2006, from http://www.jite.org/documents/Vol2/v2p153-164-109.pdf

Bajares, M. F. (1992). Teachers' Beliefs and Educational Research: Cleaning up a Messy Construct. *Review of Educational Research*, *62*(3), 307-332.

Basinger, D. (2003). Teachers Integrating Technology: Case Studies.   Retrieved 3 September, 2006, from http://www.usca.edu/essays/vol82003/basinger1.pdf

Becta ICT Research. (2003). What the Research Says About ICT Support for Schools. Retrieved 8 July, 2005, from http://www.becta.org.uk/page_documents/research/wtrs_aboutict.pdf

Becta ICT Research. (2004a). A Review of the Research Literature on Barriers to the Uptake of ICT by Teachers.   Retrieved 11 June, 2006, from http://partners.becta.org.uk/page_documents/research/barriers.pdf

Becta ICT Research. (2004b). What the Research Says About ICT and Continuing Professional Development (CPD) for Teachers. 2nd Edition Revised and Updated. Retrieved 8 July, 2006, from http://www.becta.org.uk/page_documents/research/wtrs_cpds.pdf

Becta ICT Research. (2005). The Becta Review 2005. Evidence on the Progress of ICT in Education.   Retrieved 9 July, 2005, from http://www.becta.org.uk/page_documents/research/becta_review_feb05.pdf

Becta ICT Research. (2006). The Becta Review 2006. Evidence on the Progress of ICT in Education.   Retrieved 11 June, 2006, from http://becta.org.uk/corporate/publications/documents/The_Becta_Review_2006.pdf

Berglund Center Summer Institute. (2002). Learning, Technology and Educational Transformation.   Retrieved 25 July, 2008, from http://education.ed.pacificu.edu/bcis/workshop/adoption.html

Berube, W., Gaston, J., & Stepans, J. (2004). The Role of the Principal in Teacher
Professional Development. [Electronic version]. *NOVAtions Journal*, *2004*(1).
Retrieved 22 July 2007, from
http://www.novationsjournal.org/content/media/volume2004/NOVAtions2004-1.pdf

Blase, J., & Blase, J. (2001). *Empowering Teachers. What Successful Principals do* (2nd
ed.). United States of America: Corwin Press.

Blase, J., & Blase, J. R. (1994). *Empowering Teachers. What Successful Principals do*.
California: Corwin Press. Sage Publications.

Borko, H. (2004). Professional Development and Teacher Learning: Mapping the Terrain.
[Electronic version]. *Educational Researcher*, *33*(8), 3-15. Retrieved 5 September
2006, from
http://www.aera.net/uploadedFiles/Journals_and_Publications/Journals/Educational_
Researcher/Volume_33_No_8/02_ERv33n8_Borko.pdf

Bradley, M. K., Kallick, B. O., & Regan, H. B. (1991). *The Staff Development Manager. A
Guide to Professional Development*. Boston: Allyn and Bacon.

Brand, G. A. (1997). What Research Says: Training Teachers for Using Technology.
[Electronic version]. *Journal of Staff Development*, *19*(1). Retrieved 10 August 2006,
from http://www.nsdc.org/library/publications/jsd/brand191.cfm

Buckenmeyer, J. A. (2005). No Computer Left Behind: Getting Teachers on Board with
Technology. Retrieved 12 April, 2007, from
http://center.uoregon.edu/ISTE/uploads/NECC2005/KEY_7304940/Buckenmeyer_ne
cc2005_RP.pdf

Busch, T. (1995). Gender Differences in Self-efficacy and Attitudes Toward Computers.
[Electronic version]. *Journal of Educational Computing Research*, *Volume 12*(1995),
147-148. from http://www.personal.psu.edu/users/m/t/mtel27/gender_differences.pdf

Bush, T. (2003). *Theories of Educational Leadership and Management*. London: Sage
Publications.

Bush, T., & Glover, D. (2004). Leadership Development: Evidence and Beliefs. Retrieved
10 October, 2007, from http://www.nesl.org.uk/media/756/EC/leadership-
development-evidence-and-beliefs.pdf

Busher, H. (2006). *Understanding Educational Leadership. People, Power and Culture*.
Berkshire: Open University Press.

Butler, J. A. (1992). Staff Development. Retrieved 20 August, 2007, from
http://www.nwrel.org/scpd/sirs/6/cul12.html

Carlson, S., & Gadio, C. T. (2002). Teacher Professional Development in the Use of
Technology. Retrieved 16 August, 2006, from
http://www.schoolnetafrica.net/fileadmin/resources/Teacher_Professional_Developme
nt_In_the_use_of_Technology.pdf

Center for CSRI. (2007). Improving Teacher Retention with Supportive Workplace
Conditions. Retrieved 16 August, 2007, from
http://www.centerforcsri.org/index.php?option=com_content&task=view&id=466&Item
id=5

Chen, J. C., & Chang, C. (2005). Testing the Whole Teacher Approach to Professional Development: A Study of Enhancing Early Childhood Teachers' Technology Proficiency.   Retrieved 28 July, 2006, from http://ecrp.uiuc.edu/v8n1/chen.html

Chung, T. K. (2005). Successful ICT Implementation in School - Two Prerequisites. Retrieved 17 July, 2008, from http://www.thecorner.org/ict/ict_leadership.pdf

Clarke, A. (2007). *The Handbook of School Management*. Cape Town: Kate McCallum.

Cope, C., & Ward, P. (2002). Integrating Learning Technology into Classrooms: The Importance of Teachers' Perceptions. [Electronic version]. *Educational Technology & Society*, *5*(1). Retrieved 22 September 2006, from http:/www.ifets.info/journals/5_1/cope.html

Cowie, B., & Jones, A. (2005). Digital Horizons: Laptops for Teachers Evaluation Study. Update on Secondary Teachers' Experiences.   Retrieved 16 August, 2007, from http://www.minedu.govt.nz/web/downloadable/dl8568_vl/laptop-leaders-report-12-9-with-edits-ds.doc

Cox, M. J., Preston, C., & Cox, K. (1999). What Motivates Teachers to Use ICT?   Retrieved 8 July, 2005, from http://www.leeds.ac.uk/educol/documents/00001329.htm

Darling-Hammond, L. (2005). *Professional Development Schools: Schools for Developing a Profession*. New York: Teacher College Press.

Davies, B. (2005). *The Essentials of School Leadership*. London: Sage Publications.

Davies, B., & Davies, B. J. (2005). Strategic Leadership. In B. Davies (Ed.), *The Essential of School Leadership*. London: Sage Publications.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User Acceptance of Computer Technology: A Comparison of Two Theoretical Models. *Management Science*, *35*(8), 982-1003.

Day, C. (1999). *Developing Teachers: The Challenges of Lifelong Learning*. London: Falmer Press.

Day, C., & Sachs, J. (2004). *International Handbook on the Continuing Professional Development of Teachers*. England: Open University Press.

Dean, J. (1991). *Professional Development in School*. Philadelphia: Open University Press.

Demiraslan, Y., & Usluel, Y. K. (2008). ICT Integration Processes in Turkish Schools: Using Activity Theory to Study Issues and Contradictions. [Electronic version]. *Australasian Journal of Educational Technology*, *24*(4), 458-474. Retrieved 27 August 2008, from http://www.ascilite.org.au/ajet/ajet24/demiraslan.html

Di Benedetto, A. O. (2005). Does Technology Influence Teaching Practices in the Classroom?   Retrieved 22 September, 2006, from http://web.uoregon.edu/ISTE/uploads/NECC2005/KEY_6820721/DiBenedetto_NECC_Paper_RP.pdf

Diaz-Maggioli, G. (2004). Teacher-Centered Professional Development.   Retrieved 31 July, 2007, from http://www.ascd.org/portal/site/ascd/template.chapter/menuitem.b71d101a2f7c208cdeb3ffdb62108a0c/?chapterMgmtId=5b39cba5ddcaff00VgnVCM1000003d01a8c0RCRD

Dimmock, C., & Walker, A. (2005). *Educational Leadership. Culture and Diversity*. London: Sage Publications.

Dirksen, D., & Tharp, D. (1996). Utilizing CBAM to Assess the Use of Instructional Technologies in the Classroom.   Retrieved 17 April, 2000, from http://www.coe.uh.edu/insite/elec_pub/html1996/06preser.html

DoE. (2004a). ICT in Schools in Turkey. Policy Note.   Retrieved 10 February, 2008, from http://www.oecd.org/dataoecd/25/62/2736884.pdf

DoE. (2004b). *White Paper on e-Education. Notice 1922 of 2004*. Pretoria.

Drago-Severson, E. (2004). *Helping Teachers Learn. Principal Leadership for Adult Growth and Development*. California: Sage Publications.

Eastin, M. S., & LaRose, R. (2000). Internet Self-efficacy and the Psychology of the Digital Divide.   Retrieved 7 August, 2006, from http://jcmc.indiana.edu/vol6/issue1/eastin.html

Edgerson, D. E., & Kritsonis, W. A. (2006). Analysis of the Influence of Principal-Teacher Relationships on Student Academic Achievement: A National Focus. [Electronic version]. *National Journal for Publishing and Mentoring Doctoral Student Research*, *1*(1). Retrieved 10 March 2008, from http://www.nationalforum.com/Electronic%20Journal%20Volumes/Edgerson,%20David%20Analysis%20of%20the%20Influence%20of%20Principal.pdf

Ehman, L., Bonk, C., & Yamagata-Lynch, L. (2005). A Model of Teacher Professional Development to Support Technology Integration. [Electronic version]. *AACE Journal*, *13*(3), 251-270. Retrieved 8 August 2006, from http://www.thutong.org.za/resources/research/Model%20Teacher%20Prof%20Dev%20ICT%20Integration%202005.pdf

Everard, K. B., Morris, G., & Wilson, I. (2004). *Effective School Management* (4th ed.). London: Sage Publications.

Fabry, D., & Higgs, J. (1997). Barriers to the Effective Use of Technology in Education. *Journal of Educational Computing*, *17*(4), 385-395.

Foskett, N., & Lumby, J. (2003). *Leading and Managing Education. International Dimensions*. London: Paul Chapman Publishing.

Francis, H. A., & Ezeife, A. N. (2007). Integrating Information and Communication Technology into the School Curriculum: A Case for Professional Development Models.   Retrieved 16 August, 2007, from http://www.asstudents.unco.edu/students/AE-Extra/2007/4/Ezeife.html

Gibson, I. W. (2002). Technology, Pedagogy and Education. [Electronic version]. *Journal of Information for Teacher Education*, *11*(3), 315-334. Retrieved 14 August 2007, from http://dx.doi.org/10.1080/14759390200200140

Gibson, S., & Oberg, D. (1999). Two Studies of Teacher Learning about Internet Use. [Electronic version]. *International Electronic Journal for Leadership in Learning*, *3*(3), 1-9. Retrieved 28 July 2006, from http://www.ucalgary.ca/~iejll/volume3/gibson.html

Girod, M., & Cavanaugh, S. (2001). Technology as an Agent of Change in Teacher Practise. Retrieved 5 November, 2005, from http://www.thejournal.com/magazine/vault/A3429.cfm

Glatthorn, A. A., Jones, B. K., & Bullock, A. A. (2006). *Developing Highly Qualified Teachers. A Handbook for School Leaders*. United States of America: Corwin Press.

Gordon, G. (2003). Do Principals Make a Difference?   Retrieved 30 August, 2007, from http://www.centerforcsri.org/index.php?option=com_content&task=view&id=466&It

Green, F. (2000). *The Head Teacher in the 21st Century. Being a Successful School Leader*. Harlow: Pearson Education Limited.

Guru, M., & Percy, B. (2005). *Recapturing Technology for Education. Keeping Tomorrow in Today's Classrooms*. United States of America: Rowman & Littlefield Publishers, Inc.

Han, C. (2002). Leadership Roles of a Pre-school Principal in the Use of Information and Communication Technology: A Hong Kong Experience. [Electronic version]. *Contemporary Issues in Early Childhood*, *3*(2), 293-297. Retrieved 16 August 2007, from http://www.wwwords.co.uk/pdf/viewpdf

Hezel Associates LLC. (2005-2006). PBS TeacherLine National Survey of Teacher Professional Development.   Retrieved 17 August, 2007, from http://www.hezel.com/PBSTeacherLine2005_2006_report.pdf

Ho, J. (2006). Technology Leadership. *IT Literature Review*   Retrieved 10 March, 2008, from http://www.moe.gov.sg/edumall/rd/litreview/techn_leadership.pdf

ICT op School. (2006). *Four in Balance Monitor 2006. Evidence on ICT in Education*. Netherlands: Kennisnet ICT op School.

Inger, M. (1993). Teacher Collaboration in Secondary Schools. *CenterFocus*, *2*.

Jackson, G. (2000). Technology for Teacher Support.   Retrieved 4 May, 2005, from http://www.techknowlogia.org/TKL_active_pages2/CurrentArticles/main.asp?FileType=HTML&ArticleID=209

Jacobs, M., Vakalisa, N., & Gawe, N. (2004). *Teaching-learning Dynamics. A Participative Approach for OBE* (3rd ed.). Cape Town: Heinemann Publishers.

Jamieson-Proctor, R. M., Burnett, P. C., Finger, G., & Watson, G. (2006). ICT Integration and Teachers' Confidence in Using ICT for Teaching and Learning in Queensland State Schools. [Electronic version]. *Australasian Journal of Educational Technology*, *22*(4), 511-530. Retrieved 16 August 2007, from http://www.ascilite.org.au/ajet/ajet22/jamieson-proctor.html

Jimoyiannis, A., & Komis, V. (2007). Teacher Development. [Electronic version]. *Teacher Development*, *11*(2), 149-173. Retrieved 14 August 2007, from http://www.ecedu.upatras.gr/services/people/files_publications/TD_JimoyiannisKomis.pdf

Johnson, S. M. (2004). *Helping Teachers Learn. Principal Leadership for Adult Growth and Development*. California: Sage Publications.

Kalake, M. (2007). *Factors Enabling and Constraining ICT Implementation in schools: A Multiple Case Study of Three Secondary Schools in Lesotho.* Rhodes University.

Kante, C. (2003). e-Training: The New Frontier of Teacher Professional Development. [Electronic version]. *TechKnowLogia*(19), 1-4. Retrieved 7 July 2005, from http://www.techknowlogia.org/TKL_active_pages2/CurrentArticles/t-right.asp?IssueNumber=19

Knapp, L. R., & Glenn, A. D. (1996). *Restructuring Schools with Technology*. Boston: Allyn & Bacon.

Kotyk, P. (2006). Online Professional Development for Teachers. [Electronic version]. *Massachusetts Computer Using Educators. On Cue*, *2006*(Winter). Retrieved 17 April 2007, from http://www.masscue.org/publications/archive/online_PD_teachers.pdf

Kovalchick, A., & Dawson, K. (2004). *Education and Technology: An Encyclopedia*. California: ABC-CLIO.

Kruger, A. G., & Steinman, C. F. (2003). The Organisational Climate and Culture of Schools. In I. Van Deventer & A. G. Kruger (Eds.), *An Educator's Guide to School Management Skills*. Pretoria: Van Schaik.

Lal, V. (2002). The Impact of Computer-based Technologies in Schools - A Prelimary Literature Review. Retrieved 27 August, 2006, from http://www.effectsproject.uts.edu.au/project_papers/4_vijendra_lal.pdf

Latina, Z. (2000). Early Adopters of Technological Innovations. Retrieved 24 July, 2008, from http://www.zonalatina.com?ZLdata99.htm

Law, N., & Chow, A. (2007a). *IEA SITES International Report: Pedagogical Practices in Mathematics and Science and the Use of ICT*: International Association for the Evaluation of Educational Achievement.

Law, N., & Chow, A. (2007b). *IEA SITES International Report: Teacher Characteristics, Contextual Factors and How These Affect the Pedagogical Use of ICT*: International Association for the Evaluation of Educational Achievement.

Leask, M. (2001). *Issues in Teaching Using ICT*. Cambridge: University Press.

Leithwood, K. (2002). Organizational Conditions to Support Teaching and Learning. In W. D. Hawley & D. L. Rollie (Eds.), *The Keys to Effective schools. Educational Reform as Continuous Improvement*. California: Corwin Press.

Lieberman, A. (2000). Networks as Learning Communities: Shaping the Future of Teacher Development. *Journal of Teacher Education*, *51*(3), 221-227.

Loveless, A., & Dore, B. (2002). *ICT in the Primary School*. Philadelphia: Open University Press.

Marsh, C. C. (1997). *Planning, Management and Ideology: Key Concepts for Understanding Curriculum* (Vol. 2). London: Falmer Press.

Massachusetts Department of Education. (2002). *EdTech 2001*. Retrieved 5 March 2007. from http://www.doe.mass.edu/edtech/etreport/2001.pdf.

McCain, T. D. E., & Jukes, I. (2001). *Windows of the Future*. California: Corwin Press.

McKenzie, J. (1999). *How Teachers Learn Technology Best*. Washington: FNO Press.

Means, B. (1994). *Technology and Educational Reform*. California: Jossey-Bass Inc.

Moonen, B., & Voogt, J. (1998). Using Networks to Support the Professional Development of Teachers. [Electronic version]. *Journal of In-service Education*, *24*(1998), 99-110. from http://taylorandfrancis.metapress.com/media/78llrlywyhl43rjgvkwp/contributions/n/6/j/m/n6jmm4247480nl41.pdf

Mullen, C. A. (2005). *Mentorship*. United States of America: Peter Lang Publishing.

Nawawi, M. H., Ayub, A. F. M., Ali, W. Z. W., Yunus, A. S. M., & Tarmizi, R. A. (2005). Teachers' Perceptions on the Conditions Facilitating the Use of Computers in Teaching Mathematics. [Electronic version]. *Malaysian Online Journal of Instructional Technology*, *2*(3), 88-98. Retrieved 22 September 2006, from http://www.pppjj.usm.my/mojit/articles/pdf/Dec05/11%20-%20MATHEMATICS_TEACHERS_PERCEPTIONS-f.pdf

NCREL. (2000). Critical Issue: Providing Professional Development for Effective Technology Use. Retrieved 25 February, 2005, from http://www.ncrel.org/sdrs/areas/issues/methods/technlgy/te1000.htm

Nichols, J. (2006). Technology Integration Model for Teachers. Retrieved 29 July, 2007, from http://www.teach-nology.com/tutorials/integrate/print.htm

Nolan, K., Friesen, D., Maeers, V., & Couros, A. (2005). A Case-Study of Pre-service Teachers Learning to Teach with Technology During Internship. Retrieved 30 August, 2007, from http://www.educationaltechnology.ca/couros/publications/research/Nolan-EdMedia2005.pdf

OFSTED. (2001). *ICT in Schools. The Impact of Government Initiatives*. London.

Paul, J. R. M. (1999). Empowering Teachers to Use Computers Effectively Across the Curriculum. Retrieved 7 July, 2005, from http://archive.wcape.school.za/mm99/cd/conf99/proceedings/31/CTPAPE~1.rtf

Pelgrum, W. J. (2007). *IEA SITES International Report: School Conditions for Pedagogy and ICT*: International Association for the Evaluation of Educational Achievement.

Phelps, R., Graham, A., & Kerr, B. (2004). Teachers and ICT: Exploring a Metacognitive Approach to Professional Development. [Electronic version]. *Australasian Journal of Educational Technology*, *20*(1), 49-68. Retrieved 28 July 2006, from http://www.ascilite.org.au/ajet/ajet20/phelps.html

Plomp, T., Anderson, R. E., Law, N., & Quale, A. (2003). *Cross-National Information and Communication. Technology Policy and Practices in Education*. United States of America: Information Age Publishing.

Prinsloo, I. J., & Van Schalkwyk, O. J. (Eds.). (2008). *Distance Education Programme ACE: Education Management*. Pretoria: University of Pretoria.

Rallis, S. F., & Goldring, E. B. (2000). *Principals of Dynamic Schools. Taking Charge of Change*. California: Corwin Press.

Roberts, J., & Associates. (1999). Integration of Information and Communication Technologies (ICTs) Through Teacher Professional Development: Issues and Trends in Canada.   Retrieved 8 August, 2006, from http://www.cmec.ca/international/forum/itr.canada.en.pdf

Rodrigues, S. (2005a). *International Perspectives on Teacher Professional Development: Changes Influenced by Politics, Pedagogy and Innovation*. New York: Nova Science Publishers.

Rodrigues, S. (2005b). *A Model of Teacher Professional Development. The Partnership in the Primary Science Project*. New York: Nova Science Publishers.

Sallis, E., & Jones, G. (2002). *Knowledge Management in Education. Enhancing Learning and Education*. London: Kogan Page Limited.

Sapre, P. (2002). Realising the Potential of Educational Management in India. *Educational Management and Administration*, *30*(1), 101-108.

Schlager, M., & Fusco, J. (2003). Teacher Professional Development, Technology, and Communities of Practice: Are We Putting the Cart before the Horse?   Retrieved 3 September, 2006, from http://tappedin.org/tappedin/web/papers/2003/TPDBarab.pdf

Schumaker, D. R., & Sommers, W. A. (2001). *Being a Successful Principal. Riding the Wave of Change Without Drowning*. California: Corwin Press.

Scrimshaw, P. (2004). Enabling Teachers to Make Successful Use of ICT.   Retrieved 7 July, 2005, from http://www.becta.org.uk/page_documents/research/enablers.pdf

Selwyn, N. (2002). *Telling Tales on Technology: Qualitative Studies of Technology and Education*. London: Ashgate Publishing Limited.

Sergiovanni, T. J., & Starratt, R. J. (1988). *Supervision: Human Perspectives* (4th ed.). New York: McGraw-Hill.

Seyoum, A. F. (2004). Key Issues in the Implementing and Integration of ICT in Education System of the Developing Countries.   Retrieved 10 September, 2006, from http://edu.et/session%20IV_fullpapers/Key%20Challenges%20fators%20implementation_Abebe%20Feleke.pdf

Shelly, G. B., Cashman, T. J., Gunter, R. E., & Gunter, G. A. (2004). *Teachers Discovering Ccomputers. Integrating Technology in the Classroom* (3rd ed.). United States of America: Thomson Learning.

Simonson, M. R., & Thompson, A. (1997). *Educational Computing Foundations* (3rd ed.). Englewood Cliffs: Prentice-Hall.

Somekh, B., & Davis, N. (1997). *Using Information Technology Effectively in Teaching and Learning*. London: Routledge Publishers.

Soule, H. (2003). What do you Mean by ICT Integration? [Electronic version]. *Journal for Educational Reform in Namibia*, *16*(April), 1-11. Retrieved 16 August 2007, from http://www.schoolnetafrica.net/fileadmin/resources/What_do_you_mean_by_ICT_integration.pdf

Southworth, G. (2005). Learning-centred Leadership. In B. Davies (Ed.), *The Essentials of School Leadership*. London: Sage Publications.

Spurr, B., Rosanowski, J., & Williams, C. (2003). Investigating How Principals Influence Learning.   Retrieved 16 August, 2007, from http://www.atea.edu.au/ConfPapers/2003/Reviewed%20Papers/Spurr.doc

Stephens, P., & Crawley, T. (1994). *Becoming an Effective Teacher*. England: Stanley Thornes Publishers.

Steyn, G. M., & Van Niekerk, E. J. (2005). *Human Resource Management in Education*. Pretoria: UNISA Press.

Stoner, G. (1999). A Conceptual Framework for the Integration of Learning Technology. Retrieved February 10, 2006, from http://www.icbl.hw.ac.uk/ltdi/implementing-it/frame.htm

Tallerico, M. (2005). *Supporting and Sustaining Teachers' Professional Development. A Principal's Guide*. United States of America: Corwin Press.

Tenbusch, J. P. (1998). Teaching the Teacher; Technology Staff Development that Works. Retrieved 10 September, 2005, from http://www.electronic-school.com/0398f1.html

Theroux, P. (2004). Enhance Learning with Technology.   Retrieved 19 September, 2006, from http://members.shaw.ca/priscillatheroux/change.htm

Thomas, H. E. (2006). *The Sustainable Implementation of Computers in School Districts: A Case Study in the Free State Province of South Africa.* University of Pretoria, Pretoria.

Thorburn, D. (2004). Technology Integration and Educational Change: Is it Possible? Retrieved 11 August, 2006, from http://www.usask.ca/education/coursework/802papers/thorburn/index.htm

Toledo, C. (2005). A Five-Stage Model of Computer Technology Integration into Teacher Education Curriculum. [Electronic version]. *Contemporary Issues in Technology and Teacher Education*, *5*(2), 177-191. Retrieved 25 July 2008, from http://www.citejournal.org/articles/v5i2currentpractice2.pdf

Tomlinson, H. (2004). *Educational Leadership. Personal Growth For Professional Development*. London: Sage Publications.

Vallance, M. (2008). Beyond Policy: Strategic Actions to Support ICT Integration in Japanese Schools. [Electronic version]. *Australasian Journal of Educational Technology*, *24*(3), 275-293. Retrieved 27 August 2008, from http://www.ascilite.org.au/ajet/ajet24/vallance.pdf

Valli, L., & Hawley, W. D. (2002). Designing and Implementing School-based Professional Development. In W. D. Hawley & D. L. Rollie (Eds.), *The Keys to Effective schools. Educational Reform as Continuous Improvement*. California: Corwin Press.

Van der Westhuizen, P. C. (1997). Educational Management Tasks. In P. C. van der Westhuizen (Ed.), *Effective Education Management*. Pretoria: Kagiso.

Van Deventer, I., & Kruger, A. G. (2003). *An Educator's Guide to School Management Skills*. Pretoria: Van Schaik.

Van Rooyen, J. W., Joubert, H. J., & Heystek, J. (2005). ACE: Education Management. In *Department of Education. Management and Policy Studies*. Pretoria: University of Pretoria.

Viadero, D. (2005). Pressure Builds for Effective Staff Training.   Retrieved 4 September, 2006, from http://www.edweek.org/agentk-12/teacher-recruiter/2005/07/27/43pd.h24.html

Wallace, M., & Poulson, L. (2003). *Learning to Read Critically in Educational Leadership and Management*. London: Sage Publications.

Walsh, K. (2002). ICTs about Learning: School Leadership and the Effective Integration of Information and Communications Technology.   Retrieved 8 February, 2008, from http://www.ncsl.org.uk/media/1DO/CD/icts-about-learning.pdf

Wang, Q., & Woo, H. L. (2007). Systematic Planning for ICT Integration in Topic Learning. [Electronic version]. *Educational Technology and Society*, *10*(1), 148-156. Retrieved 16 August 2008, from http://www.ifets.info/journals/10_1/14.pdf

Waters, S. (2008). Rogers Adoption Innovation Curve.   Retrieved 25 July, 2008, from http://suewaters.wikispaces.com/Rogers

Webber, C., & Robertson, J. (1998). Boundary Breaking: An Emergent Model for Leadership Development. [Electronic version]. *Education Policy Analysis Archives*, *6*(21), 1-22. Retrieved 20 April 2007, from http://epaa.asu.edu/epaa/v6n21.html

West-Burnham, J. (1992). *Managing Quality in Schools: Effective Strategies for Quality Based School Improvement*. Harlow: Longman.

Wikipedia. (2006). Technology Integration.   Retrieved 27 September, 2006, from http://en.wikipedia.org/wiki/Technology_integration

Woodbridge, J. (2004). Technology Integration as a Transforming Teaching Strategy. [Electronic version]. *techlearning*, *2004*(March). Retrieved 27 July 2006, from http://www.techlearning.com/shared/printableArticle.jhtml?articleID=17701367

Young, P. G., Sheets, J. M., & Knight, D. D. (2005). *Mentoring Principals. Frameworks, Agendas, Tips and Case Stories for Mentors and Mentees*. United States of America: Corwin Press.

Zepeda, S. J. (1999). *Staff Development. Practices that Promote Leadership in Learning Communities*. New York: Eye On Education.

Zhao, Y., & Bryant, F. L. (2006). Can Teacher Technology Integration Training Alone Lead to High Levels of Technology Integration? A Qualitative Look at Teachers' Technology Integration after State Mandated Technology Training. [Electronic version]. *Electronic Journal for the Integration of Technology in Education*, *5*, 53-62. Retrieved 23 September 2006, from http://ejite.isu.edu/Volume5/Zhao.pdf

Zheng, D. (2003). Teachers' Perception of Using Instructional Technology in the Classroom. Retrieved 22 September, 2006, from http://www.education2.uconn.edu/epsy240/dzheng/portfolio/products/Teacher_Perception_IT.pdf

**Chapter 3: Research design and methodology**

# Chapter Three

## Research design and methodology

___

### 3.1        Introduction

Research is a process of gaining a better understanding of the complexities of human experience.  The goal of research is to describe and understand a field, practice or activity (Brown & Dowling, 2001, p. 7).  McMillan and Schumacher (2001, pp. 5 - 6) regard educational research to be imperative as it provides valid information, knowledge and principles to guide the decision-making, thinking and discussion process in education.  Through planned and systematic collection, interpretation and analysis of data (Cohen & Manion, 1994, p. 40; Marshall & Rossman, 1999, p. 21; McMillan & Schumacher, 2001, p. 35), the emphasis falls on inductive analytical strategies (McMillan & Schumacher, 2001; Ritchie & Lewis, 2003).

Recent literature accentuates the critical role of the principal in the effective and sustainable development of ICT integration in schools (Di Benedetto, 2005, p. 4; Thomas, 2006, p. 31).  It is therefore important to clarify this position (role) that contributes to teachers' effective use of ICT in their teaching and learning practices, as well as to increase the understanding of how principals develop and unfold effective ICT practice in their managerial environments through TPD.

The conceptual framework and the literature review presented in Chapter, 2 together with the research design and methodology outlined in this chapter indicate the approach to address the research questions listed in Chapter 1 (§ 1.6).

### 3.2        The nature of this study

As indicated in Chapter 1 the perceptions of the respondents related to personal experiences in their particular school environments will be investigated.  This indicates that the research is exploratory, explanatory and descriptive in nature (Babbie & Mouton, 2001, pp. 79 - 81; Marshall & Rossman, 1999, p. 33).

This exploratory research aims to investigate the under-researched phenomena and the prime purpose is to develop understanding in an area that is little understood.  This research can generate ideas for further research and lead to the identification and/or determination of

categories of meaning.  This adds to identify plausible relationships shaping the phenomenon (Marshall & Rossman, 1999, p. 33).  The study is also descriptive of nature as it documents and describes the complexities of the phenomena, the influence of personalities, the differences of opinions on issues and how the difference influences the results (Merriam, 1998, pp. 30 - 31), as well as the process and us of data that was collected (Marshall & Rossman, 1999, p. 33).  The explanatory side of this research is mainly concerned with causes.  The focus is on seeking, providing and evaluating the influence that two or more phenomena have on each other, explaining a fundamental relationship that is important or meaningful.

The research design is the researcher's plan of enquiry (Bogdan & Knopp Biklen, 2006, p. 54; McMillan & Schumacher, 2001, p. 72) that puts paradigms of interpretation into motion (Denzin & Lincoln, 2000, p. 22) on how to proceed in gaining an understanding of a phenomenon in its natural setting (Ary et al., 2002, p. 426).  The purpose of a research design is to provide, within an appropriate mode of inquiry, the most valid and accurate answers possible to the research question (Denzin & Lincoln, 2000, p. 22; McMillan & Schumacher, 2001, p. 31).  An effective research design outlines the defined purpose in which there is coherence between the research questions and the methods or approaches proposed that generates data that is credible and verifiable (McMillan & Schumacher, 2001, p. 74).  This research design encourages the process of strategic thinking and reflection (Mason, 2002, p. 25) from the start and continues throughout the whole research process which calls for constant review of decisions and approaches (Ritchie & Lewis, 2003, p. 47).

### 3.2.1    Unit of analysis

The unit of this analysis was the principals' role in developing effective ICT at their schools through TPD.  The data captured from interviews and the researcher's field notes (§ 3.6.1) were analysed to identify the principals' influence on TPD for the integration of ICT in schools (Addendum 3.1).  The respondents were handpicked on the basis of their typicality.  Cohen and Manion (1994, p. 89) state: "In this way the researcher will build up a sample that is satisfactory to her specific needs."  In this approach, the selection of respondents are criterion-based (Mason, 2002).  The respondents have been chosen because they have "... particular features or characteristics that will make possible detailed exploration and understanding of the central themes and puzzles that the researcher wishes to study" (Ritchie & Lewis, 2003, p. 78).  The respondents encompassed all the elements that could impact on the outcome of the study to provide understanding and insight into the research problem.  Ritchie and Lewis (2003, p. 83) indicate that qualitative samples are usually small

because a phenomenon has to appear only once to be part of an analytic map.  There is no point in increasing the sample size when no new evidence is obtained.  The sampling will be terminated when a point of saturation or redundancy is reached (Mason, 2002, p. 134; Merriam, 1998, p. 64).

The use of inductive reasoning allows the researcher to draw hypotheses (Cohen & Manion, 1994, p. 3).  "Hypotheses are the relationships drawn among categories and properties" Merriam (1998, p. 18).  McMillan and Schumacher (2001, p. 41) point out: "Inductive reasoning allows one to explore and discover with an emerging research design."

### 3.2.2    Selection of research respondents

The sampling strategy I used in this qualitative research study was a purposeful sampling strategy.  As I am a part time lecturer at the University of Pretoria, I have access to principals who also give lectures.  This provided me with the opportunity to identify appropriate principals from different environments during contact sessions at different venues.  The principals themselves also put me into contact with other principals who they knew would fit in with the selection criteria.  Merriam (1998, p. 61) emphasis that: "Purposeful sampling is based on the assumption that the researcher wants to discover, understand, and gain insight and therefore must select a sample from which the most can be learned.  The logic and power of purposeful sampling lies in selecting information-rich cases for in-depth study."  I therefore selected respondents non-randomly for a particular reason (McBurney, 1994, p. 203), to generate meaningful and relevant data that will enable me to address the research question and form grounded arguments to support the findings (Mason, 2002, p. 121).

The two types of purposive sampling used in this study provided maximum variation sampling, as well as snowball sampling.  In maximum variation sampling, units are included that represent diverse variations of specified characters and important common patterns are identified (Ary et al., 2002, p. 429; Marshall & Rossman, 1999, p. 33; Merriam, 1998, p. 63).  Respondents were selected because they have particular features or characteristics that enable detailed description and exploration in this research study.  Members of a sample are chosen with a purpose to represent a location or type in relation to a key criterion and have a principal aim to ensure that within each of the key criteria.  Diversity is included so that the impact of the characteristics can also be explored (Ritchie & Lewis, 2003, p. 79).  Snowball sampling was also employed by asking respondents to point out other members of that population whom they know.  Snowball refers to the process of accumulation as each located subject suggests other subjects whom they know are information rich (Babbie & Mouton,

2001, p. 647; Cohen & Manion, 1994; Marshall & Rossman, 1999; Merriam, 1998). A summary of the profile of the respondents are available in Table 3.1.

**Table 3.1    Summary of the profile of the respondents**

| Interview | Location | Learners | | Computers & centres | | Principal | Advancement towards ICT integration | Resources |
|---|---|---|---|---|---|---|---|---|
| | | White | Black | | | | | |
| 1 | Urban | X | X | 4 | 40 in class | White male | Exceptional advanced | Very good |
| 2 | Urban | X | X | 2 | 28 in class 18 in media | White male | Semi advanced | Poor |
| 3 | Rural | X | X | 4 | 40 in class | White male | Exceptional advanced | Very good |
| 4 | Rural | X | X | 2 | 35 in class | White male | Semi advanced | Good |
| 5 | Rural | | X | 1 | 24 in class | Black male | Good advanced | Poor |
| 6 | Rural | | X | 2 | 20 in class | Black male | Poorly advanced | Very poor |
| 7 | Urban | X | X | 1 | 35 in class | White female | Good advanced | Good |

| | |
|---|---|
| Exceptional advanced: | Various ICT strategies in place for effective and sustainable integration |
| Good advanced: | Various ICT strategies in place for effective integration |
| Semi advanced: | Current ICT strategies need to be amended |
| Poorly advanced: | No ICT strategies in place for effective and sustainable integration |
| Very good: | Exceptional resources available for teachers and learners |
| Good: | Resources available for teachers and learners |
| Poor: | Restricted resources available for teachers and learners |
| Very poor: | Minimum resources available for teachers and learners |

From Table 3.1 it becomes evident that the unit of analysis is multi-racial and that it includes both genders. The sample relates to both urban and rural areas; different levels of resourcing of the selected schools, as well as of the different levels of resourcing available for the advancement of ICT integration.

## 3.3    Research methodology

The methodological design is the logic through which a researcher addresses the research questions (Mason, 2002, p. 30), and gains data for the study (Denzin & Lincoln, 2000, p. 157). Research methodology encompasses the complete research process: the research approaches, procedures and data-collection or sampling methods used (McMillan & Schumacher, 2001, p. 74). Therefore, the aim of research methodology is to understand the processes and not the product of scientific inquiry (Cohen & Manion, 1994, p. 39). According to Burrell and Morgan (1979, p. 22), social research paradigms can be classified in the four categories indicated in Figure 3.1.

**Figure 3.1        Four paradigms of social research***



Radical Change

Radical Humanism | Ontology | Radical Structuralism

Subjectivism — — — Epistemology — — — — — Objectivism

Interpretivism | | Functionalism

Regulation
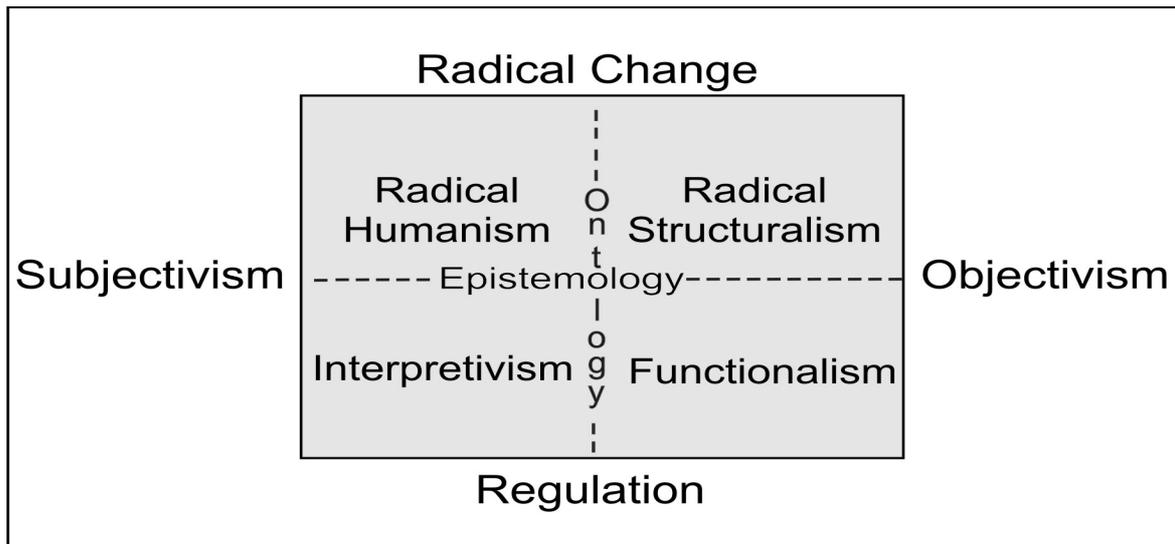
\*        Adapted from Burrell and Morgan (1979, p. 22).

I followed an interpretive approach to explore, explain and describe the principals' influences on TPD for the integration of ICT in schools.  Mason (2002, p. 56) indicates that the interpretive approach not only sees people as primary sources of data but also seek the meaning and interpretation that people give to their social world.  Cohen and Manion (1994, p. 36) state: "Efforts are made to get inside the person and to understand within."  According to Flick, Von Kardoff and Steinke (2004, p. 5) the qualitative research approach: "Is more open and thereby 'more involved' than other research strategies and forms the starting point for the construction of a grounded theoretical basis."  Cohen and Manion (1994, p. 37) maintain that: "Theory should not precede research but follow it" as the "theory becomes sets of meanings which yield insight and understanding of people's behaviour."  Qualitative research is therefore grounded in a philosophical position that is broadly interpretive in the sense that it is concerned with how the social world is interpreted, understood, experienced, produced and constituted.  Methods of data generation are used that are flexible and sensitive to the social context in which data are produced.  Emphasis is placed on 'holistic' forms of analysis and explanation (Mason, 2002, p. 3).

## 3.4        Qualitative research approach

Qualitative research is an umbrella concept that includes several research strategies (Bogdan & Knopp Biklen, 2006, p. 2; Merriam, 1998, p. 5).  Research strategies are flexible combinations of techniques to obtain valid and reliable data.  Qualitative methods emphasise aspects of meaning, process and context: the 'why' and the 'how', rather than the 'how many' (Cohen & Manion, 1994; Litoselliti, 2003).  Qualitative research has an unravelling capacity

to generate data that have richness, depth, nuance, context, multi-dimensionality and complexity (Denzin & Lincoln, 2000, p. 10; Flick et al., 2004, p. 3; Mason, 2002, p. 1).

Research questions are formulated to investigate topics in all their complexity (Bogdan & Knopp Biklen, 1992, p. 2). As the respondents' perceptions direct their actions, thoughts, and feelings, it is necessary to analyse the contexts and narrate the meaning they attach to particular processes, situations and events (McMillan & Schumacher, 2001, p. 396). Qualitative research enables the researcher to produce cross-contextual generalities (Mason, 2002, p. 1). Merriam (1998, pp. 11 - 18) describes five types of qualitative research: generic, ethnographic, phenomenology, grounded theory and case studies. Generic refers to the discovery and understanding of a phenomenon, a process, perspective and view of people. My study is of an ethnographic nature as I employed interviewing to collect data that lead to socio-cultural interpretation. In this study I identified and clarified principals' perceptions, attitudes and practices relating to the challenges and preferences for TPD that contribute to teachers effective use of ICT in their teaching and learning practices. This will increase an understanding of how principals develop and unfold effective ICT practices through TPD in their schools. This research can also be seen as phenomenological. As Merriam (1998, p. 15) states: "The focus would be on the essence or structure of an experience (phenomenon)." This research is based on the assumption that principals exert particular influences on TPD for the integration of ICT in their schools. The experiences of the different principals are analysed and compared to identify the essence of the phenomenon. This study included a grounded theory as the researcher assumed an inductive stance and strived to derive meaning from the data in order to develop theory. Merriam (1998, p. 17) indicates: "The end result of this type of qualitative research is a theory that emerges from, or is 'grounded' in, the data." The comparative method is used to compare data determining the similarities and differences. Data with similar dimensions are grouped together as categories. The object of this analysis is to seek patterns in the data that are then arranged in relationship with one another in building a grounded theory (Merriam, 1998, p. 18).

Qualitative research provides rich narrative descriptions of the respondents' perspectives on the construction of the reality of their social world. The purpose of qualitative research is to understand social phenomena of multiple realities from respondents' perspective. The interviews took place in natural settings and no attempt was made to manipulate the respondents' behaviour. The researcher is the primary agent for the gathering and analysis of the data. The general characteristics of qualitative research is summarised in Table 3.2.

**Table 3.2    Characteristics for qualitative research**

| Characteristics | Description |
|---|---|
| Concern for content | • Human experience takes its meaning from social, historical, political and cultural influences<br>• Reality is socially constructed and constantly changing |
| Purpose | • To understand social phenomena of multiple realities from respondents' perspectives |
| Rich narrative description | • Data are in the form of words<br>• Subjects' experiences and perspectives<br>• Detailed context-bound generalisations<br>• Rich detailed description<br>• In-depth |
| Sample | • Small, non-random and purposeful |
| Method | • Interviews |
| Natural setting | • Takes place in natural setting<br>• No attempt to manipulate behaviour<br>• No artificial constraints or controls |
| Human instrument | • Researcher is the primary agent for the gathering and analysis of data<br>• Studies human experiences and situations, require an instrument to capture complexity of the human experience<br>• Becomes immersed in social situation<br>• Relies on fieldwork methods |
| Emergent design | • Design emerges as the study proceeds<br>• Self-questioning throughout research in order to think critically – reflexive acts<br>• Flexible and evolving<br>• Interaction and developmental |
| Inductive analysis | • Data collection and data analysis take place simultaneously<br>• Holistic form of analysis<br>• Identification of recurring patterns<br>• Proceeds from data to hypothesis to theory |

\*    Adapted from Ary Jacobs and Razavieh (2002); McMillan and Schumacher (2001); McMillan and Wergin (2002); Merriam (1998); Ritchie and Lewis (2003).

### 3.4.1    Qualitative data collection

Mills (2003, p. 4) indicates that: "Qualitative research uses narrative and descriptive approaches for data collection to understand the way things are and what they mean from the perspective of the research respondents."  Mason (2002, p. 3) points out in order to use above mentioned approaches it "requires a data collection instrument that is sensitive to underlying meaning when gathering and interpreting them."  The qualitative research methods used to generate data was in-depth interviews and field notes.

Interviews are one of the most common forms of qualitative research methods (Ary et al., 2002; Flick et al., 2004; Marshall & Rossman, 1999; Mason, 2002; Merriam, 1998; Ritchie & Lewis, 2003; Silverman, 2004, p. 140), and involve the construction or reconstruction of knowledge (Mason, 2002, p. 63).  The interview is an intense experience for both parties involved.  An interview is a flexible, interactive and generative tool to explore meaning and language in depth (Ritchie & Lewis, 2003, p. 142; Silverman, 2004, p. 126).  The interview

generates much information that can be used to provide insight of the respondents' experiences.  Qualitative interviewing refers to in-depth, semi-structured or loosely structured forms of interviewing (Ary et al., 2002; Mason, 2002) and requires asking veritably open-ended questions in a natural setting (Ritchie & Lewis, 2003, p. 141) in order to make analytical comparisons (Mason, 2002, p. 65).

The in-depth interview was used in this study.  McMillan and Schumacher (2001, p. 42) state that the "in-depth interview merely extends and formalises conversation and is often characterised as a conversation with a goal."  The open-ended nature of this research method allows the respondents to answer the questions according to their own frame of reference (Bogdan & Knopp Biklen, 1992, p. 3).  With this method I was able to use the data to substantiate my hypothesis (McMillan & Schumacher, 2001, pp. 273 - 274).  The in-depth interview focuses on the individual.  It provides an opportunity to address complex experiences and investigates each principal's personal perspective using a range of probes and other techniques to achieve in-depth understanding of the personal context within which the research phenomenon is located.  This type of data collection method generates data that adds richness, depth and roundedness to a study.  The researcher and principals interacted intensely; allowing for detailed subject coverage, clarification and understanding of motivations and decisions; and also generative in the sense of creating knowledge or thought.  Structure was combined with flexibility and data were captured in their natural form.  The data were tape-recorded for accurate transcription and analysis.  The key features of the interviews are summarised in Table 3.3.

Table 3.3        Key features of in-depth interviews*

| Features | Description |
|---|---|
| Naturalistic | • Interview data is captured in its natural form |
| Researcher | • Plays a key role in development of data and meaning<br>• More concerned with process than outcome<br>• Captures perspectives accurately |
| Data | • Data is descriptive in the form of words<br>• Includes field notes<br>• Theory is grounded in data<br>• Direction of research is determined after data is collected |
| Structure | • Makes use of different techniques, strategies and procedures<br>• Responses are probed and explored to achieve depth of answer in terms of penetration, exploration and explanation<br>• Researcher responsive to relevant issues raised spontaneously<br>• Structure is flexible<br>• Interview guide /schedule sets out the key topics and issues to be covered |
| Interactive | • Material is generated by interaction and collaboration between researcher and interviewee<br>• Encourages interviewee to talk freely when answering questions |
| Generative | • Creates new knowledge and engenders clear thinking |

**Table 3.3        Key features of in-depth interviews***

| Features | Description |
|---|---|
| **Explanatory** | • Explores respondents perspectives for example reasons, feelings, opinions and beliefs |
| **Analysis** | • Use of quotations helps to illustrate and substantiate analysis<br>• Analyses data inductively |
| **Aim** | • To achieve depth and coverage across key issues |

\*    Adapted from Bogdan and Knopp Biklen (2006); McMillan and Schumacher (2001); Ritchie and Lewis (2003).

I made use of an interview guide, different techniques, strategies, procedures to make the interviews as flexible as possible.  Familiar settings allowed for interaction to take place between the interviewee and the researcher.  I could explore and incorporate the interviewees' attitudes, attentions, perspectives and expectations on issues relating to the research question.  I, the researcher was the key agent in the development of data and meaning, capturing the principals' perspectives accurately.  Even though the interviews were recorded, the data were collected on the premises.  This supplemented the understanding of the data as the location contributed to the understanding of the individual interviews.  Ritchie and Lewis (2003), as well as Ary, Jacobs and Razavieh (2002) indicate various advantages for using in-depth interview as a data collection method.

- Providing undiluted focus of the respondents

- Providing opportunity for detailed investigation of respondents' perspectives and experiences

- In-depth understanding of the personal and research context

- Providing detailed subject coverage

- Clarification and detailed understanding of respondents' motivations and decisions

- Combining interview structure with flexibility

- Encouraging respondents to talk freely; allowing to explore impacts and outcomes

- Generating information through interaction between researcher and respondent

- Achieving depth in responding; opportunity to explore and explain

- Generating new knowledge and thoughts

- Capturing data in its natural form

- Audio recording of data and taking note of changes in the format when transferred to text

- Obtaining much data in a short period

- Providing insight to respondents' perspectives

- Allowing for immediate follow-up and clarification of respondents' responses

- Developing personal relationships in interacting with respondents.

Cohen and Manion (1994) and Ritchie and Lewis (2003) indicate various disadvantages for using in-depth interviews as a data collection method. To counteract these disadvantages, I took corrective actions during this study:

- **Prone to subjectivity and bias on the part of the interviewer:** I resisted supplying particular frames of reference for the respondents' responses. I maintained neutrality by encouraging expression, but not by helping in constructing responses.

- **Interviewee may feel uneasy and adopt avoidance tactics:** The interviews took place in a relaxed atmosphere and a neutral context conducive to open and undistorted communication. I approached the principals at the lecturing venues where I taught. This informal approach created a relaxed atmosphere and the principals were eager to share their experiences on ICT integration at their schools.

