KNOWLEDGE AND SKILLS TRANSFER FROM A POSTGRADUATE COURSE IN COMPUTER-BASED EDUCATION TO TEACHING PRACTICE

by

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DECLARATION

I, Bella P Vilakazi, declare that the work depicted in this mini-dissertation is original (except where citations and acknowledgements indicate otherwise). No part of this work has been, or will be, submitted in any form as part of another degree at this, or any other University.

NOVEMBER 2006

DEDICATION

This mini-dissertation is dedicated to my husband

BHEKI VILAKAZI

My deepest gratitude goes to my husband, Bheki, for his patience and understanding throughout the writing of this dissertation.

Bheki, you became a mother to our children when I could not be there. You made sacrifices so that I could complete my study and I could not have come this far had it not been for your love and support.

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ABSTRACT

Emerging technologies are changing human beings as well as their social matrix in which they interact. The integration of ICT into education is an indication of societal and cultural change and as the social matrix becomes altered, it imposes different demands on the individual components of the greater community. It is often not easy for people to accept change and initially they resist it. In this inquiry, some of the tensions that exist in such an activity system have been identified.

Vygotskian theory stipulates that human beings learn with and from each other through mediation of psychological and physical tools. The two participants in this inquiry, registered for the postgraduate course in Computer-based Education (CBE) to enable them to interact with the tools of ICT. The theoretical and practical components of the course also exposed them to the concept of learning through technology. The knowledge and skills acquired related to the use of computer technology in educational settings was supposed to help them to interact with technology at the school where they were employed to teach.

In order to transfer skills and knowledge back to teaching practice the two participants needed the support of colleagues, school management, parents and other members of the greater community as defined by their activity system to enable them to achieve this. Through the analysis of a single focus group interview and two individual interviews, initial findings show that existing rules and policies within the school need to be adapted to accommodate the introduction of ICT at the school. It is also apparent from the findings that there are a number of tensions that influence the transfer of skills and knowledge from the postgraduate course to teaching practice. These tensions are inherent to the unique context as defined by the greater school community. The participants report that, due to a number of reasons, they are not interacting with ICT tools as much as they were expecting to. This is becoming frustrating to them as they are not applying what they learned. They feel that their knowledge is becoming redundant because of

this. Most of the tensions between the various components of the activity system as defined in this inquiry originate from the insufficient preparation for the introduction of computers in educational settings at the school. Furthermore, participants report a lack of support from colleagues and management structures as well as parents and other parties who form part of the immediate community at the school. As a result of this it is difficult for them to integrate ICT into their daily teaching and learning activities.

It is also interesting to note that the graduates of the CBE course also focus more on the upliftment of other staff members when they return to the school and are very concerned about getting these colleagues to learn basic computer skills. As a result they do not integrate the technology into their teaching and learning. Furthermore, when they do get the learners to use the computers at the school they still focus on basic skills not related to the teaching and learning of their subject or learning area. These, and a number of other issues, are described in the findings of this inquiry and explained in terms of tensions that arise between the various components of this activity system.

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INTRODUCTION AND GENERAL ORIENTATION
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1.1 INTRODUCTION

With the introduction of computers in most South African schools, it is increasingly important for educators to become equipped with computer skills in order to use technology in their professional, teaching and learning activities. As a result of emerging technologies in education, or what the South African government refers to as 'Information and Communication Technology' (ICT), the process of teaching and learning is changing (White Paper on e-Education, 2003). It is essential that educators encourage and shape this change by having the ability to recognise the benefits of educational multimedia and the theories that underpin the development of skills and knowledge in this field. The role of the teacher is changing to what Nikolova (2001), refers to as that of a 'learning navigator', that is the one who guides the pupil through the process of learning. In order to fulfil this role, educators have to know more about the design and development of learning packages that allow for flexible learning mediated by technology. This does not, however, mean that all educators will be able to design and develop these learning packages. Simply having knowledge of the theories and processes underlying this practice should be sufficient in the case of most educators using technology in their teaching.

To this end, a number of educators have enrolled since the 1990s for the postgraduate Computer-Based Education (CBE) course offered at the University of Johannesburg. This course exposes students to a variety of modules and, throughout the theoretical and practical components of the course, the concept of learning and knowledge acquisition using computer technology is explored

allowing students the opportunity to learn about learning theories, philosophies of learning, and learning styles related to the use of Information and Communication Technology (ICT) in the classroom. In 2003, the participants completed the course, which was spread over a period of 2 years part-time. They are currently practising at their school and are not pursuing any further study when this dissertation was written.

