



Chapter 5: Conclusions and recommendations

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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
<ul style="list-style-type: none"> • Assess current situation: <ul style="list-style-type: none"> ○ Satisfied ○ Dissatisfied 	<ul style="list-style-type: none"> • Establish mission and vision • Planning TPD activities and ICT resources: <ul style="list-style-type: none"> ○ In-house training ○ Strategies ○ ICT budget • Potential of ICT: <ul style="list-style-type: none"> ○ Convenience ○ Resources ○ New experience ○ Enhance teaching and learning • Importance of computer literacy when employing teachers • Prioritisation of ICT 	<ul style="list-style-type: none"> • Initiate projects • Creativity in generating sufficient funding 	<ul style="list-style-type: none"> • Establish an ICT-operational system: <ul style="list-style-type: none"> ○ Internet WAN ○ Networked LAN • 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
<ul style="list-style-type: none"> • TPD activities • TPD support • Continuous support • TPD for teacher's individual needs • TPD creates opportunity for collaboration • In-house TPD • TPD activities are delegated • TPD in ICT • Allocation of time for TPD • Sufficient TPD funding 	<ul style="list-style-type: none"> • ICT support • ICT sustainability • ICT exposure • ICT potential • Delegate responsibility of ICT • ICT integration in teaching and learning 	<ul style="list-style-type: none"> • Collaboration • Mentoring • Inspired and motivated • Culture for teaching and learning • Attitude towards ICT • Community of practice • Appraisal and incentives • 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).

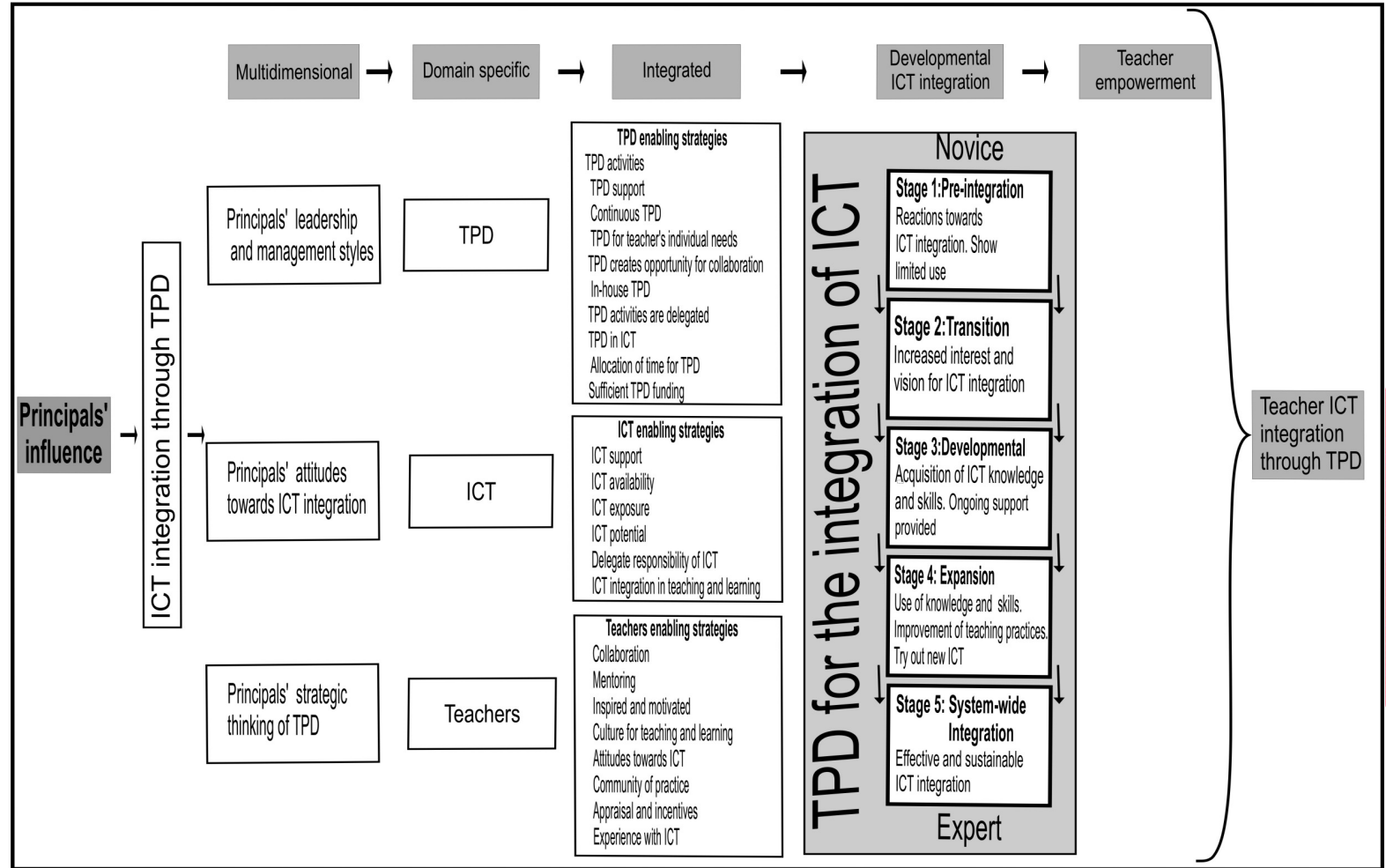
Although literature holds the view that teachers are simultaneously the subject of change, as well as the change agent, principals constitute the crucial component for successful and sustained ICT integration. TPD is a tool that creates opportunity for growth and learning, helping teachers to adapt to 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 itself 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 (§ 4.2.2 and § 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 five 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 researchers 'strive' for neutrality and objectivity, we can never attain 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 21st 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 21st 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.

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 21st 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 21st 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?

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