- **Time consuming, reluctance of respondent:** The interviews were conducted during the contact sessions and therefore demanded no additional time from the principals.

- **Expensive**: As the interviews were conducted during the contact sessions at learning centres, little additional travelling was necessary.

- **Trust between the interviewer and interviewee:** Due to existing relationships before the interviews, the climate of trust continued. Trust was also strengthened by the relationship of professionalism.

- **Audio taping of conversation, scared to speak:** The principals gave permission beforehand to be audio taped. The relaxed setting was conducive to the principals' willingness to share their experiences.

- **Personal and professional qualities of interviewer:** I listened carefully to fully comprehend the principals' responses. I then judged how to pose further probing questions. I also made notes during the interviews to elicit further discussion, clarification and elaboration.

- **Establish credibility with respondents:** I posed meaningful questions based on my knowledge and understanding of the topic.

- **Over-hasty interpretation of what researcher hears:** I paid special attention to the interview process; focusing on listening intently, and responding appropriately. As the interviews were audio taped, it provided me with the opportunity to review the interviews repeatedly to prevent hasty conclusions and interpretations.

- **Quality of questions:** I posed content-mapping and content-mining questions to generate an in-depth understanding of the respondent's experiences. I also avoided leading questions.

- **Reliability:** I audio taped the interviews, painstakingly transcribed the interviews and subsequently presented the transcription to the respondent as part of member checking

to verify the accuracy of the interview.  Field notes made during the interviews supplied verification of interview data.

- **Validity:**  I paid careful attention to all detail during the data collection and analysis of the data to ensure trustworthiness of the research process (Cohen & Manion, 1994; Ritchie & Lewis, 2003).

### 3.4.2    Field notes

Field notes presented an additional opportunity to collect data during in-depth interviews.  I took notes during the in-depth interviews then later expanded on them to constitute extensive field notes.  Field notes provide an opportunity for the researcher to record and comment on his/her thoughts about the setting, the respondents and activities.  Such data can contribute to further steps in subsequent fieldwork and issues relevant during the analysis phase (Merriam, 1998, p. 106; Ritchie & Lewis, 2003, p. 133).  Ary, Jacobs and Razavieh (2002, p. 431) indicate that field notes have two components: "The descriptive part which includes a complete description of the setting, the people and their reactions and interpersonal relationships, and accounts of events", and the second as the: "Reflective part which includes the observer's personal feelings or impressions about the events, comments on the research method, decisions and problems, records of ethical issues, and speculations about data analysis."  I included my field notes as part of the analysis to provide understanding of the research setting, as well as on the experiences of the respondents (§ 3.6.1) (Addendum 3.1).

### 3.5    Trustworthiness

Silverman (2004, p. 283) states: "Validity and reliability are two important concepts to keep in mind when doing research, because in them the objectivity and credibility of research are at stake."  To produce reliable and valid knowledge in an ethical manner, researchers should consider multiple methods to collect, analyse and interpret data.  Validity is more important and comprehensive than reliability, as it is harder to evaluate or measure (Ary et al., 2002, p. 267).  Trochim (2001, pp. 1 - 2) explains the relationship between reliability and validity as presented in Figure 3.2.  Together they contribute to the study's trustworthiness.

**Figure 3.2      Relationship between reliability and validity***

| Reliable not valid | Valid not reliable | Neither reliable nor valid | Both reliable and valid |
|---|---|---|---|
| Consistently and systematically measuring the wrong value for all respondents | On average, getting the right answer for the group | Hits are spread across the target, consistently missing the centre | Consistently hitting the centre of the target and measuring the concept perfectly |
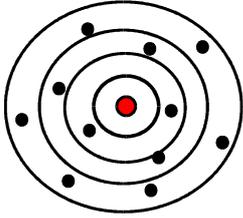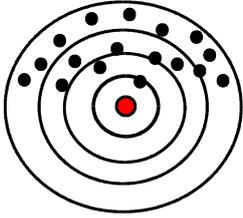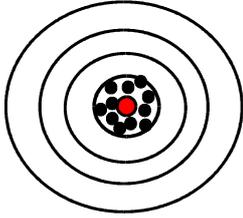
*       Adapted from Trochim (2001, pp. 1 - 2).

### 3.5.1     Validity

Validity refers to the truth (or falsity) of prepositions generated by research.  The researcher and respondents agree about the description or composition of events, especially the meanings of these events (Mason, 2002; McMillan & Schumacher, 2001; Mills, 2003). Validity is a test of whether the collected data accurately gauge what is being measured (Babbie & Mouton, 2001, p. 648; Denzin & Lincoln, 2002, p. 302; Mason, 2002, p. 39; Mills, 2003, p. 96).  McMillan and Schumacher (2001) and Ritchie and Lewis (2003) point to strategies to enhance validity in the conduct of qualitative inquiry and the qualitative researcher can use as a combination:

- **Field work and long-term observation:**  I conducted the research in a natural setting to promote the reality of the respondents' experiences more accurately.  Interim data analysis and corroboration enhanced the validity of data collected over a period of time.
- **Constant comparative method:**  I continuously checked and compared the findings.
- **Triangulation:**  I used multiple literature resources to confirm and enhance my findings.
- **Respondent language; verbatim accounts:**  I obtained verbally exact statements of respondents to provide concrete evidence of my findings.
- **Low-inference descriptors:**  I made use of a computer-based qualitative data analysis programme (Atlas.ti™) to capture the text to ensure precise, literal and detailed descriptions of respondents and situations.
- **Record data:**  I made use of audio recorders to obtain accurate data.
- **Respondent review:**  I requested each respondent to review the transcribed interview to check for accuracy of presentation.  They all agreed to the accuracy of the text documents (Addendum 3.2).

- **Negative or deviant cases:** I actively searched for, recorded, analysed, and reported negative cases or discrepant data that related to exceptions that modified patterns found in the data.

### 3.5.2    Reliability

According to McMillan and Wergin (2002, p. 10) reliability refers to: "The degree of error that exists when obtaining a measure of a variable.  No measure or instrument is perfect; each will contain some degree of error.  The error can be because of the individual (general skills, attitudes, motivation) or because of the way the instrument is designed and administered.  Reliability is the estimate of the error in the assessment." Ritchie and Lewis (2003, p. 271) indicate a distinction between external and internal reliability.  External reliability relates to the level of replication that can be expected if similar studies are undertaken, while internal reliability relates to the extent to which assessments, judgements and ratings, internal to the research conducted, are agreed upon or replicated between researchers.  Both are important in terms of reliability.  The reliability of findings depends on the likely recurrence of aspects in the original data, as well as the way the data is interpreted.  Reliability is to determine the extent to which measures are free from error.  If an instrument is void of any such elements, it is considered as reliable.  According to Merriam (1998, p. 206) reliability in the traditional sense of repeated measures to obtain similar results are problematic when it comes to qualitative research because of human behaviour involved.  Reliability in qualitative studies should be determined by the results that are consistent with the data collected.  I used the following strategies were used to ensure that my findings were reliable:

- **Replication logic**:  I conducted the study with multiple respondents up to the point of data saturation
- **Code-recode strategy:**  I coded the data over an extended period of time to ensure consistency of coding strategy
- **Observation by multiple observers:**  I consulted peers in the field of ICT to check on the consistency of my coding strategies
- **Stepwise replication**:  I approached peers in the field of ICT to check on the consistency of compiling the patterns (networks) in the computer-based qualitative data analysis program
- **Researcher's position**:  I have explained my position as researcher and have declared my biases relating to the data collection and analyses
- **Triangulation**:  I used more than one method to collect data and continuously ensured my understanding of what was presented

- **Audit trail**: I have explained all the procedures followed during this study. The transcribed data is available as an integrated dataset in (Addendum 3.1) (Ary et al., 2002, pp. 435 - 436; Merriam, 1998, pp. 204 - 207).

## 3.6 Data analysis

Data analysis is the: "Process of making sense and meaning from the data that constitute the finding of the study" (Merriam, 1998, p. 178). Therefore, data analysis is the process of making the data more manageable by organising the collected data into categories and interpreting data, searching for recurring patterns to determine the importance of relevant information (Bogdan & Knopp Biklen, 1992, p. 153; Marshall & Rossman, 1999, p. 150). In qualitative research the collecting of data and analysis takes place simultaneously to build a coherent interpretation of the data (McMillan & Schumacher, 2001). The data analysis starts by coding each incident into as many categories as possible and as the research continues the data is then placed in existing categories or existing categories are modified if not, and new categories emerge (Marshall & Rossman, 1999, p. 151; Seale et al., 2004, p. 475). Without continuous analysis, the data can be unfocused, repetitious and overwhelming. Merriam (1998, p. 11) indicates that: "The analysis usually results in the identification of recurring patterns that cut through the data or into the delineation of a process." I first read all the interviews repeatedly to gain a sense of the whole and to facilitate the interpretation of smaller units of data. I compared and contrasted the text segments to identify context-bearing data segments, and naming and classifying categories (McMillan & Schumacher, 2001, p. 464).

The data of this research study were analysed inductively to allow categories and patterns to emerge from the data leading to sets of smaller and similar data that are more workable. I used the comparative method to compare one unit of information with another looking for recurring regularities and patterns in the data to assign the information into categories. The categories were then also subdivided. The names of the categories reflected the focus and purpose of my study. The use of the inductive process helped me to determine links between the categories enabling me to form tentative hypotheses that lead to the development of theory (Merriam, 1998, pp. 180 - 192). I double-checked, refined my own analysis and interpretations to ensure validity and reliability.

Data saturation is used to describe the point in qualitative research when the issues contained in data are repetitive of data collected previously (Somekh & Lewin, 2005, p. 345).

### 3.6.1 Use of Atlas.ti™ to prepare the data analysis

A computer-based qualitative data analysis program, Atlas.ti™ was used to analyse data and identify and synthesise patterns. After transcribing the transcribed interviews, I imported them into Atlas.ti™ as a hermeneutic unit (HU) titled 'interviews' (Addendum 3.1). The HU became the prime data to be analysed to determine principals' influence on TPD for teachers' ICT integration. The interviews and field notes converged as one dataset and consisted of seven primary documents (Addendum 3.1). The primary documents represented the seven interviews of the principals. Many comments were added to the hermeneutic unit of additional information pieces.

In Chapter 4 use was made of the Atlas.ti™ numbering system to identify quotations from the primary documents. Therefore "(4:37 (10))" indicates that the quotation originates from primary document four, quotation number 37 line 10 of the particular primary document. Some interviews were conducted in Afrikaans as it was the principal's choice. Such quotations are translated into English, but the original versions are appended in footnotes.

### 3.6.2 Establishing theoretical and conceptual codes

According to Ary, Jacobs and Razavieh (2002, p. 466) categories allow for the classification of similar ideas, concepts and themes. Each unit of meaning (category) is recognised by a word or phrase that describes the essence of the category, these are then the codes for the categories. The goal is to generate a set of categories that represent a realistic reconstruction of the collected data. The conceptual codes of principals' influence on ICT integration obtained from the interviews were associated with the theory codes documented in the literature. Merriam (1998, p. 183) states: "Categories should reflect the purpose of the research. In effect, categories are the answers to your research questions." The following preliminary categories (theory and conceptual codes) were identified:

- ICT enabling strategies
- Leadership and management styles
- Principals' attitudes towards ICT integration
- Principals' strategic thinking of TPD
- Teacher enabling strategies
- TPD enabling strategies.

McMillan and Schumacher (2001, p. 476) state: "The ultimate goal of qualitative research is to make general statements about relationships among categories by discovering patterns in the data." The process of searching for patterns lead to an in-depth analysis to understand the complex link between the principals' attitudes, leadership and management styles,

strategic thinking and implementation of enabling strategies towards effective and sustainable ICT integration (Chapter 4).

## 3.7 Ethical considerations

Ethics are generally considered to deal with beliefs about what is right or wrong, proper or improper, good or bad (McMillan & Schumacher, 2001, p. 196). It is the responsibility of the researcher to ensure that ethical standards are adhered to. The following measures were taken while planning and conducting my study to ensure that the rights and welfare of each subject would be protected, and that nobody was harmed or hurt in any way during the research procedures:

- I received informed consent from every respondent before the interviews (Addendum 3.3). I informed the respondents of the goals of the study and what I hoped to achieve (Ary et al., 2002, p. 438; Denzin & Lincoln, 2002, pp. 138 - 139; Ritchie & Lewis, 2003, pp. 66 - 67; Seale et al., 2004, pp. 231 - 232).

- I was always open and honest with the respondents and respondents were never mislead during the study (Denzin & Lincoln, 2000, pp. 138 - 139).

- Information obtained from the respondents remain confidential (Denzin & Lincoln, 2000, p. 139; Seale et al., 2004, p. 233).

- Collecting of data was anonymous and confidential. I will link no names or identity to my findings (Denzin & Lincoln, 2000, p. 139; McMillan & Schumacher, 2001, pp. 366 - 367; Ritchie & Lewis, 2003, pp. 67 - 68).

- I posed no physical or mental discomfort to the respondents in my study (Ary et al., 2002, p. 438; McMillan & Schumacher, 2001, p. 377; Ritchie & Lewis, 2003, pp. 68 - 69).

- I will take care during the disseminating of findings to pay special attention to accuracy, and there will be no bias about any opinion (Denzin & Lincoln, 2000, p. 140). Research findings will be made available to all respondents.

- My study adheres to the ethical considerations of the Faculty of Education, University of Pretoria. My approved ethical and research statement is available on the CD-ROM as (Addendum 3.4).

## 3.8 Limitations of this study

There may be inhibiting factors in carrying out this research. Merriam (1998, p. 20) states: The human instrument is as fallible as any other research instrument." The researcher as human instrument is limited by being human – mistakes are made, opportunities are missed, personal bias interferes. McMillan and Schumacher (2001, pp. 23 - 24) point out that an institution such as a school is a public enterprise and is influenced by the external

environment. The institutions themselves change: legislative mandates and judicial orders change, the structure of schools change and programmes are added or deleted continuously. Different respondents process ideas differently and the situational elements also have to be considered indicating the complexity of the research.  The respondents without realising use particular words to express their ideas that are used as an indication of their attitudes towards ICT integration.  I did not test the different leadership and management styles I only refer to them as they have been identified in the literature as the most appropriate and used styles by principals.  The cultural diversity of the principals especially those who had to express themselves in their second language such as English can be an inhibiting factor as the words used can have different meanings for the researcher and the respondents.

## 3.9     Summary

This chapter dealt with the research design and methodology of this study.  The nature and methodology of this research was indicated.  The qualitative data collection method was discussed and substantiation was given for choosing this particular research approach.  The strategies implemented to ascertain trustworthiness was pointed out.  The data analysis process was outlined and the use of Atlas.ti™ acknowledged.  The preliminary theory and conceptual codes were given.   The ethical considerations taken into account and the limitations of this study were outlined.  The next chapter gives a comprehensive description of the data analysis and findings from the interviews with the seven principal's as well as the field notes and comments I made.

## 3.10    References used in this chapter

Ary, D., Jacobs, L. C., & Razavieh, A. (2002). *Introduction to Research in Education* (6th ed.). Belmont: Wadsworth.

Babbie, E., & Mouton, J. (2001). *The Practice of Social Research*. Cape Town: Oxford.

Bogdan, R. C., & Knopp Biklen, S. (1992). *Qualitative Research for Education. An Introduction to Theory and Methods* (2nd ed.). Boston: Pearson.

Bogdan, R. C., & Knopp Biklen, S. (2006). *Qualitative Research for Education. An Introduction to Theories and Methods* (5th ed.). Boston: Pearson.

Brown, A., & Dowling, P. (2001). *Doing Research/Reading Research*. London: FalmerPress.

Burrell, G., & Morgan, G. (1979). *Sociological Paradigms and Organizational Analysis*. London: Heinemann Books.

Cohen, L., & Manion, L. (1994). *Research Methods in Education* (4th ed.). London: Routledge Publishers.

Denzin, N. K., & Lincoln, Y. S. (2000). *Handbook of Qualitative Research* (2nd ed.). United States of America: Sage Publications.

Di Benedetto, A. O. (2005). Does Technology Influence Teaching Practices in the Classroom?   Retrieved 22 September, 2006, from http://web.uoregon.edu/ISTE/uploads/NECC2005/KEY_6820721/DiBenedetto_NECC_Paper_RP.pdf

Flick, U., Von Kardorff, E., & Steinke, I. (2004). *A Companion to Qualitative Research*. London: Sage Publications.

Litoselliti, L. (2003). *Using Focus Groups in Research*. London: Continuum.

Marshall, C., & Rossman, G. B. (1999). *Designing Qualitative Research* (3rd ed.). London: Sage Publications.

Mason, J. (2002). *Qualitative Researching* (2nd ed.). London: Sage Publications.

McBurney, D. H. (1994). *Researh Methods* (3rd ed.). California: Brooks &Cole Publishing Company.

McMillan, J. H., & Schumacher, S. (2001). *Research in Education. A Conceptual Introduction* (5th ed.). New York: Longman.

McMillan, J. H., & Wergin, J. F. (2002). *Understanding and Evaluating Educational Research* (2nd ed.). New Jersey: Merrill Prentice Hall.

Merriam, S. B. (1998). *Qualitative Research and Case Study Applications in Education*. San Francisco: Jossey-Bass Inc.

Mills, G. E. (2003). *Action research. A guide for the teacher researcher* (2nd ed.). New Jersey: Merrill Prentice Hall.

Ritchie, J., & Lewis, J. (2003). *Qualitative research practice. A guide for Social Science Students and Researchers*. London: Sage Publications.

Seale, C., Gobo, G., Gubrium, J. F., & Silverman, D. (2004). *Qualitative Research Practice*. London: SAGE Publications

Silverman, D. (2004). *Qualitative Research. Theory, Method and Practice* (2nd ed.). London: Sage Publications.

Somekh, B., & Lewin, C. (2005). *Research Methods in the Social Sciences*. Cornwall: Sage Publications.

Thomas, H. E. (2006). *The Sustainable Implementation of Computers in School Districts: A Case Study in the Free State Province of South Africa.* University of Pretoria, Pretoria.

Trochim, W. M. K. (2001). Reliability and Validity.   Retrieved 12 January 2002, from http://www.trochim.human.cormell.edu/kb/rel&val.html

# Chapter Four

## Data analysis and findings

---

### 4.1       Introduction

The academic puzzle that drives this study is the influence of the principal's inspirational actions on teachers' attainment of ICT skills for integration of technology and enhanced instruction.  In the previous chapter I described the research design and methodology of used in this study.  I justified the choices I made with regard to the selection of respondents.  The qualitative approach and method used to analyse the data are justified.  The purpose of this chapter is to report on my analyses of the data in the integrated data set.

Through reviewing the literature (Chapter 2), interviewing the seven principals, compiling my own field notes and comments, I established a preliminary set of codes for the initial deductive analysis phase.  These preliminary codes guided me to reduce the data and to establish initial emerging patterns.  Inductive reasoning allowed me to construct new codes and there after combine some codes to form new categories.  Berg (2001, p. 246) states that: "The development of inductive categories allows researchers to link or ground these categories to the data from which they derive."  These categories addressed the heart of the research question.  I gained a better understanding of the themes underpinning the main research question.  Seale, Gobo, Gubrium, Silverman (2004, p. 475), as well as Marshall and Rossman (1999, p. 151) indicate that data analysis starts by coding each incident into as many categories as possible and as the analysis continues, the data then is placed into categories.  These categories may consequently be modified or new categories may emerge.  Through the interpretive approach I explored the meaning and interpretations the respondents bestowed on their social environments.  This enabled me to describe and explain the principals' influences on TPD for ICT integration.  I ascertained an in-depth understanding of the scope and depth of principal's influence on ICT integration in schools.

I have been a teacher in the same school for twenty years.  This involvement provided me with the opportunity to experience the leadership of three different principals and this exposure provided me with the insight that, although the general circumstances at the school did not change much, the three different principals influenced me as a teacher at different levels.  I started to ask the question: What were the differences?  One difference was the principals' attitudes towards the integration of ICT, leadership and management styles, as

well as their strategic thinking motivated me to achieve at different levels. As I progressed with my study, I soon realised that principals do not perceive their actual influence on teachers in their schools.

To gain an in-depth understanding of principals' influence, I divided the main question into sub-questions. In this chapter I report my findings of the analyses of the data according to the sub-questions:

- **Sub-question 1:** How do principals' influences differ with regard to ICT integration in their schools?
  This question refers to the principals different leadership and management styles of principals as well as the different factors associated with their attitude towards ICT integration.
- **Sub-question 2:** How does principal's strategic thinking of TPD influence ICT integration?
  This question explores and describes the dynamics associated with strategic thinking of TPD for ICT integration in order to diminish barriers to the effective integration of ICT in teaching and learning.
- **Sub-question 3:** What are the enabling strategies that principals can follow to develop and sustain teachers' integration of ICT in teaching and learning?
  This question will explore the different enabling strategies essential for effective and sustainable ICT integration through TPD.

## 4.2 How do principals' influences differ with regard to Information and Communication Technology integration in their schools?

The aim of every principal is to lead and manage the school to achieve and maintain excellence in teaching and learning. In spite of this common aim, principals' influences on the teachers' integration of ICT vary. Their influence can be either positive, and lead to effective and sustainable ICT integration, or be negative and lead to ineffective or unsustainable ICT integration and a general sense of dissatisfaction among the teachers. West-Burnham (1992, p. 117) states: "No school improves without being led." Principals' influence is determined by the way they lead and manage. Various authors indicate the influence of the principal's leadership on teaching and learning (Butler, 1992, p. 11; Knapp & Glenn, 1996, p. 9; Young et al., 2005, p. 25). Many authors regard a principal's leadership as the determining factor for the success and sustainability of educational change (Akbulut et al., 2007, p. 2; Bush, 2003, p. 10; Southworth, 2005, p. 76; Steyn & Van Niekerk, 2005, p. 6;

Wallace & Poulson, 2003, p. 229).  I established initial codes (Figure 4.1) according to the indications from the literature about the importance of leadership.
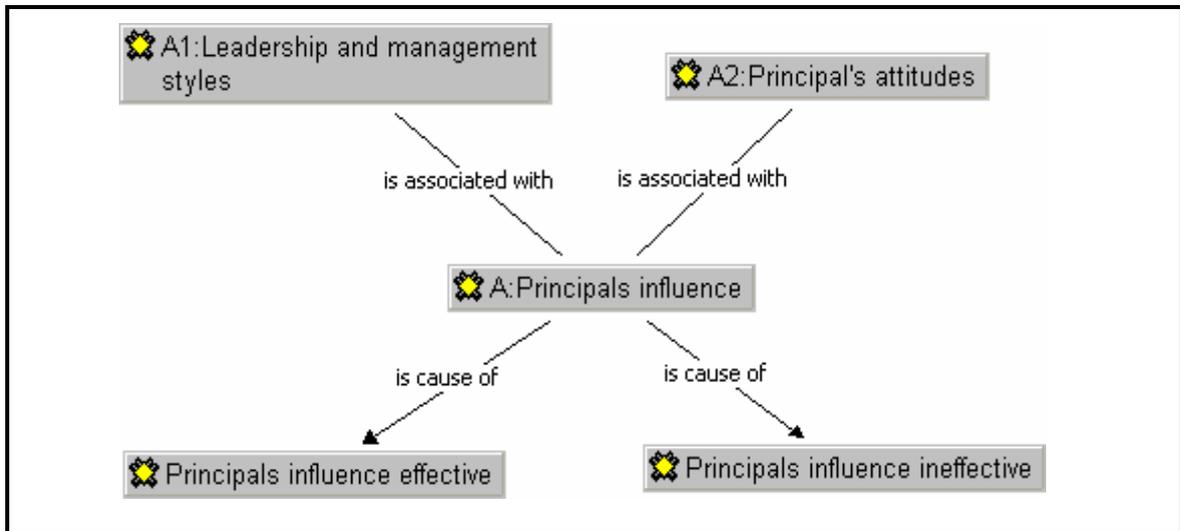


**Figure 4.1**　　　　**Influence of different attitudes, leadership and management styles**

Figure 4.1 indicates the patterns of leadership and management.  Principals have different leadership and management styles in their support of effective teaching and learning.  Some applied a combination of styles, depending on their particular environment, circumstances and the experience of the teachers they lead:

- *I am very democratic…* [1] (3:594 (61))
- *… I really try to involve the people in management and I think I am really not an autocrat* [2] (4:319 (49))
- *Sometimes a person has to be a bit autocratic* [3] (3:601 (61))
- *One is where I would say I do a democratic way where I allow giving an input but at the same time I would try to force a particular direction* (6:389 (85)).

Another aspect of a principal's influence is the attitude of the principal (Figure 4.1).  Han (2002, p. 294) maintains that the able principal has the capacity to influence, lead and motivate teachers to better performance and to encourage innovative changes in teaching and learning.  Davies and Davies (2005, p. 23) mention that without the principal's interest and enthusiasm a school cannot be strategically focused.  The respondents indicated that their attitude towards ICT integration differed:

- *I think a person can still do more* [4] (4:314 (37))
- *…try to motivate the teachers…* [5] (8:206 (13))
- *So I think the way you teach, you must apply technology* [6] (1:700. (57))
- *We have now already implemented good things here by us* [7] (3:600 (61))

---

[1] *Ek is baie demokraties …*
[2] *… probeer regtig die mense in die bestuur te betrek en ek dink ek is definitief nie 'n outokraat nie*
[3] *Partykeer moet 'n mens maar bietjie outokraties wees*
[4] *Ag ek dink 'n mens kan dit nog meer doen*
[5] *…probeer die ouens aanmoedig…*
[6] *So ek dink die manier van onderrig gee, moet jy tegnologie aanwend*

- *… like being very much recharged and everything the teachers learn they give to the learners* (5:356 (77)).

### 4.2.1 Leadership and management styles

My analysis indicates that a principal's leadership and management style can consist of three possible styles: democratic, authoritarian or laissez-faire (Figure 4.2).
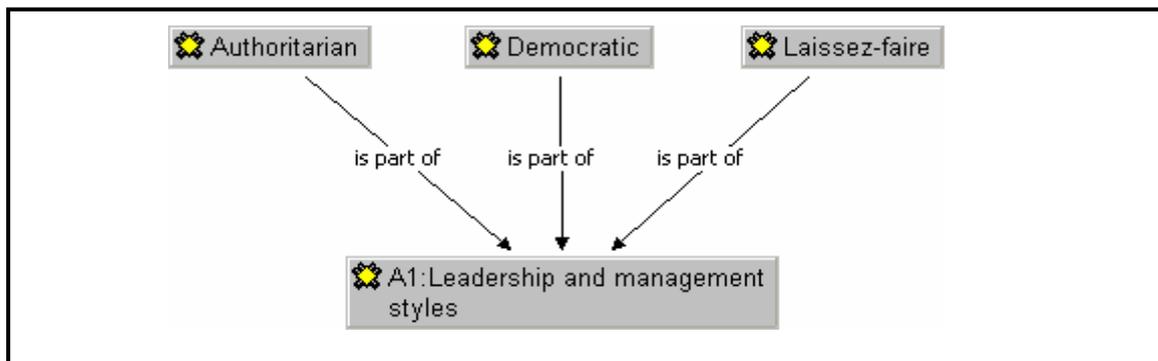


**Figure 4.2    Different leadership and management styles as an influencing factor**

Three respondents indicated their democratic style of management and leadership:

- *… we come together as a SMT, look at it and talk about it and see whether it could fit amongst ourselves or not* (5:340 (57))
- *The thing is that is where I think the principal and the SGB have an enormous responsibility because they are responsible together with the teachers* [8] (1:676 (137))
- *Because I think "the more heads the more knowledge* [9]*". I tend to ask the SMT and I would also ask individuals involved what do they think how should we go about it* (7:244 (61)).

Another respondent indicated his autocratic style by declaring that he delegated most of the ICT responsibility as well as authority to teachers and it appears that he was not accountable for the integration of ICT into teaching and learning:

- *… but the responsibility is actually the responsibility of the subject teacher and the different subject heads* [10] (8:285 (17))
- *… the teacher that currently runs the integration section for me, has trained teachers who are interested* [11] (8:215 (33))
- *… she is available but she is more of a facilitator and a help that makes these things available so she does not run the programme, the programme is actually more subject-driven* [12] (8:203 (17))
- *… the lady responsible for the media centre provides that information and updates them about courses* [13] (8:234 (65)).

---

[7] *Ons het nou al baie goeie dinge geïmplementeer by ons*

[8] *Die ding is dit is waar ek dink die hoof en die beheerliggaam is geweldig verantwoordelik want hulle is tog verantwoordelik saam met die personeel*

[9] *…"hoe meer koppe hoe meer kennis"…*

[10] *… die verantwoordelikheid is eintlik die verantwoordelikheid van die vakonderwysers en die verskillende vakhoofde*

[11] *… die jufrou wat nou die integrasie afdeling dryf vir my het byvoorbeeld al vir personeel wat belangstel opleiding gegee*

[12] *… sy is beskikbaar maar sy is meer 'n fasiliteerder en 'n hulp wat die goed beskikbaar stel so sy dryf nie die program nie, die progam moet dan meer eintlik vak gedrewe wees*

[13] *… die dame verantwoordelik vir die mediasentrum gee daai inligting deur en hou hulle op hoogte van kursusse*

The same respondent also indicated a laissez-faire approach to leadership and management:

- *I think it is very difficult to draw the line and say I decide or they decide I think it is a combination of discussion and needs that emerge* [14] *(*8:242 (85))
- *Unknown is unwanted. If the teachers know and see the opportunities that are there then it happens* [15] *(*8:244 (93)).

Bush (2003, pp. 194-195) mentions that the application of different styles can increase the effectiveness of leadership and management. In an environment such as a school, teachers differ and it makes sense that different leadership and management styles should be used to accommodate all. Two respondents pertinently indicated their combination of leadership styles:

- *There are two ways. One is where I would say I do a democratic way where I allow giving an input but at the same time I would try to force a particular direction that is the vision that saying ultimately this is the direction that we need to follow. I know some other times it tends to sound that I am hard but I am quite aware it is that some of them don't have an idea and where should we take that, it is ICT in the environment that it is our own school (*6:390 (85))
- *Sometimes a person has to be a bit autocratic and sometimes there are certain things where you have to take a stand and then you make the final decision democratically, it works for me at this stage* [16] (3:601 (61)).

Through combining leadership and management styles, they in reality felt more capable of integrating and managing change effectively in their schools. Prinsloo and van Schalkwyk (2008, p. 167) point out that although there is no correct style, each style has advantages and disadvantages. A respondent described how he used the democratic style as he believed that it was the most appropriate style for his school:

- *No, I try to strive for the ideal, that of task and people orientation. No, I think a person must, I really try to involve the people in management and I think I am definitely not autocratic* [17] (4:318 (49)).

The same respondent indicated that he definitely did not use an autocratic style as he feared the negative impact it would have on the teachers' attitudes. It also emerged that he followed a laissez-faire style as there were no pre-established aims or requirements with regard to teachers' ICT integration:

- *No, there are no specific requirements* [18] 4:418 (45)
- *… he must make a new contribution somewhere* [19] 4:419 (49)

---

[14] *Ek dink dit is baie moeilik om daai lyn te trek en te sê ek besluit of hulle besluit ek dink dit is 'n kombinasie van gesprekke en behoeftes wat uitkom*

[15] *Onbekend is onbemind. So as die ouens weet en hulle sien die geleenthede raak en die moontlikhede raak dan gebeur dit*

[16] *Partykeer moet 'n mens maar bietjie outokraties wees en partykeer is daar sekere dinge waaroor jy moet standpunt inneem en dan neem jy die finale besluit maar demokratiese styl, is vir my nogal, werk vir my op hierdie stadium*

[17] *Nee ek probeer maar die ideale nastreef, daai taak en mens georiënteerd is. Nee ek dink 'n mens moet, ek probeer regtig die mense in die bestuur te betrek en ek dink ek is definitief nie 'n outokraat nie*

[18] *Nee, daar is nie spesifieke eise nie*

[19] *… hy moet êrens 'n nuwe bydrae maak*

- *Responsibility no, I think a person must be eager to learn I must not look at somebody else to teach me* [20] 4:420 (81)
- *I don't know. A person must be careful how a person handles it* [21] 4:361 (109)
- *But a person only, I don't know my experience is you just annoy them more than what you get them to really do something well* [22] 4:368 (133).

The two respondents who applied the laissez-fair style seemed to experience a sense of aimlessness, a lack of focus and direction.  Clarke (2007, p. 1) states: "Strong leadership and good management are both essential for the success of a school, and a good principal is skilled in both."  Prinsloo and Van Schalkwyk (2008, p. 162) aptly summarise: "People look to the leader for clarity and direction."

In conclusion, principals' have unique styles of management and school leadership.  The respondents in this study indicated that they followed the autocratic, laissez-faire and democratic leadership styles in their schools for ICT integration.  Most principals have the mistaken belief that the democratic style is the most appropriate and advisable style to apply.

### 4.2.2 Principals' attitudes towards Information and Communication Technology integration

When entering the office of each respondent, I immediately take notice of the type of computer on the principal's desk.  All the respondents had a personal laptop regardless of the size of the school, the financial or the security barriers.  They all indicated that the laptop was essential for effective management and that they used it constantly:

- *… I mainly use it for the smart system this is the schools administrative system* [23] (1:613 (5))
- *On a daily basis. I have my computer on my table we use it fully for the schools admin, research, information and personal work* [24] (8:194 (5))
- *Every day and  to retrieve information about learners when I have interviews with parents and teachers* [25] (3:541 (5))
- *Yes, I use it for schoolwork if I want to write stuff. Planning our timetable is on the computer, our marks admin is on the computer, the budget is on the computer, the finances are on the computer* [26] (4:300 (17))
- *My personal itinerary. Well I do use it almost on a daily basis…* (5:321 (21))
- *I carry a computer even now I having it is my laptop in my car I can't work without it I wonder if definitely for sure the laptop is actually I use it daily* (6:364 (33))
- *Daily all day long. Corresponding to the department, correspondence to the department and info on learners* (7:238 (17)).

---

[20] *Responsibility, ag no, I think, 'n mens moet leergierig genoeg wees ek moet nie vir iemand anders kyk om vir my te leer nie*

[21] *Ek weet nie. 'n Mens moet versigtig wees hoe 'n ou dit hanteer*

[22] *Maar 'n ou maak hulle net, ek weet nie, my ervaring is jy maak die ou net meer kwaad as jy wat jy… hulle werklik waar kry om iets goeds te doen*

[23] *… ek gebruik hom hoofsaaklik jy weet vir die smart stelsel dis nou die skool se adminastratiwe stelsel*

[24] *Op 'n daaglikse basis. Ek het my rekenaar op my tafel ons gebruik hom volledig vir skool administrasie, navorsing, inligting en vir persoonlike werk*

[25] *Elke dag en om informasie van leerlinge te bekom as ek onderhoude het met ouers en personeel doen*

[26] *Ja, ek gebruik dit vir skoolwerk as ek goeters wil skryf. Beplanning, ons rooster is op die rekenaar, ons punte administrasie is op die rekenaar, die begroting is op die rekenaar, die finansies is op die rekenaar*

As leaders of their schools, the position automatically gave them the privilege of obtaining a laptop to assist them in their managerial tasks. I agree with Kalake (2007, pp. 143 - 145) research that principals' daily use of ICT enhances their knowledge and skills on using ICT in education and enables them to voice an opinion on the relevance of ICT in education. From my observations in the field I conclude that although all the respondents used ICT on a daily basis their attitudes towards ICT integration differed widely (Figure 4.3).
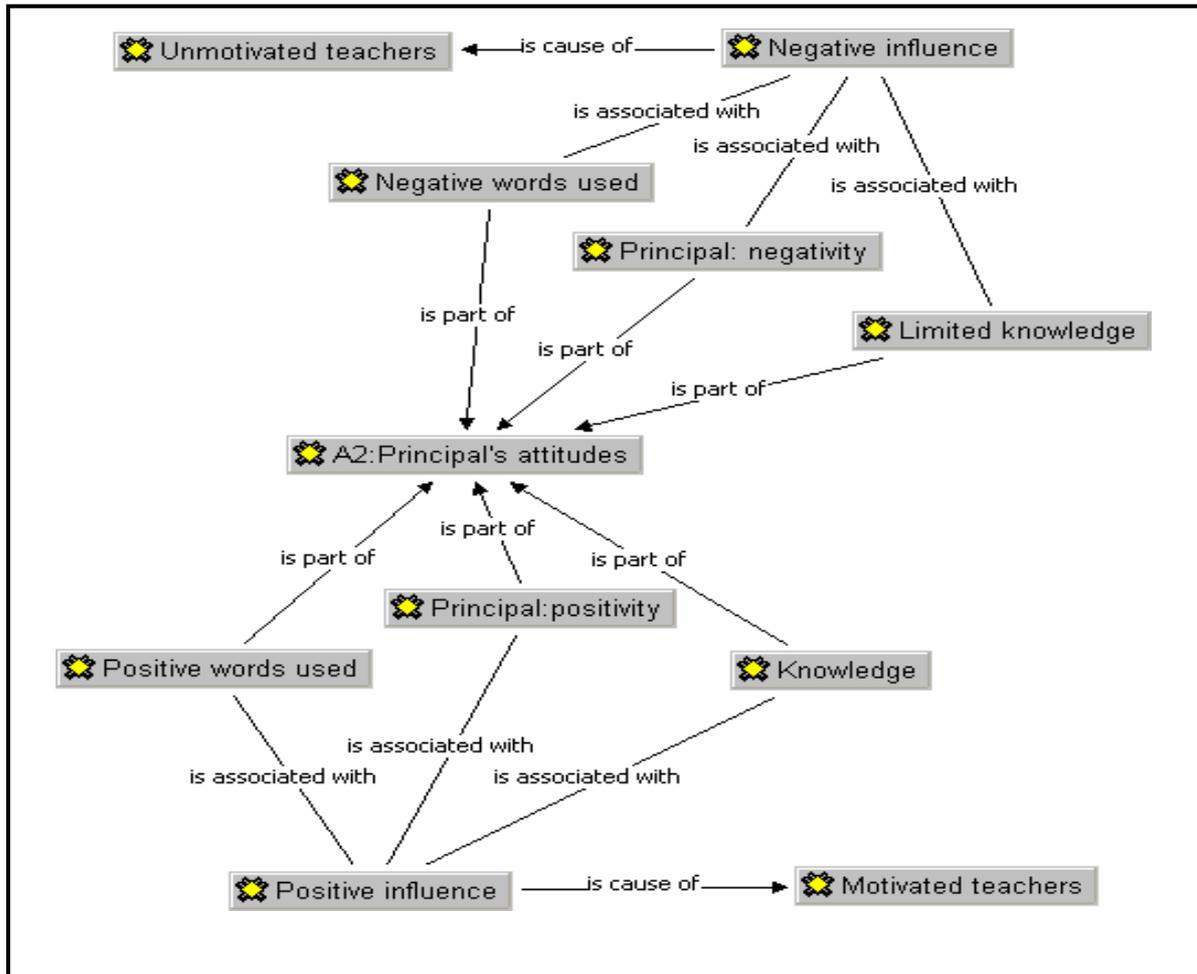


**Figure 4.3        Principals' attitudes as an influencing factor**

From my analysis it became apparent that the principal's attitude towards the integration of ICT in teaching and learning has an influence on teacher motivation to use ICT. Figure 4.3 indicates principals' attitudes have a positive influence and lead to motivated teachers, or a negative influence and lead to unmotivated teachers. Principals should recognise the importance of and promoting teachers' motivation as it is conducive to teachers' optimal performance (Everard et al., 2004, p. 25; Foskett & Lumby, 2003, pp. 79 - 80; Steyn & Van Niekerk, 2005, p. 143). Everard, Morris and Wilson (2004, p. 35) state: "The key to effective management is the ability to get results from other people, through other people and in

conjunction with other people. If the underlying psychology is wrong, the most carefully constructed system and techniques will fail."

Akbaba-Altun (2006, p. 186) points out principals' insufficient ICT-related knowledge leads to interpreting of regulations according to their own will. Southworth (2005, p. 88) states: "Leadership learning is necessary because creating learning schools rest, in large measure, on the quality of leadership." If principals are not knowledgeable about ICT-related issues and the latest TPD developments, they are not in a position to lead and manage ICT integration effectively. The code 'knowledge' captures this reasoning.

I observed that there was a distinct link between principals' positive attitudes towards ICT integration. Table 4.1 lists the factors associated with a principal's positive attitude to motivate or inspire teachers. From interviews one and three, I noticed that respondents did not mention that any teachers were unmotivated or unwilling to integrate ICT. I could sense the positive energy from the respondents when they talked about the use of ICT in their schools. I observed how these two respondents conveyed the positivism towards ICT in their schools. I noted how frequently the respondents used the word 'inspired'[27], and how they transferred this inspiration to their teachers. Davies and Davies (2005, p. 11), Dimmock and Walker (2005, p. 12), Clarke (2007, p. 1), Bush (2003, pp. 7 - 9), ICT op School (2006, p. 14), Ho (2006, p. 3) all agree that inspiring teachers attain objectives and implement change.

**Table 4.1    Factors that relate to having a positive influence**

| Positive comments | Knowledgeable | Positive words | Motivated teachers |
|---|---|---|---|
| **Respondent 1:** | | | |
| • *It is absolutely necessary, you cannot teach here if you are not computer literate*[28] *(1:620 (9))*<br>• *… you know that you have to be there and you have to make a plan to get there*[29] *(1:696 (77))*<br>• *… have to apply technology in your classroom teaching and cannot get on without it*[30] *(1:705 (13))* | • *… we had with our teacher development we had a future's expert from the University*[31] *(1:692 (61))* | • *… extremely impressive*[32] *(1:718 (29))*<br>• *… we have big dreams and plans*[33] *(1:720 (49))*<br>• *… success that they experience*[34] *(1:723 (101))*<br>• *… inspire*[35] *… (1:719 (33))* | • *So there is really a vibe, the teachers know we just have to be there and it has to happen*[36] *(1:658 (65))*<br>• *…they are really highly motivated*[37] *(1:667 (97))* |

---

[27] *… inspireer …*

[28] *Dis absoluut noodsaaklik jy kan nie meer hier skool hou as jy nie rekenaarvaardig is nie …*

[29] *… jy weet jy moet daar wees moet jy plan maak om daar te kom*

[30] *… jy moet hierdie tegnologie in jou klasaanbieding aanwend en kan nie meer daar sonder nie*

[31] *… ons het met personeel opleiding het ons hierdie goed van, ons het 'n toekomskundige gehad van die universiteit*

[32] *… geweldig indrukwekkend*

**Table 4.1    Factors that relate to having a positive influence**

| Positive comments | Knowledgeable | Positive words | Motivated teachers |
|---|---|---|---|
| **Respondent 3:** | | | |
| • *We have now already implemented good things here* [38] *(3:600 (61))*<br>• *I think it will be fantastic because a person is going to learn, you have to learn from each other* [39] *(3:620 (96))*<br>• *So I am absolutely for teachers reaching out further than just here with us* [40] *(3:623 (45))* | • *… contact with subject advisers from other provinces and we attend their courses* [41] *(3:578 (45))*<br>• *… done research at other schools, there is really no other software available for subjects* [42] *(3:608 (69))*<br>• *I attended a symposium here of the minister of education* [43] *(3:656 (144))* | • *… just think how wonderful it will be* [44] *(3:626 (81))*<br>• *… teachers are also hungry to do these things…* [45] *(3:645 (128))*<br>• *… inspired* [46] *(3:646 (128))*<br>• *… extremely excited* [47] *(3:666 (160))* | • *…everybody all of a sudden want to start working with computers, getting extremely inspired* [48] *(3:647 (128))*<br>• *… not one teacher who at this stage is not extremely excited* [49] *(3:665 (160))* |

There was also a relationship of the negative influences (Table 4.2).  Those respondents who seem to convey a negative attitude towards ICT also used negative phrases.

---

[33] *… ons het groot drome en planne*

[34] *… sukses wat hulle ervaar*

[35] *… inspireer*

[36] *So daar is regtig 'n vibe, die ouens weet net ons is daar en dit moet net gebeur*

[37] *… hulle is regtig hoogsgemotiveerd*

[38] *Ons het nou al baie goeie dinge geïmplementeer by ons*

[39] *Ek dink dit sal fantasties wees want 'n ou gaan leer, jy moet bymekaar leer*

[40] *So ek is absoluut ten gunste daarvan dat personeel moet wyer uitreik as net hier by ons*

[41] *… kontak met vakadviseurs van ander provinsies en ons gaan woon hulle kursusse by*

[42] *… navorsing gedoen by ander skole, daar is nêrens rêrig nog sagteware vir vakke nie*

[43] *Ek was op 'n simposium hier van die minister van onderwys*

[44] *… dink net hoe wonderlik dit sal wees*

[45] *… personeel is ook honger om hierdie goed te doen*

[46] *… geinspireer…*

[47] *… geweldig opgewonde…*

[48] *… almal wil ewe skielik nou begin rekenaar, hulle raak geweldig geinspireer*

[49] *… daar is een personeellid wat op hierdie stadium nie geweldig opgewonde is nie…*

**Table 4.2    Factors that relate to having a negative influence**

| Negative comments | Limited knowledge | Negative words | Unmotivated teachers |
|---|---|---|---|
| **Respondent 2:** | | | |
| • *In the first place a person tries to motivate the teachers* [50] (8:205 (13)) | • *Never heard of them…* [51] (8:231 (45)) | • *Try* [52] (8:268 (13))<br>• *… it helps a little* [53] (8:272 (37))<br>• *Unknown is unwanted* [54] (8:274 (93))<br>• *Unpractical* [55] (8:275 (97)) | • *… established ideas or a lack of, or resistance to change is possible the main thing* [56] (8:260 (121))<br>• *… a lot of teachers who say no thank you I don't need it* [57] (8:246 (97)) |
| **Respondent 4:** | | | |
| • *A person sits with the older teachers that are not really clued up about it* [58] (4:314 (37))<br>• *… they do it to please …* [59] (4:423 (125)) | • *I don't really know of other effective programmes* [60] (4:405 (209)) | • *Try…* [61] (4:334 (73))<br>• *… I did it…* [62] (4:336 (77))<br>• *…it is all that I do* [63] (4:370 (133)).<br>• *.. I am actually not interested in their stuff* [64] (4:350 (85))<br>• *… teachers' that think the principal is mad* [65] (4:402 (201)) | • *… that resistance against change is always a factor…* [66] (4:400 (201))<br>• *… and the others do it because they must do it, they don't really do it for themselves* [67] (4:422 (201)) |

Figure 4.3 and Table 4.1 indicate that various factors contribute to a negative influence of teachers' effective and sustainable integration of ICT in their teaching and learning.  I identified similar factors relating to teachers' non-motivation in respondents two and four.  It was alarming to hear the same words repeatedly, e.g. 'try'[68].

This relates to the opinions of Foskett and Lumby (2003, p. 192), Blase and Blase (1994, p. 79), Steyn and Van Niekerk (2005, p. 23) who maintain that negativity demote and hampers the functioning of a school, as well as the attainment of objectives and opportunities for development.  I wonder whether they have had limited success in the integration of ICT, or if the teachers were unmotivated.  Respondent six indicated a majority of teachers avoid

---

[50] *Eerstens probeer 'n ou die ouens aanmoedig…*
[51] *Nog nie van hulle gehoor …*
[52] *Probeer…*
[53] *… dit help 'n bietjie*
[54] *Onbekend is onbemind*
[55] *Onprakties*
[56] *… gevestigde idees of 'n gebrek aan, of teenkanting vir verandering is waarskynlik die groot ding*
[57] *… baie van die personeel wat sê nee dankie ek het dit nie nodig nie*
[58] *'n Ou sit maar daar bietjie met die ouer mense wat nie regtig, hulle is nie regtig so "opgeclue" daaroor nie*
[59] *… doen hulle om jou te plesier …*
[60] *Ek weet nie regtig van baie ander effektiewe programme …*
[61] *Probeer…*
[62] *… het dit gedoen*
[63] *… dis maar al wat ek maar doen*
[64] *… ek stel nie regtig belang in hulle goed nie*
[65] *… onderwysers wat dink ag man die hoof is mal…*
[66] *… daai weerstand teen verandering is maar altyd 'n faktor…*
[67] *…en die ander doen dit omdat hulle dit moet doen, hy doen dit nie regtig vir homself nie*
[68] *… probeer …*

integrating ICT in teaching and learning and preferred traditional methods of teaching: … *would say sixty percent of them still stick to the old method* (6:407 (141)). However, the respondent remained positive and regarded it as a challenge and also made plans to obtain the interest of his teachers: … *a big challenge what I eventually made I tried to compile a mini glossary of websites that educators could visit and those whom definitely for sure they don't have that interest and normally I take along my memory stick* (6:373 (45)).

Respondent seven indicated that the teachers who avoided integrating ICT where elderly teachers: *The only problem is especially with the elderly staff members you know that are scared of the computer* (7:246 (77)). I conclude that this respondent accepted that mature teachers were not going to change and that the respondent was not going to influence them anymore: … *the more you tell them you cannot break the computer the less they are interested in learning. But that is can I say one other pity* (7:246 (77)). The ironic fact was that the respondent also adhered to the description of mature teacher: … *I am an old teacher I've been teaching for thirty-seven years* (7:286 (81)), and kept on referring to mature teachers as: *elderly staff* (7:247 (77)), *older teachers* (7:287 (230)) and *oldies* (7:288 (198)).

Respondent five indicated that it remained a challenge for all teachers to become ICT literate: *Then it gives us a challenge each and each and every teacher must be computer literate …* (5:332 (45)), but he remained positive: *Schools do not change their minds on computers they are going to stay behind and in the past but computers are there to stay, it is a new innovation which is going to be great* (5:348 (61)). When I asked if there were any teachers at his school who were not interested in becoming ICT literate, he answered: *Fortunately at this school no. Quite a number of teachers are skilled* (5:391 (129)) and *those who are not particularly interested those are the ones who tried to make a statement sometime they have applied for a post somewhere else* (5:381 (133)).