1.2   THE CONTEXT AND THE RATIONALE OF THE INQUIRY

My personal story of how I became involved in this field started when I was still a practising educator who decided to read for the Further Diploma in Education or FDE (now the Advanced Certificate in Education or ACE). Although there were computers at my school, the thought of having to use them for teaching and learning had not crossed my mind up to that point. Computers at the school were always locked away for some reason and regarded as something almost sacred. Being a teacher at the school I was not even allowed to touch the computer in the administration office. For this reason I decided to choose the field of Computer-based Education for my diploma specialisation.

Through discussions with my colleagues in the FDE course, I discovered that some of them were experiencing the same phenomenon. The general assumption by school management seemed to be that educators who were learning how to use computers had to be watched carefully lest they break them. A common driving force for educators was to find out more about computers and technology in education and the subsequent choice of CBE as a field of specialisation. At that stage, most educators also focused on simply acquiring basic computer skills that would empower them within their individual teaching contexts. In general, it was a new and exciting time filled with anticipation and great expectations.

I am also a postgraduate student of the CBE course, although I am no longer a practising educator. After completing the course, I found that I was much more marketable in the private sector, which led to my appointment as an instructional designer where I was able to apply the knowledge and practical skills that I had

learned in the course within my new place of work. Based on my experiences then and now, I became curious about the issue of transfer of knowledge and skills to the workplace. In particular, I wanted to find out if the same transfer of knowledge and skills was taking place through the educators, who were my classmates during the course, back to their daily practice at the schools where they currently teach.[1]

As indicated in the opening paragraphs of this chapter, educators have become aware of the emergence of new technologies in education. This, as a result, has led them to seek the skills needed to use the emerging technologies in their personal and professional lives. Registering for the CBE course simply exposed them to innovative ways of teaching and learning. Lautenbach (2005) has also noted this phenomenon, where "emerging technologies invited them [university lecturers] to change the way they approach the development and teaching of their courses". Focusing once again on the educators, this inquiry is based on the situated worlds of two graduates of the postgraduate course in CBE who are presently teaching at a Gauteng High School. These graduates have been exposed to the principles of CBE at postgraduate level and, in my opinion; have been provided with the cognitive tools to act consciously within their work environment.

According to Nardi (1996:7),"consciousness" develops through daily practice and experience. Individuals are seen to be what they are because of what they do, based on the social matrix to which they belong and in which they interact with other people and artefacts (that also belong in the social matrix). Consequently, they have a certain effect on each other or they produce an outcome, which can be either positive or negative. In this inquiry the perceived outcome could be described as the transfer of knowledge and skills learned in a postgraduate CBE course back to educational practice. The participants in this inquiry belong to the social matrix of their school and surrounding environment and interact with the

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tools of ICT within this school context. Literature on educational theory amply describes the issues outlined above and includes the emergence of Activity theory (Engeström, 1987a; Kaptelinin, 1996; Nardi, 1996 & Vygotsky, 1978), which is rooted in Vygotsky's cultural-historical views on learning. In this light, the process of transferring knowledge and skills learned in one context to another can be seen as the activity that drives this inquiry. To this end, Activity theory forms the theoretical framework for this inquiry and will also serve as the analytical lens through which I will view all data (see also Lautenbach, 2005).

Nardi (1996) highlights Activity theory as one that seeks to understand and clarify the "unit of consciousness and activity". The activity system in this inquiry includes the subjects (two educators who are graduates of the CBE course), engaging with the tools of ICT (the object) through activity mediated by the computer (tool), in order to transfer knowledge and skills learned in a postgraduate course in CBE to everyday practice as a teacher (objective). This is explained further in Chapter 2.

The educators in this inquiry are enveloped within their immediate cultural, historical, social and educational contexts (Lautenbach, 2005). These aspects must, therefore, also be included in the expanded Activity theory triangle (Engeström, 1987b). They are explained in more detail below. The rules that influence these educators within the activity system include technology standards and policies within the school and within the educational arena in general. Complicating the activity system, the division of labour at the school is characterised by both vertical hierarchies (principal, heads of department, educators) and horizontal subdivisions created by subject specialisation and varying technological abilities. The greater community of the school also has an impact on the interaction of educators with ICT tools. Their technological abilities and interests will influence their judgement, which will in turn influence the extent of educators' actions towards integrating computers in their teaching practice, and their responsibility of transferring skills and knowledge to the teaching practice.