Respondents five, six and seven indicated that they were knowledgeable about ICT-related developments:

- *Initially we do have workshops early in the year about computers but in the meantime we have some programmes from the NGOs we, like for instance let's say Damelin this service provider who initially sold its products through correspondence* (*5:334 (49*))
- *We are quite aware number one that the curriculum is changing …* (6:369 (41))
- *Gauteng online is one of the projects that is run by the Provincial Department theyare using stage by stage implementation so probably they have come up to implement, it is one of the projects within our school* (6:399 (109))
- *Luckily I'm doing this incognito so I can say that their programmers are not up to standard and the people offering the courses are not up to standard* (7:290 (262)).

I established that the respondents who were positive about ICT, were also knowledgeable on ICT-related issues. This relates to what I have established during the literature review that

indicates that for continuous change in education, it is essential for principals to regularly update their own ICT knowledge and skills to facilitate appropriate change (Gibson, 2002, pp. 321 - 322; Han, 2002, p. 295).

### 4.2.3 Conclusion

The first sub-question related to the principals' leadership and management styles. The principals' perceptions on how they manage and lead their schools, provide an indication of how they perceive their role in the integration of ICT for teaching and learning. My data indicate that principals have the capacity to lead and manage ICT integration effectively. However, this in not the case in many schools.

The second part of the question aimed to determine if there was any relationship with the principals' attitudes towards ICT integration and the influence they have on teachers' ICT integration. By means of inductive analysis of my interview data, I identified it is not only the principals' actions that have an influence but also their attitudes. The following factors of the principals' attitudes were identified as having an influence on teachers' effective ICT integration:

- General comments made by principals
- Gaining of knowledge
- Content of phraseology when talking about ICT integration.

These three factors are an indication of principals' attitudes towards ICT integration. If teachers encountered these in daily conversation with their principals, they will either be positively or negatively influenced on the use of ICT in teaching and learning. Therefore, principals should be aware of how they express themselves when talking about ICT integration as teachers pick up on their attitudes towards the use of ICT.

### 4.3 How does principal's strategic thinking of teacher professional development influence Information and Communication Technology integration?

The DoE (2004, p. 11) has initiated several TPD initiatives to train teachers in ICT literacy. To date no training for the intermediate and advanced levels dealing with the integration of ICT in the curriculum has taken place. In Gauteng, the focus is on the acquisition and upgrading of ICT infrastructure and facilities (DoE, 2005, pp. 8, 14). The pace at which the

DoE is facilitating the integration is slow. This has led schools to become idle and caused principals negative attitude towards the DoE initiative of TPD for ICT:

- *… what is still keeping us back is the Gauteng Online story* [69] *(1:751 (25))*
- *… if you are going to wait for their training I think it might still take a few years so it is just a question … you know you have to be there and you make a plan to get there* [70] *(1:753 (77))*
- *Then currently they are building the third one the Gauteng Online but that is the one they are still busy (6:431 (17))*
- *But for the lower-level educators since we had the training of the thirty we haven't yet taken them from that beginner lesson to a greatly advanced level (6:437 (177))*
- *… we have Gauteng online and e-learning and all that stuff but unfortunately they came and they installed it and then there is no signal for it they trying to fix things like that (7:295 (250)).*

Respondents indicated that they have taken matters in their own hands, and have provided in-house TPD for ICT integration:

- *I must say we handle our own training* [71] *(1:749 (73))*
- *At this stage we do it ourselves. The Department is not able to do it, not on such a big scale. No, I think we have to take our own initiatives* [72] *(3:698 (136))*
- *… we offer courses you know at the end of the year (7:291 (142))*
- *… there can come a lot more from the Department's side but just like a lot of other stuff in education if you are serious about it and you don't drive it, it will not take place* [73] *(8:297 81))*
- *Initially we do have workshops early in the year about computers (5:402 (49)).*

Respondents indicated that the DoE training is below the current competencies of teachers at their schools:

- *... the training they give is very basic and I think that our people have already done that, we have gone a step higher* [74] *(1:52 (77))*
- *… the courses that they give are of poor quality or they waste people's time, or it takes place at a funny time or it is poorly organised so I am not really interested in their stuff* [75] *(4:433(85))*
- *… one that did happen in 2005 we had three workshops that we ran through the four packages of Microsoft Office then from that one I think the follow-up lesson was done by Schoolnet with thirty educators the challenge is out of that thirty you will only find five or six of them are actually utilizing … using it (6:436 (157))*
- *Luckily I'm doing this incognito so I can say that their programmers are not up to standard and the people offering the courses are not up to standard (7:290:(262)).*

Most of the respondents agreed the DoE current TPD initiatives and strategies are not effective in aiding the process of effective and sustainable ICT integration in their schools. Principals have to plan strategically about their current ICT integration situation (Figure 4.4).

---

[69] *… wat ons nog terug hou, jy weet, is hierdie Gauteng Online storie*

[70] *… as jy gaan wag vir hulle opleiding dink ek gaan dit dalk jare vat, so dit is maar net 'n kwessie van as jy weet jy moet daar wees moet jy plan maak om daar te kom*

[71] *Maar ek moet sê ons hanteer ons eie opleiding*

[72] *Op hierdie stadium is dit maar onsself wat dit doen. Die department is nog nie regtig gerat om dit te kan doen nie, nie op so 'n skaal nie. Nee, ek dink ons moet maar self die inisiatiewe neem*

[73] *… daar kan baie meer van die department se kant af kom, maar soos soveel ander goed in die onderwys as jy ernstig daaroor is en jy dryf dit nie dan gaan dit nie gebeur nie*

[74] *… die opleiding wat hulle gee is geweldig basies en ek dink ons mense is al daar verby, ons is al 'n trappie hoër*

[75] *… die kursusse wat hulle in elk geval aanbied is van swak gehalte of hulle mors die ouens se tyd, of dit is op 'n snaakse tyd of dit is swak gereël so ek stel nie regtig belang in hulle goed nie*

It is essential for the principal to think strategically about TPD strategies for effective ICT integration.

Funding, time and manpower is used ineffectively without any determined attempts at assisting teachers with their ICT integration (Seyoum, 2004, p. 5; Thorburn, 2004, p. 7). Figure 4.4 indicates the importance of strategic planning as it provides direction and assists the principal in determining appropriate strategies required for effective and sustainable ICT integration.  Davies and Davies (2005, pp. 10 - 13) point out that strategic leadership is the critical characteristic of effective school development.  Strategic principals provide direction and compile a framework of the future requirements of the organisation.  The function of the strategy is to translate the school's vision into reality and provide direction through a proactive transformational mindset.
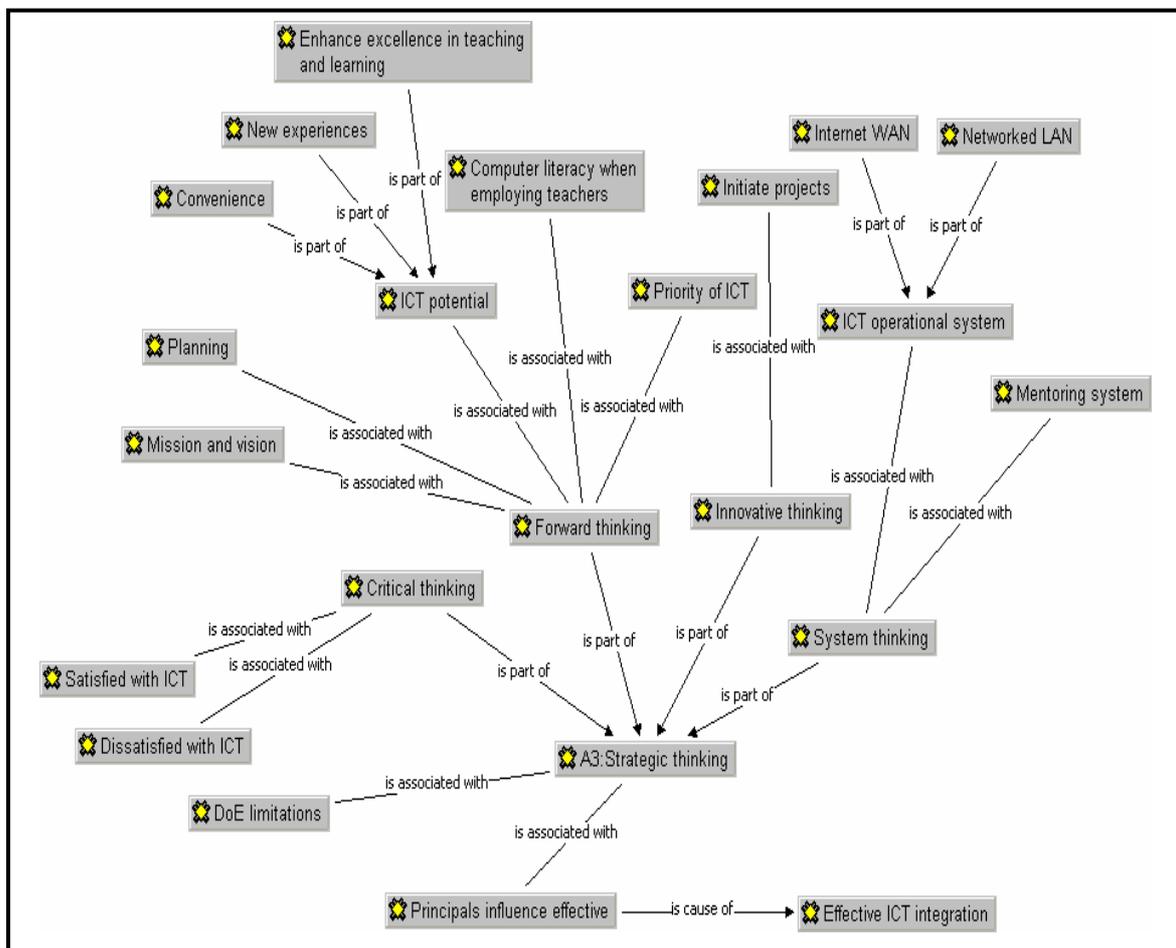


**Figure 4.4        Principal's strategic thinking as an influential factor**

Without the principal's interest, enthusiasm and understanding, the school will not be strategically focused (Davies & Davies, 2005, p. 23).  Everard, Morris and Wilson (2004, p. xii) indicate that strategic thinking consists of: innovative, critical reflective, systems and forward thinking that forms a fundamental component of excellence in leadership.  Principals'

strategic thinking establishes the fundamental elements for effective TPD for ICT integration. Figure 4.4 indicates the codes that are related with strategic thinking: critical, forward, innovative and system thinking.

### 4.3.1 Critical thinking

Effective principals assess current situations and resources, monitor the impact of TPD programmes to make informed decisions, and plan ahead for improved teaching and learning (Arnold et al., 2006, p. 3; Scrimshaw, 2004, p. 5). I asked the respondents if they were satisfied with the scope and level of ICT integration. Four respondents indicated they were not entirely satisfied:

- *No* [76] (8:202 (25)). *Just the fact it is not sufficiently available* [77] (8:204 (29))
- *I think a person can do more. A person sits there with the older members who are not really clued up on that* [78] (4:438 (37))
- *I would say yes on a small scale I'm satisfied but I would like more teachers to acquire more skills related to computer preparation* (5:329 (37))
- *I'm not yet happy because if I visit other schools whom I know that we started at the same time you can really see the leap that they already that they two or three years ahead of us when we were the first schools who were to develop the projects* (6:380 (61)).

However, two respondents were satisfied with their current progress towards ICT integration that would enhance teaching and learning, and they indicated:

- *Yes, absolutely, at the moment there is an atmosphere at school that you are supposed to teach this way* [79] (1:699 (29))
- *Yes, I think we are busy, I have just constituted a committee of teachers, all the heads of subjects had to go and do research on what is available in their subjects* [80] (3:533 (29)).

From my observations' my field notes and the respondents' comments on their satisfaction of ICT integration, I noted that the respondents' perception of ICT integration varied. A respondent commented on her satisfaction, but also referred to her learners' computer literacy:

- *Yes, we offer ICT as part of a technology even in grade … or part of IT I shouldn't say IT I should say we offer basic computer literacy as a part of technology even in grade eight* (7:297 (33)).

### 4.3.2 Forward thinking

Clarke (2007, p. 2), Foskett and Lumby (2003, p. 122), indicate that an important component for effective and successful leadership is that principals should institutionalise and

---

[76] *Nee*

[77] *Net bloot omdat dit nie beskikbaar genoeg is nie*

[78] *Ag, ek dink 'n mens kan dit nog meer doen. 'n Ou sit maar daar bietjie met die ouer mense wat nie regtig … hulle is nie regtig so "opgeclue" daaroor nie*

[79] *Ja, absoluut en op die oomblik wil ek vir jou sê hier is 'n atmosfeer in die skool van dat jy maar veronderstel is om so skool te hou*

[80] *Ja, ek dink ons is besig, ek het juis nou 'n komitee saamgestel van personeel, al die vakhoofde wat vir my moes gaan navorsing doen in hulle vak wat is beskikbaar, ensovoorts*

communicate a clear attainable vision. It promotes and assists in various actions to enhance and sustain effective teaching and learning, as well as creating direction and purpose for future success. Bush (2003, pp. 6 - 7), Wallace and Poulson (2003, pp. 220 - 222), Tomlinson (2004, pp. 143 - 144), Spurr, Rosanowski and Williams (2003, p. 3), Arnold, Perry, Watson, Minatra and Schwartz (2006, p. 2), Berube, Gaston and Stepans (2004, p. 2), Young, Sheets and Knight (2005, p. 25) all state the requirement of a vision that assists, attains aims and objectives, paves the way for TPD to take place, establishes excellence, allows change to take place by making use of available skills, talents and resources, and ensures that management activities and actions that are purposeful and functional. All the respondents had some sort of a mission or vision towards future ICT integration:

- *… you see the mission of the school is actually very important, if there is something of excellence in teaching, such things in your vision and you don't address the IT issue then you are lying to yourself* [81] (1:754 (137))
- *Well in the future if it is financially viable to supply as many classrooms as possible with computers, internet and projectors* [82] (8:298 (57))
- *Well we would like to have a laptop in every classroom as well as a plasma screen, for every subject we would like to have the software that will help us even if we have to help with the development and we would like every teacher to be able to use it* [83] (3:700 (37))
- *… every classroom has its own computer and all are linked to a network. I am telling you that is what a guy wants, we are already working on that* [84] (4:437 (161))
- *… we look at is each and every educator in the school must be computer literate* (5:404 (45))
- *… to make sure that we really understand that when people are into the computer lab it is not to say to type, it is about the integration of that information within the learning area that they are working with especially from the side of the educators* (6:439 (217))
- *To use technology* (7:296 (45)).

Nolan, Friesen, Maeers, Couros (2005, pp. 2 - 4) point out that the goal should ultimately be that teachers make use of ICTs' full potential by integrating it effectively in their teaching and learning practices to the benefit of the learners. Hezel Associates (2005-2006, pp. 2 - 4) indicate that principals have significant responsibilities when it comes to initiating, organising, planning and implementing TPD in their schools, especially through creating in-house training opportunities. Planning is necessary to ensure an effective and efficient school (Clarke, 2007, p. 3). This strategic thinking process gives principals the opportunity to plan what strategies can be applied in their schools to create effective TPD opportunities for teachers integrating ICT into their existing teaching practices. Scimshaw (2004, p. 15), Conole (2004, p. 4), DoE (2005, p. 25), Seyoum (2004, p. 2), Noland, Friesen, Maeers and

---

[81] *… jy sien die missie van die skool is eintlik verskriklik belangrik, as daar iets is van uitnemende onderrig, sulke goed in jou visie en jy spreek nie die IT ding aan nie dan is jy besig om vir jouself te lieg*

[82] *Wel in die toekoms om indien effektief koste moontlik is vir soveel as moontlik klasse moontlik rekenaars, internet en projektors te gee*

[83] *Wel ons sal graag in elke klas sal ons graag 'n laptop wil hê, ons sal in elke klas graag 'n plasmaskerm wil hê, ons wil vir elke vak wil ons graag die sagteware wil hê wat ons kan help daarmee al moet ons dan nou maar self daarmee help met die ontwikkeling daarvan en ons sal graag wil hê dat elke personeel in ons skool moet dit kan toepas*

[84] *… elke klaskamer het hulle 'n rekenaar en almal moet gekoppel wees op 'n netwerk, ek sê vir jou, dis wat 'n ou wil hê, ons werk nou al daaraan*

Couros (2005, p. 2), Jimoyiannis and Komis (2007, p. 169), Thorburn (2004, p. 1) Selwyn (2002, p. 28) accentuate the fact that the planning of ICT integration in education is now a complex and demanding challenge, opportunity, risk as well as a necessity.

Respondents indicated that they plan for TPD activities as well as ICT resources necessary for ICT integration (Table 4.3). Most of the respondents pointed out that they could budget annually for appropriate and required ICT as well as TPD activities.

Table 4.3      Planning of TPD activities and ICT resources

| TPD | ICT |
|---|---|
| • *We did a survey this morning among the teachers in terms of training to specifically make use of it* [85] (1:684 (9))<br>• *… we have a special budget for TPD* [86] (3:568 (45))<br>• *… in the budget you make provision for it, we look at what we can get if there are courses or maybe you can get a speaker …* [87] (4:372 (137))<br>• *Each year, yes, we do make a budget necessary for that* (5:358 (81))<br>• *… we offer courses, you know, at the end of the year* (7:254 (142)) | • *… that has to be in the budget it is non-negotiable* [88] (1:677 (13))<br>• *… every year there is a big budget for computer and technology advancement for the school* [89] (3:675 (181))<br>• *…a person builds it into his budget …* [90] (4:399 (201))<br>• *Although the budget is not going to be enough that is when we go out and purchase computers to supplement that what we have…* (5:405 (81))<br>• *I've made that it is a requisition that through the staff development to buy for them the memory sticks* (6:413 (169))<br>• *I've got quotations on my table that I want to discuss with the SGB tonight because we need more computers* (7:249 101)) |

Although two respondents indicated the importance of establishing TPD, they made no plans for any TPD activities to take place:

• *… if you are serious about it and you don't drive it, it will not take place* [91] *(8:298 (81))*

• *I think it is the school because we have to definitely for sure create a particular culture, we don't have to put the responsibility or the liability because at the end we are the ones who produce, who are expected to the production so that we make it work easier and quite effective in terms of how do we really function (6:440(61)).*

One respondent gave no clear indication of planning for acquiring any ICT resources due to insufficient funding:

• *…it is a problem that it is not so attainable and achieved* [92] (8:210 (13)).

---

[85] *Ons het vanoggend 'n opname weer onder die personeel gemaak in terme van opleiding om dit spesifiek te gebruik*

[86] *… ons het 'n spesiale begroting vir personeel opleiding*

[87] *… ou se begroting maak jy darem voorsiening vir dit, ons kyk maar wat 'n ou kan kry as daar kursusse is of jy dalk 'n spreker of 'n ding kan kry…*

[88] *… daai moet in die begroting wees, dit is on-onderhandelbaar*

[89] *… daar jaarliks groot begroting gaan op die rekenaar en die tegnologiese vooruitgang van die skool*

[90] *… n mens bou dit in jou begroting in…*

[91] *… as jy ernstig daaroor is en jy dryf dit nie dan gaan dit nie gebeur nie*

[92] *… dit is 'n probleem dat dit nie so beskikbaar en bereik is nie*

Principals' prioritisation of ICT integration and how they predicted the future would impact on ICT on teaching and learning has a determining influence on the strategies they will implement for TPD and to what lengths they will go to implement the strategies. Most of the respondents indicated the importance of ICT integration:

- *… you have to use ICT in your classroom teaching, you cannot go without it any longer* [93] (1:624 (13))
- *We are now busy earnestly, this is now from this year onwards to put everything in this type of ICT* [94] (3:590 (57))
- *Make it a point that the computers are incorporated in class and curriculum* (5:336 (53))
- *Especially at this rate that which the education is changing definitely for sure everybody needs to have it* (6:368 (41))
- *I mean I can't teach the way I used to teach when I started teaching and ja you just got to keep up with it* (7:274 (214)).

Two respondents contradicted themselves on their priority of ICT integration. On the question whether it was important that teachers make use of ICT and are knowledgeable about ICT respondent two stated: *It is non-negotiable* [95] (8:196 (9:9)). As the interview proceeded, I realised that ICT integration was not 'non-negotiable' because the respondent *… postponed it for a year* [96] (8:250 (101)) and stated: *I would like to do it but it is totally unpractical* [97] (8:245 (97)).

Respondent four maintained: *I don't think you can do really without computers at this stage. I don't think you can really be without it. You are in the Stone Age if you work without it* [98] (4:304 (29)). *No, never ever. A person can not work without those things, you are dead if you do* [99] (4:406 (229)). However, this respondent contradicted himself as well by stating: *…I think a person can give effective teaching without a computer. You don't really need a computer* [100] (4:325 (53)).

All respondents acknowledged that ICT has enormous potential for education, and that it is important for achieving excellence in teaching and learning. During the interviews various factors emerged, indicating the respondents' perceptions of this potential (Table 4.4). They indicated that ICT was convenient, enhanced teaching and learning, provided excellent resources and offered new experiences for teachers as well as learners.

**Table 4.4    ICT potential**

| Convenience | Resources | New experiences | Enhances teaching and learning |
|---|---|---|---|
| • … the application of technology just | • … with this stuff there is a vast amount of | • … she can sit here in class, the computer screen is on in the other class and | • … I think if you experience the learners are |

---

[93] *Moet hierdie tegnologie in jou klasaanbieding aanwend en kan nie meer daar sonder nie*

[94] *Ons is nou besig om ernstig, dit is nou van hierdie jaar af alles in hierdie tipe van tegnologie te sit*

[95] *Dit is on onderhandelbaar*

[96] *… dit vir 'n jaar uitgestel*

[97] *… ek sou dit graag wou doen maar dit is totaal en al onprakties*

[98] *Ek dink nie jy kan regtig daarsonder nie. Jy is in die Steentydperk as jy daarsonder werk*

[99] *Nee, nooit never nie. 'n Ou kan nie sonder daai goed werk nie, jy is dood as jy dit doen*

[100] *… ek dink 'n mens kan effektief onderrig gee sonder 'n rekenaar. Jy het nie regtig 'n rekenaar nodig nie*

**Table 4.4    ICT potential**

| Convenience | Resources | New experiences | Enhances teaching and learning |
|---|---|---|---|
| *makes life easier* [101] (1:647 (33))<br>• *It is a question that you just press a button and everything is done* [102] (3:663 (156))<br>• *It is very time effective …* [103] (4:306 (29))<br>• *… it will make the work of the teachers very very easy and for quite a lot of things we will be using the computer* (5:350 (65))<br>• *… teachers, work can be updated quite easily* (6:411 (165))<br>• *Anything at any given time you can ask me of any learner and I can look in the computer* (7:237 (13)) | *knowledge currently, that is available on the Internet* [104] (4:332 (69))<br>• *… also searching information* (6:412 (165))<br>• *… we have this topic that we are busy with we are looking for this information, in the meantime get the web connections* [105] (8:287 (37))<br>• *We got Internet facilities for all learners. I think in today's life you can't go without a computer* (7:281 (45))<br>• *… prepare to share some of the information through the memory stick it actually tells you that we have moved a long way* (6:423 (101)) | *she can quickly explain this thing and they can see, the learners see everything on the screen and the teacher sees it…* [106] (3:631 (96))<br>• *In the meantime we have contacted the American Embassy and we have a liaison programme with two schools in America via the Internet which the learners benefit more from …* [107] (8:227 (37))<br>• *If you enjoy teaching again and you have all the learners' attention and everybody behaves; that is pleasant for the teacher* [108] (1:736 (101))<br>• *… gives you a chance to always try something new and innovative in a way it grabs the educators, a chance to become empowered in terms of the content that it teaches* (6:424 (165))<br>• *… click on this thing there are all seven from which one do we want more of and I mean this is part of OBE stuff and you show the learners what is going on with this stuff* [109] (4:416 (165)) | *paying attention this is now nice, it's quiet in your class and there is intelligent questions the learners are riveted to this …* [110] (1:735 (101))<br>• *… how does the cross section of this leaf look like, click on Oxford University www and there it is, in glorious colour* [111] (4:415 (165))<br>• *… if each teacher could have a laptop they could present their classes so much more efficiently with PowerPoint* (7:283 (53)) |

Most respondents agreed that knowledge about and to be skilled in ICT are the determining factors when employing or promoting teachers:

---

[101] *… so die aanwending van die tegnologie maak net die lewe vir 'n ou makliker*

[102] *Dit is 'n kwessie van jy druk 'n knoppie en alles is klaar*

[103] *Dit is baie tyd effektief …*

[104] *… en met hierdie goeters daar is so legio van kennis wat daar tans is, is in die Internet*

[105] *…ons het hierdie onderwerp wat ons hanteer ons soek hierdie inligting, kry solank vir ons die webskakels*

[106] *…kan sy hier in haar klas sit, die rekenaarskerm is aan in die ander klas en sy kan gou hierdie ding verduidelik en hulle kan sien, die kinders sien alles op die skerm en die personeellid sien dit…*

[107] *Nou het ons intussen tyd met die Amerikaanse ambassade kontak gemaak en ons het 'n skakelprogram wat die kinders eintlik meer uit baat met twee skole in Amerika wat via internet gebeur…*

[108] *As jy weer lekker skool hou, en jy het al die kinders se aandag en almal let op, almal gedra hulle en dis heerlik vir 'n onderwyser*

[109] *…kliek op die ding daar is al sewe van watter een wil ons meer hê en ek bedoel dit is deel van die OBE goeters en jy wys vir die kinders wat gaan aan met hierdie goed*

[110] *… ek dink as jy ervaar die kinders wat oplet dit is nou lekker stil in jou klas en dis intelligente vrae die kinders sit vasgenael vir hierdie goed*

[111] *… hoe lyk die deursnit van hierdie blaar kliek op Oxford Universiteit.www woeps daar lê die ding mooi in kleur wys*

- *… you must be computer literate that is one of the criteria. Even when it comes to our promotions you have to be computer literate if you want to apply for a promotion post here by us* [112] (3:669 (172))
- *… we advertise the post for the teacher who is computer literate* (5:339 (53))
- *You cannot just employ anybody who does not know anything about computers* (5:380 (121))
- *I would ask people whether they are computer literate. I did it in our previous interviews…* (7:273 (206))
- *… there is a whole section on administration and computer literacy, computer training and computer application, are the three questions asked* [113] (8:243 (89)).

### 4.3.3    Innovative thinking

Many principals found themselves in an environment where financial resources are not readily available.  They perceived this as hampering the successful integration of ICT. Principals become creative about generating additional funding.  Drago-Severson (2004, pp. 53 - 54) states that insufficient resources negatively impact on teachers' learning and teaching as it determines the frequency, quality and the number of teachers that can undergo TPD.  Seyoum (2004, p. 1) and Walsh (2002, p. 19) add that with continuous technological advancements and limited financial resources, principals have to generate sufficient funding for effective and sustainable ICT integration and ICT infrastructure.

- *… it is just a question that you know you have to be there and you have to make a plan to get there* [114] (1:696 (77))
- *We have, for example , the specific institution that is coming to give us a presentation, it is going to sponsor us, and a lot of this stuff they are going to give to us* [115] (3:610 (73))
- *… every year we approach the corporate world, the business to sponsor our staff development workshops* (5:342 (57))
- *… we actually approached Telkom Foundation to come and install the computers* (6:403 (117))
- *Fundraises and parents, you don't really get from parents. Fundraises we offered last Saturday we offered a departmental function where we did the catering and obviously there is a bit of money left from catering* (7:251 (109)).

All respondents indicated that creativity in generating funding for TPD was often required. When referring to my field notes, I noted that two of the respondents' comments indicated limitations to their initiatives:

- *… said the school does not really have money for this stuff you have to build it, then you jump in and you build it, you plan it yourself* [116] (4:410 (237)).

---

[112] *... hy moet rekenaargeletterd wees, dit is een van die kriteria. Selfs by ons bevorderingsposte; jy moet rekenaargeletterd wees as jy wil aansoek doen vir 'n bevorderingspos by ons*

[113] *… daar is 'n hele afdeling oor administrasie en rekenaargeletterdheid, rekenaaropleiding en rekenaartoepassing, is drie spesifieke vrae wat gevra word*

[114] *… dit is maar net 'n kwessie van as jy weet jy moet daar wees moet jy plan maak om daar te kom*

[115] *Ons het byvoorbeeld, die spesifieke plek wat ons nou hierdie aanbieding kom doen, kom ons borg, en baie van hierdie goeters gaan hulle vir ons gratis gee*

[116] *…gesê die skool het regtig nie geld vir die goed nie jy moet maar daai goed bou, jy klim maar in en jy bou maar self, jy maak maar self 'n plan*

This comment referred to a respondent's previous school where he initiated a project — this was an indication to me that you can plan as necessary. Currently this principal has not initiated any projects to generate additional funding.

The second respondent's project was small. They had only received five Internet-connected computers, which indicated that only a few privileged teachers could receive training in searching for information on the Internet:

- *… the American Embassy has installed an ADSL line and has given us five computers with a bit of training about research and so on* [117] *(8:299 (37)).*

### 4.3.4    System thinking

Functional technological infrastructure and facilities should be available before teachers can integrate ICT on a regular basis in teaching and learning activities (Becta ICT Research, 2004, p. 3; Cowie & Jones, 2005, p. 10; Gibson & Oberg, 1999, p. 2; Han, 2002, p. 296; Means, 1994, p. 177; Seyoum, 2004, p. 2). Table 4.5 indicates the scope and extent that principals in this study make ICT operational systems, as well as mentoring systems, available to teachers at their schools. Both these systems are of the utmost importance for effective and efficient integration of ICT in teaching and learning.

**Table 4.5        Availability of ICT operational system and mentoring system**

| ICT operational system | | Mentor system |
|---|---|---|
| **Internet WAN** | **Networked LAN** | |
| **Respondent 1:** | | |
| • *When a learner comes and does research or wants information it is in electronic format* [118] *(1:698 (133))* | • *… the Smart System this is the school's administrative system* [119] *(1:614 (5))* | • *… we have pace setters for every subject and phase …* [120] *(1:643 (53))* |
| **Respondent 2:** | | |
| • *… try and get more information from the computers especially the Internet* [121] *(8:199 (13))* | • *… we use it fully for the school's admin, research and information* [122] *(8:194 (5))* | • *Not really formally …* [123] *(8:259 (117))* |
| **Respondent 3:** | | |
| • *In the four computer centrums Internet is available* [124] *(3:684 (216))* | • *… everyone has a computer linked to the network* [125] *(3:653 (136))* | • *The moment when a teacher comes in then a mentor is assigned, usually the subject* |

---

[117] *…die Amerikaanse ambassade het nou vir ons 'n ADSL-lyn ingesit.Hulle het vir ons vyf rekenaars gegee, bietjie opleiding gegee rondom die navorsing en die goed*

[118] *As 'n kind kom navorsing doen of inligting wil hê moet dit in elektroniese formaat*

[119] *…die smart stelsel dis nou die skool se adminastratiewe stelsel*

[120] *… ons het pasaangeërs nou maar vir elke vak en fase …*

[121] *… meer inligting vanaf die rekenaar te probeer kry, veral die internet*

[122] *… ons gebruik hom volledig vir skool administrasie, navorsing, inligting*

[123] *Nie regtig formeel nie…*

**Table 4.5        Availability of ICT operational system and mentoring system**

| ICT operational system | | Mentor system |
|---|---|---|
| **Internet WAN** | **Networked LAN** | |
| | | *head…* [126] *(3:672 (176))* |
| **Respondent 4:** | | |
| • *… there is Internet we have ADSL lines* [127] *(4:310 (165))*<br>• We obviously have a Internet café [128] *(4:443 (177))* | • *… over the hundred computers that are on the network* [129] *(4:390 (165))* | • *Yes we do use the tutor or mentor system …* [130] *(4:383 (117))* |
| **Respondent 5:** | | |
| • *No, not yet. It is something that we are looking at. We are looking at the Internet too but the rural area the matter is with Telkom now … (5:387(173))* | • *… administrative purposes for say for instance if you want to check the payment for school fees of the learners I do use the computer, for some time tables for learners I also check the computer and learners progress, progress register in the computer maybe comparing the marks (5:322 (33))* | • *Usually the senior teachers, teachers who have been in the teaching profession for some time who understand and who has the experience of what teaching entails and who can also be able to assist the person with educational matters (5:385 (145))* |
| **Respondent 6:** | | |
| • *With Gauteng online I believe it will be our first experience with the connection with the Internet (6:408(153))* | • *…haven't yet synchronized in such a way that we be able to find information that based on administration from the individual computers… (6:362 (25))* | • *Ag, we introduced the concept but we did not implement it properly, we are not implementing it properly here (6:414 (193))* |
| **Respondent 7:** | | |
| • *We got Internet facilities (7:283 (45))* | • *We make use of computers for all admin, marks, mark sheets, absentees all the financial matters basically everything. Anything at any given time you can ask me of any learner and I can look in the computer (7:236 (13))* | • *Each new teacher is allocated to one of the oldies (7:271 (198))* |

The shaded areas in Table 4.5 indicate the absence of availability of infrastructural and mentoring systems.  Only two respondents did not have ICT operational system available relating to Internet connection.  All respondents reported that the computers in the administrative block were connected to a local area network except for one.  Some had

---

[124] *In die vier sentrums is daar Internet*
[125] *… elkeen het 'n rekenaar wat gekoppel is aan 'n netwerk*
[126] *Die oomblik as 'n personeellid inkom dan word daar 'n mentor, dit is gewoonlik die vakhoof …*
[127] *…daar is Internet ons het ADSL lyne*
[128] *Ons het natuurlik 'n Internet kafee*
[129] *… oor die honderd rekenaars wat op 'n netwerk*
[130] *Ja ons gebruik maar die teoter of mentor stelsel…*

additional computers that were also connected to the local area network. The learners, as well as teachers had access to the Internet. Two respondents had no formal mentoring system at their schools.

### 4.3.5 Limited strategic thinking

The data analysis indicated that respondents showed limited strategic thinking. The categories illustrate the limitations (Figure 4.5).
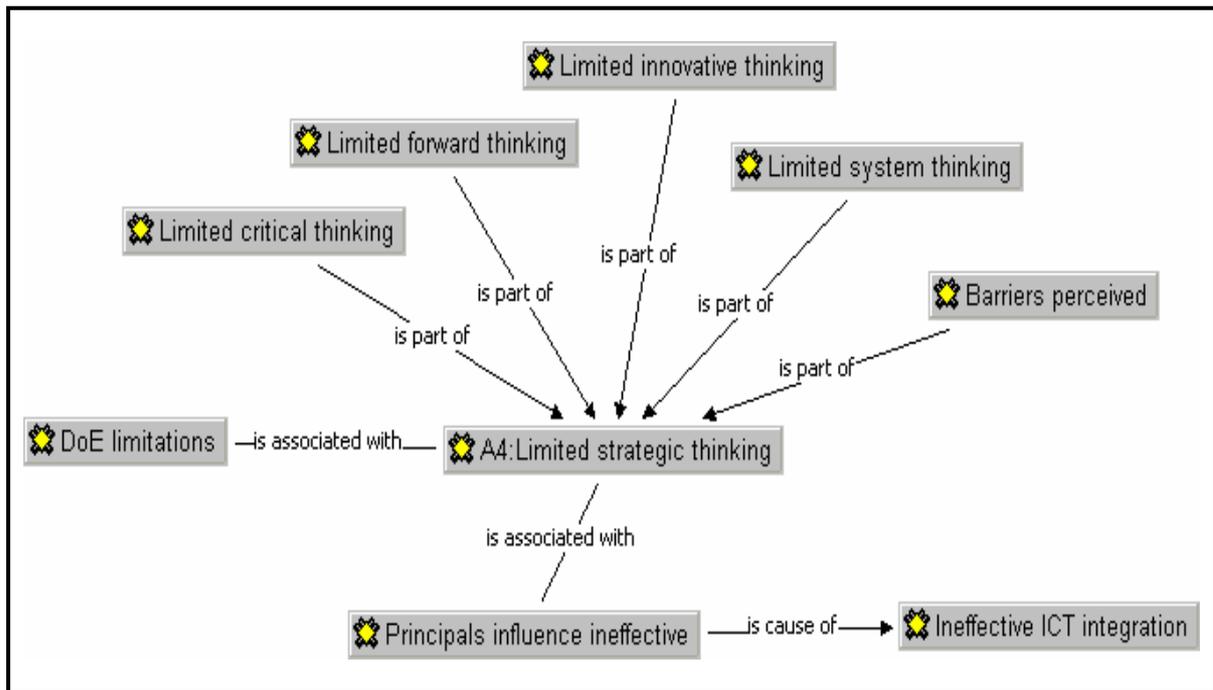


**Figure 4.5    Indication of principals' limited strategic thinking**

Limited strategic thinking is associated with ineffective leadership by principals for ICT integration (Figure 4.5). Respondents indicated their limitations on strategic thinking. Respondent two did not adhere to any of the types of effective strategic thinking (Table 4.6).

**Table 4.6    Respondent 2: Principal's limited strategic thinking**

| Critical thinking | Forward thinking | Innovative thinking | System thinking | Barriers perceived |
|---|---|---|---|---|
| • *I would like to do it but it is totally impracticable* [131] *(8:248 (97))*<br>• *… but it is not a formal aspect that is formally driven* [132] *(8:216 (33))* | • *… the programme must then be more subject-driven …* [135] *(8:213 (17))* | • *… it is financially not viable in our school* [137] *(8:301 (29))*<br>• *..bit of training in* | • *… the five computers that are specifically connected to the Internet* [139] *(8:230 (41))* | • *…finances and security I almost want to say are the two biggest stumbling-blocks* [142] *(8:249 (101))* |

---

[131] *Ek sou dit graag wou doen maar dit is totaal en al onprakties*
[132] *…maar dit is nie 'n formele aspek wat formeel gedryf word nie*

**Table 4.6        Respondent 2: Principal's limited strategic thinking**

| Critical thinking | Forward thinking | Innovative thinking | System thinking | Barriers perceived |
|---|---|---|---|---|
| • …it is just a lack of exposure [133] (8:302 (109))<br>• … unfortunately once again availability plays an important role [134] (8:303 (129)) | • …the whole security situation is once again going to put off some guys to use it [136] (8:304 (129)) | regard to research [138] (8:221:(37)) | • No, we have a computer-typing centre [140] (8:300 (41))<br>• …it is mostly for learners [141] (8:231 (41)) | • … established ideas or a lack of, or resistance against change is possibly the big thing [143] (8:261 (121)) |

From the field notes it became apparent that respondent two focused on the barriers of integrating ICT into teaching and learning.  He constantly blamed the barriers for not integrating ICT.  He also did not think of planning ahead, or strategising to overcome his perceived barriers.  The barriers seemed to hamper his strategic thinking and planning:

- *I presume you are now going to ask me what the barriers are, so it is a problem that these are not available and achievable…*[144] (8:323 (13))
- *With us finances are a crisis, just now I wanted to refer to the barriers, but a few things, the availability of computers and the security around computers…*[145] (8:204 (29))
- *… not financially attainable in our school's framework to give every teacher a computer or to have available or even to have enough laptops and projectors to use it meaningful* [146] (8:311 (29))
- *…finances and security I almost want to say are the two biggest stumbling-blocks* [147] (8:249 (101))
- *… established ideas or a lack of, or resistance against change is possible the big thing* [148] (8:261 (121)).

---

[133] *…dit is bloot 'n gebrek aan blootstelling*
[134] *…ongelukkig weereens speel beskikbaarheid 'n geweldige rol*
[135] *…die progam moet dan meer eintlik vakgedrewe wees*
[136] *…die hele veiligheidsituasie gaan party ouens nou weer afsit om dit te gebruik*
[137] *…nie finansieel haalbaar binne ons skool*
[138] *… bietjie opleiding gegee rondom die navorsing*
[139] *… die vyf rekenaars is wat spesifiek met die internet gekoppel is*
[140] *Nee, ons het 'n rekenaartiksentrum*
[141] *…dit is hoofsaaklik vir leerlinge*
[142] *…finansies en sekuriteit wil ek amper sê is die twee grootste struikelblokke*
[143] *… gevestigde idees of 'n gebrek aan, of teenkanting vir verandering is waarskynlik die groot ding*
[144] *Ek neem aan jy gaan netnou vir my vra wat is die barriers, so dit is 'n probleem dat dit nie so beskikbaar en bereik is nie…*
[145] *By ons is finansies 'n krisis ek wou nou-nou al na die barrier verwys het, maar 'n paar goed, die beskikbaarheid van rekenaars en die veiligheid rondom rekenaars*
[146] *…nie finansieel haalbaar binne ons skool se opset om vir elke ou 'n rekenaar te gee en beskikbaar te hê of om selfs genoeg draagbare rekenaars en projektors te hê om dit sinvol te gebruik nie*
[147] *…finansies en sekuriteit wil ek amper sê is die twee grootste struikelblokke*
[148] *… gevestigde idees of 'n gebrek aan, of teenkanting vir verandering is waarskynlik die groot ding*

Respondent 4 indicated that he had neglected two types of strategic thinking (Table 4.7).

**Table 4.7       Respondent 4: Principal's limited strategic thinking**

| Critical thinking | Forward thinking | Barriers perceived |
|---|---|---|
| • All that we do…[149] (4:380 (141))<br>• I think a person can do more [150] (4:440 (37))<br>• No, there are not specific expectations [151] (4:441 (45))<br>• Yes, I don't think you change those guys [152] (4:364 (125))<br>• No it is not a prerequisite [153] (4:442 (153)) | • We did it …[154] (4:336 (77))<br>• … there is not really time for it [155] (4:376 (141))<br>• … but so far this year I left it for this year [156] (4:439 (141))<br>• …the guys that come to us are all computer literate [157] (4:382 (149)) | ..frequently we are without telephone lines then they steal the telephone cables …[158] (4:444 (197)) |

Respondent six indicated two types of strategic thinking that he had neglected (Table 4.8).

He had many perceived barriers to overcome.

**Table 4.8       Respondent 6: Principal's limited strategic thinking**

| Critical thinking | Forward thinking | Barriers perceived |
|---|---|---|
| • … those classes who are not doing anything serious maybe typing when they need to do serious work (6:422 (261))<br>• …we kept some of the classes away to make sure that we get the maximum machines working in the centrums (6:441 (261))<br>• …it is not that easy to slot in time (6:444 (129))<br>• … they haven't yet seen it in practice (6:445 (133))<br>• … mostly it will be for those subjects whom clearly want their worked typed  (6:452 (257))<br>• Now I would say it is still a big challenge (6:372 (45))<br>• No I'll be honest with you, I'm not yet happy (6:380 (61))<br>• Yes, for now I put it that it that it is still a big challenge (6:429 (73))<br>• Okay, I think that one is a big challenge (6:430 (89)) | I would say those one that did happen in 2005 (6:410 (157)) | • …is the issue of security …(6:447 (217))<br>• …sixty percent of them still stick to the old method (6:446 (141))<br>• … expected to raise funds on our own and were we draw most of our kids it is from squatter areas (6:451 (229))<br>• … time that we need to set aside to make sure that we really understand that when people are into the computer lab it is not to say to type it is about the integration of that information within the learning area (6:448 (217)) |

---

[149] *Al wat ons net doen*
[150] *Ag ek dink 'n mens kan dit nog meer doen*
[151] *Nee, daar is nie spesifieke eise nie.*
[152] *Ja ek dink nie jy verander daai ouens nie*
[153] *Nee, dit is nie 'n voorvereiste nie*
[154] *Ons het dit gedoen*
[155] *…daar is nie regtig tyd daarvoor nie*
[156] *… maar vanjaar sover ek het nou die jaar dit gelos*
[157] *… die ouens wat na ons kom is almal rekenaargeletterd*
[158] *…heel dikwels sonder telefoonlyne want dan steel hulle die kabels …*

Respondent six experienced many barriers. However, he viewed them as a challenge. Due to insufficient critical thinking and forward thinking he indicated no actions, plans or strategies to address the challenges. Focused TPD is required to assist him to address the multitude of barriers and improve his strategic thinking.

Although respondent seven demonstrated adequate thinking skills, she indicated only her perceived barriers. This respondent addressed the barriers through her innovative thinking, strategies and actions:

- *Mind change* (7:275 (226))
- *… learners swop the hard drives, the memory, it is quite easy to open it up and take the memory out and put the new memory in* (7:298 (118))
- *We try to raise money…* (7:299 (105)).

### 4.3.6 Conclusion

Although the DoE has various TPD initiatives in place for the integration of ICT, my data analysis indicated that most of the respondents are negative towards their initiatives. They perceive DoE's attempts to train teachers for the integration of ICT into their teaching practices slow, insufficient regarding continuous and follow-up support. They also question the quality of the training. The success rate of teachers returning from training that integrate ICT into their teaching and learning practices seem to be very low and unsustainable. Some of the respondents took matters into their own hands and initiated in-house training to ensure that their teachers acquire the competencies for ICT integration. However, my data also indicated that principals required thinking strategically about teachers' ICT integration through TPD. Some of the respondents seem to neglect engaging all types of strategic thinking. Some respondents perceived the barriers differently than others in terms of the intensity and frequency. In spite of shared perceptions of the same barriers, some respondents addressed the barriers through creative and appropriate strategies.

The following dynamics emerged from my analysis and indicated the principals' effective leadership for ICT integration:

- Critical thinking:    - Determining satisfied and un-satisfied elements
- Forward thinking:    - Establishing a mission and/or vision
  - Planning ahead for TPD activities and ICT resources
  - Acknowledging the potential of ICT and areas where ICT can be effectively applied
  - Computer literacy when employing and promoting teachers
  - Prioritisation of ICT integration
- Innovative thinking:  - Initiate projects

- System thinking:    - Establishing efficient and effective ICT operational system as well as a mentoring system.

**4.4        What are the enabling strategies that principals can follow to develop and sustain teachers' integration of Information and Communication Technology in teaching and learning?**

Several authors share the same opinion that principals' interest and continuous involvement in ICT integration is the key in determining how ICTs will be used in schools by teachers and learners (Busher, 2006, p. 151; Drago-Severson, 2004, p. xxi; Johnson, 2004, p. xvii; Seyoum, 2004, p. 3; Soule, 2003, p. 8; Spurr et al., 2003, p. 3; Tallerico, 2005, p. 100; Zepeda, 1999, p. 14).  Gordon (2003, p. 2), Tomlinson (2004, pp. 101 - 102), Blase and Blase (1994, pp. 9 - 10), Cowie and Jones (2005, p. 3) agree that for fundamental change to take place, principals are required to provide appropriate support and ensure conducive working conditions that will positively affect teachers' attitudes, essential for the implementation of change into their teaching and learning practices.  Principals should assess the presence of certain conditions in schools and then take appropriate steps to strengthen the conditions that are already present while taking steps to rectify or establish those that are not present in order to facilitate and enhance the integration of ICT in teaching and learning (Nawawi et al., 2005, p. 96).  Van der Westhuizen (1997, pp. 191 - 192) indicates that many aspects influence the relationship between a principal and teachers necessary for work satisfaction and overall contentment.

From the literature I derived that certain enabling factors have to be considered to aid the process of effective and sustainable ICT integration. From my analysis I categorised the enabling strategies into three categories: TPD enabling strategies, ICT enabling strategies and teacher enabling strategies essential to be implemented by the principal for effective ICT integration to materialise (Figure 4.6).
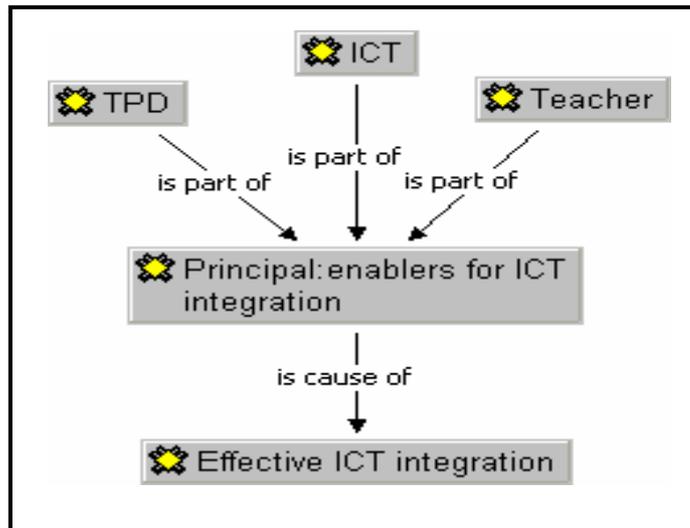
**Figure 4.6    Categories for effective ICT integration**

My field notes and the respondents' comments relating to the strategies that they put into practice for effective and sustainable ICT integration varied considerably. Some respondents made use of more enabling strategies than others. This observation led me to catalogue all the enabling strategies that the respondents implemented and group them together under the three categories (Figure 4.6) that allowed me to form a comprehensive catalogue of enabling strategies.

### 4.4.1    Teacher professional development enabling strategies that principals can follow to develop and sustain teachers' integration of Information and Communication Technology in teaching and learning

A way that a principal can provide and sustain supportive contexts for teachers is through TPD as it influences teachers' confidence levels, their inclination toward trying out innovative ideas, as well as their attitude towards the teaching profession and creative classroom practices (Blase & Blase, 1994, p. 67; Center for CSRI, 2007, p. 2; Drago-Severson, 2004, pp. xxi, 38; Tallerico, 2005, p. 123). Hezel Associates (2005-2006, pp. 2 - 4) indicate that principals have significant responsibilities when it comes to initiating, organising, planning and implementing TPD in their schools. Various authors agree that principals have to create opportunities for TPD (Blase & Blase, 2001, pp. 14, 16, 23, 64; Blase & Blase, 1994, p. 9; Han, 2002, p. 295; Thorburn, 2004, p. 9).