1.3 THE TRANSFER OF SKILLS AND KNOWLEDGE

According to the theories of learning, there are different views on what transfer of skills and knowledge is. Thorndike (1906), a recognised learning theorist, explains 'transfer' as occurring when something learned is applied to other situations. According to his theory, the knowledge and skills that learners acquire at school should be linked to what they will encounter outside school. Strategies to understand how learning can be "connected" and applied to what society needs in terms of knowledge and skills have been investigated for a long time (Beach, 1999). All curriculum design therefore needs to include and emphasise those learning tasks that will enable learners to function in other contexts (Thorndike, 1906).

Thorndike (1906), agrees with those behaviourists who claim that if, for instance, learners are trained to acquire basic computer skills, the acquisition of those skills will enable them to apply them outside school situations. On the other hand, cognitive theorists believe in the transfer of principles, where learners who use computers to learn mathematical concepts, for instance, will be able to apply the skills in other computer-mediated environments (Hergenhann, 1982).

Caffarella (2002) believes that the transfer of skills and knowledge and linking them to what learners should be doing in society has profound implications for educators, because employers in the work place need to invest in employees who will perform and increase work productivity. Secondly, it is urgent and essential that educators help societies recover from social ills, for example poverty and illiteracy, by ensuring that learners are prepared to face the challenges of the workplace. Lastly, modern society is being transformed by information and knowledge overload, therefore they need to able to identify what is most applicable and practical within their social matrix.

However, the transfer that is taking place is minimal, or non-existent. The reasons could be that either the educators in general are not prepared to align learning with social needs, or that they are not being prepared sufficiently for transfer.

Alternatively, there are underlying factors at the workplace that influence or prevent transfer from taking place optimally (ibid.). Detterman and Sternberg (1993) conclude that "transfer is rare, and its likelihood of occurrence is directly related to similarity between two situations". In the context of this inquiry, the participants involved are post-graduates of the CBE course, faced with a challenge or responsibility of transferring the skills and knowledge learned from the course to their teaching practice.

1.4   PARTICIPANTS IN THE INQUIRY

The participants in this inquiry are two female educators who graduated from the CBE course in 2003. They were purposively selected based on the successful completion of their Honours degree in CBE, and their continued use of computers in their day-to-day practice as educators, within the locality of their school. They are currently practising at a school in the Gauteng Province. One of them is a member of the School Management Team (SMT). This position is commonly known as Head of Department. Conducting the inquiry at their place of work offered me the opportunity to interact with them in their natural settings. The school where they work and interact with computers may be regarded as their natural setting, since that is where they go daily and spend most of their time.

1.5   THE PROBLEM STATEMENT

In this mini-dissertation I argue that educators, like other human beings, learn through interaction and communication. Moreover, their socio-cultural environment and cultural historical background at the school must impact on their learning (compare Vygotsky, 1978), as they interact with their environment and invoke their previous experience and learning (Lautenbach, 2005). Henning, Maseko and Diseko (2004), also argue that people learn from communication with others who are more knowledgeable than themselves. It is more so when knowledge is in a physical, cultural and social context or an "established theoretical one". All these have a social dimension and it is evident in education where relationships develop

between student-educators and their lecturers and between student-educators themselves (Jarvis, Holford & Griffin, 1998). This type of learning can be referred to as the school's hidden curriculum, where social relations support and motivate learning processes (ibid.).

During the CBE course, the participants interacted with their lecturers, ICT tools and other colleagues. This interaction should have had an impact on their knowledge, skills, experiences and approach to their teaching practice (Lautenbach, 2005). At their school, on the other hand, they interact with colleagues and learners and the community, which consists of parents and other stakeholders with an interest in the school. Thus, it becomes apparent that people exist and operate within contextual settings that function both concurrently and simultaneously. Sociologically, individuals learn and are socialised into the values, attitudes and beliefs of a particular culture. They therefore share this knowledge and these skills, helping them to decide what they can use in their societies for survival (Jarvis, Holford & Griffin, 1998).