Day and Sachs (2004, p. 48) point out that TPD deals with changes that teachers experience in their skills throughout their teaching careers. TPD allows teachers to grow professionally by extending and renewing their knowledge and skills (Arnold et al., 2006, pp. 3 - 4). TPD

creates a supportive environment and principals should encourage and create TPD opportunities were teachers can continuously share their expertise, success, frustrations and knowledge with one another (Blase & Blase, 2001, pp. 14, 16, 23, 64; Blase & Blase, 1994, p. 9; Gibson, 2002, p. 32; Han, 2002, p. 295; Theroux, 2004, p. 3; Thorburn, 2004, p. 9). Clarke (2007, p. 131) emphasises that an effective TPD programme is a critical factor in a school that has to be an integral part of teachers' professional lives. This will ensure continuous improved teaching and learning; contributing to the school's excellence. From the literature, my field notes and analyses the following categories indicating the enabling strategies associated with TPD for effective ICT integration emerged (Figure 4.7).
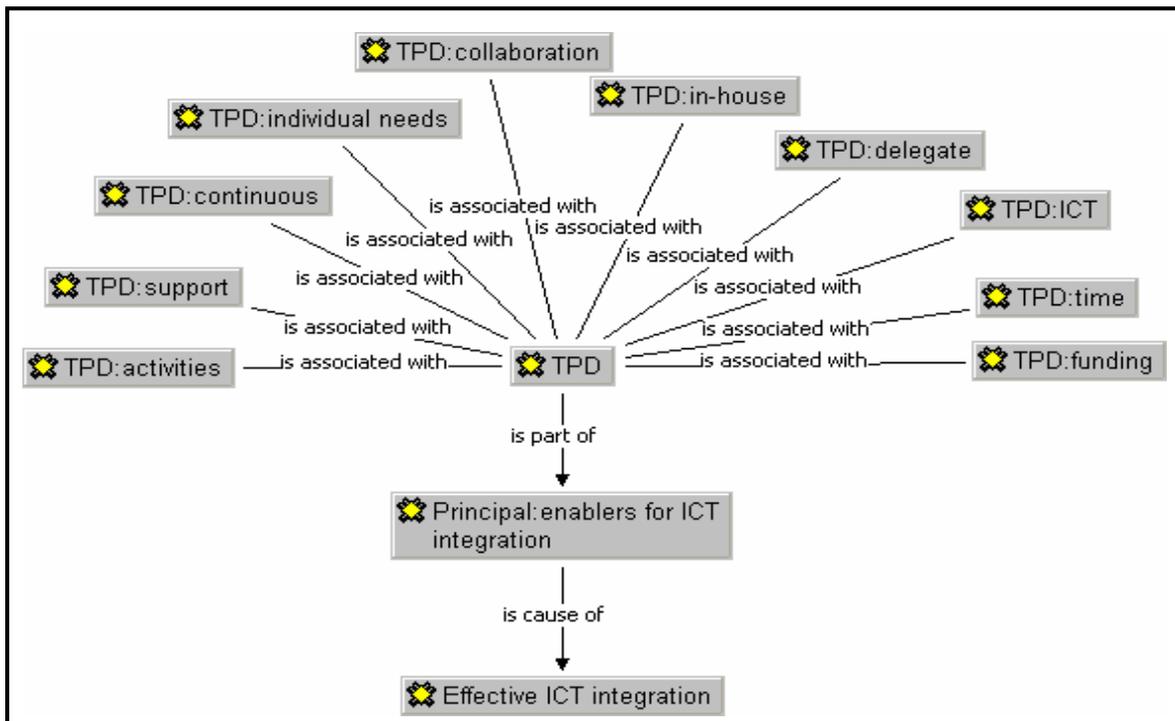


**Figure 4.7    TPD enabling strategies**

The enabling strategies associated with TPD are vital for principals to instigate and uphold as it will determine to what extent ICT integration will be effective and sustained.


**4.4.1.1    Teacher professional development activities**

Drago-Seversen (2004, p. xxi) points out the primary manner in which principals can ensure that teachers are supported in their personal and professional growth and that is through sustained effective TPD activities. TPD ought to include actions or activities that will lead to the improvement of teaching and learning practices having an effect on the development of the whole school (Zepeda, 1999, pp. 5 - 7). All respondents indicated that they initiate various TPD activities. Activities included sending teachers on courses, joint planning in

particular departments, inviting experts and specialists to present workshops, attending courses at other schools and provinces, making use of correspondence programmes and visiting other schools that are better informed.

- *We have adopted a knew style at school where their planning as I say it is in a particular department* (5:415 (73))
- *… also had someone here from the University that came and showed the people…*[159] (1:693 (65))
- *… contact with learning area specialists from other provinces and we attend their courses …*[160] (3:578 (45))
- *… visit schools to find out more about the learning area …*[161] (3:712 (45))
- *…I send all my staff to attend training courses in Gauteng* [162] (3:714 (45))
- *We received good aid from the teaching by area specialists…*[163] (3:716 (45))
- *…if they have time during break or maybe in the afternoon where we got an extra hour as a staff we go through my laptop…*(6:473 (45))
- *… in the meantime we have some programmes from NGOs we, like for instance let's say Damelin this service provider who initially sell its products through correspondence* (5:410 (49))
- *…we see what there is if there are courses or if you can maybe get a speaker…*[164] (4:467 (37))
- *Then out-sourcing a person who, who is to be clever to come give us a workshop* (5:412 (57))
- *… they sometimes have short courses or something they invite me or some of the teachers to do it* (7:313 (146))
- *… the teacher that currently runs the integration section for me, has trained the interested teachers…*[165] (8:215 (33)).

### 4.4.1.2    Teacher professional development support

As Young, Sheets and Knight (2005, p. 134) note nothing effective happens in a school without the endorsement and support of the principal.  Blase and Blase (1994, p. 23) agree that a supportive environment allows for collaborative planning and shared decision making, provides essential training, as well as policy and curriculum expertise.  Kovalchick and Dawson (2004, p. 32), Rodrigues (2005b, p. 60), Lieberman (2000, p. 77) all say that the principal must ensure that teachers receive the required support in the integration process or they will revert to their old teaching and learning practices.  Johnson (2004, p. xvii) and Southworth (2005, p. 76) found that a principal demonstrating effective leadership and management abilities that provide continuous support enables teachers to succeed in even the most challenging environment, whereas an ineffective and unsupportive principal can undermine the work of even the most able, eager and committed teachers.  Respondents stated that support at school was readily available:

- *You can ask someone to quickly show me how to do it and that person is immediately going to assist you* [166] (1:798 (109))

---

[159] *… ook iemand gehad wat van die universiteit wat vir die ouens kom wys het…*
[160] *… kontak met vakadviseurs van ander provinsies en ons gaan woon hulle kursusse by*
[161] *…skool te gaan besoek om meer uit te vind oor die leerarea*
[162] *…ek het nou al my personeel gestuur om die opleidingskursusse in Gauteng te gaan bywoon*
[163] *Ons het veral nou baie goeie hulp gekry van vakadviseurs…*
[164] *… ons kyk maar wat 'n ou kan kry as daar kursusse is of jy dalk 'n spreker…*
[165] *… die jufrou wat nou die integrasie afdeling dryf vir my het byvoorbeeld al vir personeel wat belangstel opleiding gegee*
[166] *Jy kan vir 'n ou sê wys gou-gou net vir my hoe doen mens dit en daai persoon gaan vir jou dadelik help*

- *Yes, some go in large groups then there is training in something specific for everyone or everyone who is interested then the computer centre is packed* [167] (1:789 (73))
- *…to find out more about the learning area we, make sure that it can be done …*[168] (3:569 (45))
- *… in the afternoon we can take a few minutes we can help them to use the computer* (5:420 (105))
- *HOD that we are having a problem* (5:425 (117))
- *… we get someone from the outside who is converted with the subject concerned to come and help out* (5:427 (117))
- We open up questions to the teacher such as how far are you with your computer learning… (5:371 (105)).

### 4.4.1.3    Continuous teacher professional development

Several authors agree the integration of innovative practices and changes do not happen without continuous involvement from the principal (Busher, 2006, p. 151; Seyoum, 2004, p. 3; Spurr et al., 2003, p. 3; Tallerico, 2005, p. 100).  Principals can provide constant support by ensuring that teacher training is a continuous process that provides regular updates on ICT development and integration in education (NCREL, 2000, p. 2; Seyoum, 2004, p. 5).  Many authors state that TPD should take place continuously due to changes in the education system and the rapid developing pace of ICT (Day & Sachs, 2004, p. 55; Glatthorn et al., 2006, pp. 41 - 43; Rodrigues, 2005a, p. 1).  Only three respondents indicated that continuous TPD takes place:

- *… if you are not there where you want to be, you can ask for assistance, the assistance is continuously there* [169] (1:796 (109))
- *This stuff takes place continuously through the term. That is why we have meetings for this type of stuff in the afternoons* [170] (3:741 (168))
- *… a person tries to see what the teachers are able to learn from each other…*[171] (4:465:65))
- *…educators would meet the afternoon and come together and talk about the problems that they encounter in their day* (5:435 (73)).

One respondent mentioned that TPD activities take place quarterly:

- *… takes place quarterly* (7:310 (134)).

### 4.4.1.4    Teacher professional development for teachers' individual requirements

Prinsloo and Van Schalkwyk (2008, pp. 162 - 163) indicate that leadership entails understanding and acknowledging the requirements and contributions of individual teachers to maximise their strengths and minimise their limitations for the benefit of the school.  Day and Sachs (2004, p. 155) acknowledge that teachers are in different phases, have different requirements with respect to their personal growth and development, have different

---

[167] *Ja, party gaan in groot groepe, dan is daar opleiding in iets spesifiek vir almal of almal wat belangstel dan sit hulle 'n rekenaarsentrum vol*

[168] *…meer uit te vind oor die leerarea maak ons voorsiening vir hom dat hy dit wel kan doen*

[169] *…as jy nog nie is waar jy wil wees nie kan jy maar aanhou vra , die hulp is deurgaans daar*

[170] *Hierdie goeters word deurlopend deur die kwartaal…dit is hoekom ons in die middae vergaderings het en sulke tipe van goed*

[171] *…probeer 'n ou kyk wat die ouens van mekaar kan leer…*

orientation and attitudes to change and development, seek different sources of knowledge and learn in different ways at different times in their careers. As a result training should be flexible to suit all the teachers and also be comprehensive enough to provide skills and knowledge for all levels (Tenbusch, 1998, p. 4), applicable and relevant to teachers' current classroom practices and experiences (Rodrigues, 2005b, p. 75). TPD must consequently cater for teachers' individual requirements by making use of tailor-made techniques, adult-centred instruction and a variation of delivery methods (Basinger, 2003, p. 3; Carlson & Gadio, 2002, p. 120; Center for CSRI, 2007, p. 2; Ehman et al., 2005, p. 260; Kotyk, 2006, p. 26; Lieberman, 2000, p. 78). Four respondents indicated that they take teacher's individuality into account and create TPD opportunities for the requirements of individual teachers:

- *We did this morning a survey of the staff in connection with training to specifically be able to use it* [172] (1:684 (9))
- *… so you can individually go and sit there and say to her, teach me this, assist me …*[173] (1:784 (69))
- *We assist everyone* [174] (3:581 (53))
- *They indicated what is the problem they encountered* (5:421 (105))
- *…must be on the level of the person that attends that workshop* (7:315 (154)).

### 4.4.1.5 Teacher professional development creates opportunity for collaboration

Numerous authors agree that collaboration allows teachers to support and motivate each other, share expertise, plan together, reflect on teaching and learning practices which in turn leads to co-operation, reduced workload, effective communication and increased teachers' efficiency and confidence (Arnold et al., 2006, p. 3; Blase & Blase, 1994, p. 19; Drago-Severson, 2004, pp. 17 - 18; Glatthorn et al., 2006, p. 19; Inger, 1993, p. 1; Leask, 2001, p. 137; Rallis & Goldring, 2000, p. 46; Rodrigues, 2005b, p. 9). Teachers in effective schools are reported to work collegially and to collaborate and achieve shared goals (Cowie & Jones, 2005, p. 9; Day & Sachs, 2004, p. 36). Collegiality is essential for effective and sustainable implementation of educational change, activities and interactions (Day & Sachs, 2004, p. 222; Gibson, 2002, p. 324; Selwyn, 2002, p. 135; Thorburn, 2004, p. 5). By continuously creating opportunities for collaboration allowing teachers to be in an environment where learning and development can take place on a regular basis (Darling-Hammond, 2005, p. 12). Brand (1997, p. 4), Moonen and Voogt (1998, p. 103), Zheng (2003, p. 8) conclude that a collaborative learning environment between teachers are of utmost importance for sustaining effective integration of ICT in education. Five respondents agreed that

---

[172] *Ons het vanoggend 'n opname weer onder personeel gemaak in terme van opleidig om dit spesifiek te gebruik*
[173] *…so 'n mens kan selfs individueel daar gaan sit en vir haar sê, leer my dit help my*
[174] *Ons maak vir elkeen voorsiening*

collaboration was important and when teachers came together for TPD activities collaboration between them took place:

- *… I think they work good together* [175] (1:774 (53))
- *… I definitely think so because a person learns from your colleagues, it is a developmental process* [176] (1:804 (45))
- *… where we share with schools around us…*[177] (3:711 (45))
- *In other words there has to be continuous contact with each other…* [178] (3:724 (89))
- *… you have to learn from each other* [179] (3:726 (96))
- *… grouped together and then they talk amongst themselves about problems they encounter* (5:425 (117))
- *Yes there is collaboration* (6:462 (121))
- *In any learning area there is a head of that learning area, they've got to do the same planning for the same learning area for any given time* (7:309 (130)).

### 4.4.1.6 In-house teacher professional development

Hezel Associates (2005-2006, pp. 2 - 4) indicate that principals have significant responsibilities when it comes to initiating, organising, planning and implementing TPD in their schools, especially through creating in-house training opportunities. Tomlinson (2004, p. 47) points out that every school should have its own particular training strategy to support teachers to achieve pre-determined goals and objectives. Teachers then realise the importance of training to guide them in achieving educational objectives and to make use of every possible training opportunity (Stephens & Crawley, 1994, pp. 81 - 82; Tomlinson, 2004, p. 47). Five of the respondents indicated that they do make use of in-house TPD:

- *I must say we handle our own training* [180] (1:749 (73))
- *At this stage we do it ourselves* [181] (3:733 (136))
- *… we offer courses you know at the end of the year …* (7:311 (142))
- *Initially we do have workshops early in the year about computers* (5:402 (49))
- *… give training to teachers who are interested…* [182] (8:312 (33)).

One respondent says: *… I ensure that my teachers' are trained…*[183] (4:466 (85)) and then contradicts himself by stating: *I did previous years, every Friday afternoon had a weekly teachers' meeting and then I handled certain training aspects…*[184] (4:381 (141)) proving that currently he is not ensuring that his teachers are trained.

### 4.4.1.7 Teacher professional development activities are delegated

---

[175] *...ek dink hulle werk nogal goed saam*
[176] *…ek dink definitief want 'n mens leer mos maar by kollegas, dis 'n groei proses*
[177] *…waar ons met skole om ons deel …*
[178] *Met ander woorde daar moet voortdurend kontak wees met mekaar …*
[179] *…jy moet by mekaar leer …*
[180] *Maar ek moet sê ons hanteer ons eie opleiding*
[181] *Op hierdie stadium is dit maar ons self wat dit doen*
[182] *… vir personeel wat belangstel opleiding gegee …*
[183] *…ek kyk dat my mense opgelei is…*
[184] *… Ek het vroeër jare elke keer 'n Vrydagmiddag 'n personeelvergadering gehad, wekliks gehad en dan het ek nou bepaalde opleidingsaspekte het ek nou hanteer…*

According to Schumaker and Sommers (2001, pp. 28 - 29), Tomlinson (2004, p. 99) principals should delegate power, authority and responsibility as they alone cannot achieve the set aims and objectives.  Prinsloo and Van Schalkwyk (2008, p. 57) point out although principals through delegation entrust teachers with authority and responsibility, the principal remains accountable.  Five respondents indicated that they delegated the responsibility for TPD to teachers in their school:

- *This one lady's extra-mural activity is training given in ICT* [185] (1:797 (109))
- *… our computer study teacher gives training in beginner courses and advanced courses for staff* [186] (3:729 (128))
- *… teacher offer Excel for everybody or Word or basic computer literacy* (7:312 (142))
- *…come together with their HOD trying to work out their problems* (4:354 (73))
- *… on how to search, how to attain the information you want, how to set up a PowerPoint presentation* [187] (8:313 (33)).

### 4.4.1.8    Teacher professional development in Information and Communication Technology

There is a common necessity among teachers that ICT forms part of their TPD (Becta ICT Research, 2006, p. 38; Francis & Ezeife, 2007, p. 3).  Several authors proclaim the importance of principals' support and encouragement of TPD activities enabling teachers to engage in innovative practices by making use of ICTs in their teaching and learning (Becta ICT Research, 2005, p. 5; Berube et al., 2004, pp. 1 - 3; Drago-Severson, 2004, p. xxi; Han, 2002, p. 294; Roberts & Associates, 1999, p. 10; Scrimshaw, 2004, p. 5; Zepeda, 1999, p. 6).  Successful ICT integration in education requires that teachers have the relevant ICT knowledge and skills (Albion, 1999, p. 1; Asan, 2003, p. 154; Chen & Chang, 2005, p. 4; Gibson & Oberg, 1999, p. 2; NCREL, 2000, p. 1).  Rodrigues (2005b, p. 19) states that the introduction of any innovatory practice has to be accompanied by significant TPD.  Roberts and Associates (1999, p. iv) concur that TPD programmes can help teachers to address the impact of ICT and make appropriate decisions about the role that ICT will play in their teaching practices.  Sallis and Jones (2002, p. 108) reveal by learning how to integrate ICT communities of practice are built up.  Five respondents gave an indication that they created TPD opportunities for ICT training. The training focused on acquiring the basic ICT knowledge and skills:

- *… the use of Excel and that type of stuff, PowerPoint* [188] (3:730 (128))
- *… there is training in something specific for everyone or everybody who is interested…* [189] (1:787 (73))

---

[185] *Juis omdat dit hierdie een dame se buitemuurs is opleiding in ICT*
[186] *…ons rekenaarstudie onderwysers bied vir personeel beginnerskursusse aan en 'n bietjie meer gevorderde kursusse aan*
[187] *…oor hoe om te search, hoe om inligting te kry wat hulle wil hê, hoe om 'n PowerPoint presentation op te stel*
[188] *…die gebruik van Excel en daai tipe van goeters, PowerPoint*
[189] *… daar opleiding in iets spesifiek vir almal of almal wat belangstel…*

- *… we do have workshops early in the year about computers* (5:409 (49))
- *… teacher offer Excel for everybody or Word or basic computer literacy* (7:312 (142))
- *… on how to search, how to attain the information you want, how to set up a PowerPoint presentation* [190] (8:313 (33)).

Becta ICT Research (2006, p. 41) shows that despite the high levels of training, teachers indicated that ICT was the common area in which they required more professional development.  Contradictory, most principals indicate that their teachers' skills in ICT meet or exceed current requirements (Becta ICT Research, 2006, p. 38).  One respondent concured with Becta ICT Research with the following statement:  *We did do it.  We are all fairly computer literate* [191] (4:336 (77)).  My field notes indicate the respondent did not recently create any TPD activities for the attainment of ICT knowledge and skills as he presumed that his teachers were ICT literate although he did no inquire to determine whether his assumption was correct.

Shelly, Cashman, Gunter and Gunter (2004, p. 6.05) state that ICT: "... cannot enhance learning unless teachers know how to use and integrate ICT into curriculum-specific or discipline-specific areas.  TPD on the integration of ICT in the curriculum is required (NCREL, 2000, p. 1; Seyoum, 2004, p. 7).  Teachers should participate in professional development activities where the emphasis falls on intensive curriculum-based ICT training (Zhao & Bryant, 2006, p. 53).  Day and Sachs (2004, p. 242) maintain: "There is no curriculum development without teacher development."  Only two respondents indicated that they provide training for ICT integration into the curriculum.  The one respondent sends his teachers on training courses: *… I'm soon sending them on a course where they receive training because in their learning plan provision is made for the presenting of computer programmes* [192] (3:707 (29)) and the other respondent let the teachers illustrate how they incorporate ICT in their teaching so that the other teachers can learn: *…PowerPoint presentation of the teachers. I think the way in which you teach you have to implement the technology…*[193] (1:808(57)) and they work out lessons together integrating ICT: *…you are not going to give in a poor product to you colleague, if you work out a part…* [194] (1:775 (53)).

### 4.4.1.9    Allocation of time for teacher professional development

Numerous authors agree that it is crucial to create time for TPD (Cope & Ward, 2002, p. 10; Glatthorn et al., 2006, p. 58; Rallis & Goldring, 2000, p. 49; Tallerico, 2005, p. 119).  Centre

---

[190] *…oor hoe om te search, hoe om inligting te kry wat hulle wil hê, hoe om 'n PowerPoint presentation op te stel*
[191] *Ons het dit gedoen. Ons is darem almal al redelik rekenaar geletterd*
[192] *…stuur ek nou op 'n kursus binnekort waar hulle gaan om opleiding te kry want binne in hulle leerplan word daar voorsiening gemaak vir die aanbieding van rekenaarprogramme*
[193] *PowerPoint aanbieding kyk van hierdie juffrou. So ek dink die manier van onderrig gee, moet jy tegnologie aanwend*
[194] *…jy gaan nie nou nie 'n swak produk vir jou kollegas gee nie, as jy een deel uitgewerk*

for CSRI (2007, p. 1) states insufficient time not only prohibits attendance of TPD activities, but it also leads to a stressful working environment which diminishes the quality of instruction, morale, effectiveness and commitment. Teachers require time to learn new technologies and integrate their newly attained skills into their teaching and learning practices. Such changes take time and do not happen overnight (Bradley, Kallick & Regan, 1991, p. 14; Buckenmeyer, 2005, p. 14; Carlson & Gadio, 2002, p. 124; Day & Sachs, 2004, p. 28; Gibson, 2002, p. 322; Knapp & Glenn, 1996, p. 222; Means, 1994, pp. 215 - 216; Theroux, 2004, p. 3; Woodbridge, 2004, p. 2; Zepeda, 1999, p. 85). When teachers do not have sufficient time to incorporate new innovations, skills or strategies, they usually revert to their previous teaching and learning practices. Scrimshaw (2004, p. 11) emphasises the importance of allocating sufficient time as it is one of the key elements for teachers to successfully integrate ICT into their daily teaching and learning practices. A few respondents indicated they generated time for TPD activities into the busy schedules:

- *…weekly there is co-ordinated meetings between the staff* [195] (3:725 (89))
- *… the teachers have weekly learning area meetings* [196] (1:777(53)
- *…educators would meet the afternoon and come together and talk about the problems that they encounter in their day* (5:435 (73)).

### 4.4.1.10    Sufficient teacher professional development funding

Although many schools have been provided with sufficient computers and adequate facilities, teachers' use of these facilities and computers are limited. This if often due to insufficient funding for TPD in the use of ICT (Carlson & Gadio, 2002, p. 125; Day & Sachs, 2004, p. 75; Guru & Percy, 2005, pp. xiii,xiv; Selwyn, 2002, p. 23; Seyoum, 2004, p. 3). It is therefore necessary to allocate sufficient resources for TPD activities. With continuous technological advancements and limited financial resources, principals have to be creative in generating sufficient funds for effective and sustainable ICT integration and ICT infrastructure (Seyoum, 2004, p. 1; Walsh, 2002, p. 19). The literature indicates that it is crucial to ensure sufficient funding for teachers to receive TPD for the attainment of ICT knowledge and skills. Four respondents gave an indication that they do make provision in their budgets for TPD:

- *… in the budget you make provision for it, …* [197] (4:372 (137))
- *…that has to be in the budget it is non-negotiable …*[198] (1:674 (121))
- *Each year, yes we do make a budget necessary for that* (5:358 (81))
- *…we have a special budget for TPD …* [199] (3:568 (45)).

---

[195] *…weekliks is daar koördineringsvergaderings tussen die personeel*
[196] *…so die ouens het weekliks vakvergaderings*
[197] *… ou se begroting maak jy darem voorsiening vir dit…*
[198] *…daai moet in die begroting wees dit is ononderhandelbaar*
[199] *… ons het 'n spesiale begroting vir personeelopleiding*

### 4.4.1.11 Conclusion

The analysis gave me an indication that principals must execute most of the enabling TPD strategies to ensure effective and appropriate TPD. The following enabling strategies emerged and proved to have a measurable impact on effective TPD for ICT:

- TPD activities
- TPD support
- Continuous TPD
- TPD for teachers' individual requirements
- TPD creates opportunity for collaboration
- In-house TPD
- TPD activities are delegated
- TPD in ICT
- Allocation of time for TPD
- Sufficient TPD funding.

It is extremely important that principals implement most if not all of the above enabling TPD strategies as it will aid them in the process to empower their teachers in regard to effective teaching and learning. The more enabling strategies they implement the better. From my analysis I could conclude the following information with regard to the respondents' implementation of TPD enabling strategies (Table 4.9).

**Table 4.9        Respondents' implementation of TPD enabling strategies**

| TPD enabling strategies | | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|---|
| 1 | Activities | X | X | X | X | X | X | X |
| 2 | Support | X | | X | X | X | | |
| 3 | Continuous | X | | X | | X | | |
| 4 | Teachers' individual requirements | X | | X | | X | | X |
| 5 | Creates opportunity for collaboration | X | | X | | X | X | X |
| 6 | In-house | X | X | X | | X | | X |
| 7 | Activities are delegated | X | X | X | | X | | X |
| 8 ICT | Basic skills | X | X | X | | X | | X |
| | Curriculum | X | | X | | | | |
| 9 | Allocation of time for continuous TPD | X | | X | | X | | |
| 10 | Sufficient funding | X | | X | X | X | | |

Some respondents implemented more enabling strategies than others. It is however ironic that effective ICT integration revolves around creating continuous TPD activities that assist teachers in integrating ICT into the curriculum, the enabling strategy that most principals seem to disregard is providing TPD opportunities for teachers to learn how to integrate ICT into their teaching practices. Providing continuous TPD and the allocation of time for

continuous TPD seem to be strategies that most respondents neglect to implement. Respondent two, four and six used the least enabling strategies. Respondents one and three were the only respondents who used all the enabling strategies.

### 4.4.2 Information and CommunicationTechnology enabling strategies that principals can follow to develop and sustain teachers' integration of Information and CommunicationTechnology in teaching and learning

Ho (2006, p. 2) says that principals should encourage teachers to use ICT in their instructional practices. Gibson (2002, p. 319) suggests that principals as the leaders in their schools, should not underestimate the impact of integrating ICT into teaching and learning. They should be actively involved in every aspect relating to ICT integration, and attain competencies on the use of ICT to increase the chances that teachers will be successful in integrating ICT in their teaching practices. Thomas (2006, p. 41) confirms this view: "Institutional leadership in the form of the school principal and the school management team are seen as having significant influence on the integration of computers in the classroom." Many authors state ICTs form an important component that can inspire teachers, assist them with the challenges of the teaching profession and promote their lifelong professional development (Dirksen & Tharp, 1996, p. 2; Jackson, 2000, p. 1; Leask, 2001, p. 61; Loveless & Dore, 2002, p. 154). Jimoyiannis and Komis (2007, p. 167) comment that ICT integration is more than just putting computers in classroom, teachers are more likely to make use of ICTs in their teaching and learning practices if they are convinced of ICT's effectiveness and usefulness. Once again authors point out that the integration of innovative practices and changes do not happen without continuous involvement from the principal (Busher, 2006, p. 151; Seyoum, 2004, p. 3; Spurr et al., 2003, p. 3; Tallerico, 2005, p. 100). From the literature, my field notes and analyses the following categories indicating the enabling strategies associated with ICT for effective ICT integration emerged (Figure 4.8).
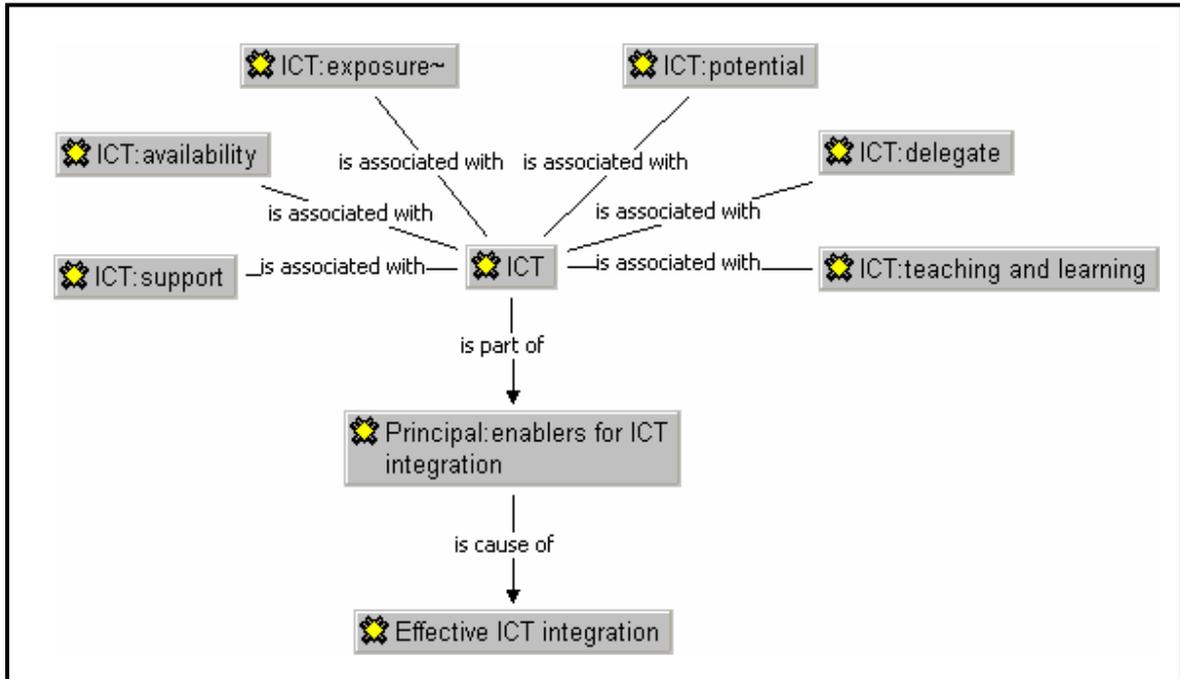
**Figure 4.8      ICT enabling strategies**

### 4.4.2.1      Information and CommunicationTechnology support

Teachers also require ICT support when it is expected of them to learn and integrate ICT effectively into their teaching and learning practices (Becta ICT Research, 2003, p. 1; Buckenmeyer, 2005, p. 15; Han, 2002, p. 296; Scrimshaw, 2004, p. 10; Seyoum, 2004, p. 3). Three respondents had specific people giving ICT support:

- *… a full-time staff member that only does that, his task is to service and repair the computers…*[200] (3:744 (181))
- *… we created a HOD post what I call HOD IT …*[201] (1:807 (17))
- *…we are a KDA school…*[202] (1:806 (61)).

My field notes indicate KDA schools get continuous technical support as they supply the maintenance aspect at the school.

- *… people come every week to check whether everything is in working order* [203] (4:460 (197))
- *… should there be any problems with the computers report it to them…* (5:408 (33)).
- *We've got an IT group* (7:301 (29)).

### 4.4.2.2      Information and CommunicationTechnology availability

Drago-Severson (2004, pp. 53 - 54) states that insufficient resources negatively impact on teachers' learning and teaching as it determines the frequency, quality and the number of teachers that can undergo TPD.  Literature indicates that functional technological

---

[200] *…'n voltydse personeellid wat net dit doen, dit is sy taak om die rekenaars te hersien en te herstel…*
[201] *…ons het 'n departementshoofpos geskep wat ek noem 'n departementshoof IT*
[202] *… ons 'n KDA skool…*
[203] *…… ouens kom elke week dan kom kyk hulle of die goed reg werk…*

infrastructure and facilities must be available before teachers can integrate ICT on a regular basis in teaching and learning activities (Becta ICT Research, 2004, p. 3; Cowie & Jones, 2005, p. 10; Gibson & Oberg, 1999, p. 2; Han, 2002, p. 296; Means, 1994, p. 177; Seyoum, 2004, p. 2). For teachers to be successful, principals should take the necessary steps to ensure that appropriate, flexible and instructional resources are available when teachers require them (Center for CSRI, 2007, pp. 2 - 3; Gordon, 2003, p. 3; Scrimshaw, 2004, p. 5). Some respondents indicated that their teachers had access to Internet and network facilities:

- *Yes all teachers can have an e-mail address at the school* (7:279 (246))
- *… in other words you can connect at any place and you can find the information that you want* [204] (3:735 (136))
- *… everyone has at least their own e-mail address* [205] (4:450 (77))
- *…quickly send one another e-mail* [206] (1:708 (41)).

Teachers also had various options of facilities available for the use of ICT:

- *In the administration block there are a total of ten computers…* (6:453 (25))
- *… a computer that is allocated just for their use …* [207] (4:446 (33))
- *The media centre also has a computer with a projector* [208] (4:448 (33))
- *We have given a few teachers and the head of grades computers, there are nobody in the office without a computer* [209] (1:799 (117))
- *… media centre is also equipped, you can always go there with your class if you want to present a lesson, the facility is available for everyone* [210](1:766 (37))
- *… there are forty computers in a class and then there is in every office of the HOD and the SGB everyone has a computer…* [211] (3:749 (136))
- *No, we have a teachers' computer centre right next door. At present there is three computers there, there is computers in the staff room, they can use that, there is a computers in each and every head of department's office which the department can use and if needs to be they can use my computer if I'm not using it* (7:308 (93))
- *… They'll go to the computer centrums and use the computers to solve their problems* (5:416 (85)).

However, the availability and access to an infrastructure for ICT does not guarantee that teachers integrate ICT effectively (Buckenmeyer, 2005, pp. 3, 9; Rodrigues, 2005b, p. 19; Seyoum, 2004, p. 3; Zhao & Bryant, 2006, p. 58). One respondent's statement concurs with that of the above authors… *there over a hundred computers that are linked to a network and everybody has access to the Internet and e-mail...* [212] (4:458 (165)). Still there are teachers at his school who are resisting making the required changes to incorporate ICT: *And obviously you*

---

[204] *…met ander woorde, jy kan by enige plek inskakel en jy kan die goeters, inligting trek wat jy wil hê*

[205] *…hulle het al elkeen hulle eie e-pos adres ten minste*

[206] *…stuur julle gou vir mekaar e-pos*

[207] *…'n rekenaar wat net vir hulle gebruik is…*

[208] *Die mediasentrum het ook 'n rekenaar met 'n projektor*

[209] *Ons het vir 'n klomp onderwysers en vir die graadhoofde…hulle het almal rekenaars, daar is nie ouens wat in 'n kantoor êrens nie 'n rekenaar het nie*

[210] *…mediasentrum is ook ingerig…jy kan altyd met 'n klas daarheen gaan as jy so les wil aanbied, so die fasiliteit is vir almal daar*

[211] *…daar is veertig rekenaars in 'n klas en dan is daar in elke kantoor van die departementshoofde van die beheerliggaam elkeen het 'n rekenaar…*

[212] *… daar is oor die honderd rekenaars wat op 'n netwerk is en elke ou het toegang tot die Internet en toegang tot e-pos…*

*have, I say again, the resistance to change is always a factor* [213] (4:400 (201)), *I have such people, lady, teaching for thirty-five years and she wants the book in her hands* [214] (4:448 (33)). One respondent mentioned that it was important to book the computer centre to ensure that it was available when required: *… it is important that they book the computer lab…* (5:419 (101)).

### 4.4.2.3    Information and CommunicationTechnology exposure

Authors state teachers' perceptions and practices change as they become more comfortable with using ICT (Asan, 2003, p. 154; Francis & Ezeife, 2007, p. 4; Lal, 2002, p. 2; Webber & Robertson, 1998, pp. 9 - 10; Zheng, 2003, p. 8). Theroux (2004, p. 2) maintains there should be sufficient opportunity for hands-on experience. Respondent's indicated that they exposed their teachers to ICT:

- *Yes, our big thing is to give them the technology…* [215] (1:665 (85))
- *… the continuous providing of available facilities and that plays a prominent part* [216] (1:671 (113))
- *We have given twenty people laptops and in twenty classes we have installed data projectors…* [217] (1:756 (9))
- *… it is the satisfaction they get when they use it* [218] (1:790 (89))
- *We are in the process of providing every teacher with a laptop…* [219] (3:547 (17))
- *… we also have that computer with that screen …* [220] (4:454 (97)).

### 4.4.2.4    Information and CommunicationTechnology potential

Wang and Woo (2007, p. 149) points out that the primary factor that has an influence on the effectiveness of learning is the pedagogical design that justifies the how, why and the way in which ICT is to be used. Jimoyannis and Komis (2007, p. 167) agree that teachers are more likely to make use of ICTs in their teaching and learning practices if they are convinced of ICTs' effectiveness and usefulness. Means (1994, p. 18) states: "There is a tremendous need for teacher training that will demonstrate to teachers the potential of various technologies…"

Cope and Ward (2002, pp. 1, 10), Zhao and Bryant (2006, p. 55) agree that to integrate ICT successfully in education it is important that teachers have the appropriate perceptions of ICT usefulness as it has an impact on their instructional practice. All the respondents indicated that ICT integration has potential with regard to the enhancement of education:

- *…did a PowerPoint presentation that was extremely impressive* [221] (1:728 (29))
- *… they see her as an inferior teacher because she does not use the technology* [222] (1:730 (37))

---

[213] *En natuurlik het jy, ek sê weer, daai weerstand teen verandering is maar altyd 'n faktor*
[214] *Ek sit met sulke mense daar, tannie hou nou al vir vyf en dertig jaar so skool en sy wil 'n boek in die hand hê*
[215] *Ja ons groot ding is om hierdie tegnologie vir hulle te gee…*
[216] *…die aanhoudende beskikbaarstelling van fasiliteite en dit speel nogal 'n baie groot rol*
[217] *Ons het ook nou vir twintig ouens laptops gegee en in twintig klaslokale dataprojektors ingesit…*
[218] *… is die satisfaksie wat hulle daaruit kry as hulle dit gebruik*
[219] *Ons is op die oomblik besig om vir elke personellid 'n laptop te kry…*
[220] *… ons het ook nou daai rekenaar met daai skerm…*
[221] *…'n hele PowerPoint ding gedoen het geweldig indrukwekkend…*

- *… so the use of technology just makes life easier and in the long run saves a lot of time* [223] (1:733 (57))
- *…I think if you experience the learners are paying attention and it is quiet in your class and it is intelligent questions, the learners are clued to this type of stuff* [224] (1:735 (101))
- *… it is easier to attain information* [225] (3:688 (13))
- *… click click quickly here and give a Biology class I just quickly want to show the learners how the cross-section of a leaf looks like, click on Oxford University.www there is the thing all in colour for the learners to see...* [226] (4:415 (165))
- *… use of the computers now by doing their work themselves…* (5:417 (93))
- *… prepare to share some of the information through the memory stick it is actually tells you that we have moved a long way* (6:423 (101))
- *… teacher could have a laptop, they could present their classes so much more efficient with PowerPoint* (7:283 (53))
- *If you can see the bigger picture and see what computers are worth and especially in teaching* (7:306 (85))
- *… once a month we go to the American embassy then they put up a live digital video conference* [227] (8:282 (37)).

### 4.4.2.5 Delegating Information and CommunicationTechnology responsibility

Blase and Blase (2001, p. 41) point out that the successful shared-governance principals realise by incorporating teachers in the decision-making process, it is essential for empowering teachers, and that cooperative decision-making is the foundation of shared governance. Drago-Severson (2004, p. 100) as well as Blase and Blase (2001, p. 65) agree that having teachers assuming responsibilities creates the opportunity for teachers to learn, grow professionally, make decisions and become involved. This provides teachers with a sense of ownership in the overall operation of the school and will contribute to a positive and enthusiastic teacher corps.

- *… the one teacher in the computer centre her extra-mural activities are teacher training…* [228] (1:786 (69))
- *… vice-principal that is responsible for IT in the school…* [229] (1:800 (121))
- *… then I also have a vice-principal that is responsible…* [230] (3:705 (25))
- *… I also appointed a committee of teachers…* [231] (3:706 (29))
- *… two teachers who are responsible and they are the people who are in charge of the computers…* (5:407 (33))
- *..the stuff we have now but the teachers also have to see how it works…* [232] (4:468 (205)),
- *We've got an IT group* (7:301 (29))
- *… a lady that drives the programme…* [233] (8:308 (17)).

---

[222] *… hulle beskou haar as 'n swakker onderwyseres want sy wend nie nou hierdie tegnologie aan nie*
[223] *…so die aanwending van die tegnologie maak net die lewe vir 'n ou makliker en spaar op die ou vir 'n ou end baie tyd*
[224] *…ek dink as jy ervaar die kinders wat oplet dit is nou lekker stil in jou klas en dis intelligente vrae die kinders sit vasgenael vir hierdie goed*
[225] *…dis baie makliker om inligting te bekom*
[226] *……kliek kliek gou gou hierso en ek gee 'n biologie klas ek wil net vinnig vir die ouens wys hoe lyk die deursnit van hierdie blaar, kliek op Oxford Universiteit.www woeps, daar lê die ding mooi in kleur: wys vir die kinders…*
[227] *……eenkeer 'n maand gaan ons na die Amerikaanse ambassade toe dan sit hulle vir ons 'n live digital video conference op*
[228] *…die een juffrou in die een rekenaarstudiesentrum haar buitemuurs is personeelopleiding…*
[229] *… adjunkhoof wat verantwoordelik is vir IT in die skool…*
[230] *… dan het ek ook 'n adjunkhoof wat daarmee belas is…*
[231] *… ek het juis nou 'n komitee saamgestel van personeel…*
[232] *… die goeters het ons nou daar, maar die onderwyser moet ook nou kyk hoe dit werk*

### 4.4.2.6 Information and CommunicationTechnology integration in teaching and learning

Shelly, Cashman, Gunter and Gunter (2004, p. 6.05) indicate that curricula should drive ICTs. Teachers should use appropriate ICTs for the particular learning content to enhance learning. Guru and Percy (2005, pp. 5 - 6), Wang and Woo (2007, p. 149) accentuate the fact that ICTs should not be seen as separate disciplines. It must enhance the existing curriculum areas through integration as a resourceful tool to teach, rather than as a separate subject to teach about. Authors agree ICT is not transformative on its own. ICTs require teachers to integrate it successfully into the curriculum and instructional framework, align it with teaching and learning outcomes and use it for engaged learning projects (Kovalchick & Dawson, 2004, p. 33; NCREL, 2000, p. 1). Literature indicates curriculum integration refers to the effective integration of ICT throughout the curriculum to help learners meet the outcomes of each learning area. The computer is a tool for generating and modifying curricula, enabling teachers to incorporate the latest approaches into their teaching and learning (Albion, 1999, p. 1; Di Benedetto, 2005, p. 2; Leask, 2001, p. 181; Somekh & Davis, 1997, p. 100; Wikipedia, 2006, p. 3). Plomp, Anderson, Law and Quale (2003, p. 16) point out that learning with ICT indicates the use of various computer applications that enhance teaching and learning practices. Learning through ICT means that ICT is integrated so completely as an essential tool in the curriculum that the teaching and learning of that curriculum is no longer possible without it. Curriculum support involves providing continuous assistance and guidance to teachers in their use of ICT in the curriculum as well as the provision of TPD activities that focus on ICT training and integration (Becta ICT Research, 2003, p. 1). Carlson and Gadio (2002, p. 1) conclude that, teachers are required to integrate ICT appropriately and effectively into education. Three respondents indicated they realised the importance of integrating ICT into teaching and learning especially thinking of education in the future:

- *…if we want to teach our learners we have to adapt to their world by using the technology* [234] (1:801 (121))
- *…because you are working with the type of learner that is focused on technology* [235] (3:721 (69))
- *…make it a point that the computers are incorporated in class and curriculum…*(5:336 (53).

---

[233] *… dame wat die program vir ons bestuur…*

[234] *…as ons vir hulle kinders wil skool hou dat dit aanpas by hulle wêreld deur van die tegnologie gebruik te maak…*

[235] *…omdat jy met die tipe kind wat jy nou mee werk is gerig op tegnologie*

**4.4.2.7    Conclusion**

The analysis gave me an indication of the ICT enabling strategies had to be implemented to ensure effective and sustainable ICT.  The following enabling strategies emerged and showed to have a considerable impact on effective ICT integration:

- ICT support
- ICT availability
- ICT exposure
- ICT potential
- Delegate responsibility of ICT
- ICT integration in teaching and learning.

The more enabling strategies they implement the better.  From my analysis I drew information with regard to the respondents' implementation of ICT enabling strategies (Table 4.10).

**Table 4.10    Respondents' implementation of ICT enabling strategies**

| ICT enabling strategies | | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|---|
| 1 | Support | X | | X | X | X | | X |
| 2 | Availability | X | | X | X | X | X | X |
| 3 | Exposure | X | | X | X | | | |
| 4 | Potential | X | X | X | X | X | X | X |
| 5 | Delegate responsibility | X | X | X | X | X | X | X |
| 6 | Integration in teaching and learning | X | | X | | X | | X |

Respondents one and three implemented all ICT enabling strategies.  Respondents two and six indicated implementing the least ICT enabling strategies.  All the respondents acknowledged ICTs' potential and delegated tasks relating to ICT.  The enabling strategy that was implemented the least was teachers being exposed to ICT and integrating ICT into teaching and learning.  I presume insufficient exposure influenced teachers' integration of ICT into their practices.

**4.4.3    Teacher enabling strategies that principals can follow to develop and sustain teachers' integration of Information and Communication Technology in teaching and learning**

Various authors report effective teachers are the determining factor in quality education and change in education ultimately rely on teachers (Borko, 2004, p. 3; Chen & Chang, 2005, p. 1; Jacobs et al., 2004, p. 24).  Prinsloo and Van Schalkwyk (2008, pp. 162 - 163) state leadership entails understanding and acknowledging the requirements and contributions of

individual teachers to maximise their strengths and minimise their limitations for the benefit of the school.  Many authors are of the same opinion that it is important that the principal creates and sustains an environment where teacher learning can flourish and continuous development can take place through the provision of necessary resources (Blase & Blase, 2001, pp. 16, 80; Day & Sachs, 2004, p. 36; Drago-Severson, 2004, p. 39; Sallis & Jones, 2002, p. 96; Young et al., 2005, p. 26).  Literature indicates principals are primarily responsible for determining and maintaining the climate and the culture of schools. Therefore they also influence the teaching and learning that occur at the school (Arnold et al., 2006, p. 3; Blase & Blase, 2001, p. 97; Gordon, 2003, p. 4; Spurr et al., 2003, p. 4). Glatthorn, Jones and Bullock (2006, p. 56) as well as Spurr, Rosanowski and Williams (2003, p. 3) concur principals should strive to improve teachers' working conditions and morale, develop a culture in which teachers work together for the common good and develop the capacity and commitment of teachers.

Gordon (2003, p. 2) and Tomlinson (2004, pp. 101 - 102) add by providing appropriate support and ensuring conducive working conditions will positively affect teachers' attitude for the implementation of change in their teaching and learning practices.  Figure 4.9 indicates the importance of teachers in effective ICT integration.  The principals must ensure supportive working conditions where continuous TPD can take place.  Principals must therefore implement enabling strategies which focus on the teachers as individuals to maximise their strengths and minimise their limitations for the benefit of the school.  From the literature, my field notes and analyses the following categories indicating the enabling strategies associated with teachers' for effective ICT integration emerged (Figure 4.9).
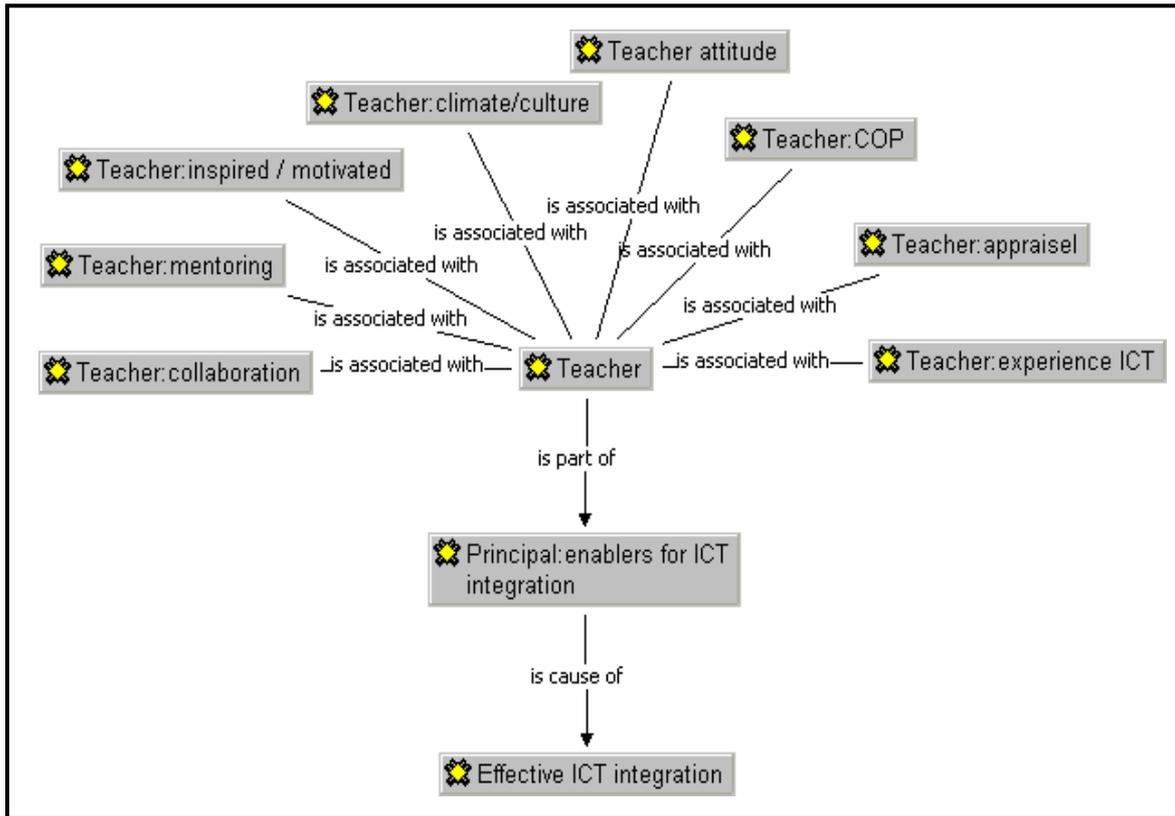
**Figure 4.9       Teacher enabling strategies**

### 4.4.3.1     Teacher collaboration

Teachers in effective schools are reported to work collegially and to collaborate and achieve shared goals (Cowie & Jones, 2005, p. 9; Day & Sachs, 2004, p. 36).  Steyn and Van Niekerk (2005, p. 113) add teachers working together in teams become more effective, professional and efficient.  This leads to improving the quality of education and creating better learning and teaching environments.  Carlson and Gadio (2002, p. 121) as well as Schlager and Fusco (2003, p. 4) agree that it is essential to create opportunities for collaboration where teachers can share experiences, discuss possibilities, reflect on their learning, apply new strategies, and evaluate their learning.  Numerous authors accentuate the fact that there are a variety of benefits when teachers take part in collaboration.  Collaboration allows teachers to support and motivate each other, share expertise, plan together, reflect on teaching and learning practices which in turn lead to co-operation, reduced workload, effective communication and increased teachers' efficiency and confidence (Arnold et al., 2006, p. 3; Blase & Blase, 1994, p. 19; Drago-Severson, 2004, pp. 17 - 18; Glatthorn et al., 2006, p. 19; Inger, 1993, p. 1; Leask, 2001, p. 137; Rallis & Goldring, 2000, p. 46; Rodrigues, 2005b, p. 9).  Five respondents indicated that opportunities for collaboration are created for teachers to collaborate about their teaching and learning practices:

- … *extremely impressive, was shown to all the teachers …*[236] (1:763 (29))
- …*you work something out and you give it to your colleague …*[237] (1:768 (37))
- …*they learn from each other and it makes them excited…*[238] (1:653 (61))
- …*you can exchange ideas and you attend the discussions on the different subjects…*[239] (3:715 (45))
- … *you have to lean from one another* [240](3:726 (96))
- …*we come together as a CMT look at it and talk about it and see whether it could fit amongst ourselves or not. There after the CMT is satisfied and understand then we take this matter to the teachers and we talk about it…*(5:437 (57))
- …*grouped together and then they talk amongst themselves about the problems they encounter* (5:425 (117))
- *Yes there is collaboration…* (6:462 (121))
- … *prepare to share some of the information through the memory stick it is actually tells you that we have moved a long way* (6:423 (101))
- … *as a staff we go through my laptop and they choose a topic and either they take it in a form of a hard copy that we made and it is print out or those who have memory sticks we make copies so that if we make any changes we could* (6:456 (45))
- … *teachers sharing information…* (6:463 (121))
- *but they could see immediately as soon as they interact with other colleagues from other schools they see that there is a gap of actual fact of information you could see other colleagues are quite long that it's advanced* (6:459 (65))
- *In any learning area there is a head of that learning area, they've got to do the same planning for the same learning area for any given time* (7:309 (130)).

### 4.4.3.2     Teacher mentoring

Cowie and Jones (2005, p. 9), Steyn and Van Niekerk (2005, p. 266) state that mentoring is a way of supporting teachers to ensure that they acquire the necessary knowledge and skills. Busher (2006, pp. 142 - 143), Drago-Severson (2004, p. 18), Zepeda (1999, p. 111) agree mentoring creates a supportive learning environment where teachers can modify their current practices and get the opportunity to enhance their self-development. Mullen (2005, p. 6) and Zepeda (1999, p. 78) point out that for mentorship to have a positive and lasting effect, it should be part of the school culture. According to Clarke (2007, p. 128) a mentoring programme assists in the development of committed and competent teachers, establishing a school environment that strives for excellence in teaching and learning. Several authors state mentors should support teachers at different ICT levels, skills, preferences and abilities; helping them as individuals to integrate ICT effectively into their teaching and learning practices (McKenzie, 1999, p. 111; Shelly et al., 2004, p. 6.16; Zhao & Bryant, 2006, p. 60). McKenzie (1999, pp. 112 - 115) stipulates that effective mentors share the responsibility of integrating ICT effectively as they assist and support teachers with planning and attainment of the necessary confidence, knowledge and skills as well as applying newly learned strategies. Mentors should through continuous assessment keep track of the teachers'

---

[236] *… geweldig indrukwekkend en mooi vir die hele personeel gewys het…*
[237] *… jy werk 'n ding uit en jy gee hom vir jou kollega…*
[238] *…hulle leer dit by mekaar en dit maak die ouens opgewonde…*
[239] *…jy kan gedagtes uitruil en jy woon die besprekings by van die verskillende vakke…*
[240] *… jy moet bymekaar leer*

development. Respondents indicated that they make use of a mentoring system and it is usually the senior or experienced teachers that are appointed as mentors:

- *To assist your junior teacher you can use senior teachers* [241] (3:728 (96))
- *The moment a teacher comes in then a mentor is assigned, it is usually the subject head* [242] (3:742 (176))
- *… everybody together then we introduce their mentors* [243] (3:743 (176))
- *…we have pace setters for every phase and learning area* [244] (1:773 (53))
- *Yes we do use the tutor or mentoring system* [245] (4:457 (117))
- *Usually the senior teachers, teachers who have been in the teaching profession for some time who understand and who has the experience of what teaching entails and who can also be able to assist the person with educational matters very very clearly* (5:430 (145))
- *Each new teacher is allocated to one of the oldies and they have to show them around* (7:317 (198))*.

One respondent indicated that they introduced the mentoring concept but they are not implementing it properly: *We introduced the concept but we did not implement it properly, we are not implementing it properly here* (6:414(193)).

### 4.4.3.3    Teachers are inspired and motivated

Ho (2006, p. 2) accentuates that principals should encourage teachers to use ICT in their instructional practices. A number of authors agree that when principals motivate individual teachers it is important that they should understand what motivates each individual teacher. Principals should recognise the importance of and promoting teachers' motivation as it is conducive to teachers performing optimally (Everard et al., 2004, p. 25; Foskett & Lumby, 2003, pp. 79 - 80; Steyn & Van Niekerk, 2005, p. 143). Blase and Blase (1994, p. 75) as well as Foskett and Lumby (2003, p. 76) agree the encouragement of ICT integration and ongoing appropriate motivation will ensure that teachers are committed to achieve the pre-established goals. Carlson and Gadio (2002, p. 122), Butler (1992, p. 4) and Dean (1991, p. 16) point out strategies on how teachers can be motivated and what can be done to keep them motivated. These have to be considered as it increases the effectiveness of TPD activities. Rodrigues (2005b, p. 58) and NCREL (2000, p. 1) stipulate that the integration of ICT in teaching and learning depends on knowledgeable, confident and enthusiastic teachers who are motivated and are prepared to integrate ICT effectively.

- *We encourage the teachers to work out their lessons in such a way* [246] (1:622 (13))
- *Yes, it inspires the others…* [247] (1:764 (33))
- *No, they are highly motivated* [248] (1:792 (97))

---

[241] *Maar om jou junior personeellid te help, kan jy gebruik maak van senior personeel*
[242] *Die oomblik as 'n personeellid inkom dan word daar 'n mentor, dit is gewoonlik die vakhoof*
[243] *…almal bymekaar dan stel ek hulle mentors aan hulle bekend…*
[244] *…ons het pasaangeërs nou maar vir elke vak en fase*
[245] *Ja ons gebruik maar die tutor- of mentorstelsel*
[246] *Ons moedig die ouens aan om hulle lesse so uit te werk*
[247] *Ja, dit inspireer dan die ander…*
[248] *Nee hulle is regtig hoogs gemotiveerd*

- *… it is already an enormous motivation to say 'wow' here I have everything…*[249] (3:738 (156))
- *… there is not one teacher who at this stage is not extremely excited, who is not positive*[250] (3:739 (160))
- *…everybody all of a sudden wants to start working with computers, they are extremely inspired*[251] (3:647 (128)
- *… I motivate and encourage them in terms of using the computers* (5:418 (97))
- *… is a token of our appreciation of the difference the teacher made* (5:424 (109))
- *… we want you to become a very, very very good teacher* (5:429 (141)).

Carlson and Gadio (2002, p. 122) conclude that some teachers require additional motivation and incentives to actively participate in TPD activities and to embrace technological-driven opportunities. Two respondents indicated that they indeed motivate their teachers but they still have teachers that resist change:

- *… the teachers are motivated to get stuff there*[252] (4:447 (33))
- *… that is also part of motivation…*[253] (4:455 (97))
- *A person does have the older teachers who are not really, they are not really clued up about it*[254] (4:449 (37))
- *.. that resistance to change is always a factor*[255] (4:461 (201)).
- *Try and motivate them to use the technology*[256] (8:305 (13))
- *… is motivation from your side to implement is and to stay relevant*[257] (8:313 (73))
- *… there are many teachers who are still totally unskilled in technology*[258] (8:316 (109)).
- *There are still teachers who quite simple still want to do as they did twenty years back; they don't feel like investigating new methods or think of alternative methods*[259] (8:324 (121)).

### 4.4.3.4    Teacher culture

Prinsloo and Van Schalkwyk (2008, p. 70) maintains: "A culture of teaching and learning in a school will influence a productive and positive classroom environment which is conducive to effective teaching and learning." The autjors agree that principals are primarily responsible for determining and maintaining the climate and the culture of schools. Therefore they also influence the teaching and learning that occur at the school (Arnold et al., 2006, p. 3; Blase & Blase, 2001, p. 97; Gordon, 2003, p. 4; Spurr et al., 2003, p. 4). Butler (1992, p. 12) points out to sustain such a collaborative culture, it is necessary that the principal facilitates and supports a conducive work environment. Drago-Severson (2004, p. 41) states principals shape school cultures according to a particular school's situational factors, resources and challenges. There is widespread agreement that teachers require more than just knowledge about incorporating ICT in education, they also require an ongoing supportive climate and

---

[249] *… dit is al klaar 'n geweldige motivering om te sê sjoe hier het ek alles…*
[250] *…daar is een personeellid wat op hierdie stadium nie geweldig opgewonde is nie, wat nie positief is nie*
[251] *… almal wil ewe skielik wil nou begin rekenaar, hulle raak geweldig geinspireer*
[252] *…die ouens word maar aangemoedig om daar goed te kry*
[253] *… dis nou ook maar deel van die motivering…*
[254] *'n Ou sit maar daar bietjie met die ouer mense wat nie regtig, hulle is nie regtig so "opgeclue" daaroor nie*
[255] *…daai weerstand teen verandering is maar altyd 'n faktor*
[256] *Probeer hulle aanmoedig om die tegnologie te gebruik*
[257] *…is aanmoediging van jou kant seer sekerlik om dit te doen en om relevant te bly*
[258] *…daar is nog baie ouens wat totaal nog rekenaar ongeletterd is*
[259] *Daar is party onderwysers wat doodeenvoudig nog wil doen soos wat hulle dit twintig jaar terug gedoen het en nie lus het om ander metodes te gaan ondersoek en om ander maniere te probeer uit te dink nie*

culture for sustainable, effective and institutionalised change (Akbulut et al., 2007; Chen & Chang, 2005; Cowie & Jones, 2005; Dirksen & Tharp, 1996; Gibson & Oberg, 1999; Girod & Cavanaugh, 2001; Ho, 2006; Knapp & Glenn, 1996; Leask, 2001; Loveless & Dore, 2002; Means, 1994; Moonen & Voogt, 1998; NCREL, 2000; Rodrigues, 2005b; Shelly et al., 2004; Simonson & Thompson, 1997; Spurr et al., 2003; Thorburn, 2004; Webber & Robertson, 1998).  Glatthorn, Jones and Bullock (2006, p. 56), Spurr, Rosanowski and Williams (2003, p. 3) confirm principals should strive to improve teachers' working conditions and morale, develop a culture in which teachers work together for the common good and develop the capacity and commitment of them as teachers.  Two respondents indicated that there is a culture at their schools where teachers really want to integrate ICT into their teaching and learning practices:

- *… at present I want to tell you here is an atmosphere in the school that you are supposed to teach in such a way…* [260] (1:699 (29))
- *So there is really a vibe…*[261] (1:782 (65))
- *…everybody all of a sudden wants to start working with computers…* [262] (3:647 (128).

Although one respondent admits that creating an ICT culture is important he indicates that it has not materialised at his school:

- *I would say it is the culture within the specific schools…* (6:458 (65))
- *… we have to, definitely for sure, create a particular culture…* (6:465 (161)).

### 4.4.3.5    Teacher attitudes towards Information and Communication Technology

Authors point out that the attitudes and beliefs of teachers towards ICT have an influence on the sustained use of ICT in classrooms (Asan, 2003, p. 154; Buckenmeyer, 2005, pp. 11, 14; Busch, 1995, p. 148; Chen & Chang, 2005, p. 7; Gibson & Oberg, 1999, p. 2; Thorburn, 2004, p. 2; Zhao & Bryant, 2006, pp. 53, 54).  Seyoum (Seyoum, 2004), Asan (2003, pp. 153 - 154) and Zepeda (1999, p. 80) state teachers should have a positive attitude towards ICT for effective implementation and integration of ICT in education.  Ajzen (1988, p. 120) maintains: "People's attitudes influence their adoption of certain behaviours and that their attitudes are determined by salient beliefs about that behaviour." Two respondents said that teachers at their schools are positive about integrating ICT:

- *… teachers have this idea we have to move forward with it…*[263] (1:779 (61))
- *… the teachers just know we are there and it must happen* [264] (1:783 (65))
- *.. there is not one teacher at this stage that is not extremely excited, that is not positive* [265] (3:665 (160)).

---

[260] *…op die oomblik wil ek vir jou sê hier is 'n atmosfeer in die skool vandat jy maar veronderstel is om so skool te hou…*
[261] *So daar is regtig 'n vibe…*
[262] *… almal wil ewe skielik wil nou begin rekenaar*
[263] *… ouens het nogal 'n idee van ons moet vorentoe gaan met dit…*
[264] *…die ouens weet net ons is daar en dit moet net gebeur*
[265] *…daar is geen personeellid wat op hierdie stadium nie geweldig opgewonde is nie, wat nie positief is nie*

One respondent indicated the importance of teachers' attitudes towards ICT as there were teachers at her school who did not have the appropriate attitude towards ICT: *It depends on yourself if you want to be you can be. If you don't want to use a computer you won't ever learn how to use a computer* (7:305 (85)). *…the more you tell them you cannot break the computer the less they are interested in learning* (7:285 (77)).

### 4.4.3.6    Teacher community of practice

Day and Sachs (2004, p. 297) state it is essential that the COP and structures support the professional development efforts as the effectiveness of professional development is context-specific and takes into account teachers' life stage and career development, along with school-identified requirements.  Busher (2006, p. 137) points out that principals should create a collaborative working community where teachers are encouraged to share perspectives, beliefs and work together as a team to sustain and improve successful teaching and learning.  Other authors are of the same opinion: COP is an important enabling support agent for the integration of innovations and change.  COP enables teachers to collaborate with professionals becoming an important support element for integrating ICT in teaching and learning (Day & Sachs, 2004, p. 221; Dean, 1991, p. 10; Drago-Severson, 2004, p. 24; Nolan et al., 2005, p. 4).  Tomlison (2004, pp. 130, 136) confirms COP should support teachers to take risks, be innovative and develop professionally in a positive climate to become motivated and high performance teachers.  Two respondents confirmed that they are striving towards a COP where teachers integrate ICT in their daily teaching and learning activities:

- *It is absolutely compulsory you can not teach here if you are not computer literate…*[266] (1:620 (9))
- *… you have to use the technology in you class teaching and can't go without it*[267] (1:759 (13))
- *…as soon as the other teachers are going to use it and you fall behind and you see "I'm falling behind", nobody likes being behind*[268] (3:740 (160)).

### 4.4.3.7    Teacher appraisal and incentives

Steyn and Van Niekerk (2005, pp. 280, 297) state that teachers must understand that appraisal is a mechanism through which TPD can be measured and has the potential to improve the quality of teaching and learning.  Clarke (2007, p. 158) points out that the purpose of performance appraisal is to improve the performance of teachers through the use of positive reinforcements for teachers who perform well, and to support, coach and warn teachers whose performance does not meet expectations.  Many authors indicate appraisal is a process that assesses teacher's performance and it should be approached delicately as

---

[266] *Dis absoluut noodsaaklik, jy kan nie meer hier skool hou as jy nie rekenaarvaardig is nie…*
[267] *…jy moet hierdie tegnologie in jou klasaanbieding aanwend en kan nie meer daarsonder nie*
[268] *… sodra die ander mense dit gaan gebruik en jy raak agter en jy sien:"Hey, ek raak agter", niemand hou daarvan om agter te raak nie*

it involves teacher's personal qualities and beliefs  (Rallis & Goldring, 2000, pp. 48 - 49; Steyn & Van Niekerk, 2005, pp. 155 - 156; Tomlinson, 2004, pp. 132 - 134).  Clarke (2007, p. 132) observes that in South Africa performance management is required by the DoE.  In South African schools the DoE uses the *Integrated Quality Management System* (IQMS) model for school improvement.  The results of the development appraisal consequently form the basis for the development of the school improvement plan.  The responsibility for developing the school improvement plan rests with the school development team of which the principal is a member.  As noted above, it is required by the DoE that all schools implement the IQMS model before attention will be given to the respondents' implementation of incentives.

Blase and Blase (2001, p. 123) as well as Steyn and Van Niekerk (2005, p. 169) agree that successful principals determine the appropriate type of reward for the particular situation and the individual teacher.  Authors concur that the provision of incentives and a school environment conducive to teacher learning can improve teaching and learning that results in a lasting and positive change (Akbulut et al., 2007, p. 2; Carlson & Gadio, 2002, p. 123; Drago-Severson, 2004, p. 55; Thorburn, 2004, pp. 5 - 6).  Respondents indicated that they made use of various forms of incentives such as laptops, bonuses, trophies, diplomas and pens:

- *… once a year at the end of the year we give the teachers a bonus…*[269] (4:456 (105))
- *… teachers who did very very well to come and receive their incentives in front of each and everyone in the hall* (5:422 (109))
- *Normally the incentives would be in the form of being a trophy, a diploma and a pen* (5:423 (109)).

Cowie and Jones (2005, pp. 3 - 6) indicate that laptops have a positive impact on teachers' personal and professional development.  Two respondents' agreed that by providing teachers with laptops led to teachers being motivated to use ICT*:*

- *…everyone receives a laptop, you have everything in your class, you know, I think that is already an enormous motivation…*[270] (3:749 (156))
- *We have given twenty teachers laptops and in twenty classes we installed projectors…*[271] (1:756 (9))
- *… something that is a very big motivator is the satisfaction that they get from using it* [272] (1:791 (89))
- *So the teachers are eager to do this stuff, especially when they hear they are going to receive laptops and screens in their classes, everyone all of a sudden wants to start using the computer, they are extremely inspired* [273] (3:751 (128)).

---

[269] *…een keer 'n jaar aan die einde van die jaar vir die ouens so bonussie gee…*
[270] *… ons gee vir julle elkeen 'n laptop, jy kry alles in jou klas, jy weet, ek dink dit is al klaar 'n geweldige motivering…*
[271] *Ons het ook nou vir twintig ouens laptops gegee en in twintig klaslokale data projektors ingesit…*
[272] *…iets wat 'n baie groot motivering is, is die satisfaksie wat hulle daaruit kry as hulle dit gebruik*
[273] *So die personeel is ook honger om hierdie goed te doen, veral toe hulle hoor maar hulle gaan laptops kry, hulle gaan skerms in hulle klasse kry, almal wil ewe skielik wil nou begin rekenaar, hulle raak geweldig geinspireer*

### 4.4.3.8     Teacher experience with Information and CommunicationTechnology

Glatthorn, Jones and Bullock (2006, p. 22) indicate: "The key to success lies in how technology is experienced and applied. Monnen and Voogt (1998, p. 100), Knapp and Glenn (1996, p. 31) agree teachers should perceive ICT integration as practical and beneficial as well as become committed users before real integration will take place. Teachers with appropriate experience of ICT, see the relevance of integrating ICT in teaching and learning (Cox et al., 1999, p. 5; Gibson & Oberg, 1999, p. 6; McCain & Jukes, 2001, p. 113; Zheng, 2003, p. 8). Two respondents pertinently indicated that the mere success they experience from the use of ICT potential can motivate teachers:

- *… something that is a very significant motivator is the satisfaction what they get from using it* [274] (1:791 (89))
- *I think the motivation comes once again from what they experience, the success they experience* [275] (1:793 (101))
- *… it is already an enormous motivation to say:"Wow, now I have everything…"* [276] (3:738 (156)).

### 4.4.3.9     Conclusion

The analysis gave me an indication of the teachers' enabling strategies that had to be implemented to ensure effective and sustainable ICT. The following enabling strategies were identified and showed to have an impact on effective ICT integration:

- Collaboration
- Mentoring
- Inspired and motivated
- Culture of teaching and learning
- Attitude towards ICT
- Community of practice
- Appraisal and incentives
- Experience with ICT.

From my analysis I could conclude the following information with regard to the respondents' implementation of teachers' enabling strategies (Table 4.11).

---

[274] *…iets wat 'n baie groot motivering is, is die satisfaksie wat hulle daaruit kry as hulle dit gebruik*
[275] *Ek dink die motivering kom weereens uit dit wat hulle ervaar, die sukses wat hulle ervaar*
[276] *… dit is al klaar 'n geweldige motivering om te sê:"Sjoe hier het ek alles…"*

**Table 4.11      Respondents' implementation of teachers' enabling strategies**

| Teacher enabling strategies | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| 1   Collaboration | X |  | X |  | X | X | X |
| 2   Mentoring | X |  | X | X | X |  | X |
| 3   Inspired and motivated | X | X | X | X | X |  |  |
|      Teachers still unmotivated |  | X |  | X |  |  |  |
| 4   Culture of teaching and learning | X |  | X |  |  |  |  |
| 5   Attitude towards ICT | X |  | X |  |  |  |  |
| 6   COP | X |  | X |  |  |  |  |
| 7   Incentives | X |  | X | X | X |  |  |
| 8.  Experience with ICT | X |  | X |  |  |  |  |

Respondents one and three implemented all the teachers' enabling strategies. It was quite alarming to realise that respondents two, six and seven used the minimum teacher enabling strategies. Although respondent two and four indicated that they motivated their teachers they also mentioned that there were teachers at their schools who did not want to make the required ICT integration changes. The principals were unable to create a culture of COP to implement ICT as part of those teachers everyday teaching practice. Teachers do not seem to have enough experience with ICT and do not have the appropriate attitude towards ICT. Therefore ICT will not be effectively integrated into their teaching and learning practices.

## 4.5      Chapter summary

Chapter four presented an analysis of the data collected from the interviews and field notes. Data were discussed accordingly to three sub-questions (§ 4.1). These sub-questions allowed me to comprehensively study the influence principals have on teachers' ICT integration.

The first sub-question (§ 4.2) gave an indication of how the various principals' influences differ with regard to ICT integration in their schools. It was not only about the principals' leadership and management styles that had an influence but also their attitude towards ICT integration. I perceived that some of the principals were unclear about what constituted the appropriate style. To them it was more about implementing the correct style instead of utilising the most suitable style (§ 4.2.1). Principals perceived the democratic style to be the most appropriate style but literature indicates that leaders should not only apply one style, it is advisable to incorporate a combination of leadership and management styles according to the circumstances in which the principals find themselves. Some principals did not acknowledge the fact they were actually implementing a laissez-faire and autocratic style. The analysis indicated the lack of knowledge concerning the application of the appropriate style led to principals applying styles that would have a negative influence on teachers' ICT integration.

All the principals had laptops to aid them in their leadership of their schools. Although they all indicated the importance of ICT in their daily work, their attitude towards teachers' ICT integration differed immensely (§ 4.2.2). This attitude had an influence on teacher's motivation to use ICT. It is as if they transferred their attitude towards ICT to the teachers. There was a distinguishable correlation between principals' attitudes, words expressed concerning ICT and teachers' motivation to integrate ICT. Principals who showed a negative influence on teachers led to unmotivated teachers that avoided integrating ICT. The influence that principal's have will not only effect teachers but will have far-reaching effects on the ICT culture and COP of the entire school. Principals had to be knowledgeable on issues relating to TPD and ICT to be in a position to aid, manage and direct their teaching corps in the process of effective ICT integration.

The second sub-question determined how principals' strategic thinking influenced TPD for ICT integration (§.4.3). The DoE focus is on the acquisition and upgrading of ICT infrastructure and facilities. Consequently it is up to the principals to initiate, plan and implement TPD for effective and sustainable ICT integration. As a result principals have to strategically think about issues concerning TPD for ICT integration. Such thinking is essential as it assists the principal to determine, plan, direct and incorporate appropriate strategies. Principal's strategic thinking that encompasses the entire teaching terrain; critically thinking about TPD for the integration of ICT, thinking towards the future with regard to the significance of ICT, thinking of methods to obtain goals and thinking about the systems vital for effective and sustainable ICT integration all will have a significant influence on the success of ICT integration. Innovative thinking is especially crucial when principals perceive financial resources to be a barrier that hamper the successful integration of ICT. Limited strategic thinking is related to ineffective principal leadership and management that hinders and prolongs effective ICT integration.

The third sub-question identified enabling strategies to develop and sustain teachers' integration of ICT in teaching and learning (§ 4.4). It is evident that TPD is an important aspect for ICT integration as it gives teachers the opportunity to attain knowledge and skills that will enhance their teaching and learning practices. The principal forms the crucial component to initiate and maintain effective TPD opportunities. Principals provide support in the form of ongoing TPD to sustain ICT integration but when TPD is not maintained teachers will revert to their previous teaching and learning practices. A comprehensive catalogue of enabling strategies was formed that would assist principals in their quest to implement effective TPD for successful and sustainable ICT integration. Most of the principals executed only a few enabling strategies. The more enabling strategies the principals apply the more

success they will have in their efforts to keep up with the demands of education in the 21st century and sustain effective ICT integration in their schools.

Although it is essential that principals apply enabling strategies it is crucial that they clarify and come to grips with the concept of ICT integration. Most principals create opportunities for TPD so that teachers can receive basic training in ICT. Principals are very enthusiastic and impressed when teachers do PowerPoint presentations in their teaching but unfortunately that is not ICT integration. Principals have to pay a lot more attention to create TPD opportunities where emphasis falls on intensive curriculum-based ICT training.

It was quite alarming to see how many principals used the minimum of teacher-enabling strategies. Although teachers are an extremely important factor in effective and sustainable ICT integration it seems also to be the most neglected one. Principals will have to create a culture and COP where ICT integration becomes part of the teachers' daily educational practices where teachers can get experience in ICT, otherwise ICT will remain a component with the **potential** to revolutionise and transform education.

## 4.6 References used in this chapter

Ajzen, I. (1988). *Attitudes, Personality and Behaviour*. England: Open University Press.

Akbaba-Altun, S. (2006). Complexity of Integrating Computer Technologies into Education in Turkey. [Electronic version]. *Educational Technology and Society*, *2006*(9), 367-380. Retrieved 13 April 2007, from http://www.ifets.info/journals/9_1/15pdf

Akbulut, Y., Kesim, M., & Odabasi, F. (2007). Construct Validation of ICT Indicators Measurement Scale (ICTIMS). [Electronic version]. *International Journal of Education and Development using Information and Communication Technology*, *3*(3), 1-17. from http://ijedict.dec.uwi.edu//viewarticle.php?id=359&layout=html

Albion, P. R. (1999). Self-Efficacy Beliefs as an Indicator of Teachers' Preparedness for Teaching with Technology. Retrieved 22 September, 2006, from http://www.usq.edu.au/users/albion/papers/site99/1345.html

Arnold, M., Perry, R., Watson, R., Minatra, K., & Schwartz, R. (2006). The Practitioner: How Successful Principals Lead and Influence. Retrieved 16 August, 2007, from http://cnx.org/content/ml4255/latest/

Asan, A. (2003). Computer Technology Awareness by Elementary School Teachers: A Case Study from Turkey. [Electronic version]. *Journal of Information Technology Education*, *2*(2003), 153-164. Retrieved 8 August 2006, from http://www.jite.org/documents/Vol2/v2p153-164-109.pdf

Becta ICT Research. (2003). What the Research Says About ICT Support for Schools. Retrieved 8 July, 2005, from http://www.becta.org.uk/page_documents/research/wtrs_aboutict.pdf

Becta ICT Research. (2004). What the Research Says About ICT and Continuing Professional Development (CPD) for Teachers. 2nd Edition Revised and Updated. Retrieved 8 July, 2006, from http://www.becta.org.uk/page_documents/research/wtrs_cpds.pdf

Becta ICT Research. (2005). The Becta Review 2005. Evidence on the Progress of ICT in Education. Retrieved 9 July, 2005, from http://www.becta.org.uk/page_documents/research/becta_review_feb05.pdf

Becta ICT Research. (2006). The Becta Review 2006. Evidence on the Progress of ICT in Education. Retrieved 11 June, 2006, from http://becta.org.uk/corporate/publications/documents/The_Becta_Review_2006.pdf

Berg, B. L. (2001). *Qualitative Research Methods for the Social Sciences. Fourth Edition*. United States of America: Allyn & Bacon.

Berube, W., Gaston, J., & Stepans, J. (2004). The Role of the Principal in Teacher Professional Development. [Electronic version]. *NOVAtions Journal*, *2004*(1). Retrieved 22 July 2007, from http://www.novationsjournal.org/content/media/volume2004/NOVAtions2004-1.pdf

Blase, J., & Blase, J. (2001). *Empowering Teachers. What Successful Principals do* (2nd ed.). United States of America: Corwin Press.

Blase, J., & Blase, J. R. (1994). *Empowering Teachers. What Successful Principals do*. California: Corwin Press. Sage Publications.

Borko, H. (2004). Professional Development and Teacher Learning: Mapping the Terrain. [Electronic version]. *Educational Researcher*, *33*(8), 3-15. Retrieved 5 September 2006, from http://www.aera.net/uploadedFiles/Journals_and_Publications/Journals/Educational_Researcher/Volume_33_No_8/02_ERv33n8_Borko.pdf

Brand, G. A. (1997). What Research Says: Training Teachers for Using Technology. [Electronic version]. *Journal of Staff Development*, *19*(1). Retrieved 10 August 2006, from http://www.nsdc.org/library/publications/jsd/brand191.cfm

Buckenmeyer, J. A. (2005). No Computer Left Behind: Getting Teachers on Board with Technology.   Retrieved 12 April, 2007, from http://center.uoregon.edu/ISTE/uploads/NECC2005/KEY_7304940/Buckenmeyer_necc2005_RP.pdf

Bush, T. (2003). *Theories of Educational Leadership and Management*. London: Sage Publications.

Busher, H. (2006). *Understanding Educational Leadership. People, Power and Culture*. Berkshire: Open University Press.

Butler, J. A. (1992). Staff Development.   Retrieved 20 August, 2007, from http://www.nwrel.org/scpd/sirs/6/cul12.html

Carlson, S., & Gadio, C. T. (2002). Teacher Professional Development in the Use of Technology.   Retrieved 16 August, 2006, from http://www.schoolnetafrica.net/fileadmin/resources/Teacher_Professional_Development_In_the_use_of_Technology.pdf

Center for CSRI. (2007). Improving Teacher Retention with Supportive Workplace Conditions.   Retrieved 16 August, 2007, from http://www.centerforcsri.org/index.php?option=com_content&task=view&id=466&Itemid=5

Chen, J. C., & Chang, C. (2005). Testing the Whole Teacher Approach to Professional Development: A Study of Enhancing Early Childhood Teachers' Technology Proficiency.   Retrieved 28 July, 2006, from http://ecrp.uiuc.edu/v8n1/chen.html

Clarke, A. (2007). *The Handbook of School Management*. Cape Town: Kate McCallum.

Conole, G. (2004). E-learning: The Hype and the Reality.   Retrieved 27 August, 2006, from http://www-jime.open.ac.uk/2004/12/conole-2004-12-paper.html

Cope, C., & Ward, P. (2002). Integrating Learning Technology into Classrooms: The Importance of Teachers' Perceptions. [Electronic version]. *Educational Technology & Society*, *5*(1). Retrieved 22 September 2006, from http:/www.ifets.info/journals/5_1/cope.html

Cowie, B., & Jones, A. (2005). Digital Horizons: Laptops for Teachers Evaluation Study. Update on Secondary Teachers' Experiences.   Retrieved 16 August, 2007, from http://www.minedu.govt.nz/web/downloadable/dl8568_vl/laptop-leaders-report-12-9-with-edits-ds.doc

Cox, M. J., Preston, C., & Cox, K. (1999). What Motivates Teachers to Use ICT?   Retrieved 8 July, 2005, from http://www.leeds.ac.uk/educol/documents/00001329.htm

Darling-Hammond, L. (2005). *Professional Development Schools: Schools for Developing a Profession*. New York: Teacher College Press.

Davies, B. (2005). *The Essentials of School Leadership*. London: Sage Publications.

Davies, B., & Davies, B. J. (2005). Strategic Leadership. In B. Davies (Ed.), *The Essential of School Leadership*. London: Sage Publications.

Day, C., & Sachs, J. (2004). *International Handbook on the Continuing Professional Development of Teachers*. England: Open University Press.

Dean, J. (1991). *Professional Development in School*. Philadelphia: Open University Press.

Dimmock, C., & Walker, A. (2005). *Educational Leadership. Culture and Diversity*. London: Sage Publications.

Dirksen, D., & Tharp, D. (1996). Utilizing CBAM to Assess the Use of Instructional Technologies in the Classroom. Retrieved 17 April, 2000, from http://www.coe.uh.edu/insite/elec_pub/html1996/06preser.html

DoE. (2004). *White Paper on e-Education. Notice 1922 of 2004*. Pretoria.

DoE. (2005). *Report on Provincial Visits to Gauteng, Western Cape and Northern Cape*. Pretoria.

Drago-Severson, E. (2004). *Helping Teachers Learn. Principal Leadership for Adult Growth and Development*. California: Sage Publications.

Everard, K. B., Morris, G., & Wilson, I. (2004). *Effective School Management* (4th ed.). London: Sage Publications.

Foskett, N., & Lumby, J. (2003). *Leading and Managing Education. International Dimensions*. London: Paul Chapman Publishing.

Francis, H. A., & Ezeife, A. N. (2007). Integrating Information and Communication Technology into the School Curriculum: A Case for Professional Development Models. Retrieved 16 August, 2007, from http://www.asstudents.unco.edu/students/AE-Extra/2007/4/Ezeife.html

Gibson, I. W. (2002). Technology, Pedagogy and Education. [Electronic version]. *Journal of Information for Teacher Education*, *11*(3), 315-334. Retrieved 14 August 2007, from http://dx.doi.org/10.1080/14759390200200140

Gibson, S., & Oberg, D. (1999). Two Studies of Teacher Learning about Internet Use. [Electronic version]. *International Electronic Journal for Leadership in Learning*, *3*(3), 1-9. Retrieved 28 July 2006, from http://www.ucalgary.ca/~iejll/volume3/gibson.html

Girod, M., & Cavanaugh, S. (2001). Technology as an Agent of Change in Teacher Practise. Retrieved 5 November, 2005, from http://www.thejournal.com/magazine/vault/A3429.cfm

Glatthorn, A. A., Jones, B. K., & Bullock, A. A. (2006). *Developing Highly Qualified Teachers. A Handbook for School Leaders*. United States of America: Corwin Press.

Gordon, G. (2003). Do Principals Make a Difference? Retrieved 30 August, 2007, from http://www.centerforcsri.org/index.php?option=com_content&task=view&id=466&It

Guru, M., & Percy, B. (2005). *Recapturing Technology for Education. Keeping Tomorrow in Today's Classrooms*. United States of America: Rowman & Littlefield Publishers.

Han, C. (2002). Leadership Roles of a Pre-school Principal in the Use of Information and Communication Technology: A Hong Kong Experience. [Electronic version]. *Contemporary Issues in Early Childhood*, *3*(2), 293-297. Retrieved 16 August 2007, from http://www.wwwords.co.uk/pdf/viewpdf

Hezel Associates LLC. (2005-2006). PBS TeacherLine National Survey of Teacher Professional Development.   Retrieved 17 August, 2007, from http://www.hezel.com/PBSTeacherLine2005_2006_report.pdf

Ho, J. (2006). Technology Leadership. *IT Literature Review*   Retrieved 10 March, 2008, from http://www.moe.gov.sg/edumall/rd/litreview/techn_leadership.pdf

ICT op School. (2006). *Four in Balance Monitor 2006. Evidence on ICT in Education*. Netherlands: Kennisnet ICT op School.

Inger, M. (1993). Teacher Collaboration in Secondary Schools. *CenterFocus*, *2*.

Jacobs, M., Vakalisa, N., & Gawe, N. (2004). *Teaching-learning Dynamics. A Participative Approach for OBE* (3rd ed.). Cape Town: Heinemann Publishers.

Jimoyiannis, A., & Komis, V. (2007). Teacher Development. [Electronic version]. *Teacher Development*, *11*(2), 149-173. Retrieved 14 August 2007, from http://www.ecedu.upatras.gr/services/people/files_publications/TD_JimoyiannisKomis.pdf

Johnson, S. M. (2004). *Helping Teachers Learn. Principal Leadership for Adult Growth and Development*. California: Sage Publications.

Kalake, M. (2007). *Factors Enabling and Constraining ICT Implementation in schools: A Multiple Case Study of Three Secondary Schools in Lesotho.* Rhodes University.

Knapp, L. R., & Glenn, A. D. (1996). *Restructuring Schools with Technology*. Boston: Allyn & Bacon.

Kovalchick, A., & Dawson, K. (2004). *Education and Technology: An Encyclopedia*. California: ABC-CLIO.

Lal, V. (2002). The Impact of Computer-based Technologies in Schools - A Prelimary Literature Review.   Retrieved 27 August, 2006, from http://www.effectsproject.uts.edu.au/project_papers/4_vijendra_lal.pdf

Leask, M. (2001). *Issues in Teaching Using ICT*. Cambridge: University Press.

Lieberman, A. (2000). Networks as Learning Communities: Shaping the Future of Teacher Development. *Journal of Teacher Education*, *51*(3), 221-227.

Loveless, A., & Dore, B. (2002). *ICT in the Primary School*. Philadelphia: Open University Press.

Marshall, C., & Rossman, G. B. (1999). *Designing Qualitative Research* (3rd ed.). London: Sage Publications.

McCain, T. D. E., & Jukes, I. (2001). *Windows of the Future*. California: Corwin Press.

McKenzie, J. (1999). *How Teachers Learn Technology Best*. Washington: FNO Press.

Means, B. (1994). *Technology and Educational Reform*. California: Jossey-Bass Inc.

Moonen, B., & Voogt, J. (1998). Using Networks to Support the Professional Development of Teachers. [Electronic version]. *Journal of In-service Education*, *24*(1998), 99-110. from http://taylorandfrancis.metapress.com/media/78llrlywyhl43rjgvkwp/contributions/n/6/j/m/n6jmm4247480nl41.pdf

Mullen, C. A. (2005). *Mentorship*. United States of America: Peter Lang Publishing.

Nawawi, M. H., Ayub, A. F. M., Ali, W. Z. W., Yunus, A. S. M., & Tarmizi, R. A. (2005). Teachers' Perceptions on the Conditions Facilitating the Use of Computers in Teaching Mathematics. [Electronic version]. *Malaysian Online Journal of Instructional Technology*, *2*(3), 88-98. Retrieved 22 September 2006, from http://www.pppjj.usm.my/mojit/articles/pdf/Dec05/11%20-%20MATHEMATICS_TEACHERS_PERCEPTIONS-f.pdf

NCREL. (2000). Critical Issue: Providing Professional Development for Effective Technology Use. Retrieved 25 February, 2005, from http://www.ncrel.org/sdrs/areas/issues/methods/technlgy/te1000.htm

Nolan, K., Friesen, D., Maeers, V., & Couros, A. (2005). A Case-Study of Pre-service Teachers Learning to Teach with Technology During Internship. Retrieved 30 August, 2007, from http://www.educationaltechnology.ca/couros/publications/research/Nolan-EdMedia2005.pdf

Plomp, T., Anderson, R. E., Law, N., & Quale, A. (2003). *Cross-National Information and Communication. Technology Policy and Practices in Education*. United States of America: Information Age Publishing.

Prinsloo, I. J., & Van Schalkwyk, O. J. (Eds.). (2008). *Distance Education Programme ACE: Education Management*. Pretoria: University of Pretoria.

Rallis, S. F., & Goldring, E. B. (2000). *Principals of Dynamic Schools. Taking Charge of Change*. California: Corwin Press.

Roberts, J., & Associates. (1999). Integration of Information and Communication Technologies (ICTs) Through Teacher Professional Development: Issues and Trends in Canada. Retrieved 8 August, 2006, from http://www.cmec.ca/international/forum/itr.canada.en.pdf

Rodrigues, S. (2005a). *International Perspectives on Teacher Professional Development: Changes Influenced by Politics, Pedagogy and Innovation*. New York: Nova Science Publishers.

Rodrigues, S. (2005b). *A Model of Teacher Professional Development. The Partnership in the Primary Science Project*. New York: Nova Science Publishers.

Sallis, E., & Jones, G. (2002). *Knowledge Management in Education. Enhancing Learning and Education*. London: Kogan Page Limited.

Schlager, M., & Fusco, J. (2003). Teacher Professional Development, Technology, and Communities of Practice: Are We Putting the Cart before the Horse?   Retrieved 3 September, 2006, from http://tappedin.org/tappedin/web/papers/2003/TPDBarab.pdf

Schumaker, D. R., & Sommers, W. A. (2001). *Being a Successful Principal. Riding the Wave of Change Without Drowning*. California: Corwin Press.

Scrimshaw, P. (2004). Enabling Teachers to Make Successful Use of ICT.   Retrieved 7 July, 2005, from http://www.becta.org.uk/page_documents/research/enablers.pdf

Seale, C., Gobo, G., Gubrium, J. F., & Silverman, D. (2004). *Qualitative Research Practice*. London: SAGE Publications

Selwyn, N. (2002). *Telling Tales on Technology: Qualitative Studies of Technology and Education*. London: Ashgate Publishing Limited.

Seyoum, A. F. (2004). Key Issues in the Implementing and Integration of ICT in Education System of the Developing Countries.   Retrieved 10 September, 2006, from http://edu.et/session%20IV_fullpapers/Key%20Challenges%20fators%20implementation_Abebe%20Feleke.pdf

Shelly, G. B., Cashman, T. J., Gunter, R. E., & Gunter, G. A. (2004). *Teachers Discovering Ccomputers. Integrating Technology in the Classroom* (3rd ed.). United States of America: Thomson Learning.

Simonson, M. R., & Thompson, A. (1997). *Educational Computing Foundations* (3rd ed.). Englewood Cliffs: Prentice-Hall.

Soule, H. (2003). What do you Mean by ICT Integration? [Electronic version]. *Journal for Educational Reform in Namibia, 16*(April), 1-11. Retrieved 16 August 2007, from http://www.schoolnetafrica.net/fileadmin/resources/What_do_you_mean_by_ICT_integration.pdf

Southworth, G. (2005). Learning-centred Leadership. In B. Davies (Ed.), *The Essentials of School Leadership*. London: Sage Publications.

Spurr, B., Rosanowski, J., & Williams, C. (2003). Investigating How Principals Influence Learning.   Retrieved 16 August, 2007, from http://www.atea.edu.au/ConfPapers/2003/Reviewed%20Papers/Spurr.doc

Stephens, P., & Crawley, T. (1994). *Becoming an Effective Teacher*. England: Stanley Thornes Publishers.

Steyn, G. M., & Van Niekerk, E. J. (2005). *Human Resource Management in Education*. Pretoria: UNISA Press.

Tallerico, M. (2005). *Supporting and Sustaining Teachers' Professional Development. A Principal's Guide*. United States of America: Corwin Press.

Tenbusch, J. P. (1998). Teaching the Teacher; Technology Staff Development that Works. Retrieved 10 September, 2005, from http://www.electronic-school.com/0398f1.html

Theroux, P. (2004). Enhance Learning with Technology.   Retrieved 19 September, 2006, from http://members.shaw.ca/priscillatheroux/change.htm

Thomas, H. E. (2006). *The Sustainable Implementation of Computers in School Districts: A Case Study in the Free State Province of South Africa.* University of Pretoria, Pretoria.

Thorburn, D. (2004). Technology Integration and Educational Change: Is it Possible? Retrieved 11 August, 2006, from http://www.usask.ca/education/coursework/802papers/thorburn/index.htm

Tomlinson, H. (2004). *Educational Leadership. Personal Growth For Professional Development*. London: Sage Publications.

Van der Westhuizen, P. C. (1997). Educational Management Tasks. In P. C. van der Westhuizen (Ed.), *Effective Education Management*. Pretoria: Kagiso.

Wallace, M., & Poulson, L. (2003). *Learning to Read Critically in Educational Leadership and Management*. London: Sage Publications.

Walsh, K. (2002). ICTs about Learning: School Leadership and the Effective Integration of Information and Communications Technology. Retrieved 8 February, 2008, from http://www.ncsl.org.uk/media/1DO/CD/icts-about-learning.pdf

Wang, Q., & Woo, H. L. (2007). Systematic Planning for ICT Integration in Topic Learning. [Electronic version]. *Educational Technology and Society*, *10*(1), 148-156. Retrieved 16 August 2008, from http://www.ifets.info/journals/10_1/14.pdf

Webber, C., & Robertson, J. (1998). Boundary Breaking: An Emergent Model for Leadership Development. [Electronic version]. *Education Policy Analysis Archives*, *6*(21), 1-22. Retrieved 20 April 2007, from http://epaa.asu.edu/epaa/v6n21.html

West-Burnham, J. (1992). *Managing Quality in Schools: Effective Strategies for Quality Based School Improvement*. Harlow: Longman.

Young, P. G., Sheets, J. M., & Knight, D. D. (2005). *Mentoring Principals. Frameworks, Agendas, Tips and Case Stories for Mentors and Mentees*. United States of America: Corwin Press.

Zepeda, S. J. (1999). *Staff Development. Practices that Promote Leadership in Learning Communities*. New York: Eye On Education.

Zhao, Y., & Bryant, F. L. (2006). Can Teacher Technology Integration Training Alone Lead to High Levels of Technology Integration? A Qualitative Look at Teachers' Technology Integration after State Mandated Technology Training. [Electronic version]. *Electronic Journal for the Integration of Technology in Education*, *5*, 53-62. Retrieved 23 September 2006, from http://ejite.isu.edu/Volume5/Zhao.pdf

Zheng, D. (2003). Teachers' Perception of Using Instructional Technology in the Classroom. Retrieved 22 September, 2006, from http://www.education2.uconn.edu/epsy240/dzheng/portfolio/products/Teacher_Perception_IT.pdf

# Chapter Five

## Conclusions and recommendations

___

### 5.1     Introduction

The ability to utilise and integrate ICT in education has become the norm for the 21st century as ICT is already evident in every sphere of life.  The vast amount of information, communication and collaboration available through ICT has given teachers the opportunity in becoming experts in their fields that would satisfy the demands of educational challenges for the 21st century.  Using ICT in education cannot be avoided as it is a high-intensity tool that empowers teachers and learners to do new things and existing things better and more efficiently.  In South Africa the potential that ICT can have on enhancing and improving the quality of education has been acknowledged and various ICT initiatives have seen the light, trying to integrate and maintain the use of ICT (GautengOnline, 2003; Intel Education, 2003; Khanya, 2001; Microsoft, 2007; SchoolNet SA, 2007; SCOPE, 2003; Telkom, 2007; Thutong Educational Portal, 2004).  As McCain and Jukes state (2001, p. 121): 'If the education system is to survive and rise to the challenges faced within the 21st century, the system must take on the qualities of a learning organisation and the teacher must take on the qualities of new millennium learners."  Although the importance and potential of ICT in education has been acknowledged for years, system-wide effective and sustainable ICT integration by teachers have not yet realised in South Africa (Law & Chow, 2007, p. 30). The pace of integration is slow and teachers avoid using ICT as part of their teaching and learning practices (Buckenmeyer, 2005; Jimoyiannis & Komis, 2007, p. 150).  Numerous barriers hamper the integration of ICT (Asan, 2003, pp. 153 - 160; Nawawi et al., 2005, p. 88; Zheng, 2003, pp. 2, 5).  However Becta ICT Research (2004a, pp. 19 - 20) points out that the factors influencing teachers ICT integration should not be viewed in isolation.  Much pressure and focus is placed on teachers to integrate ICT into their teaching and learning practices (Becta ICT Research, 2006, p. 70).  Although teachers are a key element to successful integration, principals are the change agents for effective and sustainable ICT integration in schools (Di Benedetto, 2005, p. 4; Vallance, 2008, p. 290).

Despite research findings that indicate that principals hold a critical position in the effective and sustainable development of ICT integration (Law & Chow, 2007, pp. 1 - 2; Vallance, 2008, p. 290), limited research is available (ICT op School, 2006, p. 14; Kalake, 2007, p. 53). Principals are in the position where they can make a difference and influence the teachers to

be positive, enthusiastic, motivated and knowledgeable about ICT integration. Research also indicates the necessity of creating TPD opportunities that focus on improving the effectiveness of teachers and the ideal means to implement changes in education (Chen & Chang, 2005, p. 1; Demiraslan & Usluel, 2008, pp. 468, 470; Walsh, 2002, p. 16; Zhao & Bryant, 2006, p. 54). Therefore, the most effective way principals can provide the necessary support, training and motivation to teachers for ICT integration is by providing ongoing and appropriate TPD (Demiraslan & Usluel, 2008, p. 470; Vallance, 2008, p. 289).

Given anecdotal evidence that high-quality leadership is essential for successful ICT implementation in schools, it becomes imperative to obtain solid evidence about principals' influence on teachers' effective and sustainable ICT integration through TPD. The necessity for research on the interrelatedness of factors associated with the principals' influences of ICT integration drives this study. It is therefore my intention to provide a 'whole-approach' indicating the inter-relatedness of the various categories and the specific responsibility the principal has towards TPD for ICT integration.

In this chapter I provide a synoptic overview of the inquiry, as well as a summary of the key findings indicating the interrelatedness of the different categories. A new approach to teachers' ICT integration through TPD emerged, indicating the principal's important role in this approach. The proposed theoretical framework shows the interrelatedness and necessity of the different categories that consists out of various factors.

## 5.2    Synoptic overview of the inquiry

In Chapter 1 I provided an orientation of the study indicating the importance of effective and sustained ICT integration into teachers' existing teaching and learning practices. I provided background information to this study indicating the importance of supportive and continuous TPD for effective ICT integration as well as the critical and crucial part the principal has to fulfil when executing educational change and reform. I provided an overview on ICT in South Africa and reported on the various ICT initiatives, goals, objectives, strategies as well as implementation phases planned by the DoE.

There is widespread assumption that leadership is an essential determining factor for effective ICT integration (Akbaba-Altun, 2006, p. 186; Berube et al., 2004, pp. 1 - 6; Bush & Glover, 2004, p. 3; Di Benedetto, 2005, p. 4; DoE, 2004a, p. 4; Han, 2002, pp. 295 - 296; Hezel Associates LLC, 2005-2006, p. 2; Ho, 2006, pp. 1, 7; Leithwood, 2002, p. 105; Nawawi et al., 2005, pp. 98 - 90; NCREL, 2000, p. 6; Pelgrum, 2007, pp. 1 - 2; Thomas, 2006, p. 31;

Vallance, 2008, p. 290; Walsh, 2002, pp. 3, 5; West-Burnham, 1992, p. 117). In the rationale for the study, I outlined the need for recent and systematically-collected data on ICT leadership in schools and the principal's contribution to the successful and sustainable ICT integration in classrooms (Becta ICT Research, 2005, p. 5; ICT op School, 2006, p. 14; Kalake, 2007, p. 53). The background, rationale of this study, theoretical framework and identification of research problems guided me to devise my research question: How do principals influence TPD for the integration of ICT in their schools? I indicated my research approach to this study and gave my epistemological as well as ontological assumptions. A short overview on the research approach was given. I concluded Chapter 1 by stipulating the value of this research and defined certain concepts as well as terminology.

In Chapter 2 I explored the literature pertaining to this study according to Stoner's (1999, p. 1) adapted conceptual framework on the role of the principal as the main influential factor on teachers' effective ICT integration. I integrated the work of various authors to explore principal's leadership and management as it influences the teaching and learning in the school (Akbulut et al., 2007, p. 2; Becta ICT Research, 2005, p. 4; Bush, 2003, p. 10; Butler, 1992, p. 11; Dimmock & Walker, 2005, p. 78; Knapp & Glenn, 1996, p. 9; Southworth, 2005, p. 76; Steyn & Van Niekerk, 2005, p. 6; Vallance, 2008, p. 290; Wallace & Poulson, 2003, p. 229; Walsh, 2002, pp. 4, 24; Young et al., 2005, pp. 25, 134). I also explored the interrelatedness of leadership and management (Clarke, 2007, pp. 1 - 3; Everard et al., 2004, p. 22; Green, 2000, p. 8; Prinsloo & Van Schalkwyk, 2008, p. 48) and the necessity of leadership and management for effective as well as efficient educational performance. I referred to the different leadership and management styles and the importance of choosing the appropriate style for a particular situation. As there are a variety of leadership and management styles, I focused on three basic styles described in management literature: autocratic, laissez-faire and democratic (Bradley et al., 1991, pp. 92 - 97; Prinsloo & Van Schalkwyk, 2008, pp. 165 - 166; Van Rooyen et al., 2005, pp. 72 - 73).

Different perspectives on TPD were given, identifying the most appropriate perspective (Becta ICT Research, 2004b, p. 1; Day & Sachs, 2004, p. 3; Diaz-Maggioli, 2004, p. 3; Schlager & Fusco, 2003, p. 4; Steyn & Van Niekerk, 2005, p. 250) and the importance of principals' support and involvement for continuous TPD activities to enable teachers to engage in innovative practices by making use of ICTs in their teaching and learning (Blase & Blase, 2001, pp. 14, 16, 23, 24; Blase & Blase, 1994, p. 9; Demiraslan & Usluel, 2008, pp. 468, 470; Han, 2002, pp. 294 - 295; Hezel Associates LLC, 2005-2006, pp. 2 - 4; Thorburn, 2004, p. 9). Numerous sources indicated the significance of TPD in teachers' professional lives (Berube et al., 2004, pp. 1 - 3; Blase & Blase, 2001, p. 78; Blase & Blase, 1994, pp. 61 -

62; Chung, 2005, p. 2; Drago-Severson, 2004, p. xxi; Gibson, 2002, p. 320; Roberts & Associates, 1999, p. 10; Scrimshaw, 2004, p. 5; Theroux, 2004, p. 3; Zepeda, 1999, p. 6). An extensive report was given on the factors that have diverse influences on teachers' ICT integration and indicated that teachers respond differently to these factors due to their individual personalities, experiences, knowledge and skills, attitudes and beliefs, perceptions, motivations, different career phases, levels of awareness and classroom practices. I explained the importance of TPD in the ICT integration process as it leads to teacher empowerment. Several constrictions to effective TPD were indicated as well as the corrective actions that could be taken. Teacher-based, school-based and external-based strategies for supporting TPD in the use of ICT were also described.

Literature indicates the significant role of principals in the process of effective and sustainable ICT integration (Busher, 2006, p. 151; Gibson, 2002, p. 319; Ho, 2006, p. 2; Seyoum, 2004, p. 3; Spurr et al., 2003, p. 3; Tallerico, 2005, p. 100; Thomas, 2006, p. 41). The broad literature perspective on the factors that impact on teachers' ICT integration and influence that principals have by establishing favourable conditions, relationships and COP that is conducive for the integration of ICT. Principals can support teachers in their endeavour to integrate ICT effectively into their teaching and learning practices by ensuring that the various influential factors facilitate the ICT integration process. I concluded Chapter 2 by differentiating between two main categories of barriers to ICT integration as well as the enablers for the uptake of ICT.

In Chapter 3 I explained the research design and methodology. The nature of the research was exploratory, explanatory and descriptive in nature (Babbie & Mouton, 2001, pp. 79 - 81; Marshall & Rossman, 1999, p. 33). My unit of analysis was the principals' role in developing effective and sustainable ICT integration through TPD and I motivated the utilisation of certain strategies to identify knowledgeable respondents that contributed to my information-rich integrated dataset (Merriam, 1998, p. 61) and included diversity so that the impact of the characteristics could also be explored (Ritchie & Lewis, 2003, p. 79).

Details of my research methodology and the theoretical underpinning of this study also followed in this chapter. I approached the study according to the interpretive paradigm as principals, their interpretations, perceptions, meanings and understandings constituted my primary sources of data (Mason, 2002, p. 56). I indicated and explained the rationale for using qualitative research in this study. As qualitative research is based on a philosophical position that is broadly interpretive, it allowed me to make sense of 'how' the principals interpret, experience and influence ICT integration in their schools. I then gave a description

on the qualitative data collection method used, namely in-depth interviews. I went on to substantiate the using of this data collection method. The corrective actions taken were explained as I indicated some disadvantages of in-depth interviews as a data-collection method.

Incorporating field notes provided the opportunity to record and comment on my thoughts about the setting, the respondents and activities. Steps taken to ensure the study's trustworthiness namely validity and reliability were explained I collected data that were credible as well as verifiable (Lichtman, 2006, p. 22; McMillan & Wergin, 2002, p. 6). I employed a computer-based qualitative data analysis system, Atlas.ti™ to code the data according to themes; categorise themes and elicit meanings from the data as findings for this study (Merriam, 1998, p. 178). The data-analysis process was outlined and I indicated the use of Atlas.ti™ that aided me in the inductive analysis process to establish preliminary theoretical and conceptual codes reflecting the purpose of my study. The ethical considerations were discussed and I concluded this chapter by indicating certain limitations of this study.

Chapter 4 reports on my analysis of the data in the integrated data set. The interpretive approach allowed me to explore the meaning and interpretations that the seven respondents bestowed on their social surroundings. From the transcribed in-depth interviews, field notes and my comments I conducted my analysis. I started by coding each incident into as many categories as possible. As the analysis continued I reduced the categories by clustering them as certain patterns emerged. To gain a thorough understanding of principals' influences, I divided the main question into three sub-questions. The sub-questions assisted me in explaining and describing the principals' influence on TPD for ICT integration, establishing a comprehensive understanding of the extent and depth of principals' influence on ICT integration in schools. Answering the sub-questions key categories emerged that lead to establishing the interrelatedness between categories.

In order to sustain effective ICT integration principals should apply various approaches of strategic thinking, as well as appropriate management and leadership styles. Principals should create continuous TPD activities and apply appropriate strategies to ensure that the interrelated factors lead to favourable conditions that will help to infuse and sustain ICT integration in their schools.

## 5.3 Synopsis of key findings

In the following section I provide an inventory of the initial key findings from the qualitative analysis grouped according to the sub-questions.

### 5.3.1 Leadership and management styles as well as factors associated with principals' attitude towards Information and Communication Technology integration

The first sub-question focused on principals' leadership and management styles as well as the different factors associated with their attitude towards ICT integration. It became apparent that principals' leadership and management styles influenced teachers' ICT integration (§ 4.2.1). It seems essential for principals to make use of a combination of styles, applying an appropriate style according to the situation and circumstances the principals find themselves in. Principals are not knowledgeable of the three basic leadership and management styles. Principals should pre-establish certain aims, goals and objectives in order to direct their implementation of leadership and management styles. Some principals select a certain leadership and management style thinking that it is the most valid style to use. Some principals use a certain style to avoid negativity towards them. Principals delegate authority and responsibility. However, this sometimes leads to lessened accountability. Principals should remain accountable for effective and sustainable ICT integration. The findings concur with the literature that principals' leadership and management styles are influential factors for effective ICT integration (Akbulut et al., 2007, p. 2; Butler, 1992, p. 11; Knapp & Glenn, 1996, p. 9; Southworth, 2005, p. 76; Steyn & Van Niekerk, 2005, p. 6; Wallace & Poulson, 2003, p. 229; West-Burnham, 1992, p. 117; Young et al., 2005, p. 25).

Another aspect of a principal's influence on ICT integration is the principal's attitude towards ICT (§ 4.2.2). The mere fact that every principal had a laptop to assist them in their leadership and management tasks, indicated the importance of ICT. Although all principals indicated the importance of ICT their attitude towards teachers' ICT integration differed. Literature indicates that principals have the capacity to influence, motivate and encourage (Han, 2002, p. 294). Therefore, as Davies (2005, p. 23) points out, principals should show interest and be enthusiastic about ICT. All the respondents were not enthusiastic to create TPD opportunities that would enable teachers to integrate ICT. The findings also confirmed that it was important for principals to continuously motivate teachers towards ICT integration (Everard et al., 2004, pp. 25, 35; Foskett & Lumby, 2003, pp. 79 - 80; Steyn & Van Niekerk, 2005, p. 143)

2005, p. 143). Findings showed that principals who are knowledgeable about ICT and TPD-related issues were in a position to create appropriate TPD for effective ICT integration. The findings concur with Kalake (2007, pp. 143 - 145), Akbaba-Altun (2006, p. 186) and Southworth (2005, p. 88) that principals should be knowledgeable about ICT-related issues, latest TPD developments, as well as have knowledge and skills in using ICT to lead and manage ICT integration effectively.

Findings indicated that principals' positive attitudes, positive comments as well as being knowledgeable lead to motivated and inspired teachers. Principals' negative comments and opinions, as well as limited knowledge lead to teachers' low motivation to use ICT in teaching and learning. This coincides with the opinions of Foskett and Lumby (2003, p. 192), Blase and Blase (1994, p. 79), Steyn and Van Niekerk (2005, p. 23) that negativity demotes and hampers the functioning of a school, as well as the attainment of objectives and opportunities for development. Although the literature indicates the importance and influence principals have on teachers' effective ICT integration, there is, however, no clear indication of the significant role of principals' attitudes towards ICT.

The following noteworthy findings emerged from the data, indicating that it is crucial for principals to focus on the essential components to motivate teachers' effective ICT integration through TPD:

### 5.3.1.1    Principal's leadership and management styles

Although principals have different leadership and management styles the following can aid them in their quest to achieve and maintain excellence in teaching and learning:

- be knowledgeable about different leadership and management styles
- be knowledgeable on the advantages and disadvantages of the different leadership and management styles
- use of a combination of different leadership and management styles to increase effective management and leadership
- be able to apply appropriate leadership and management styles in different situations
- select management and leadership styles not according to teachers' attitudes, but according to the most appropriate style for a particular situation
- pre-established aims, goals and objectives towards ICT integration
- remain accountable in spite of delegating responsibility and authority to teachers.

### 5.3.1.2    Principal's attitude towards ICT integration

Principals have the capacity to influence, lead and motivate teachers to better performance. Principals can encourage ICT integration by keeping the following in mind:

- principals should attain knowledge and skills on effective ICT usage, latest TPD developments and ICT-related issues
- principals' positive attitude towards ICT integration includes knowledge of ICT implementation, as well as evidence of positive comments and words
- principals' positive attitude leads to inspired and motivated teachers integrating ICT effectively and continuously into teaching and learning
- principals' limited knowledge, negative comments and words result in unmotivated teachers and the avoidance of integrating ICT into teaching and learning.

### 5.3.1    Principals' strategic thinking of teachers' professional development for Information and Communication Technology integration

The second sub-question focused on principals' strategic thinking.  The findings indicated that principals' strategic thinking is vital for effective ICT integration.  Although the DoE has various initiatives, their main focus relates to the acquisition and upgrading of ICT infrastructures and facilities.  As a result many principals have taken matters into their own hands and created TPD opportunities for ICT integration.  Despite various TPD opportunities there are teachers who resist ICT integration into their teaching and learning strategies.  This implies that there has to be other influential factors.  Principals should think strategically of TPD for ICT integration as it provides direction and a framework of the future needs of the school.  Literature indicates that strategic leadership is a critical characteristic of effective school development and improvement (Davies & Davies, 2005, pp. 10 - 13).  Although the literature indicates that strategic thinking consists of innovative, critical, reflective, systems and forward thinking (Everard et al., 2004, p. xii), I established fundamental elements for strategic thinking for effective TPD to ensure successful ICT integration (Table 5.1).

**Table 5.1     Fundamental elements associated with the different categories of strategic thinking**

| Critical thinking | Forward thinking | Innovative thinking | Systems thinking |
|---|---|---|---|
| • Assess current situation:<br>  o Satisfied<br>  o Dissatisfied | • Establish mission and vision<br>• Planning TPD activities and ICT resources:<br>  o In-house training<br>  o Strategies<br>  o ICT budget<br>• Potential of ICT:<br>  o Convenience<br>  o Resources<br>  o New experience<br>  o Enhance teaching and learning<br>• Importance of computer literacy when employing teachers<br>• Prioritisation of ICT | • Initiate projects<br>• Creativity in generating sufficient funding | • Establish an ICT-operational system:<br>  o Internet WAN<br>  o Networked LAN<br>• Mentoring system |

Literature indicates the importance of the different categories of strategic thinking, but neglects to indicate the correlation between the categories.  It is essential for principals to implement all four categories in their strategic-thinking process.  My findings illustrate that some principals use limited strategic thinking as they do not include all four categories.  I conclude that limited strategic thinking leads to inappropriate or insufficient TPD opportunities, as well as ineffective and unsustainable ICT integration.  Findings also indicate principals' intensity and frequency of perceived barriers for ICT integration can hamper their ability to think strategically of TPD for ICT integration.

### 5.3.3     Enabling strategies that principals can implement to develop and sustain teachers' integration of Information and Communication Technology in teaching and learning

Literature indicates that principals have to create TPD opportunities (Blase & Blase, 2001, pp. 14, 16, 23, 64; Blase & Blase, 1994, p. 9; Han, 2002, p. 295; Thorburn, 2004, p. 9). Literature also accentuates principals' involvement with ICT integration into teachers learning and teaching practices (Busher, 2006, p. 151; Gibson, 2002, p. 319; Ho, 2006, p. 2; Seyoum, 2004, p. 3; Spurr et al., 2003, p. 3; Tallerico, 2005, p. 100; Thomas, 2006, p. 41).  Principals' influences are associated with teachers' positive attitude towards ICT integration is also acknowledged in the literature (Gordon, 2003, p. 2; Prinsloo & Van Schalkwyk, 2008, pp. 162 - 163; Spurr et al., 2003, p. 3; Tomlinson, 2004, pp. 101 - 102).  The literature indicates the three important factors that have to be considered to aid the process of effective and sustainable ICT integration and I indicate these in Table 5.2.

These enabling strategies can assist principals to ensure that effective ICT takes place and that the changes made are sustainable.

| Table 5.2 | Enabling strategies for effective and sustainable ICT integration through TPD | |
| --- | --- | --- |
| **TPD-enabling strategies** | **ICT-enabling strategies** | **Teacher-enabling strategies** |
| • TPD activities<br>• TPD support<br>• Continuous support<br>• TPD for teacher's individual needs<br>• TPD creates opportunity for collaboration<br>• In-house TPD<br>• TPD activities are delegated<br>• TPD in ICT<br>• Allocation of time for TPD<br>• Sufficient TPD funding | • ICT support<br>• ICT sustainability<br>• ICT exposure<br>• ICT potential<br>• Delegate responsibility of ICT<br>• ICT integration in teaching and learning | • Collaboration<br>• Mentoring<br>• Inspired and motivated<br>• Culture for teaching and learning<br>• Attitude towards ICT<br>• Community of practice<br>• Appraisal and incentives<br>• Experience with ICT |

Literature also stipulates the importance of the three components, namely ICT, TPD and teachers in ICT integration but neglects to show their interrelatedness. Table 5.2 indicates a comprehensive catalogue of enabling strategies that would aid principals in their quest to implement effective TPD for successful and sustainable ICT integration. From the findings it becomes evident that the more enabling strategies the principals applied, the more success they had to sustain effective ICT integration.

## 5.4    Proposed theoretical framework for principals to follow that would lead to sustainable and effective Information and Communication Technology integration through teacher professional development

I established this proposed theoretical framework through a series of subsequent steps:
- From the literature, I derived and authenticated preliminary categories (Chapter 2)
- I used valid qualitative research methods to attain credible respondents, make plausible field notes and comments of the in-depth interviews (Chapter 3)
- I followed a process of triangulation during data analysis to substantiate the validity and credibility of the data (Chapter 4)
- Key findings indicated and explained the interrelatedness of the findings. Therefore the new approach is justified and clarified (Chapter 5).

Although literature holds the view that teachers are simultaneously the subject of change, as well as the change agent, principals constitute the crucial component for successful and sustained ICT integration. TPD is a tool that creates opportunity for growth and learning, helping teachers to adapt to change, refine practices, implement innovations, increase

effectiveness and lessen isolation. Therefore, TPD is a tool to aid teachers in the process of ICT integration and sustained ICT use. The purpose of all leadership and management activities should be to support effective teaching and learning in schools. Although literature acknowledges that quality leadership is the most important requirement for successful schools, there is no recent literature on principals' influences on TPD for the integration of ICT in schools. The findings of this study indicate that the principal is a vital component to initiate, maintain and ensure that appropriate as well as effective TPD takes place for teacher's ICT integration. Consequently principals have enormous influence on the teachers' ICT integration at their schools. My findings indicate that if principals realise the impact they have on teachers' ICT integration, it will in it self make a considerable difference.

Through the process of exploring, describing and explaining principals' influences through TPD on ICT integration lead to interesting findings. The findings of the three sub-questions resulted in a theoretical framework for principals to create effective TPD for successful and sustainable ICT integration (Figure 5.1). This theoretical framework also indicates the relationship of the different categories for the integration of ICT in schools in association with the specific role of the principal in TPD. The interrelatedness of the different categories from the theoretical framework is instrumental to the success and sustainability of ICT integration. This framework indicates what enables principals to effectively lead the ICT implementation process through TPD and what entails good leadership for ICT integration.

Chen and Chang (2005, pp. 1 - 4) propose the 'whole teacher' approach to professional development. They designed this approach specifically for early childhood teachers, and this approach highlights the importance of all aspects of teacher development. This theoretical framework is based on the same principle that the different components of ICT integration cannot be seen in isolation but have to be seen in their entirety. This theoretical framework consists of five interrelated categories (Figure 5.1).

**Figure 5.1    Principals' influences on TPD as indicator  for the integration of ICT in schools**
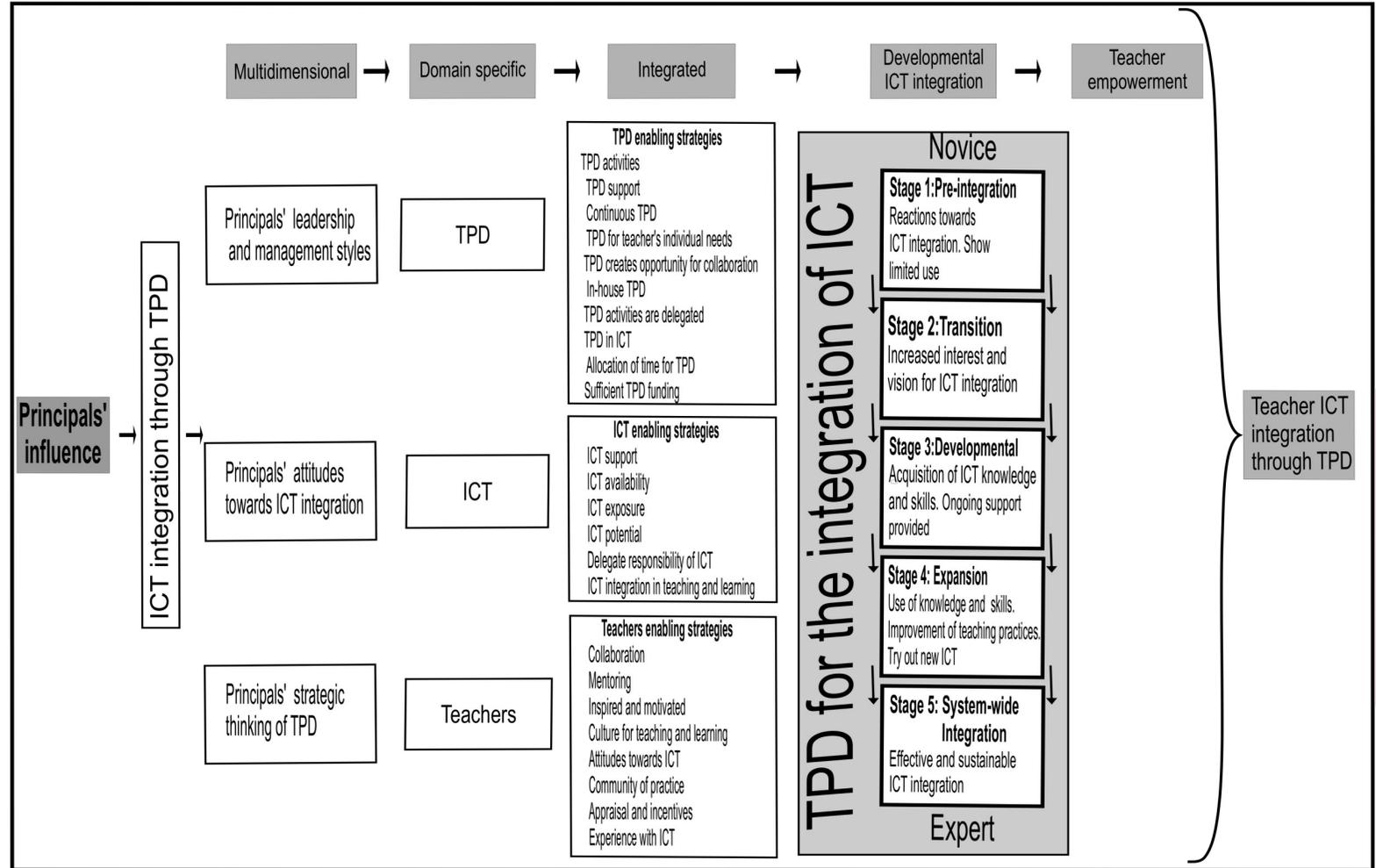
### 5.4.1     Multidimensional

The first dimension signifies the multidimensional aspects of principals' influences.  It refers to the multidimensional aspect of a principal's influence on ICT integration through TPD (Figure 5.1).  From the findings of this study I concluded that principals' influences consist of multiple dimensions each dimension is of equal importance.  It also refers to principal's leadership and management styles (§ 4.2.1 and § 5.3.1).  Principals' influences differ according to their application of appropriate styles under certain conditions.  Three leadership and management styles play an important role: democratic, authoritarian and laissez-faire.  Although the aim of every principal is to lead and manage the school to achieve and maintain excellence in teaching and learning, some principals have more success relating to effective and sustainable ICT integration through TPD than others.

The second dimension refers to principals' attitudes towards ICT integration as it influences teachers' motivation to use ICT (§ 4.2.2and § 5.3.1).  A distinct relationship exists between principals' positive attitudes towards ICT integration and teachers' motivation to integrate ICT into teaching and learning.  Principals using positive comments and phrases as well as being knowledgeable about current ICT and TPD practices contribute towards the motivation of teachers.  Therefore teachers can determine a principal's attitude towards ICT integration through their principal's general verbal communication and the effort that the principal makes to be knowledgeable of the latest TPD and ICT developments.  If teachers perceive principals' attitude as negative, they tend to become unmotivated and uninspired to integrate ICT into their teaching and learning practices.  Principals' attitude towards ICT integration is therefore considered as an essential influential factor.

The last dimension refers to principals' strategic thinking of TPD for ICT integration (Figure 5.1).  It has become essential for teachers to know how to integrate ICT successfully into their teaching and learning practices.  Principals should create and sustain effective TPD opportunities.  In order for TPD to be effective principals should think strategically about TPD (§ 4.3 and § 5.3.2).  It is important for principals to apply critical, forward, innovative, and system thinking when strategically thinking of TPD for ICT integration.  Each thinking process aids the effectiveness and interrelatedness of TPD.  Limited strategic thinking can hamper the effectiveness of TPD and lead to low ICT integration.

### 5.4.2     Domain specific

The next category refers to the specific domains relating to ICT integration (Figure 5.1).  The three domains identified are TPD, ICT and teachers (§ 4.4 and § 5.3.3).  TPD not only

creates a supportive environment, but also leads to the improvement of teaching and learning practices. The use of ICT in education has been emphasised over the years and the focus is now on effective ICT integration that enhances teaching and learning. Various teacher factors should be considered as they determine effective and sustainable use of ICT. Teachers are after all the point of ICT integration. Knowledge of these three domains guides the principal to initiate effective and appropriate TPD for individual teacher's ICT integration needs. Principals therefore should continuously be involved in these three domains to ensure that certain enabling factors are in place to create an environment that is favourable for every teacher for sustainable change. The three domains are interrelated and of equal importance.

### 5.4.3    Integrated enabling strategies

The third category refers to three enabling strategies that are vital to ensure effective and sustainable ICT integration (Figure 5.1). These strategies interact and influence one another simultaneously. Enabling strategies form the basis to ensure effective TPD for the integration of ICT (§ 4.4 and § 5.3.3). The more enabling strategies, the stronger the foundation for effective TPD. Figure 5.1 provides a comprehensive catalogue of enabling strategies that assist principals in their quest to implement effective TPD for successful and sustainable ICT integration.

### 5.4.4    Developmental Information and Communication Technology integration

The fourth category indicates the developmental stage. This category is based on Toledo's (2005, pp. 177 - 191) five-stage developmental model for the integration of ICT (Figure 5.1). This five stage model provides a template for principals to assist them in planning TPD activities (§ 2.5.5). These five developmental stages will support teachers' development in ICT integration from novice to expert catering for the different levels as teachers do not require the same TPD. The importance of this model is that fives stages are sequential; starting from limited professional and personal ICT use right up to where ICT is successfully embedded into the curriculum. Teachers' enthusiasm for ICT integration increases as they gain confidence, knowledge and skills.

### 5.4.5    Teacher empowerment

This last category focuses on teacher empowerment. Principals influence teacher empowerment by creating focus TPD opportunities for individual teacher's needs for effective ICT integration (Figure 5.1). Principals can therefore empower teachers by ensuring that

attention is provided to the previous four categories of ICT integration through continuous TPD activities. The main goal of ICT integration through TPD is teacher empowerment. Empowering teachers through TPD for ICT integration leads to capable teachers that can determine appropriate ICT integration methods and techniques that will enhance their teaching and learning practices. Newly gained knowledge and skills allow them to reflect on best practices. Empowered and knowledgeable teachers can effectively integrate ICT into their teaching and learning practices.

From the literature review, I identified various barriers to ICT integration (§ 2.5.6) and enablers for the uptake of ICT (§ 2.5.7). Most of these barriers will recede when principals' use appropriate leadership and management styles, demonstrate positive attitudes towards ICT integration, think strategically about TPD, and apply indicated enabling strategies. The enablers for the uptake of ICT coincide with the various enabling strategies.

Although teachers are important in successful ICT integration, principals constitute the crucial component. The proposed theoretical framework will aid principals in the process of effectively integrating ICT through teacher professional development and also enable them to sustain ICT integration. Figure 5.1 indicates the interrelatedness of the various categories and the importance thereof. The proposed theoretical framework will not only be beneficial for principals in their management and leadership position but will also lead to teacher empowerment, enabling them to meet the demands of educational challenges for the 21st century.

## 5.5      Limitations of this study

The research activities from this study include limitations. They may result from my choice of methodological approach, as well as limitations encountered during the execution the research strategies.

### 5.5.1      Theoretical limitations

Both qualitative and quantitative research methods are valuable and important research methods. Implementing just one research method may lead to limited findings of a study. I used only qualitative research methodologies in this study that could be the reason for some limitations in terms of addressing all the aspects relating to the main research question.

The analysis of the data represented a small number of principals and therefore no generalization to wider population can be made. However, the value of this type of

interpretive studies lies in generating theory that can be tested and applied in quantitative studies.  The interpretive approach of this study leaves some questions unanswered.  The findings of this research were not tested to determine whether they were statistically significant or due to change.  As the focus of this qualitative research was on the principals' attitudes and influences on ICT integration the study is limited in that it did not determine the statistical relationship between two or more variables.  The cause and effect as well as the relationship between various variables were not investigated.

### 5.5.2      Executive limitations

I was not a highly-skilled researcher at the beginning of this study and had insufficient experience of qualitative research to embark on a huge qualitative project. Merriam (1998, p. 22) indicates that sensitivity in the data-gathering phase is needed: "Knowing when to allow for silence, when to probe more deeply, when to change the direction of the interview."  After spending numerous hours on transcribing the interviews, I realised that I lacked experience in interviewing techniques especially with the first few interviews by asking inappropriate questions and not following up on respondents' answers I may have missed valuable information.  As I gained more experience in the interviewing process I adapted my questions and concentrated on attaining as much as possible applicable information associated with the research topic.  I also followed up on some of the questions, but the initial opportunity to gain relevant information had passed.  Merriam (1998, p. 20) states: "The human instrument is as fallible as any other research instrument."  The researcher as human instrument is limited by being human – mistakes are made, opportunities are missed, personal bias interferes.  Although I strived to be objective and neutral in the collection, interpretation and presentation of the data being biased might have crept into the qualitative research practice. Ritchie and Lewis (2003, p. 20) point out: "…while researches 'strive' for neutrality and objectivity, we can never attaint this aspiration fully."

McMillan and Schumacher (2001, pp. 23 - 24) maintain that institutions such as schools are public enterprises and are influenced by the external environment.  The institutions themselves change: legislative mandates and judicial orders change, the structure of schools change and programmes are added or deleted continuously.  Another limitation is the ambiguities that exist in languages although being recognised in this type of analysis can lead to confusion as the term 'integration" can have various meanings to different respondents.  Different respondents process ideas differently and the situational elements also have to be considered indicating the complexity of the research.  As I, the researcher, was the primary instrument for the gathering and analysing of the data I experienced some

difficulty in transcribing the respondents' interviews. The respondents without realising used words and phrases to express their ideas as well as attitudes towards ICT integration. The cultural diversity of the principals, especially those who had to express themselves in a language, namely English, which is not their mother tongue could have been an inhibiting factor as the replies of the respondents could have had different connotations for the researcher. The fact that I, a white female, had to interview black male principals might also have had a bearing on the content of responses received. Out of the seven respondents only one was a white female. It would have been ideal to have more female respondents. The snowball sampling method helped me to identify a female principal who was willing to participate in an interview as there are not many female principals.

The respondents or I could also have communicated an expectancy that the subject fulfils. Mouton (2001, p. 106) refers to it as: "research expectancy effect." Some respondents contradicted themselves when commenting on certain issues. Some principals refused to participate as they felt they were not knowledgeable enough on the subject and others just could not fit the interview into their busy schedules. Mouton (2001, p. 107) refers to another limitation that could have taken place in the interview namely the: "social desirable effects." The respondents may have answered what they felt would please the interviewer.


**5.6    Value of this study**

It has become essential to incorporate technology effectively into education in order to be in a position to satisfy educational challenges of the 21$^{st}$ century. ICT has much to offer to education as it can help teachers and learners enhance and improve the quality of teaching and learning. ICT has become part of learners' everyday lives outside the education arena. It is therefore essential to keep track of ICT development in education as learners are more and more expecting to be educated through the implementation of ICT, and, thereby, enriching their learning experience. ICTs form an important component to inspire teachers, reduce workload, assist them with the challenges of the teaching profession, promote their lifelong professional development and improve the general efficiency throughout the school.

This research aimed to provide an alternative approach to the traditional approach where the focus was mainly placed on teachers for effective and sustainable ICT integration. Specific factors relating to ICT integration was identified and clarified as well as gaining an improved understanding of how principals influence ICT integration in their schools. The clarification of relevant concepts, as well as establishing the interrelatedness of new categories enabled me

to compile a theoretical framework.  This study gave an indication that the various categories of principals' influences on TPD for the integration of ICT cannot be studied in isolation.

Therefore, the proposed theoretical framework should be implemented in all the identified categories as they are interrelated and the attainment of one category leads to the next category guiding teachers through the process of attaining effective and sustainable ICT integration through TPD.  This research has indicated that principals have a marked and continuous influence on teachers' ICT integration.  The theoretical framework can aid principals with ICT integration in the following manner:

- develop and unfold effective ICT practices in the school's teaching and learning environment through TPD
- empower their teachers at school through TPD for ICT integration
- have a positive influence by applying appropriate leadership and management styles, demonstrating positive attitudes towards ICT integration and focus on strategically thinking of TPD
- integrate appropriate and effective enabling strategies that would lead to effective and sustained ICT integration
- establish specific and clear objectives, guidelines and time-bound targets, required infrastructure and commitment from teachers
- identify which factors hinder the effective and sustainable ICT integration
- give an indication what needs to be in place for effective TPD for ICT integration.

The proposed theoretical framework can assist not only principals, but also the DoE in the process of effective and sustainable ICT integration through TPD promoting ICT in education.  As the White Paper on e-Education (2004b, pp. 40 - 41) stipulates that phase 2 (2007-2010) of the long-term strategy is the system-wide integration of ICTs into teaching and learning with main emphasis on ICT integration.  By 1013 teachers and learners should be ICT-literate and all teachers should integrate ICTs into teaching and learning practices (DoE, 2004b, p. 41).  The theoretical framework can assist this implementation phase during:

- TPD activities training teachers to effectively integrate ICT into their teaching and learning practices
- workshops for principals on ICT integratng indication how principals through TPD activities at their schools can aid and influence the process
- evaluation and assessment of current ICT integration projects and strategies at schools
- the compiling of ICT policy for effective and sustained ICT integration, as well as effective and appropriate TPD.

Principals are in a position where they can have a positive influence on teachers' effective ICT integration and through this process empower teachers to achieve excellence in teaching and learning. Principals therefore have an enormous responsibility towards their teachers to ensure that effective and sustained TPD is provided to ensure successful ICT integration. From this study it is evident that leadership for the 21$^{st}$ century will have to focus on effective and sustained TPD where teachers can learn to integrate ICT successfully into their teaching and learning practices. This indicates that principals will have to adapt their leadership and management styles, change their attitude towards ICT integration and focus more on strategic thinking of TPD for ICT integration. For some principals it indicates an entire paradigm shift and a changed approach to ICT integration. Principals should be actively involved in all the dimensions of ICT integration, and not be mere bystanders that assume their teachers are skilled in ICT integration in teaching and learning practices. Principals who are committed to ICT integration will implement effective strategies to ensure that conditions in the school are conducive to optimal and effective ICT integration. Much rests on the shoulders of the principals as their actions will have an influence on teachers' attitude, motivation and commitment towards ICT integration. Leadership is about influencing, inspiring, supporting and leading teachers to attain pre-established goals and implement change to improve teaching and learning.

## 5.7 Recommendations

From the findings of my study, I make the following recommendations:

- Principals should become knowledgeable about effective ICT integration in teaching and learning
- Principals should become knowledgeable about the different leadership and management models and know the advantages and disadvantages of each style
- Principals should prioritise ICT integration and initiate intensive TPD for effective ICT integration into current teaching and learning practices of teachers
- Principals should not assume that teachers who are computer literate are also knowledgeable and skilled in ICT integration
- Principals should realise that they can support teachers' ICT integration through continuous TPD
- Principals should be assisted in their strategic thinking of TPD for ICT integration especially those principals with severe perceived barriers that hamper their strategic thinking
- Principals should realise the enormous influence they have on teachers motivation and attitude towards ICT integration

- Just as teachers are inspired, motivated and supported by principals, they should also be inspired, motivated and supported by the DoE

- DoE should provide TPD to principals where best practices of ICT integration can be shared and assistance be provided to principals to improve their schools' ineffective ICT integration.

## 5.8 Personal reflection of my research journey

This research study has become my life for the past five years. This journey started when I completed my Master's degree in Computer-integrated Education and my interest increased when I became the teacher responsible for ICT integration at our school, although I realised that there were numerous barriers to effective ICT integration. The fact that intrigued me the most was, although principals had the same resources and perceived the same barriers, the level of ICT integration and sustainability differed. My interest in the integration of ICT in education increased due to the SITES 2006 project in South Africa.

This five year journey has enriched my life and a lot of lessons were learnt and perseverance became my virtue. I realised that principals have an enormous responsibility and expectations that they have to fulfil and success of a school rests a great deal on the shoulders of the principal. Principals have to handle numerous barriers in their schools and have to consider a variety of people's actions and reactions to make appropriate decisions. My respect for principals has increased as they have to deal with so many facets of education. The integration of ICT is not as simple as it seems, although extremely necessary in education it is a complex and demanding challenge for principals.

This research study gave me the opportunity to gain experience in conducting qualitative research and in-depth interviews. I also gained valuable knowledge and insight on the research topic. This research was the ideal opportunity to study TPD at close quarters and to grow at a personal level.

## 5.9 Proposed related research questions

I conclude this study with possible questions emanating from the research that should be addressed in future studies. Although the qualitative approach by means of interviews provided detailed information and depth of understanding, a follow-up by means of a quantitative approach would provide insight into some of the issues indicated in this study.

209

Although the SITES 2006 performed a quantitative study I realised that certain aspects that I uncovered were not researched in the SITES 2006 project. Therefore it would be advisable for this research to be extended and the implementation of the proposed theoretical framework for ICT integration through TPD be tested with a larger number of principals. The following questions relating to this study surfaced and should be addressed during future research to provide further understanding:

### 5.9.1 Topic 1: Principal-related

Quality leadership is widely acknowledged as one of the most important requirements for successful schools. Principals are the cornerstone to promote the innovative use of ICT in their schools. Answering the following questions can aid principals in their quest to maintain success in their schools and to integrate ICT successfully.

- What training do leaders require in regard to effective and sustainable ICT integration?
- How can leaders adapt their leadership and management styles for effective and sustained ICT integration?
- What knowledge and skills are required from principals to lead and manage ICT integration?
- What are the strategies for ICT integration that will improve learner achievement?
- How do the different leadership and management styles influence ICT integration?
- What is required from school leadership in the 21$^{st}$ with regard to ICT integration?

### 5.9.2 Topic 2: Teacher-related

Teachers are one of the key elements to successful ICT integration in classrooms. Various ways that will enable teachers to facilitate the ICT integration process have to be identified and implemented.

- What impact does the provision of laptops have on teachers' effective and sustainable ICT integration practices?
- How do teachers perceive ICT integration in their schools?
- How do teachers perceive TPD for ICT integration at their schools?
- How can teachers implement ICT as a professional tool in their teaching and learning practices?
- How can ICT become an integral part of the teacher's instructional repertoire?
- How can teachers become involved in establishing a culture of ICT integration?

### 5.9.3 Topic 3: ICT-related

ICT has the potential to improve the quality of education and training. To satisfy the demands of educational challenges for the 21$^{st}$ century it is crucial to keep on studying ICT-related issues and making suitable adjustments in ICT implementation.

- What are the learning outcomes of ICT integration in the curriculum for the different learning areas and different grades?
- What is the impact of ICT integration on teaching and learning?
- What is the impact of ICT integration on the learning environment?
- What influence does mentoring/peer coaching have on ICT integration?
- How can ICT enhance teaching and learning?
- What are the teaching and learning methodologies associated with ICT integration?
- What are the best practices for ICT integration?
- What is the current level of ICT integration in South African schools?

### 5.9.4 Topic 4: TPD-related

The provision and promotion of appropriate TPD opportunities can lead to the improvement of teaching and learning practices, allowing teachers to grow as professionals by extending and renewing their knowledge and skills. Therefore, TPD creates an environment where effective ICT training and learning can take place by supporting teachers in their pursuit, of effective ICT integration. By identifying effective and appropriate TPD practices will lead to successful and sustainable ICT integration.

- What are the successful and sustainable TPD practices for ICT integration?
- How can COP enhance effective in-house TPD?

### 5.9.5 Topic 5: DoE-related

For successful, sustainable and system-wide ICT integration in South Africa the DoE's involvement is important. Questions need to be answered on the contribution that the DoE can make to facilitate the ICT integration process.

- How can the DoE assist principals with various perceived barriers?
- What are the specific and clear objectives, guidelines and time-bound targets, required infrastructure, curriculum framework and assessment systems necessary for ICT integration into the curriculum?

- How can the DoE implement effective and appropriate TDP for ICT integration?
- How can the DoE use the Integrated Quality Management System (IQMS) model to motivate teachers to integrate ICT into their teaching and learning?

**5.10      References used in this chapter**

Akbaba-Altun, S. (2006). Complexity of Integrating Computer Technologies into Education in Turkey. [Electronic version]. *Educational Technology and Society*, *2006*(9), 367-380. Retrieved 13 April 2007, from http://www.ifets.info/journals/9_1/15pdf

Akbulut, Y., Kesim, M., & Odabasi, F. (2007). Construct Validation of ICT Indicators Measurement Scale (ICTIMS). [Electronic version]. *International Journal of Education and Development using Information and Communication Technology*, *3*(3), 1-17. from http://ijedict.dec.uwi.edu//viewarticle.php?id=359&layout=html

Asan, A. (2003). Computer Technology Awareness by Elementary School Teachers: A Case Study from Turkey. [Electronic version]. *Journal of Information Technology Education*, *2*(2003), 153-164. Retrieved 8 August 2006, from http://www.jite.org/documents/Vol2/v2p153-164-109.pdf

Babbie, E., & Mouton, J. (2001). *The Practice of Social Research*. Cape Town: Oxford.

Becta ICT Research. (2004a). A Review of the Research Literature on Barriers to the Uptake of ICT by Teachers.   Retrieved 11 June, 2006, from http://partners.becta.org.uk/page_documents/research/barriers.pdf

Becta ICT Research. (2004b). What the Research Says About ICT and Continuing Professional Development (CPD) for Teachers. 2nd Edition Revised and Updated. Retrieved 8 July, 2006, from http://www.becta.org.uk/page_documents/research/wtrs_cpds.pdf

Becta ICT Research. (2005). The Becta Review 2005. Evidence on the Progress of ICT in Education.   Retrieved 9 July, 2005, from http://www.becta.org.uk/page_documents/research/becta_review_feb05.pdf

Becta ICT Research. (2006). The Becta Review 2006. Evidence on the Progress of ICT in Education.   Retrieved 11 June, 2006, from http://becta.org.uk/corporate/publications/documents/The_Becta_Review_2006.pdf

Berube, W., Gaston, J., & Stepans, J. (2004). The Role of the Principal in Teacher Professional Development. [Electronic version]. *NOVAtions Journal*, *2004*(1). Retrieved 22 July 2007, from http://www.novationsjournal.org/content/media/volume2004/NOVAtions2004-1.pdf

Blase, J., & Blase, J. (2001). *Empowering Teachers.  What Successful Principals do* (2nd ed.). United States of America: Corwin Press.

Blase, J., & Blase, J. R. (1994). *Empowering Teachers. What Successful Principals do*. California: Corwin Press. Sage Publications.

Bradley, M. K., Kallick, B. O., & Regan, H. B. (1991). *The Staff Development Manager. A Guide to Professional Development*. Boston: Allyn and Bacon.

Buckenmeyer, J. A. (2005). No Computer Left Behind: Getting Teachers on Board with Technology.   Retrieved 12 April, 2007, from http://center.uoregon.edu/ISTE/uploads/NECC2005/KEY_7304940/Buckenmeyer_necc2005_RP.pdf

Bush, T. (2003). *Theories of Educational Leadership and Management*. London: Sage Publications.

Bush, T., & Glover, D. (2004). Leadership Development: Evidence and Beliefs. Retrieved 10 October, 2007, from http://www.nesl.org.uk/media/756/EC/leadership-development-evidence-and-beliefs.pdf

Busher, H. (2006). *Understanding Educational Leadership. People, Power and Culture*. Berkshire: Open University Press.

Butler, J. A. (1992). Staff Development. Retrieved 20 August, 2007, from http://www.nwrel.org/scpd/sirs/6/cul12.html

Chen, J. C., & Chang, C. (2005). Testing the Whole Teacher Approach to Professional Development: A Study of Enhancing Early Childhood Teachers' Technology Proficiency. Retrieved 28 July, 2006, from http://ecrp.uiuc.edu/v8n1/chen.html

Chung, T. K. (2005). Successful ICT Implementation in School - Two Prerequisites. Retrieved 17 July, 2008, from http://www.thecorner.org/ict/ict_leadership.pdf

Clarke, A. (2007). *The Handbook of School Management*. Cape Town: Kate McCallum.

Davies, B. (2005). *The Essentials of School Leadership*. London: Sage Publications.

Davies, B., & Davies, B. J. (2005). Strategic Leadership. In B. Davies (Ed.), *The Essential of School Leadership*. London: Sage Publications.

Day, C., & Sachs, J. (2004). *International Handbook on the Continuing Professional Development of Teachers*. England: Open University Press.

Demiraslan, Y., & Usluel, Y. K. (2008). ICT Integration Processes in Turkish Schools: Using Activity Theory to Study Issues and Contradictions. [Electronic version]. *Australasian Journal of Educational Technology*, *24*(4), 458-474. Retrieved 27 August 2008, from http://www.ascilite.org.au/ajet/ajet24/demiraslan.html

Di Benedetto, A. O. (2005). Does Technology Influence Teaching Practices in the Classroom? Retrieved 22 September, 2006, from http://web.uoregon.edu/ISTE/uploads/NECC2005/KEY_6820721/DiBenedetto_NECC_Paper_RP.pdf

Diaz-Maggioli, G. (2004). Teacher-Centered Professional Development. Retrieved 31 July, 2007, from http://www.ascd.org/portal/site/ascd/template.chapter/menuitem.b71d101a2f7c208cdeb3ffdb62108a0c/?chapterMgmtId=5b39cba5ddcaff00VgnVCM1000003d01a8c0RCRD

Dimmock, C., & Walker, A. (2005). *Educational Leadership. Culture and Diversity*. London: Sage Publications.

DoE. (2004a). ICT in Schools in Turkey. Policy Note. Retrieved 10 February, 2008, from http://www.oecd.org/dataoecd/25/62/2736884.pdf

DoE. (2004b). *White Paper on e-Education. Notice 1922 of 2004*. Pretoria.

Drago-Severson, E. (2004). *Helping Teachers Learn. Principal Leadership for Adult Growth and Development*. California: Sage Publications.

Everard, K. B., Morris, G., & Wilson, I. (2004). *Effective School Management* (4th ed.). London: Sage Publications.

Foskett, N., & Lumby, J. (2003). *Leading and Managing Education. International Dimensions*. London: Paul Chapman Publishing.

GautengOnline. (2003). GautengOnline: Bridging the Digital Devide.   Retrieved 13 June, 2007, from http://www.gautengonline.com

Gibson, I. W. (2002). Technology, Pedagogy and Education. [Electronic version]. *Journal of Information for Teacher Education*, *11*(3), 315-334. Retrieved 14 August 2007, from http://dx.doi.org/10.1080/14759390200200140

Gordon, G. (2003). Do Principals Make a Difference?   Retrieved 30 August, 2007, from http://www.centerforcsri.org/index.php?option=com_content&task=view&id=466&lt

Green, F. (2000). *The Head Teacher in the 21st Century. Being a Successful School Leader*. Harlow: Pearson Education Limited.

Han, C. (2002). Leadership Roles of a Pre-school Principal in the Use of Information and Communication Technology: A Hong Kong Experience. [Electronic version]. *Contemporary Issues in Early Childhood*, *3*(2), 293-297. Retrieved 16 August 2007, from http://www.wwwords.co.uk/pdf/viewpdf

Hezel Associates LLC. (2005-2006). PBS TeacherLine National Survey of Teacher Professional Development.   Retrieved 17 August, 2007, from http://www.hezel.com/PBSTeacherLine2005_2006_report.pdf

Ho, J. (2006). Technology Leadership. *IT Literature Review*   Retrieved 10 March, 2008, from http://www.moe.gov.sg/edumall/rd/litreview/techn_leadership.pdf

ICT op School. (2006). *Four in Balance Monitor 2006. Evidence on ICT in Education*. Netherlands: Kennisnet ICT op School.

Intel Education. (2003). Intel Teach to the Future.   Retrieved 13 June, 2007, from http://www.intel.co.za/education

Jimoyiannis, A., & Komis, V. (2007). Teacher Development. [Electronic version]. *Teacher Development*, *11*(2), 149-173. Retrieved 14 August 2007, from http://www.ecedu.upatras.gr/services/people/files_publications/TD_JimoyiannisKomis.pdf

Kalake, M. (2007). *Factors Enabling and Constraining ICT Implementation in schools: A Multiple Case Study of Three Secondary Schools in Lesotho.* Rhodes University.

Khanya. (2001). Khanya: A Cape Education Department Technology and Education Project. Retrieved 13 June, 2007, from http://www.khanya.co.za

Knapp, L. R., & Glenn, A. D. (1996). *Restructuring Schools with Technology*. Boston: Allyn & Bacon.

Law, N., & Chow, A. (2007). *IEA SITES International Report: Teacher Characteristics, Contextual Factors and How These Affect the Pedagogical Use of ICT*: International Association for the Evaluation of Educational Achievement.

Leithwood, K. (2002). Organizational Conditions to Support Teaching and Learning. In W. D. Hawley & D. L. Rollie (Eds.), *The Keys to Effective schools. Educational Reform as Continuous Improvement*. California: Corwin Press.

Lichtman, M. (2006). *Qualitative Research in Education. A User's Guide*. California: Sage Publications.

Marshall, C., & Rossman, G. B. (1999). *Designing Qualitative Research* (3rd ed.). London: Sage Publications.

Mason, J. (2002). *Qualitative Researching* (2nd ed.). London: Sage Publications.

McCain, T. D. E., & Jukes, I. (2001). *Windows of the Future*. California: Corwin Press.

McMillan, J. H., & Schumacher, S. (2001). *Research in Education. A Conceptual Introduction* (5th ed.). New York: Longman.

McMillan, J. H., & Wergin, J. F. (2002). *Understanding and Evaluating Educational Research* (2nd ed.). New Jersey: Merrill Prentice Hall.

Merriam, S. B. (1998). *Qualitative Research and Case Study Applications in Education*. San Francisco: Jossey-Bass Inc.

Microsoft. (2007). Microsoft Education: Partners in Learning.   Retrieved 12 June, 2007, from http://www.microsoft.com/education/PartnersinLearning.mspx

Mouton, J. (2001). *How to Succeed in your Master's and Doctoral Studies: A South African Guide and Resource Book*. Pretoria: Van Schaik.

Nawawi, M. H., Ayub, A. F. M., Ali, W. Z. W., Yunus, A. S. M., & Tarmizi, R. A. (2005). Teachers' Perceptions on the Conditions Facilitating the Use of Computers in Teaching Mathematics. [Electronic version]. *Malaysian Online Journal of Instructional Technology*, *2*(3), 88-98. Retrieved 22 September 2006, from http://www.pppjj.usm.my/mojit/articles/pdf/Dec05/11%20-%20MATHEMATICS_TEACHERS_PERCEPTIONS-f.pdf

NCREL. (2000). Critical Issue: Providing Professional Development for Effective Technology Use.   Retrieved 25 February, 2005, from http://www.ncrel.org/sdrs/areas/issues/methods/technlgy/te1000.htm

Pelgrum, W. J. (2007). *IEA SITES International Report: School Conditions for Pedagogy and ICT*: International Association for the Evaluation of Educational Achievement.

Prinsloo, I. J., & Van Schalkwyk, O. J. (Eds.). (2008). *Distance Education Programme ACE: Education Management*. Pretoria: University of Pretoria.

Ritchie, J., & Lewis, J. (2003). *Qualitative research practice. A guide for Social Science Students and Researchers*. London: Sage Publications.

Roberts, J., & Associates. (1999). Integration of Information and Communication Technologies (ICTs) Through Teacher Professional Development: Issues and Trends in Canada.   Retrieved 8 August, 2006, from http://www.cmec.ca/international/forum/itr.canada.en.pdf

Schlager, M., & Fusco, J. (2003). Teacher Professional Development, Technology, and Communities of Practice: Are We Putting the Cart before the Horse?   Retrieved 3 September, 2006, from http://tappedin.org/tappedin/web/papers/2003/TPDBarab.pdf

SchoolNet SA. (2007). SchoolNet South Africa.   Retrieved 12 June, 2007, from http://www.school.za

SCOPE. (2003). PumaScope: The SCOPE Project.   Retrieved 13 June, 2007, from
http://www.cs.up.ac.za/content.php?spc=fb

Scrimshaw, P. (2004). Enabling Teachers to Make Successful Use of ICT.   Retrieved 7 July,
2005, from http://www.becta.org.uk/page_documents/research/enablers.pdf

Seyoum, A. F. (2004). Key Issues in the Implementing and Integration of ICT in Education
System of the Developing Countries.   Retrieved 10 September, 2006, from
http://edu.et/session%20IV_fullpapers/Key%20Challenges%20fators%20implementat
ion_Abebe%20Feleke.pdf

Southworth, G. (2005). Learning-centred Leadership. In B. Davies (Ed.), *The Essentials of
School Leadership*. London: Sage Publications.

Spurr, B., Rosanowski, J., & Williams, C. (2003). Investigating How Principals Influence
Learning.   Retrieved 16 August, 2007, from
http://www.atea.edu.au/ConfPapers/2003/Reviewed%20Papers/Spurr.doc

Steyn, G. M., & Van Niekerk, E. J. (2005). *Human Resource Management in Education*.
Pretoria: UNISA Press.

Stoner, G. (1999). A Conceptual Framework for the Integration of Learning Technology.
Retrieved February 10, 2006, from http://www.icbl.hw.ac.uk/ltdi/implementing-
it/frame.htm

Tallerico, M. (2005). *Supporting and Sustaining Teachers' Professional Development. A
Principal's Guide*. United States of America: Corwin Press.

Telkom. (2007). Current Telkom Foundation Projects.   Retrieved 12 June, 2007, from
http://www.telkom.co.za/minisites/telkomfoundation

Theroux, P. (2004). Enhance Learning with Technology.   Retrieved 19 September, 2006,
from http://members.shaw.ca/priscillatheroux/change.htm

Thomas, H. E. (2006). *The Sustainable Implementation of Computers in School Districts: A
Case Study in the Free State Province of South Africa.* University of Pretoria,
Pretoria.

Thorburn, D. (2004). Technology Integration and Educational Change: Is it Possible?
Retrieved 11 August, 2006, from
http://www.usask.ca/education/coursework/802papers/thorburn/index.htm

Thutong Educational Portal. (2004). *Developing an Educational Portal for the National
Department of Education: Detailed Project Report*. Johannesburg: Neil Butcher
Associates.

Toledo, C. (2005). A Five-Stage Model of Computer Technology Integration into Teacher
Education Curriculum. [Electronic version]. *Contemporary Issues in Technology and
Teacher Education*, *5*(2), 177-191. Retrieved 25 July 2008, from
http://www.citejournal.org/articles/v5i2currentpractice2.pdf

Tomlinson, H. (2004). *Educational Leadership. Personal Growth For Professional
Development*. London: Sage Publications.

Vallance, M. (2008). Beyond Policy: Strategic Actions to Support ICT Integration in Japanese Schools. [Electronic version]. *Australasian Journal of Educational Technology*, *24*(3), 275-293. Retrieved 27 August 2008, from http://www.ascilite.org.au/ajet/ajet24/vallance.pdf

Van Rooyen, J. W., Joubert, H. J., & Heystek, J. (2005). ACE: Education Management. In *Department of Education. Management and Policy Studies*. Pretoria: University of Pretoria.

Wallace, M., & Poulson, L. (2003). *Learning to Read Critically in Educational Leadership and Management*. London: Sage Publications.

Walsh, K. (2002). ICTs about Learning: School Leadership and the Effective Integration of Information and Communications Technology.   Retrieved 8 February, 2008, from http://www.ncsl.org.uk/media/1DO/CD/icts-about-learning.pdf

West-Burnham, J. (1992). *Managing Quality in Schools: Effective Strategies for Quality Based School Improvement*. Harlow: Longman.

Young, P. G., Sheets, J. M., & Knight, D. D. (2005). *Mentoring Principals. Frameworks, Agendas, Tips and Case Stories for Mentors and Mentees*. United States of America: Corwin Press.

Zepeda, S. J. (1999). *Staff Development. Practices that Promote Leadership in Learning Communities*. New York: Eye On Education.

Zhao, Y., & Bryant, F. L. (2006). Can Teacher Technology Integration Training Alone Lead to High Levels of Technology Integration? A Qualitative Look at Teachers' Technology Integration after State Mandated Technology Training. [Electronic version]. *Electronic Journal for the Integration of Technology in Education*, *5*, 53-62. Retrieved 23 September 2006, from http://ejite.isu.edu/Volume5/Zhao.pdf

Zheng, D. (2003). Teachers' Perception of Using Instructional Technology in the Classroom. Retrieved 22 September, 2006, from http://www.education2.uconn.edu/epsy240/dzheng/portfolio/products/Teacher_Perception_IT.pdf

## 6    References

Ajzen, I. (1988). *Attitudes, Personality and Behaviour*. England: Open University Press.

Akbaba-Altun, S. (2006, 13 April 2006). Complexity of Integrating Computer Technologies into Education in Turkey. *Educational Technology and Society*   Retrieved 13 April, 2006, from www.ifets.info/journals/9_1/15pdf

Akbulut, Y., Kesim, M., & Odabasi, F. (2007). Construct Validation of ICT Indicators Measurement Scale (ICTIMS).   Retrieved 10 October, 2007, from http://ijedict.dec.uwi.edu//viewarticle.php?id=359&layout=html

Albion, P. R. (1999). Self-Efficacy Beliefs as an Indicator of Teachers' Preparedness for Teaching with Technology.   Retrieved 22 September, 2006, from http://www.usq.edu.au/users/albion/papers/site99/1345.html

Arnold, M., Perry, R., Watson, R., Minatra, K., & Schwartz, R. (2006). The Practitioner: How Successful Principals Lead and Influence.   Retrieved 16 August, 2007, from http://cnx.org/content/ml4255/latest/

Ary, D., Jacobs, L. C., & Razavieh, A. (2002). *Introduction to Research in Education* (6th ed.). Belmont: Wadsworth.

Asan, A. (2003). Computer Technology Awareness by Elementary School Teachers: A Case Study from Turkey. *Journal of Information Technology Education*   Retrieved 8 August, 2006, from http://www.jite.org/documents/Vol2/v2p153-164-109.pdf

Babbie, E. (2005). *The Basics of Social Research*. Canada: Wadsworth.

Babbie, E., & Mouton, J. (2001). *The Practice of Social Research*. Cape Town: Oxford.

Bajares, M. F. (1992). Teachers' Beliefs and Educational Research: Cleaning up a Messy Construct. *Review of Educational Research*, *62*(3), 307-332.

Basinger, D. (2003). Teachers Integrating Technology: Case Studies.   Retrieved 3 September, 2006, from http://www.usca.edu/essays/vol82003/basinger1.pdf

Bass, B. M., & Avolio, B. J. (1994). *Improving Organization Effectiveness: Through Transformational Leadership*. Thousand Oaks: SAGE Publications.

Beatty, B. (2005). Emotional Leadership. In B. Davies (Ed.), *The Essentials of School Leadership*. London: SAGE Publications.

Becta ICT Research. (2003). What the Research Says About ICT Support for Schools. Retrieved 8 July, 2005, from http://www.becta.org.uk/page_documents/research/wtrs_aboutict.pdf

Becta ICT Research. (2004a). A Review of the Research Literature on Barriers to the Uptake of ICT by Teachers.   Retrieved 11 June, 2006, from http://partners.becta.org.uk/page_documents/research/barriers.pdf

Becta ICT Research. (2004b). What the Research Says About ICT and Continuing Professional Development (CPD) for Teachers. 2nd Edition Revised and Updated. Retrieved 8 July, 2006, from http://www.becta.org.uk/page_documents/research/wtrs_cpds.pdf

Becta ICT Research. (2004c). What the Research says about ICT and Reducing Teachers' workload.   Retrieved 15 August, 2007 from http://partners.becta.org.uk/page_documents/research/wtrs_workloads.pdf

Becta ICT Research. (2005). The Becta Review 2005. Evidence on the Progress of ICT in Education.   Retrieved 9 July, 2005, from http://www.becta.org.uk/page_documents/research/becta_review_feb05.pdf

Becta ICT Research. (2006). The Becta Review 2006. Evidence on the Progress of ICT in Education.   Retrieved 11 June, 2006, from http://becta.org.uk/corporate/publications/documents/The_Becta_Review_2006.pdf

Berg, B. L. (2001). *Qualitative Research Methods for the Social Sciences. Fourth Edition.* United States of America: Allyn & Bacon.

Berglund Center Summer Institute. (2002). Learning, Technology and Educational Transformation.   Retrieved 25 July, 2008, from http://education.ed.pacificu.edu/bcis/workshop/adoption.html

Berube, W., Gaston, J., & Stepans, J. (2004). The Role of the Principal in Teacher Professional Development. [Electronic version]. *NOVAtions Journal, 2004*(1). Retrieved 22 July 2007, from http://www.novationsjournal.org/content/media/volume2004/NOVAtions2004-1.pdf

Blase, J., & Blase, J. (2001). *Empowering Teachers.  What Successful Principals do* (2nd ed.). United States of America: Corwin Press.

Blase, J., & Blase, J. R. (1994). *Empowering Teachers. What Successful Principals do.* California: Corwin Press. Sage Publications.

Blignaut, S., & Howie, S. (2007). *ICT Policies, Realities and Practices in South African Schools*: Tshwane University of Technology, University of Pretoria.

Bogdan, R. C., & Knopp Biklen, S. (1992). *Qualitative Research for Education. An Introduction to Theory and Methods* (2nd ed.). Boston: Pearson.

Bogdan, R. C., & Knopp Biklen, S. (2006). *Qualitative Research for Education. An Introduction to Theories and Methods* (5th ed.). Boston: Pearson.

Borko, H. (2004). Professional Development and Teacher Learning: Mapping the Terrain. [Electronic version]. *Educational Researcher, 33*(8), 3-15. Retrieved 5 September 2006, from http://www.aera.net/uploadedFiles/Journals_and_Publications/Journals/Educational_Researcher/Volume_33_No_8/02_ERv33n8_Borko.pdf

Bradley, M. K., Kallick, B. O., & Regan, H. B. (1991). *The Staff Development Manager. A Guide to Professional Development.* Boston: Allyn and Bacon.

Brand, G. A. (1997). What Research Says: Training Teachers for Using Technology. [Electronic version]. *Journal of Staff Development, 19*(1). Retrieved 10 August 2006, from http://www.nsdc.org/library/publications/jsd/brand191.cfm

Brown, A., & Dowling, P. (2001). *Doing Research/Reading Research.* London: FalmerPress.

Buckenmeyer, J. A. (2005). No Computer Left Behind: Getting Teachers on Board with Technology.   Retrieved 12 April, 2007, from

http://center.uoregon.edu/ISTE/uploads/NECC2005/KEY_7304940/Buckenmeyer_necc2005_RP.pdf

Burbules, N. C., & Callister, T. A. (2000). *Watch IT.The Risks and Promises of Information Technologies for Education*. United States of America: Westview Press.

Burrell, G., & Morgan, G. (1979). *Sociological Paradigms and Organizational Analysis*. London: Heinemann Books.

Busch, T. (1995). Gender Differences in Self-efficacy and Attitudes Toward Computers. [Electronic version]. *Journal of Educational Computing Research, Volume 12*(1995), 147-148. from http://www.personal.psu.edu/users/m/t/mtel27/gender_differences.pdf

Bush, T. (2003). *Theories of Educational Leadership and Management*. London: SAGE Publications.

Bush, T., & Glover, D. (2004). Leadership Development: Evidence and Beliefs. Retrieved 10 October, 2007, from http://www.nesl.org.uk/media/756/EC/leadership-development-evidence-and-beliefs.pdf

Busher, H. (2006). *Understanding Educational Leadership. People, Power and Culture*. Berkshire: Open University Press.

Butler, J. A. (1992). Staff Development. Retrieved 20 August, 2007, from http://www.nwrel.org/scpd/sirs/6/cul12.html

Carlson, S., & Gadio, C. T. (2002). Teacher Professional Development in the Use of Technology. Retrieved 16 August, 2006, from http://www.schoolnetafrica.net/fileadmin/resources/Teacher_Professional_Development_In_the_use_of_Technology.pdf

Center for CSRI. (2007). Improving Teacher Retention with Supportive Workplace Conditions. Retrieved 16 August, 2007, from http://www.centerforcsri.org/index.php?option=com_content&task=view&id=466&Itemid=5

Chen, J. C., & Chang, C. (2005). Testing the Whole Teacher Approach to Professional Development: A Study of Enhancing Early Childhood Teachers' Technology Proficiency. Retrieved 28 July, 2006, from http://ecrp.uiuc.edu/v8n1/chen.html

Chung, T. K. (2005). Successful ICT Implementation in School - Two Prerequisites. Retrieved 17 July, 2008, from http://www.thecorner.org/ict/ict_leadership.pdf

Clarke, A. (2007). *The Handbook of School Management*. Cape Town: Kate McCallum.

Cohen, L., & Manion, L. (1994). *Research Methods in Education* (4th ed.). London: Routledge Publishers.

Conole, G. (2004). E-learning: The Hype and the Reality. Retrieved 27 August, 2006, from http://www-jime.open.ac.uk/2004/12/conole-2004-12-paper.html

Cope, C., & Ward, P. (2002). Integrating Learning Technology into Classrooms: The Importance of Teachers' Perceptions. [Electronic version]. *Educational Technology & Society*, *5*(1). Retrieved 22 September 2006, from http:/www.ifets.info/journals/5_1/cope.html

Cowie, B., & Jones, A. (2005). Digital Horizons: Laptops for Teachers Evaluation Study. Update on Secondary Teachers' Experiences. Retrieved 16 August, 2007, from http://www.minedu.govt.nz/web/downloadable/dl8568_vl/laptop-leaders-report-12-9-with-edits-ds.doc

Cox, M. J., Preston, C., & Cox, K. (1999). What Motivates Teachers to Use ICT? Retrieved 8 July, 2005, from www.leeds.ac.uk/educol/documents/00001329.htm

Darling-Hammond, L. (2005). *Professional Development Schools: Schools for Developing a Profession*. New York: Teacher College Press.

Davies, B. (2005). *The Essentials of School Leadership*. London: SAGE Publications.

Davies, B., & Davies, B. J. (2005). Strategic Leadership. In B. Davies (Ed.), *The Essential of School Leadership*. London: SAGE Publications.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User Acceptance of Computer Technology: A Comparison of Two Theoretical Models. *Management Science*, *35*(8), 982-1003.

Day, C. (1999). *Developing Teachers: The Challenges of Lifelong Learning*. London: Falmer Press.

Day, C., & Sachs, J. (2004). *International Handbook on the Continuing Professional Development of Teachers*. England: Open University Press.

Deal, T. E. (2005). Poetical and Political Leadership. In B. Davies (Ed.), *The Essentials of School Leadership*. London: SAGE Publications.

Dean, J. (1991). *Professional Development in School*. Philadelphia: Open University Press.

Demiraslan, Y., & Usluel, Y. K. (2008). ICT Integration Processes in Turkish Schools: Using Activity Theory to Study Issues and Contradictions. [Electronic version]. *Australasian Journal of Educational Technology*, *24*(4), 458-474. Retrieved 27 August 2008, from http://www.ascilite.org.au/ajet/ajet24/demiraslan.html

Denzin, N. K., & Lincoln, Y. S. (2000). *Handbook of Qualitative Research. Second Edition*. United States of America: SAGE Publications.

Di Benedetto, A. O. (2005). Does Technology Influence Teaching Practices in the Classroom? Retrieved 22 September, 2006, from http://web.uoregon.edu/ISTE/uploads/NECC2005/KEY_6820721/DiBenedetto_NECC_Paper_RP.pdf

Diaz-Maggioli, G. (2004). Teacher-Centered Professional Development. Retrieved 31 July, 2007, from http://www.ascd.org/portal/site/ascd/template.chapter/menuitem.b71d101a2f7c208cdeb3ffdb62108a0c/?chapterMgmtId=5b39cba5ddcaff00VgnVCM1000003d01a8c0RCRD

Dimmock, C., & Walker, A. (2005). *Educational Leadership. Culture and Diversity*. London: SAGE Publications.

Dirksen, D., & Tharp, D. (1996). Utilizing CBAM to Assess the Use of Instructional Technologies in the Classroom. Retrieved 17 April, 2000, from http://www.coe.uh.edu/insite/elec_pub/html1996/06preser.htm

DoE. (2004a). *ICT in Schools in Turkey. Policy Note*. Retrieved 10 February 2008. from
www.oecd.org/dataoecd/25/62/2736884.pdf.

DoE. (2004b). *White Paper on e-Education. Notice 1922 of 2004*. Pretoria.

DoE. (2005). *Report on Provincial Visits to Gauteng, Western Cape and Northern Cape*.
Pretoria: Department of Education.

Drago-Severson, E. (2004). *Helping Teachers Learn. Principal Leadership for Adult Growth
and Development*. California: Corwin Press. Sage Publications.

Eastin, M. S., & LaRose, R. (2000). Internet Self-efficacy and the Psychology of the Digital
Divide.   Retrieved 7 August, 2006, from
http://jcmc.indiana.edu/vol6/issue1/eastin.html

Edgerson, D. E., & Kritsonis, W. A. (2006). Analysis of the Influence of Principal-Teacher
Relationships on Student Academic Achievement: A National Focus. [Electronic
version]. *National Journal for Publishing and Mentoring Doctoral Student Research*,
*1*(1). Retrieved 10 March 2008, from
http://www.nationalforum.com/Electronic%20Journal%20Volumes/Edgerson,%20Davi
d%20Analysis%20of%20the%20Influence%20of%20Principal.pdf

Ehman, L., Bonk, C., & Yamagata-Lynch, L. (2005). A Model of Teacher Professional
Development to Support Technology Integration. [Electronic version]. *AACE Journal*,
*13*(3), 251-270. Retrieved 8 August 2006, from
http://www.thutong.org.za/resources/research/Model%20Teacher%20Prof%20Dev%2
0ICT%20Integration%202005.pdf

Everard, K. B., Morris, G., & Wilson, I. (2004). *Effective School Management* (4th ed.).
London: SAGE Publications.

Fabry, D., & Higgs, J. (1997). Barriers to the Effective Use of Technology in Education.
*Journal of Educational Computing*, *17*(4), 385-395.

Flick, U., Von Kardorff, E., & Steinke, I. (2004). *A Companion to Qualitative Research*.
London: Sage Publications.

Foskett, N., & Lumby, J. (2003). *Leading and Managing Education. International Dimensions*.
London: Paul Chapman Publishing.

Francis, H. A., & Ezeife, A. N. (2007). Integrating Information and Communication
Technology into the School Curriculum: A Case for Professional Development
Models.   Retrieved 16 August, 2007, from
http://www.asstudents.unco.edu/students/AE-Extra/2007/4/Ezeife.html

GautengOnline. (2003). GautengOnline: Bridging the Digital Devide.   Retrieved 13 June,
2007, from http://www.gautengonline.com

Gibson, I. W. (2002). Technology, Pedagogy and Education. [Electronic version]. *Journal of
Information for Teacher Education*, *11*(3), 315-334. Retrieved 14 August 2007, from
http://dx.doi.org/10.1080/14759390200200140

Gibson, I. W., & Oberg, D. (1999). Two Studies of Teacher Learning about Internet Use.
[Electronic version]. *International Electronic Journal for Leadership in Learning*, *3*(3),
1-9. Retrieved 28 July 2006, from http://www.ucalgary.ca/~iejll/volume3/gibson.html

Gillani, B. B. (2003). *Learning Theories and the Design of e-Learning Environments*. Oxford: University Press of America.

Girod, M., & Cavanaugh, S. (2001). Technology as an Agent of Change in Teacher Practise. *Technology Horizons in Education*  Retrieved 5 November, 2005, from http://www.thejournal.com/magazine/vault/A3429.cfm

Glatthorn, A. A., Jones, B. K., & Bullock, A. A. (2006). *Developing Highly Qualified Teachers. A Handbook for School Leaders*. United States of America: Corwin Press.

Gordon, G. (2003). Do Principals Make a Difference?  Retrieved 30 August, 2007, from http:www.centerforcsri.org/index.php?option=com_content&task=view&id=466&lt

Green, F. (2000). *The Head Teacher in the 21st Century. Being a Successful School Leader*. Harlow: Pearson Education Limited.

Gura, M., & Percy, B. (2005). *Recapturing Technology for Education. Keeping Tomorrow in Today's Classrooms*. United States of America: Rowman & Littlefield Publishers.

Han, C. (2002). Leadership Roles of a Pre-school Principal in the Use of Information and Communication Technology: A Hong Kong Experience. [Electronic version]. *Contemporary Issues in Early Childhood*, *3*(2), 293-297. Retrieved 16 August 2007, from http://www.wwwords.co.uk/pdf/viewpdf

Harris, A. (2005). Distributed Leadership. In B. Davies (Ed.), *The Essentials of School Leadership*. London: SAGE Publications.

Hatch, J. M. (2002). *Doing Qualitative Research in Education Settings*. Albany: New York Press.

Hentsche, G. C., & Galdwell, B. J. (2005). Entrepreneurial Leadership. In B. Davies (Ed.), *The Essentials of School Leadership*. London: SAGE Publications.

Hezel Associates LLC. (2005-2006). PBS TeacherLine National Survey of Teacher Professional Development.  Retrieved 17 August, 2007, from http://www.hezel.com/PBSTeacherLine2005_2006_report.pdf

Ho, J. (2006). Technology Leadership. *IT Literature Review*  Retrieved 10 March, 2008, from http://www.moe.gov.sg/edumall/rd/litreview/techn_leadership.pdf

ICT op School. (2006). *Four in Balance Monitor 2006. Evidence on ICT in Education*. Netherlands: Kennisnet ICT op School.

Inger, M. (1993). Teacher Collaboration in Secondary Schools. *CenterFocus*, *2*.

Intel Education. (2003). Intel Teach to the Future.  Retrieved 13 June, 2007, from http:www.intel.co.za/education

Jackson, G. (2000). Technology for Teacher Support.  Retrieved 4 May, 2005, from http://www.techknowlogia.org/TKL_active_pages2/CurrentArticles/main.asp?FileType=HTML&ArticleID=209

Jacobs, M., Vakalisa, N., & Gawe, N. (2004). *Teaching-learning Dynamics. A Participative Approach for OBE* (3rd ed.). Cape Town: Heinemann Publishers.

Jamieson-Proctor, R. M., Burnett, P. C., Finger, G., & Watson, G. (2006). ICT Integration and Teachers' Confidence in Using ICT for Teaching and Learning in Queensland State Schools. [Electronic version]. *Australasian Journal of Educational Technology*, *22*(4), 511-530. Retrieved 16 August 2007, from http://www.ascilite.org.au/ajet/ajet22/jamieson-proctor.html

Jimoyiannis, A., & Komis, V. (2007). Teacher Development. [Electronic version]. *Teacher Development*, *11*(2), 149-173. Retrieved 14 August 2007, from http://www.ecedu.upatras.gr/services/people/files_publications/TD_JimoyiannisKomis.pdf

Johnson, S. M. (2004). *Helping Teachers Learn. Principal Leadership for Adult Growth and Development*. California: Sage Publications.

Joiner, L. L. (2002). The Connected Teacher. *Educational Vital Signs 2000*  Retrieved 5 November, 2005, from http://www.electronic-school.com/2002/01/0102f1.html

Kalake, M. (2007). *Factors Enabling and Constraining ICT Implementation in schools: A Multiple Case Study of Three Secondary Schools in Lesotho.* Rhodes University.

Kante, C. (2003). e-Training: The New Frontier of Teacher Professional Development. Retrieved 7 July, 2005, from http://www.techknowlogia.org/TKL_active_pages2/CurrentArticles/t-right.asp?IssueNumber=19

Khanya. (2001). Khanya:A Cape Education Department Technology and Education Project. Retrieved 13 June, 2007, from http:www.khanya.co.za

Knapp, L. R., & Glenn, A. D. (1996). *Restructuring Schools with Technology.* Boston: Allyn & Bacon.

Kotyk, P. (2006). Online Professional Development for Teachers.  Retrieved 17 April, 2007, from http://www.masscue.org/publications/archive/online_PD_teachers.pdf

Kovalchick, A., & Dawson, K. (2004). *Education and Technology: An Encyclopedia*. California: ABC-CLIO.

Kruger, A. G., & Steinman, C. F. (2003). The Organisational Climate and Culture of Schools. In I. Van Deventer & A. G. Kruger (Eds.), *An Educator's Guide to School Management Skills*. Pretoria: Van Schaik.

Lal, V. (2002). The Impact of Computer-based Technologies in Schools - A Prelimary Literature Review.  Retrieved 27 August, 2006, from http://www.effectsproject.uts.edu.au/project_papers/4_vijendra_lal.pdf

Lambert, L. (2005). Constructivist Leadership. In B. Davies (Ed.), *The Essentials of School Leadership*. London: SAGE Publications.

Latina, Z. (2000). Early Adopters of Technological Innovations.  Retrieved 24 July, 2008, from http://www.zonalatina.com?ZLdata99.htm

Law, N., & Chow, A. (2007a). *IEA SITES International Report: Pedagogical Practices in Mathematics and Science and the Use of ICT*: International Association for the Evaluation of Educational Achievement.

Law, N., & Chow, A. (2007b). *IEA SITES International Report: Teacher Characteristics, Contextual Factors and How These Affect the Pedagogical Use of ICT*: International Association for the Evaluation of Educational Achievement.

Law, N., Pelgrum, W. J., & Plomp, T. (2008). Pedagogy and ICT use in Schools Around the world: Findings from the IEA SITES 2006 Study.   Retrieved 10 August, 2008, from http://www.sites2006.net

Leask, M. (2001). *Issues in Teaching Using ICT*. Cambridge, London: University Press.

Leithwood, K. (2002). Organizational Conditions to Support Teaching and Learning. In W. D. Hawley & D. L. Rollie (Eds.), *The Keys to Effective schools. Educational Reform as Continuous Improvement*. California: Corwin Press.

Leithwood, K., & Jantzi, D. (2005). Transformational Leadership. In B. Davies (Ed.), *The Essentials of School Leadership*. London: SAGE Publications.

Lichtman, M. (2006). *Qualitative Research in Education. A User's Guide*. California: SAGE Publications.

Lieberman, A. (2000). Networks as Learning Communities: Shaping the Future of Teacher Development. *Journal of Teacher Education*, *51*(3), 221-227.

Lieberman, A., & Miller, L. (2002). Transforming Professional Development. In W. D. Hawley & D. L. Rollie (Eds.), *The Keys to Effective schools. Educational Reform as Continuous Improvement*. California: Corwin Press.

Litoselliti, L. (2003). *Using Focus Groups in Research*. London: Continuum.

Loveless, A., & Dore, B. (2002). *ICT in the Primary School*. Philadelphia: Open University Press.

Marsh, C. C. (1997). *Planning, Management and Ideology: Key Concepts for Understanding Curriculum* (Vol. 2). London: Falmer Press.

Marshall, C., & Rossman, G. B. (1999). *Designing Qualitative Research* (3rd ed.). London: SAGE Publications.

Mason, J. (2002). *Qualitative Researching* (2nd ed.). London: Sage Publications.

Massachusetts Department of Education. (2002). *EdTech 2001*. Retrieved 5 March 2007. from http://www.doe.mass.edu/edtech/etreport/2001.pdf.

McBurney, D. H. (1994). *Researh Methods* (3rd ed.). California: Brooks &Cole Publishing Company.

McCain, T. D. E., & Jukes, I. (2001). *Windows of the future*. California: Corwin Press.

McKenzie, J. (1999). *How Teachers Learn Technology Best*. Washington: FNO Press.

McMillan, J. H., & Schumacher, S. (2001). *Research in Education. A Conceptual Introduction* (5th ed.). New York: Longman.

McMillan, J. H., & Wergin, J. F. (2002). *Understanding and Evaluating Educational Research* (2nd ed.). New Jersey: Merrill Prentice Hall.

Means, B. (1994). *Technology and Educational Reform*. California: Jossey-Bass Inc.

Merriam, S. B. (1998). *Qualitative Research and Case Study Applications in Education*. San Francisco: Jossey-Bass Inc.

Microsoft. (2007). Microsoft Education: Partners in Learning.   Retrieved 12 June, 2007, from http://www.microsoft.com/education/PartnersinLearning.mspx

Mills, G. E. (2003). *Action research. A guide for the teacher researcher* (2nd ed.). New Jersey: Merrill Prentice Hall.

Moonen, B., & Voogt, J. (1998). Using Networks to Support the Professional Development of Teachers. [Electronic version]. *Journal of In-service Education*, *24*(1998), 99-110. from http://taylorandfrancis.metapress.com/media/78llrlywyhl43rjgvkwp/contributions/n/6/j/m/n6jmm4247480nl41.pdf

Mouton, J. (2001). *How to Succeed in your Master's and Doctoral Studies: A South African Guide and Resource Book*. Pretoria: Van Schaik.

Mullen, C. A. (2005). *Mentorship*. United States of America: Peter Lang Publishing.

Nawawi, M. H., Ayub, A. F. M., Ali, W. Z. W., Yunus, A. S. M., & Tarmizi, R. A. (2005). Teachers' Perceptions on the Conditions Facilitating the Use of Computers in Teaching Mathematics.   Retrieved 22 September, 2006, from http://www.pppjj.usm.my/mojit/articles/pdf/Dec05/11%20-%20MATHEMATICS_TEACHERS_PERCEPTIONS-f.pdf

NCREL. (2000a). Critical Issue: Providing Professional Development for Effective Technology Use Retrieved 25 February, 2005, from http://www.ncrel.org/sdrs/areas/issues/methods/technlgy/te1000.htm

NCREL. (2000b). Professional Development for Teachers.   Retrieved 5 November, 2005, from http://www.ncrel.org/sdrs/areas/issues/educatrs/profdevl/pd2prof.htm

Nichols, J. (2006). Technology Integration Model for Teachers.   Retrieved 29 July, 2007, from http://www.teach-nology.com/tutorials/integrate/print.htm

Nolan, K., Friesen, D., Maeers, V., & Couros, A. (2005). A Case-Study of Pre-service Teachers Learning to Teach with Technology During Internship.   Retrieved 30 August, 2007, from http://www.educationaltechnology.ca/couros/publications/research/Nolan-EdMedia2005.pdf

Novak, J. M. (2005). Invitational Leadership. In B. Davies (Ed.), *The Essential of School Leadership*. London: SAGE Publications

OFSTED. (2001). *ICT in Schools. The Impact of Government Initiatives* London.

OFSTED. (2002). ICT in Schools. Effect of Government Initiatives Retrieved 10 April, 2005, from http://www.ofsted.gov.uk/publications/docs/19.pdf

Pandor, N. (2007). E-learning in South Africa. Address by the Minister of Education, Naledi Pandor MP, at the World Ministerial Seminar on Technology in Education.   Retrieved 12 June, 2007, from http://www.education.gov.za/dynamic/dynamic.aspx?pageid=306&id=2471

Paul, J. R. M. (1999). Empowering Teachers to Use Computers Effectively Across the Curriculum. Retrieved 7 July, 2005, from http://archive.wcape.school.za/mm99/cd/conf99/proceedings/31/CTPAPE~1.rtf

Pelgrum, W. J. (2007). *IEA SITES International Report: School Conditions for Pedagogy and ICT*: International Association for the Evaluation of Educational Achievement.

Phelps, R., Graham, A., & Kerr, B. (2004). Teachers and ICT: Exploring a Metacognitive Approach to Professional Development. *Australasian Journal of Educational Technology, 20(1), 49-68* Retrieved 28 July, 2006, from http://www.ascilite.org.au/ajet/ajet20/phelps.html

Plomp, T., Anderson, R. E., Law, N., & Quale, A. (2003). *Cross-National Information and Communication. Technology Policy and Practices in Education*. United States of America: Information Age Publishing

Prinsloo, I. J., & Van Schalkwyk, O. J. (Eds.). (2008). *Distance Education Programme ACE: Education Management*. Pretoria: University of Pretoria.

Rallis, S. F., & Goldring, E. B. (2000). *Principals of Dynamic Schools. Taking Charge of Change*. California: Corwin Press.

Richards, J. (2004). What New Teachers Value Most in Principals. [Electronic version]. *NAESP*, *83*(3), 42-44. Retrieved 22 June 2007, from http://www.naesp.org/ContentLoad.do?contentId=1128&action=print

Ritchie, J., & Lewis, J. (2003). *Qualitative research practice. A guide for Social Science Students and Researchers*. London: SAGE Publications.

Roberts, J., & Associates. (1999). Integration of Information and Communication Technologies (ICTs) Through Teacher Professional Development: Issues and Trends in Canada. Retrieved 8 August, 2006, from http://www.cmec.ca/international/forum/itr.canada.en.pdf

Rodney, D. (2001). Issues and Influences in Educational Technology. Retrieved 11 November, 2007, from http:/cyberlearn.fau.edu/drodney/Issues.htm

Rodrigues, S. (2005a). *International Perspectives on Teacher Professional Development: Changes Influenced by Politics, Pedagogy and Innovation*. New York: Nova Science Publishers.

Rodrigues, S. (2005b). *A Model of Teacher Professional Development. The Partnership in the Primary Science Project*. New York: Nova Science Publishers.

Sallis, E., & Jones, G. (2002). *Knowledge Management in Education. Enhancing Learning and Education*. London: Kogan Page Limited.

Sapre, P. (2002). Realising the Potential of Educational Management in India. *Educational Management and Administration*, *30*(1), 101-108.

Schlager, M., & Fusco, J. (2003). Teacher Professional Development, Technology, and Communities of Practice: Are We Putting the Cart before the Horse? Retrieved 3 September, 2006, from http://tappedin.org/tappedin/web/papers/2003/TPDBarab.pdf

SchoolNet SA. (2007). SchoolNet South Africa. Retrieved 12 June, 2007, from http://www.school.za

Schumaker, D. R., & Sommers, W. A. (2001). *Being a Successful Principal. Riding the Wave of Change Without Drowning*. California: Corwin Press.

Schwandt, T. A. (2007). *The Sage Dictionary of Qualitative Inquiry. Third Edition.* United States of America: SAGE Publications.

SCOPE. (2003). PumaScope: The SCOPE Project.   Retrieved 13 June, 2007, from http://www.cs.up.ac.za/content.php?spc=fb

Scrimshaw, P. (2004). Enabling Teachers to Make Successful Use of ICT.   Retrieved 7 July, 2005, from http://www.becta.org.uk/page_documents/research/enablers.pdf

Seale, C., Gobo, G., Gubrium, J. F., & Silverman, D. (2004). *Qualitative Research Practice*. London: SAGE Publications

Selwyn, N. (2002). *Telling Tales on Technology: Qualitative Studies of Technology and Education*. London: Ashgate Publishing Limited.

Sergiovanni, T. J., & Starratt, R. J. (1988). *Supervision: Human Perspectives* (Fourth ed.). New York: McGraw-Hill.

Seyoum, A. F. (2004). Key Issues in the Implementing and Integration of ICT in Education System of the Developing Countries.   Retrieved 10 September, 2006, from http://edu.et/session%20IV_fullpapers/Key%20Challenges%20fators%20implementation_Abebe%20Feleke.pdf

Shelly, G. B., Cashman, T. J., Gunter, R. E., & Gunter, G. A. (2004). *Teachers Discovering Ccomputers. Integrating Technology in the Classroom* (3rd ed.). United States of America: Thomson Learning.

Silverman, D. (2004). *Qualitative Research. Theory, Method and Practice* (2nd ed.). London: Sage Publications.

Simonson, M. R., & Thompson, A. (1997). *Educational Computing Foundations* (3rd ed.). Englewood Cliffs: Prentice-Hall.

Somekh, B., & Davis, N. (1997). *Using Information Technology Effectively in Teaching and Learning*. London: Routledge Publishers.

Somekh, B., & Lewin, C. (2005). *Research Methods in the Social Sciences*. Cornwall: Sage Publications.

Soule, H. (2003). What do you Mean by ICT Integration? [Electronic version]. *Journal for Educational Reform in Namibia*, *16*(April), 1-11. Retrieved 16 August 2007, from http://www.schoolnetafrica.net/fileadmin/resources/What_do_you_mean_by_ICT_integration.pdf

Southworth, G. (2005). Learning-centred Leadership. In B. Davies (Ed.), *The Essentials of School Leadership*. London: SAGE Publications.

Spurr, B., Rosanowski, J., & Williams, C. (2003). Investigating How Principals Influence Learning.   Retrieved 16 August, 2007, from http://www.atea.edu.au/ConfPapers/2003/Reviewed%20Papers/Spurr.doc

Starratt, R. J. (2005). Ethical Leadership. In B. Davies (Ed.), *The Essentials of School Leadership*. London: SAGE Publications

Stephens, P., & Crawley, T. (1994). *Becoming an Effective Teacher*. England: Stanley Thornes Publishers

Steyn, G. M., & Van Niekerk, E. J. (2005). *Human Resource Management in Education*. Pretoria: UNISA Press.

Stoner, G. (1999). A Conceptual Framework for the Integration of Learning Technology. Retrieved February 10, 2006, from http://www.icbl.hw.ac.uk/ltdi/implementing-it/frame.htm

Stonier, T., & Conlin, C. (1985). *The Three c's: Children, Computers and Communication*. London: Wiley.

Tallerico, M. (2005). *Supporting and Sustaining Teachers' Professional Development. A Principal's Guide*. United States of America: Corwin Press.

Telkom. (2007). Current Telkom Foundation Projects.  Retrieved 12 June, 2007, from http://www.telkom.co.za/minisites/telkomfoundation

Tenbusch, J. P. (1998). Teaching the Teacher; Technology Staff Development that Works. Retrieved 10 September, 2005, from http://www.electronic-school.com/0398f1.html

Theroux, P. (2004). Enhance Learning with Technology.  Retrieved 19 September, 2006, from http://members.shaw.ca/priscillatheroux/change.htm

Thomas, H. E. (2006). *The Sustainable Implementation of Computers in School Districts: A Case Study in the Free State Province of South Africa.* University of Pretoria, Pretoria.

Thorburn, D. (2004). Technology Integration and Educational Change: Is it Possible? Retrieved 11 August, 2006, from http://www.usask.ca/education/coursework/802papers/thorburn/index.htm

Thutong Educational Portal. (2004). *Developing an Educational Portal for the National Department of Education: Detailed Project Report*. Johannesburg:Neil Butcher Associates.

Toledo, C. (2005). A Five-Stage Model of Computer Technology Integration into Teacher Education Curriculum.  Retrieved 25 July, 2008, from http://www.citejournal.org/articles/v5i2currentpractice2.pdf

Tomlinson, H. (2004). *Educational Leadership. Personal Growth For Professional Development*. London: SAGE Publications.

Trochim, W. M. K. (2001). Reliability and Validity.  Retrieved 12 January 2002, from http://www.trochim.human.cormell.edu/kb/rel&val.htm

Vallance, M. (2008). Beyond Policy: Strategic Actions to Support ICT Integration in Japanese Schools. [Electronic version]. *Australasian Journal of Educational Technology*, *24*(3), 275-293. Retrieved 27 August 2008, from http://www.ascilite.org.au/ajet/ajet24/vallance.pdf

Valli, L., & Hawley, W. D. (2002). Designing and Implementing School-based Professional Development. In W. D. Hawley & D. L. Rollie (Eds.), *The Keys to Effective schools. Educational Reform as Continuous Improvement*. California: Corwin Press

Van der Westhuizen, P. C. (1997). Educational Management Tasks. In P. C. van der Westhuizen (Ed.), *Effective Education Management*. Pretoria: Kagiso.

Van Deventer, I., & Kruger, A. G. (2003). *An Educator's Guide to School Management Skills*. Pretoria: Van Schaik.

Van Rooyen, J. W., Joubert, H. J., & Heystek, J. (2005). ACE: Education Management. In *Department of Education. Management and Policy Studies*. Pretoria: University of Pretoria.

Viadero, D. (2005). Pressure Builds for Effective Staff Training. Retrieved 4 September, 2006, from http://www.edweek.org/agentk-12/teacher-recruiter/2005/07/27/43pd.h24.html

Wallace, M., & Poulson, L. (2003). *Learning to Read Critically in Educational Leadership and Management*. London: SAGE Publications.

Walsh, K. (2002). ICTs about Learning: School Leadership and the Effective Integration of Information and Communications Technology. Retrieved 8 February, 2008, from http://www.ncsl.org.uk/media/1DO/CD/icts-about-learning.pdf

Wang, Q., & Woo, H. L. (2007). Systematic Planning for ICT Integration in Topic Learning. [Electronic version]. *Educational Technology and Society*, *10*(1), 148-156. Retrieved 16 August 2008, from http://www.ifets.info/journals/10_1/14.pdf

Waters, S. (2008). Rogers Adoption Innovation Curve. Retrieved 25 July, 2008, from http://suewaters.wikispaces.com/Rogers

Webber, C., & Robertson, J. (1998). Boundary Breaking: An Emergent Model for Leadership Development. [Electronic version]. *Education Policy Analysis Archives*, *6*(21), 1-22. Retrieved 20 April 2007, from http://epaa.asu.edu/epaa/v6n21.html

West-Burnham, J. (1992). *Managing Quality in Schools: Effective Strategies for Quality Based School Improvement*. Harlow: Longman.

Wikipedia. (2006a). Self-efficacy. Retrieved 7 August, 2006, from http://en.wikipedia.org/wiki/Self_efficacy

Wikipedia. (2006b). Technology Integration. Retrieved 27 September, 2006, from http://en.wikipedia.org/wiki/Technology_integration

Woodbridge, J. (2004). Technology Integration as a Transforming Teaching Strategy. Retrieved 27 July, 2006, from http://www.techlearning.com/shared/printableArticle.jhtml?articleID=17701367

Young, P. G., Sheets, J. M., & Knight, D. D. (2005). *Mentoring Principals. Frameworks, Agendas, Tips and Case Stories for Mentors and Mentees*. United States of America: Corwin Press.

Zepeda, S. J. (1999). *Staff Development. Practices that Promote Leadership in Learning Communities*. New York: Eye On Education.

Zhao, Y., & Bryant, F. L. (2006). Can Teacher Technology Integration Training Alone Lead to High Levels of Technology Integration? A Qualitative Look at Teachers' Technology Integration after State Mandated Technology Training. [Electronic version]. *Electronic*

*Journal for the Integration of Technology in Education*, *5*, 53-62. Retrieved 23 September 2006, from http://ejite.isu.edu/Volume5/Zhao.pdf

Zheng, D. (2003). Teachers' Perception of Using Instructional Technology in the Classroom. Retrieved 22 September, 2006, from http://www.education2.uconn.edu/epsy240/dzheng/portfolio/products/Teacher_Perception_IT.pdf

**Addendum 1.1    International research projects***

| Ofsted - London | |
|---|---|
| **Criteria** | **Description** |
| **Year** | • 1997 - 2002 |
| **Aims of projects** | • Equip schools with modern ICT facilities<br>• Create a National Grid for Learning (NGfL) containing educational information and study material<br>• Organise in-service training for teachers to enable them to use ICT effectively in their work<br>• All schools, colleges and public libraries, and as many community centers as possible, to be connected to the NGfL<br>• Britain to become a centre for excellence in developing software content, and a world leader in exporting learning services<br>• Serving teachers to feel confident and be competent to teach using ICT within the curriculum<br>• School-leavers to have a good understanding of ICT, with measures in place for assessing their competence |
| **Scope** | • Visited 368 schools<br>• 96 % of primary schools and all secondary schools were connected to the Internet<br>• Pupil to computer ratios 18:1 in primary schools and 9:1 in secondary |
| **ICT initiatives** | • Managing and funding the teacher training program, using policy directions<br>• Procurement of an appropriate infrastructure, development of content interactive learning materials<br>• Distribution of laptop computers, over 50,000 teachers have benefited from this<br>• Provide online support for teachers who have followed the training programme, with an emphasis on classroom applications. The government has also announced its intention to support the Curriculum Online project, which will see the production of digital learning resources across subjects and key stages |

| **Findings: Training** | Positive | Negative |
|---|---|---|
| | • Training has been integrated into existing good staff development practice in ICT<br>• Some shortcomings in training have been identified early and addressed energetically<br>• Personal access for teachers to a computer for the purpose of preparation and planning is one of the strongest influences on the success of ICT training and subsequent classroom use<br>• Teachers have improved their basic ICT skills and the extent to which ICT is used in classrooms has risen<br>• Some training institutes have been making improvements to their training and have acted on the feedbacks from schools<br>• Government initiatives provide a positive context for development<br>• Good training has enabled teachers, especially in primary schools, to begin to adopt effective pedagogical practice in ICT suites | • Training remains unsatisfactory in its overall effect<br>• Training for teachers has not had as widespread effect on classroom practice as intended<br>• Training materials often failed to excite teachers<br>• Teachers and schools fail to persevere with the training because of lack of time, technical and organisational difficulties<br>• Under- or over-estimating teachers' existing knowledge<br>• Poor match or unrelated training materials to teachers' current work<br>• Lack of good subject-specific ideas and resources<br>• Lack of differentiation in the training programmes to extend the highly competent ICT users and at the same time meet the needs of those teachers with lower levels of confidence<br>• Despite their training, some teachers are no better placed to sustain and develop ICT in their subject teaching |

**Addendum 1.1   International research projects\***

| | | |
|---|---|---|
| **Ofsted - London** | | |
| **Support** | • Peer support and collaboration are crucial to success<br>• Most competent supporting less skilled colleagues and sharing ideas through presentations<br>• Positive shift in ICT away from infrastructure towards its use in the classroom to enhance teaching and learning<br>• Good support ensures that schools focus on how ICT will have a positive effect on teaching and learning across the curriculum<br>• Shift in the ICT support towards the use of ICT in the classroom to enhance teaching and learning | • Poor support from trainers or mentors<br>• Lack of professional support disappoint many teachers<br>• Lack of technical support<br>• Many teachers have found online support to be unsatisfactory<br>• Lack of support from peers and school management<br>• Teachers left to their own devices to use distance learning materials in their own time rarely made little headway and did not complete their training |
| **Motivation** | • Willingness in the teaching profession to embrace ICT has increased<br>• The use of the Internet has affected teachers' perceptions of what they can achieve<br>• Teachers now recognise the potential for ICT to benefit teaching and learning and most are keen to develop their expertise | • Teachers struggle with an unfamiliar technology and are sometimes apprehensive about using it<br>• Motivation has waned in many teachers where they have not obtained appropriate subject advice and guidance<br>• Too many teachers still lack confidence in using ICT<br>• Lack of teacher expertise and confidence<br>• Many teachers feel anxious about their technical knowledge, especially when something goes wrong, this inhibits their ICT teaching<br>• Teachers become frustrated by repeated failure to access their web sites<br>• Many teachers found the expectation to work on training materials outside school hours incompatible with other pressures on their time |
| **Management** | • Senior managers in schools take an active interest in teachers' progress and support them<br>• ICT in some schools is a recognised school priority, where staff are already competent users of ICT | • Disillusionment arising from organisational problems<br>• Lack of realism in whole school ICT planning, for example aiming to do too much within the resources available |
| **Resources** | • Improvements in teaching and learning with ICT are evident in those schools that have been connected to Internet services<br>• Schools have been adapting the materials to meet their own needs<br>• Planned government funding will support the Curriculum Online project by stimulating the market for  materials and will be available to teachers | • Training materials do not sufficiently engage teachers or make them want to explore the application of ICT to their subject<br>• Training materials for specific subjects at secondary level have often failed to excite teachers<br>• Lack of opportunities to try out what they have learned in training, computer rooms are heavily timetabled for ICT lessons<br>• Although web sites and portals are developed for schools that provide access to content and external resources, most connected schools are unaware or make little effective use of it |
| **Professional development** | • Teachers now recognize the potential for ICT to benefit teaching and learning, most are keen to develop their expertise<br>• Strong emphasis is placed on the use of ICT across the curriculum<br>• Newly qualified teachers accept ICT as an integral part of their professional life, as do many of their more experienced colleagues | • ICT is capable of improving the quality of teaching and learning for individuals, even though this is not yet the norm in schools |

**Addendum 1.1    International research projects***

| Ofsted - London | |
|---|---|
| **Recommen-dations** | • Consider how best to match training approaches to the individual learning styles of teachers<br>• Provision of allocated time in which to undertake professional development<br>• Good support ensures that schools focus on how ICT will have a positive effect on teaching and learning across the curriculum<br>• Unsatisfactory training  and training materials need to be improved<br>• Plan for the continuing support for different groups of teachers after the training scheme<br>• Integrate training in the strategic management of ICT into the national training program for senior managers in schools, promote more effectively, through direct communications with schools, the role and value of interactive digital learning materials<br>• Match the best practice in content development by involving more classroom teachers<br>• Work with commercial partners to develop content that exploits the potential of Internet services<br>• Monitor and evaluate more effectively the influence of Internet on teaching and learning<br>• Improve whole-school ICT development planning in order to make the best use of available resources, and so that teachers can reinforce new skills in their teaching<br>• Establish the ICT needs of teachers following training, provide opportunities for them to share classroom experiences<br>• There is a need to promote web sites and portals<br>• Effective technical support is necessary to ensure that teachers are free to concentrate on teaching<br>• Run pilot training courses for principals and deputies on the management and leadership of ICT integration into the curriculum.<br>• Provide a clear corporate vision and strategic plan for ICT which is in line with the specific ICT objectives for education<br>• Embed support for ICT more firmly within the various support functions for school improvement, by providing appropriate professional development for advisers and inspectors<br>• Provide better support for senior managers in school to help them make progress in ICT development planning<br>• Monitor, evaluate and review progress in schools in order to make more informed decisions<br>• Work in partnership with teachers to develop their confidence |

*        Adapted from OFSTED (2002).

**Addendum 1.1    International research projects***

| USA | |
|---|---|
| **Criteria** | **Description** |
| **Year** | • 1999 -2003 |
| **Name of project** | (TICKAT) Teacher Institute for Curriculum Knowledge about Integration of Technology |
| **Aims of project** | • Provide information based on findings for future use<br>• Infusion of educational technology into K-12 curricula<br>• Increase teachers knowledge and proficiency in integrating technology in the classroom<br>• Provide year-long support to teachers who wanted to successfully integrate technology into the curriculum<br>• Identify key characteristics of professional development model<br>• Incorporated a collaborative approach in which teacher participants helped determined aspects of the program |
| **Scope** | • In-service teachers from rural schools<br>• 133 teachers, representing 18 school systems, supported over 250 completed classroom technology integration projects<br>• All subject areas<br>• 60% high school teachers and 40% middle school teachers<br>• Provided assistance through workshops, informal interaction and online instructional activities<br>• Action research |
| **ICT initiatives** | • Provide year-long support to teachers who wanted to successfully integrate technology into the curriculum |
| **Training** | • Offered technology-related learning opportunities in rural schools<br>• Provided community relevant training<br>• Created opportunity for brainstorming<br>• Teachers favored constructive activities |
| **Support** | • Provided support to participants by sustained assistance in classroom application of technology integration knowledge<br>• Create school leadership that cohorts to support other teachers with technology integration<br>• Numerous workshops according to the wishes, needs and availability of teachers were held<br>• Provided online asynchronous web-based conferencing<br>• Giving teachers early feedback and suggestions<br>• Acknowledgement by peers are important<br>• Promoted co-operation<br>• Used online conferencing activities to generate and evaluate content ideas |
| **Motivation** | • Teachers had the opportunity to add to their competence and self-confidence as they met the requirements of professional development<br>• Teachers found it important to praise, commiserate and empathise their experiences<br>• Fostered teacher knowledge, skill, confidence, motivation and beliefs |
| **Management** | • Built leadership cohorts in schools that helped other teachers' technology integration into their classrooms<br>• Strengthened the network between schools and universities |
| **Resources** | • Became equipped with rich technological resources<br>• Opportunities for creating long-term plans for technology integration<br>• Thoughtful integration into teaching and learning promoted increased student learning |

**Addendum 1.1    International research projects***

| USA | |
|---|---|
| **Professional development** | • Identified characteristics to successfully integrate technology goals into teaching practices<br>• Identified a professional development model<br>• Teachers shared their experiences with colleagues and avoided isolation<br>• Teachers continued to teach in-school technology workshops and participated in other activities to promote technology integration into the curriculum<br>• Research helped teachers gain insights into professional development process thereby improving effectiveness of practice in classroom |
| **Lessons learned** | • Avoid including shanghaied teachers. Teachers who were least devoted to developing, teaching and reporting on their technology integration projects were the ones who did not volunteer, but rather coerced to participate. Cannot assume complete willingness to participate on the part of teacher applicants although indicating keen interest in their applications<br>• Teachers need a reasonable technology environment to work in. Makes sure that minimum levels of technology equipment, software and personnel support is available<br>• Technology use must be thought in the teacher's computing environment. Provide instruction and support for teacher projects at the teachers' school setting thereby learning firsthand the technology opportunities and constraints experienced by teachers. On-site contact provided much needed support<br>• Advisable to have an internal as well as an external leader<br>• Makes sure that course requirements are not to demanding, that there is enough time to complete projects and do not add to unmanageable stress levels<br>• Asynchronous web conferencing requires clear structuring of expectations that can give meaning to teachers |

*        Adapted from Ehnman Bonk, Yamagata-Lynch (2005, pp. 251 - 270).

**Addendum 1.1    International research projects\***

| Turkey | |
|---|---|
| **Criteria** | **Description** |
| **Year** | • 2001-2002 |
| **Aims of projects** | • Research on teachers' perspectives, awareness level of specific technologies and the role technology plays in education |
| **Omvang** | • 252 teachers working in basic education schools in Trabzon, Turkey<br>• Schools were randomly selected from the 51 urban schools |
| **ICT initiatives** | • Government funding initiatives to promote the use of information technology in schools<br>• Applying information technology effectively to teaching and learning |
| **Findings:** | |
| **Training** | • Many teachers were not using the computer<br>• Teachers lacked the basic computer literacy upon which to build new technology and skills<br>• Low levels of technical skills<br>• Lack of training or insufficient training opportunities<br>• Training can help improve attitudes towards computing<br>• Numerous teachers indicated they could use the computer put felt that they weren't proficient<br>• Continuous training is necessary so that teachers can keep up-to-date with latest technology |
| **Support** | • No support to teachers who were not computer literate |
| **Teacher perceptions** | • Teachers needed to be encouraged to explore the emerging technologies for teaching<br>• Teacher's beliefs, attitudes and knowledge towards computers and computing skills help to determine the effectiveness of technology integration in education<br>• Increased computer experience diminishes computer anxiety and negative attitudes<br>• It is necessary to determine teachers perceptions as it has an influence on the effective uptake of technology in education |
| **Resources** | • Supplying computers to schools doesn't lead to computer literate teachers<br>• Insufficient resources for teachers to keep current with emerging technologies |
| **Professional development** | • Computer and related technologies had not been a routine part of their educational environment<br>• Self-development activities were limited due to poor computer access |
| **Recommendations** | • Results of study can be used in the educational system of newly developed countries<br>• In order to upgrade their computer skills in-service teachers needed proper training<br>• Schools need sufficient hardware and software<br>• Computer technology should be part of classroom activities<br>• Teachers need to become familiar with computers and apply computer technology to their instruction<br>• Teachers must use Internet to search for relevant material and develop materials for their classes<br>• Conduct study to define National Educational Technology Standards for teachers and develop plans to reach standards |

\*    Adapted from Asan (2003, pp. 153 - 164).

**Addendum 1.1    International research projects***

| Name of project | Country and year | Scope | Methodology /Assumptions | Goal / purpose | Recommendations |
|---|---|---|---|---|---|
| Partnership in Primary Science (PIPS) model | Scotland | **PIPS 1 project:**<br>• Four Scottish education authorities<br>• 16 Teachers from 10 Primary schools<br>• 2 Secondary school teachers<br>• 9 Scientists<br>• 10 Months<br><br>**PIPS 2 project:**<br>• 3 Education authorities<br>• 17 Primary school teachers<br>• 2 Secondary school teachers<br>• 5 Scientists<br>• 5 Months | • TPD has to be of intrinsic value to individual teachers if to influence teaching<br>• Changes in pedagogical content knowledge must start from teachers' perspectives<br>• Teachers must require ownership of the change process<br>• Collaboration and leadership were expected to exist in parallel<br>• Worked on the assumption that TPD is about meeting individual, school, local and government development priorities<br>• Balance between theory and practice<br>• Balance between modelling teaching strategies and the exchange of ideas<br>• Apply relevant research and addresses required standards while providing access to adequate resources<br>• Working with teachers to encourage professional development<br>• Teachers have control over the direction, relevance and content of TPD<br>• Considered risk, readiness, relevance, recognition, reflection and resource | • Provide professional development involving ICT<br>• Fashioning of knowledge in the area of effective use of various ICT in teaching and learning<br>• Development of informed use of ICT tools<br>• Use of collaborative communication technologies<br>• Promotion of online dialogue to support long term profession development<br>• Develop communities of practice to support teachers<br>• Develop reflective community of practice<br>• Provision of scaffold opportunities within a collegial community framework<br>• Encourage teachers to adopt informed positions on pedagogical issues related to the use of ICT in terms of curriculum and assessment<br>• Create opportunities for teachers to acquire skills that enable them to select and use ICT in confident and effective manner<br>• Encourage the development of teacher leaders skills<br>• Encourage personal and professional sharing<br>• Encourage student learning | **Continuing professional development:**<br>• Must be well resourced in terms of people, time and equipment<br>• Allows for reflection on current practices<br>• Promote the notion of ICT for lifelong learning<br>• Builds on knowledge and understanding<br>• Increases pedagogical content knowledge<br>• Relevant to classroom practice<br>• Recognise that teachers have different levels of experience<br>• Develop communities to support different levels of teachers<br>• Online support encouraged reflection and risk taking and should be supported on local and regional level<br>• Risk, readiness, recognition, relevance, resource and reflection are significant factors in teacher development<br>• Teacher behaviour and nature of this behaviour is an important factor<br>• Integration of ICT was determined by the teacher<br>• Contained and sustained opportunities to acquire ICT skills enabled teachers to use ICT in a confident and effective manner<br>• Emphasis on collaboration, social interaction and re-negotiation of ideas<br>• Teachers must be involved in designing, delivering and determining the programme<br>• Curriculum resource development should be in tandem with professional development |

\*          Adapted from Rodrigues (2005, pp. 1 - 95).

| Addendum 1.1 International research projects* | | | | | |
|---|---|---|---|---|---|
| **Name of project** | **Country and year** | **Scope** | **Methodology /Assumptions** | **Goal / purpose** | **Findings** |
| Part of: Education Queensland ICTs for Learning and Annual Census | 2005 Australia - Queensland | • 929 teachers from 38 Queensland state schools<br>• 133 teachers came from low socio-economic band<br>• 268 teachers came from mid-low socio-economic band<br>• 372 teachers came from mid-high socio-economic band<br>• 156 teachers came from high socio-economic band | • Rapid technology change and global communication part of the 21st century<br>• Teachers resist to change familiar practices<br>• ICT integration has had very little impact on teaching and learning<br>• There are interrelated barriers that effect the use of ICT by teachers | • Are ICT integration initiatives making a significant impact on teaching and learning?<br>• Learning with ICT: Measuring ICT use in the curriculum instrument<br>• Investigate teacher perception about their confidence to use ICT<br>• Investigate the factors that currently constrain the use of ICT for teaching and learning<br>• Focus on ICT sustainability, utilisation and transformation<br>• Provide and expand ICT support and access to schools<br>• New technologies will provide teachers with opportunities to transform the way they teach and learn | • Evidence of significant resistance to using ICT to align curriculum with new times and new technologies<br>• Current ICT initiatives hare having uneven and less than the desired result system wide<br>• Only 57% of the teachers indicated reasonable or very confident users of ICT for teaching and learning<br>• Teachers indicate that 56% of their learners in the different year levels currently use ICT<br>• Teachers indicate that only 27% of their learners made use of ICT in the different curriculum areas<br>• 45.5% of females and 33.6% males were unconfident with respect to their use of ICT for teaching and learning<br>• There was an indication that learners from confident teachers use ICT more , than what the learners of the unconfident teachers do<br>• Teacher age and years of experience is not significantly related to teachers confidence in using ICT<br>• Teacher confidence was a major factor in determining teachers' and learners' usage of ICT<br>• Teachers show a resistance to change and to transform the curriculum with ICT<br>• Significant challenge for education system<br>• Factors that afford and constrain teacher confidence in using ICT need to be addressed and resolved before any ICT curriculum initiative will have an impact on teaching and learning |

\*　　Adapted from Jamieson-Proctor, Burnett, Finger and Watson (2006).

**Addendum 1.2**         **ICTs potential in South Africa***

## e-Education

- ♦ Use of ICts to accelerate the achievement of national education goals
- ♦ Connecting learners and teachers to each other and to professional support system
- ♦ Provide platforms for learning
- ♦ Learning activities that meet educational objectives
- ♦ ICTs is a resource for reorganising schooling, and a tool to assist whole-schooling development
- ♦ ICTs can lead to meaningful integration of learners with information, motivational tool and enhance productivity
- ♦ ICTs will enhance interaction
- ♦ Will lead to invention of new ways of using ICTs
- ♦ Use information effectively and keep abreast of technological advances
- ♦ Application of digital literacy as well as information literacy

## e-Schools

- ♦ **Learners who utilise ICTs to enhance learning**
- ♦ **Qualified and competent leaders who use ICTs for planning, management and administration**
- ♦ **Qualified and competent teachers who use ICTs to enhance teaching and learning**
- ♦ **Access to ICT resources that support curriculum delivery and connections to ICT infrastructure**

## e-Learning

Learning and teaching philosophies and methodologies within the context of outcomes-based education, using ICTs in the learning environment

### Learning about ICTs
(exploring what can be done with ICTs)

- ♦ Improve the quality of teaching and learning across the education and training system
- ♦ Teaching will be transformed and learning will be an ongoing, creative process-change in teaching and learning methodology

### Learning with ICTs
(using ICTs to supplement normal processes or resources)

- ♦ Enhance the quality and reach of teaching, reduce the time spent on administrative chores
- ♦ Multimedia applications that require learners to create realistic contexts

### Learning through the use of ICTs
(using ICTs to support new ways of teaching and learning)

- ♦ Extend and enrich educational experiences across the curriculum
- ♦ Support learners to achieve the nationally-stated curriculum goals
- ♦ Use of higher-order thinking skills in order to evaluate, analyse, synthesis and produce arguments, ideas and performance
- ♦ Access for teachers and learners to a variety of learning and support material that promotes diversity, connectivity and a collective identity across the institutions

\*      Adapted from DoE (2004, pp. 14 - 19).

**Addendum 1.3          National policy framework***

**Policy Framework
Use of ICTs in
teaching and learning**

| **Equity** | **Access to ICT infrastructure** | **Capacity building** | **Norms and standards** |
|---|---|---|---|
| ♦ Allocation of additional resources<br>♦ Equal access and competence<br>♦ Develop technology baseline | ♦ Regular access to reliable infrastructure | ♦ Integral to teaching and learning<br>♦ Supports outcomes-based education<br>♦ Teachers rethink and reshape engagement with curriculum<br>♦ Develop programme to address competencies of teachers to use ICT<br>♦ Ongoing staff development and support | ♦ National norms and standards for educational ICTs<br>♦ Educational soundness standards for content<br>♦ Inter-operability of content standards<br>♦ Rights management norms<br>♦ Flexibility towards certain elements<br>♦ Enhance development and growth of the relevant existing legislation and regulation |

♦ Four key elements underpin the use of ICTs
♦ Allows creativity, problem-solving and innovation
♦ Encourages full engagement and participation  within an outcomes-based approach
♦ Dependant on policy reform

*          Adapted from DoE  (2004, pp. 22 - 24).

**Addendum 1.4**          **Rationale for ICT implementation\***

# Rationale for ICT implementation

| ICT professional development | Electronic content resource development and distribution | Access to ICT infrastructure | Connectivity | Research and development |
|---|---|---|---|---|
| Do teachers have the knowledge, skills and support they need to integrate ICTs in teaching and learning? | Is the curriculum supported through effective, engaging and sustained software, electronic content and online resources?<br><br>Do teachers contribute effectively to these resources? | Does every teacher have access to ICT infrastructure? | Does every teacher have access to an educational network and the Internet? | Are current practices continuously being assessed?<br><br>When exploring and experimenting reliable new technologies, methodologies and techniques are teachers being supported? |
| • ICTs must be integrated into pre-service and in-service training<br>• Must take place within an outcomes-based paradigm<br>• Training and support will be given<br>• ICT is a tool for improved educational performance<br>• Be part of whole-school evaluation system<br>• Teachers will be given opportunity to share good practices | • Enhance innovative, effective and sustainable e-Learning resources<br>• Resources in digital form will be accessible to all learners and teachers<br>• Content aligned with outcomes-based education<br>• Development of national educational portal | • Anticipated educational needs and objectives<br>• Establish desired level of technology resources<br>• Assess existing equipment and facilities | • Development of a national education network<br>• Universal access | • Evaluate and develop leading-edge applications for learning<br>• Research must be linked to practice<br>• Support the implementation of e-Learning approaches throughout the education system |

\*          Adapted from DoE (2004, pp. 25 - 33).

# Implementation Strategies

◆ **System-wide approach**
- ICT initiatives are being implemented across the country -have not reached every institution and district
- e-Learning should be the mainstream activity of every institution and classroom
- Maximise the benefits of e-Learing
- Embed e-Learning that will benefit all learners and teachers across the education system
- Multi-pronged strategy for the gradual integration of ICTs at all levels of the education and training system

◆ **Co-ordination and collaboration**
- Institutions are supported to meet the needs and interests of learners and communities
- e-Education policy provides a strategic framework to implement e-Education
- Annual reports will track and monitor progress and compare improvements in educational outcomes
- Implementation of the e-Educationpolicy will be monitored and managed and foster inter-governmental collaboration
- Development, implementation and monitoring of targets are crucial

◆ **Monitoring and evaluation**
- Regular reviews and periodic evaluations
- Success will be measured against nationally agreed indicators and targets
- Education and training institution will report data on e-School technology assessment readiness and targets (e-Start)
- Information will be aggregated at district, provincial and national levels

◆ **Planning cycles**
- Every learner in the general and further education and training bands will be ICT capable by 2013

**Phase 1: 2004 / 07**
- Build an education and training system to support ICT integration in teaching and learning
- Build teachers' and managers' confidence in the use of ICTs
- Build a framework for competencies for teacher development in the integration of ICTs into the curriculum
- Establish an ICt presence in institutions
- Institutions are using education content of high quality
- Institutions are connected, access the internet and communicate electronically
- Communities support ICT facilities

**Phase 2: 2007 / 10**
- System-wide integration of ICTs into teaching and learning

**Phase 3: 2010 / 13**
- ICTs integrated at all levels of the education system - management, teaching, learning and administration

.

**Addendum 1.6    National implementation projects** *

| Project Name | Source of Funding/Partnerships | Target Group | Goals and Project Description |
|---|---|---|---|
| GautengOnline | Gauteng Provincial Department of Education | Public schools in Gauteng | GautengOnline aims to issue each school with a 25-workstation computer laboratory, Internet and e-mail to be used for curriculum delivery to:<br>• build a province-wide schools' computer network<br>• create a strong local IT industry that has the capacity for IT development and innovation<br>• enhance the efficacy of government for improved service delivery<br>• position Gauteng at the cutting edge of change through technological innovation<br>• bridge the digital divide (GautengOnline, 2003). |
| Intel Teach to the Future (Intel® Teach Project) | Global Intel® Innovation in Education initiative SchoolNet SA as a local partner Intel® Teach is an official professional development programme of the South African Council for Educators | Educators across South Africa Training is funded either by the Provincial Education Department or by the school | The Intel® Teach Project is an extensive training programme for educators to use ICTs in the classroom that aims to:<br>• enable educators to use ICT in their teaching<br>• engage learners to use ICT to conduct research, compile information, and communicate with others.<br>SchoolNet SA adapted the international version of the curriculum for local interpretations (Intel Education, 2003). |
| Khanya Project | Western Cape Provincial Education Department | Public schools in the Western Cape | The Khanya Projects aims to:<br>• empower every educator in every school of the Western Cape to use appropriate and available technology to deliver curriculum to every learner in the province by 2012<br>• (progressively) eradicate the digital divide by starting with the poorest of the poor schools<br>• strive towards racial and gender equity (Khanya, 2001). |
| Meraka Institute | Derives its mandate as a national strategic initiative from President Mbeki's 2002 State of the Nation Address Private and public funding | Various projects:<br>Digital Doorway<br>Wireless Africa<br>ICT in Education<br>Open Source Centre | The objective of the Meraka Institute is to:<br>• facilitate national economic and social development through human capital development and needs-based research and innovation<br>• lead to products and services based on ICTs. |

**Addendum 1.6   National implementation projects** *

| Project Name | Source of Funding/Partnerships | Target Group | Goals and Project Description |
|---|---|---|---|
| Microsoft Partners in Learning Project | The international section of the Microsoft Partners in Learning programme SchoolNet SA as a local partner | Educators, learners, managers of schools across South Africa | The Microsoft Partners in Learning aims to: <br>• empower schools to significantly raise the level of ICT literacy of educators <br>• support educators and schools to develop a culture of digital innovation <br>• work with schools to prepare learners for the digital work place (Microsoft, 2007). |
| New Partnership for Africa's Development: NePAD eSchools Initiative | Commonwealth of Learning (COL) e-Africa Commission (eAC) Information for Development Program (infoDEV) World Bank SchoolNet Africa | Multi-country, multi-stakeholder Six schools in sixteen African countries | The first phase of the NePAD e-Schools Demonstration Initiative aims to demonstrate: <br>• the scenarios and requirements in Africa <br>• the challenges of large-scale implementation of e-schools programmes <br>• the effectiveness of a multi-country, multi-stakeholder partnerships <br>• 'best practice' models for large-scale implementations <br>• the costs, benefits and challenges of using ICTs in African schools <br>• the gains and challenges of a satellite-based network (Farrell, 2006). |
| SchoolNet SA Project | Collaborates amongst others with NGOs, donors, the private sector, on-the-ground educators, World Bank, Open Society Foundation, Thintana Consortium, Nortel Networks, Telkom, Oracle, Departments of Education, Communication, Trade and Industry, and Arts, Culture, Science and Technology, etc. | Educators and learners that use ICTs in education across South Africa | SchoolNet SA aims to stimulate ICTs in education and support the educational system via: <br>• connectivity and technology <br>• human development <br>• online content and material in function of the curriculum <br>• marketing and promotion. <br>These include support services such as: <br>• low-cost e-mail services for all schools <br>• domain registration for each school <br>• web site hosting for each school <br>• mailing lists on a variety of topics <br>• curriculum advice and technical services to schools <br>• seminars, conferences and training for educators (SchoolNet SA, 2007). |

**Addendum 1.6    National implementation projects** *

| Project Name | Source of Funding/Partnerships | Target Group | Goals and Project Description |
|---|---|---|---|
| SCOPE Project | Department of Education in conjunction with the Finnish Co-operation Programme in the Education Sector | Historically disadvantaged and rural schools across South Africa | The SCOPE project (1999-2003) aimed to:<br>• install twenty-one computer networks and dialup Internet connections in hundred schools<br>• develop educators for the effective educational use of ICT facilities through mentor-supported distance learning<br>• provide appropriate technical training onsite<br>• provide telephonic technical support to the schools<br>• monitor and evaluate the qualitative and quantitative impact of the project (SCOPE, 2003). |
| Telkom 1000 Schools Project | Telkom Foundation Corporate in partnership with SchoolNet | Equal number of schools from each province across South Africa | The Telkom Foundation aimed to:<br>• supply one thousand schools with Internet access points<br>• create hundred Super-Centres for introducing computers to schools<br>• train educators and learners to use ICT (Telkom, 2007). |
| The Thutong Educational Portal (2004) | | South African learners, educators and education managers and administrators | Provides access to:<br>• Curriculum and learner support material<br>• Educator professional development resources<br>• Administration and management resources and tools<br>• Education policy documents<br>• News and information related to current developments in South African education<br>• Online community (Thutong Educational Portal, 2004) |

\*        Adapted from Blignaut and Howie (2007, pp. 10 - 12).

## Addendum 2.1    Management and leadership models*

| **Formal model** | | |
|---|---|---|
| • System consisting out of different departments that are linked<br>• Official structure indicating authorised pattern of relationship among members<br>• Hierarchical structure representing a means of control for leaders over staff<br>• Principals must develop appropriate mission and goals – goal oriented<br>• Principals authority and power stem from their official position , pursue specific objectives (goal developer)<br>• Principals must lead teachers to achieve goals, implement plans and programmes, and meet standards (goal leader)<br>• Managerial decision-making is a rational, objective, detached and intellectual process<br>• Principals are accountable for actions and decisions | **Leadership - principal**<br><br>• Sets the tone of the school and establishes the major official objectives<br>• Assess problems, consider alternatives and make rational choices<br>• Plays a key role in policy-making and **adoption of innovations**<br>• Focal point for external communication<br>• Represents and symbolises the school to people inside and community members | **Managerial leadership**<br><br>• Managing existing activities successfully<br>• Decision process crucial<br>• Develop and implement a cyclical process involving seven managerial functions:<br>❖ goal-setting    ❖ planning<br>❖ needs identification  ❖ budgeting<br>❖ priority-setting   ❖ implementing<br>❖ strategy and vision  ❖ evaluating |

| **Structural models** | **Systems models** | **Bureaucratic models** | **Rational models** | **Hierarchical models** |
|---|---|---|---|---|
| • Formal pattern of relationships between people in the school<br>• Expresses the ways in which individuals relate to each other to achieve objectives<br>• Structures are powerful influences on the nature and direction of development within the school<br>• **Normative mode:**<br>1. Monitoring and maintenance of values within the system<br>2. Involve appraisal or judgement<br>• **Operational mode:**<br>Carrying out of practical tasks at different levels within the system<br>• Allocation of recourses, responsibilities and tasks | • Emphasise the unity, coherence and integrity of the organisation<br>• Focus on the interaction between its component parts and the external environment<br>• School is a meaningful entity<br>• Policies are developed and effectiveness assessed in pursuit of objectives<br>• Boundary is an essential element distinguishing the school and its members from the external environment<br>• **Closed systems:**<br>Minimise transaction with environment and take little account of external opinion<br>• **Open systems:**<br>Encourages interchanges with the environment, responding to external influences and seeking external support | • Hierarchical authority structure – teachers accountable to principal<br>• Goal orientated – goals mainly determined by principal and endorsed by teachers<br>• Division of labour – teachers specialising in particular tasks on the basis of expertise (subject specialists)<br>• Decisions and behaviour are governed by rules and regulations<br>• Teachers required to make an appointment to see principal<br>• Recruitment and career progress of teachers determined on merit – formal procedures for the appointment of new or promoted teacher posts<br>• Principals are accountable<br>• Applies especially to educational institutions | • Emphasise managerial processes<br>• Focus on the process of decision-making<br>❖ Aims and priorities - allocating recourses<br>❖ Long-term planning<br>❖ Evaluating alternatives<br>❖ Zero-based budgeting - taking fresh look at the areas of expenditure<br>❖ Selecting the most appropriate options linked to school objectives | • Emphasis on vertical relationships within the school<br>• Principals are accountable to governing bodies and department of education<br>• Vertical communication – information passed down the hierarchy to appropriate levels and decisions made by management are expected to be implemented<br>• Issues are referred upwards they can be resolved<br>• Horisontal communication is used for co-ordination rather than management<br>• Gets used to delegate tasks |

**Limitations:**
- Difficult to ascertain the goals of schools
- Objectives may have little operational relevance as they can be vague and general
- Focus on school as an entity and ignore or underestimate the contributions of individuals
- Validity of formal models may be limited during rapid and multiple change

- Decision-making as a rational process is questionable as most decisions are made according to experience and much human behaviour is irrational
- In top down decision-making authority of expertise may come into conflict with positional expertise
- The assumptions of stability in schools are unrealistic and invalid

| Collegial (collaborative) model | | | | |
|---|---|---|---|---|
| • Theories that emphasise that power and decision-making should be shared among the members of the school<br>• Highly normative and idealistic<br>• Decisions are made and policies are determined through a process of discussion that leads to consensus<br>• Members have a shared understanding about the aims of the school<br>• Teachers conferring and collaborating with other teachers<br>• **Restricted collegiality:** Principal shares power with a limited number of senior colleagues<br>• **Pure collegiality:** All members have an equal voice in determining policy<br>• Teachers possess authority of expertise arising from their knowledge and skills – autonomy in class, collaborate to ensure coherent approach to teaching and learning<br>• Common set of values held by members – jointly set of beliefs and values, shared vision<br>• Size of decision-making groups are small to enable everyone to be heard – democratic element of formal representations within the various decision-making bodies<br>• Power is shared with teachers and decisions are reached by consensus – consensual decision-making rests partly on the ethical dimension of collegiality<br>• **Collective support from teachers is needed to implement any worthwhile change**, involvement in decision-making process is vital | **Leadership - principles**<br><br>• Responsive to needs and wishes of colleagues<br>• Acknowledge expertise and skills of teachers and use to benefit learners<br>• Create formal and informal opportunities for testing and elaboration of policy initiatives<br>• Encourages innovation<br>• Maximises the acceptability of school decisions<br>• Promotes and nurtures a culture of shared values<br>• Emphasises the authority of expertise<br>• Facilitator of participative process<br>• Authority distribution | **Transformational leadership**<br><br>• Gain higher level of commitment from teachers resulting in extra effort and greater productivity<br>• Normative approach focusing on the process by which leaders seek to influence school outcomes<br>• Shared values and common interests<br>• Emphasise goals and vision<br>• Offers individual support and intellectual stimulation<br>• Conditions support and sustain performance<br>• High performance expectations<br>• Fosters culture-building<br>• Participation in decision-making<br>• Collaborative processes<br>• Promote effective communication<br>• Build professional learning communities | **Participative leadership**<br>• Collective decision-making<br>• Participation increases school effectiveness<br>• Participation is justified by democratic principles<br>• Delegating responsibility<br>• Eases burden on principals<br>• Collaborative or collegial<br>• Increases teamwork and commitment of teachers<br>• Leader remains accountable for decisions | **Interpersonal leadership**<br>• Key component of any leadership model<br>• Authentic range of intuitive behaviours derived from self-awareness, facilitating effective engagement with others<br>• Collaboration and interpersonal relationships are important<br>• Require high level of personal and interpersonal skills<br>• Develop a conducive environment for learning and teamwork |

**Limitations:**

| | | |
|---|---|---|
| • Can be so strongly normative they tend to obscure rather than portray reality<br>• Participative aspects of decision-making exist alongside the structural and bureaucratic components of school can cause tension | • Decision-making tend to be slow and cumbersome –requires patience and considerable investment in time<br>• Approach difficult to sustain as principal remains accountable for actions and decisions | • Decisions are reached by consensus but there are no guarantee of unanimity on outcomes<br>• Effectiveness depends on the attitudes and support of teachers<br>• Effectiveness depends on the attitude of principal who has the **legal authority to manage school** |

| Political model |
|---|

| | Leadership - principles |
|---|---|
| • Policies and decisions emerge through process of negotiation and bargaining<br>• Descriptive and analytical<br>• Interest groups develop and form alliances in pursuit of particular policy objectives<br>• Conflict is viewed as natural phenomenon<br>• Power is the medium through which conflicts of interest are resolved<br>    1. Positional power: hold an official position<br>    2. Authority of expertise: possess appropriate expertise<br>    3. Personal power: possess verbal skills or certain characteristics<br>    4. Control or rewards: have the control or influence the allocation of certain benefits<br>    5. Coercive power: enforce compliance with request or requirement<br>    6. Control of resources: allocation of resources<br>• **Principals possess substantial resources of authority and influence, have the capacity to determine many institutional decisions and affect the behaviour of colleagues – but do not have absolute power (other leaders and teachers also have power)**<br>• Authority is legitimate power which is invested in leaders within formal organisation<br>• Influence is the ability to affect outcomes and depends on personal characteristics and expertise<br>• Described as "micropolitics": the interaction and political ideologies of social systems of teachers<br>• National and local politics influence the context in which schools operate<br>• Focus on interaction of group activity rather than institution as a whole<br>• Formal groups:<br>Created to fulfil specific goals and tasks linked to the school's overall mission. Groups can be permanent (senior management) or temporary (working parties)<br>• Informal groups:<br>Exist to meet teachers' need for affiliation. Have their own leader and certain norms underpin group behaviour<br>• Individuals that form a group have a variety of interests which they pursue within the organization<br>• Professional interests:<br>Commitment for example to a particular curriculum, syllabus or teaching method and become part of the micro-political process<br>• Personal interest:<br>Focuses for example on status, promotion and working conditions<br>• Individuals in the group usually have the same values and believes, sharing common concerns<br>• As interest groups pursue their independent objectives having different aims and objectives than the other groups can generate conflict<br>• The goals of the organisation are unstable, ambiguous and contested. As the organisational goals are set through the negotiations among the members – different members and groups have different objectives and resources | • Key participant in the bargaining and negotiation process<br>• Have their own values, interests and policy objectives<br>• Have substantial reserves of power which may be used in support of achieving goals<br>• Significant impact on the nature of the internal decision-making process and have a controlling influence<br>• Uses communication skills to sustain the viability of the organisation<br>• Are mediators who attempt to build coalitions in support of policies<br>• Realists, clarify what they want and what they can get<br>• Assess the distribution of power and interests<br>• Build relationships and networks<br>• Uses persuasion, negotiation and lastly coercion |
| | **Transactional leadership**<br>• Relationships with teachers based on the process of exchange<br>• To the teacher the interactions is short-lived and limited to the exchange transaction<br>• Make use of rewards and inducements<br>• Have no wider impact on behaviour of teachers or school outcomes |

**Limitations:**
• Does not engage teachers beyond the immediate gains arising from the transaction
• Does not result in long-term commitment to the values and vision being promoted by principals
• Focuses on policy formulation and pays little attention to the implementation of policy
• Underestimates the significance of both rational and collaborative processes

• Relies heavily on power, conflict and manipulation neglects other standard aspects of an organisation
• Stresses the influence of interest groups on decision-making giving little attention to the institutional level

## Subjective model

| | |
|---|---|
| • Focuses on the individuals and their perceptions in the organisation rather than the total institution or its subunits<br>• Organisations are complex units that reflect the individuals subjective and selective perceptions derived from their values, believes, experience and background<br>• Organisations are social constructions as they emerge from the interaction of their participants<br>• Organisations have different meanings for each of their members and exist only in the experience of those members<br>• Conflict is regarded as the product of competing values<br>• Structure is not fixed or predetermined it is a product of human interaction<br>• Organisations are the products of action and its cause<br>• Social realities are constantly created and shaped because of the variable nature of human behaviour<br>• Deny the existence of organisational goals and emphasise the significance of individual purposes<br>• No organisation objectives only individual objectives | **Leadership - principles**<br>• Have own values, beliefs and goals<br>• Pursue own interest<br>• May impose their interpretations of events on other members of the institution<br>• Personal qualities of individuals more important than their official position<br>• Leadership is the product of personal qualities and skills not an automatic outcome of official authority<br><br>**Post-modern leadership**<br>• Recent model no generally agreed definition<br>• Leaders should respect , and give attention to, the diverse and individual perspectives<br>• Avoid reliance on the hierarchy, power is distributed<br>• Multiple visions and diverse cultural meanings |
| **Limitations:**<br>• Strongly normative, reflect attitudes and believes of their supporters<br>• No clear indication of the nature of the organisation –only people can have goals, no organisational goals or objectives<br>• Leaders only need to acknowledge the individual meanings placed on events by members | • Provide few guidelines for managerial action<br>• Meanings are so individual that there may be as many interpretations as people<br>• Fail to explain the similarities between schools |

## Ambiguity model

| | |
|---|---|
| • All the models that stress uncertainty and unpredictability in organisations<br>• Emphasis on instability and complexity of institutional life<br>• No clarity over objectives of institution and processes not understood<br>• Participation of members takes place according to the nature of the topic and the interest of potential participants<br>• Decision-making occurs within formal and informal settings where participation is fluid (members move in and out of decision-making opportunities)<br>• Lack clarity about the goals of the organisation. Inconsistent, vague and opaque objectives<br>• **Problematic technology in that the processes are not properly understood (basic technology available in schools is not understood because its purpose is only vaguely understood)**<br>• **As the related technology is so unclear the processes of teaching and learning are clouded in ambiguity**<br>• Organisations are characterised by fragmentation and loose coupling( lacks "glue" that holds everything together)<br>• Organisational structure is regarded as problematic. Uncertainties about authority and responsibility of individual leaders. More complex the structure of the organisation the greater potential for ambiguity<br>• Tend to be ideal for professional client-serving organisations. Teachers are expected to be responsive to the needs of the learners rather than operating according with managerial prescriptions leads to climate of ambiguity<br>• Uncertainty arising from external context (parents) adds to ambiguity of the decision-making process – environmental turbulence | **Leadership - principles**<br>• Ambiguity of purpose – no clear goals Ambiguity of power – leaders are participants<br>• Ambiguity of experience – outcomes depend on other factors as the behaviour of the leader<br>• Ambiguity of success – difficult to measure achievements of leaders<br>• Above ambiguities makes it difficult to distinguish between success and failure<br><br>**Contingent leadership**<br>• Alternative approach<br>• Acknowledge diverse nature of school context<br>• Leaders adapt their style to the diverse and unique nature of the school context |

| Ambiguity model | |
|---|---|
| • Unplanned decisions, no logical solution to problems- decisions have no clear focus <br> • Stress the advantages of decentralisation –difficult to sustain, leaders are responsible for all aspects of the institution | • Represent a mode of responsiveness <br> • Requires effective diagnosis <br> • Pragmatic, no overt sense of the 'big picture' |
| **Limitations:** <br> • Analytic or descriptive approaches <br> • Difficult to reconcile with the customary structures and processes of school <br> • Offer little practical guidance to leaders in educational institutions | • Mirror reality, organisation does not operate as anarchies <br> • Exaggerate the degree of uncertainty in educational institutions <br> • Less appropriate for stable organisations |

| Cultural model | |
|---|---|
| • Beliefs, values and ideology are at the heart of the organisation <br> • Individuals ideas, beliefs and value-preferences influence how they behave and view the behaviour of others <br> • Norms become shared traditions and communicated within the group, reinforced by symbols and ritual <br> • Symbols are a key component of the culture of all schools and central to the process of constructing meaning <br> • Culture defines the unique qualities of individual organisations <br> • Empowerment of leaders and their acceptance of responsibility <br>    ❖ Conceptually or verbally: use of language and expression of aims <br>    ❖ Behaviourally: ceremonies, rules, support mechanisms and social interaction <br>    ❖ Visually or materially: uniforms, mottoes, memorabilia and crests <br> • Assumes the existence of heroes and heroines who embody the values and beliefs of the organisation <br> • Each school has its own distinctive culture, dependent on the mix of values, beliefs and norms prevalent in organisation <br> • Culture of a school is usually expressed through its goals <br> • Core values help to determine the vision of the school <br> • Vision is expressed in a mission statement which in turn leads to specific goals <br> • Two distinct features of structures. Individual roles are established according to recommended patterns of relationship and there is structure of committees and other bodies | **Leadership – principles** <br> • Responsible for generating and sustaining culture and communicating core values and belies within the organisation and to external stakeholders <br> • Leaders have own values and beliefs arising from experience <br><br> **Moral leadership** <br> • Critical focus on the values, morals, beliefs and ethics of leaders themselves <br> • Authority and influence is derived from what is right and good <br> • Develop commitment of followers <br> • Leaders expected to behave with integrity <br> • Goals are underpinned by explicit values <br> • Based on normative rationality <br> • Moral imperative that principals face is the transformation of the institution into a learning community |
| **Limitations:** <br> • May lead to ethical dilemmas, regarded as the imposition of a culture by other leaders or members of the organisation <br> • Focussing on symbols as rituals and ceremonies may lead to other elements of the organisation being underestimated <br> • May lead to dissonance | • May be unduly mechanistic, assuming that leaders can determine the culture of the organisation <br> • Symbols my misrepresent the reality of the school <br> • Difficulties when teachers do not support the values of the leader |

\*     Adapted from Bush (2003, pp. 37 - 175, 186 - 189).

**Addendum 2.2** **Leadership styles***

| Leadership styles | | | | | |
|---|---|---|---|---|---|
| **Strategic leadership** | **Instructional leadership** | **Invitational leadership** | **Ethical leadership** | **Learning-centred leadership** | **Political leadership** |
| • Focuses on school improvement and effectiveness<br>• Driving force is to understand, interpret and act on change<br>• Is concerned with direction-setting, planning, broad dimensions of the organisation and use medium- to long term time framework<br>• Translate purpose into vision, strategy into action<br>• Align people and organisation to strategy<br>• Determine effective intervention points<br>• Develop strategic capabilities and approaches<br>• Change process the mindset and values will also change | • Focus on the direction of leadership<br>• Teaching and learning is the prime purpose<br>• Underestimates the other important purposes of education<br>• De-emphasises less academic aspects<br>• Focuses on the "what" rather than the "how" in that respect it is limited and partial | • Focuses on the educator's actions, understandings<br>• Appreciates individuals' uniqueness and potential<br>• Encourage, sustain and extend the contexts in which imaginative acts of hope thrive<br>• Foundations form the base and support for ongoing practices, programmes and policies<br>• Assumptions form what people are like and how they are to be treated<br>• Educating in democratic society based participation<br>• Inviting messages that tell people they are valuable, able, and responsible and can behave accordingly<br>• Messages are communicated through, people, places, policies, programmes and processes | • Takes into account the human dimension<br>• Respect the rights of others – civic dimension<br>• Educators have specific responsibilities- academic dimension<br>• Teaching and learning must be of high level- academic dimension<br>• Leadership dimension- affecting the core work of teaching and learning<br>• Three foundational virtues for leadership: responsibility, authenticity and being present<br>• Virtues are applied to five dimensions | • Focuses on development<br>• Desire and responsibility to improve quality of teaching and learning<br>• Influence teachers to have effect on students learning<br>• Involves developing and supporting colleagues growth as teachers<br>• Leadership is an enabling process | • Requires familiarity with the strategies and tactics of power and conflict<br>• Map political terrain<br>• Make use of formal and informal power<br>• An clear agenda is required<br>• Move when the time is right<br>• Use information as ammunition<br>• Use structure as political asset<br>• Befriend opponents<br>• Create arenas to air and solve problems<br>• What is right is often relative |

| Leadership styles | | | | |
|---|---|---|---|---|
| **Entrepreneurial leadership** | **Distributed leadership** | **Emotional leadership** | **Poetic leadership** | **Constructivist leadership** |
| • Manages and organises with initiative and risk<br>• Leadership attributes are descriptive<br>• Focus on financial management<br>• Communication skills are important<br>• Motivate themselves and others<br>• Have a vision<br>• Does what ever it takes to transform idea into reality<br>• Business is operated and grown from the concrete manifestation of their unique idea<br>• Tolerance for risk<br>• Desire for control<br>• Staff have incentives to act more pragmatically<br>• Control system rely additionally on plans and forecasts<br>• Communication takes place regardless of formal channels<br>• Creativity throughout the organisation is encouraged<br>• Organisational culture fosters innovation | • Multiple sources of guidance and direction<br>• Following the contours of expertise in an organisation, made coherent through a common culture<br>• Focuses on how leadership practice is distributed among formal and informal leaders<br>• Engaging many people in leadership activity<br>• Additive: is concerned with the dispersal of tasks among participants within an organisation<br>• Holistic: Interdependence of those providing leadership<br>• Primarily a way of analysing leadership activity in schools<br>• Analytical tool that implies wider decision-making, increased commitment to organisational goals and strategies<br>• Diminishes teacher alienation<br>• Collaboration and collegiality have positive effects on upon teachers' self-efficacy and levels of moral<br>• Encourages the introduction of reform<br>• Results in positive effects on pedagogy, school culture and educational quality | • Leadership is inherently and inescapably emotional<br>• Leadership begins and ends with the self<br>• Interactions are affected by emotional experience of identity | • Symbols are important<br>• Revisit and renew historical roots<br>• Convey cultural values and beliefs<br>• Convene and encourage rituals<br>• Celebrate key events<br>• Use of picture words and telling of stories<br>• Use of people that set example | • Reciprocal, purposeful learning and action in community<br>• **Reciprocal:** being invested in and responsible for the learning of others to assume similar responsibility for your own learning<br>• **Purpose:** sharing a vision, set of beliefs and goals about teaching and learning<br>• **Learning:** constructing meaning and knowledge through dialogue, reflection, inquiry and action<br>• **Community:** Composed of a group of people who share common goals, aspirations for the future and care about each other<br>• Leaders create conditions for mutual trust, respect and shared work<br>• Learning, teaching and leading are intricately intertwined |

\*    Adated from Beatty (2005, pp. 122 - 123); Davies and Davies (2005, pp. 10 - 28); Deal (2005, pp. 113 - 119); Everard, Norris and Wison (2004, pp. 21 - 22); Harris (2005, pp. 165 - 169); Hentsche and Galdwell (2005, pp. 145 - 156); Lambert (2005, pp. 95 - 98); Leithwood and Jantzi (2005, pp. 38 - 39); Novak (2005, pp. 44 - 46); Southworth (2005, pp. 75 - 77, 88 - 89); Starratt (2005, pp. 61 - 72).

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

## Principals' influences on Teacher Professional Development
## for the integration of Information Communication
## and Technologies in schools

2008

Dear Participant

I would like to thank you for participating in an in-depth interview on the principals' influences through TPD for the integration of ICT.  The data gained from the interviews became a crucial and valuable component of my research.

As your participation in this research project is voluntary and confidential no information will be revealed that will allow your identity to be established.

The results from this study will be used to identify the influence that principal's have on teacher's integration of ICTs in their teaching and learning practices as part of their professional development. By identifying the influences, strategies may be developed that will aid principals to integrate and sustain effective ICT through TPD in their schools.

Hereby you are asked to review the transcribed interview to check for accuracy of presentation and sign this form as confirmation.

Under no circumstances will the identity of interview participants be made known to any parties/organisations that may be involved in the research process and/or which has some form of power over the participants.


Participant's signature............................ : Date: ...........................................................


Researcher's signature........................... : Date: ...........................................................


Yours Sincerely
M.P. van Niekerk

# Principals' influences on Teacher Professional Development
## for the integration of Information Communication
## and Technologies in schools

April - August 2007

Dear Participant

You are invited to participate in a research project aimed at determining the influence that principals have on teacher professional development as indicator for the integration of ICT in schools. The information obtained from this study will help to assess whether teachers use ICT in their teaching and learning in order to empower them for the 21$^{st}$ Century in a South African context.

As the principal's influence from various schools are multidimensional, is it necessary to identify the barriers and enablers in each domain of the teaching environment which will determine the integration of ICT by teachers and the level of teacher development. Your participation in this research project is voluntary and confidential. You will not be asked to reveal any information that will allow your identity to be established, unless you are willing to be contacted for individual follow up interviews. Should you declare yourself willing to participate in an individual interview, confidentiality will be guaranteed and you may decide to withdraw at any stage should you wish not to continue with an interview.

The results from this study will be used to identify barriers and enablers that principal's experience in the integration of ICT by teachers as part of their professional development. By identifying the barriers and enablers, strategies may be developed that will lead to the sustainability of effective use of ICT by teachers in schools.

If you are willing to participate in this study, please sign this letter as a declaration of your consent, i.e. that you participate in this project willingly and that you understand that you may withdraw from the research project at any time. Participation in this phase of the project does not obligate you to participate in follow up individual interviews, however, should you decide to participate in follow-up interviews your participation is still voluntary and you may withdraw at any time.

Under no circumstances will the identity of interview participants be made known to any parties/organisations that may be involved in the research process and/or which has some form of power over the participants.


Participant's signature............................ : Date: .............................................................

Researcher's signature ........................... : Date: .............................................................


Yours Sincerely
M.P. van Niekerk

**Ethics clearance document**