The educators' contexts are open to change as they are confronted with various innovations and, as a result, they need to be able to define the context in which they are operating, and be able to adapt within it (Lautenbach, 2005). This adaptation becomes evident when they can implement solutions, procedures that are relevant to their contexts and transform them (Engeström, 1999a). This concurs with the views of Jarvis et al. (1998), who state that learning varies and is influenced by different and changing social and cultural contexts. The context of the educators within a school may, therefore, be altered as a result of changes in a number of variables, one of which may be the emergence of computers in educational settings.

I argue in this mini-dissertation that the various components of the activity system described above can influence one another and create tensions within the system. Eventually, this tension influences and impacts the outcome of the activity system, in which case it can be described as the transfer of skills and knowledge. The research question is therefore based on this activity, and the research question at

which I arrived is: **What are the tensions that influence the transfer of skills and knowledge learned in a postgraduate course in computer-based education to teaching practice?**

1.6 AIMS AND OUTCOMES OF THE INQUIRY

This research aims to expose the tensions that influence the transfer of skills and knowledge learned in a postgraduate course in computer-based education to teaching practice. To achieve this aim it is necessary to state the following objectives:

- To determine by means of an extensive literature review how the tools of ICT can be used in educational settings.
- To establish from documented literature how Cultural-Historical and Activity theories form the basis of this inquiry, and how they impact on the structure of the activity system as described in this inquiry.
- To describe, based on existing literature, how Activity theory can be utilised as both a theoretical lens and a data analysis tool in this inquiry.
- To identify the tensions in the activity system described above, by means of the empirical component of this inquiry, and to report these findings in Chapter four.

1.7 RESEARCH DESIGN

The research design for this study takes the form of a generic qualitative case study. According to Merriam (1998) and Maxwell (1996) qualitative research enables the researcher to discover, understand, and interpret the meaning, behaviour, influences and actions that people have formulated as they interact with their immediate environments. Henning, van Rensburg and Smit (2004) further argue that qualitative research explains 'why and how the phenomena happened the way it does'. This inquiry is qualitative because it seeks to discover and understand the phenomenon of transfer of skills, and what tensions emerged

after the participants qualified from the course. The behaviour and actions of the immediate community will also be examined and interpreted.

The case study is a way of organizing social data and looking at the object to be studied as a whole. According to Merriam (1998) a case study design is "employed to gain an in-depth understanding of the situation and meaning for those involved" and is commonly used in educational settings. Adelman, Kemmis, and Jenkins (1980) state that, a case study focuses on the smallest but most important details and problems that surround the case. The "case" is described below in 1.8 and further in Chapter 3.

1.8   DESCRIPTION OF THE CASE

The two participants will be purposively selected, based on successful completion of their Honours degrees in CBE, and their continued use of computers in their day-to-day practice as educators within their school. One participant teaches accounting and business economics subjects. The other offers technology and natural science subjects. None of the other educators at the school have the necessary computer skills with which to interact with ICT, except for one, who completed an ACE course in CBE. I was told that he does not seem to integrate ICT in his teaching practice.

The other educators seem to lack the motivation to integrate computers into teaching and learning activities. This creates a problem for the participants who lack support in implementing the use of ICT at the school. Educators, with their learners, are supposed to visit the computer laboratory during their learning area periods. This is not happening optimally because of a lack of skills and knowledge, and consequently a lack of interest. In addition, no time has been allocated on the time-table to accommodate each class in the computer laboratory. The participants of this study, however, do make an effort to use the laboratories, although they are often prevented from doing so by other commitments. This is elaborated on in Chapter 3 and in the findings in Chapter 4.

1.8.1 Data Collection

Data were collected by means of a semi-structured focus group interview (Kreuger, 1988). A single open-ended question was asked to initiate the discussion, and a number of sub-questions were also formulated, although not necessarily asked. They were used to direct and manage the conversation process. Their purpose was to ensure that the participants adequately addressed all aspects related to the single open-ended question. Secondly, the sub-questions were used to direct and guide the conversation in case the participants strayed from the main question. Special care was taken not to ask leading or guiding questions that might contaminate or influence the data (Henning et al., 2004). When a language other than English was used, I ensured that the correct translation was made and that accurate data were collected and documented. The translation was also made accessible to the participants in order to confirm that the translation did not change the meaning in any way.

The focus group interview was followed up by individual interviews (Merriam, 1998) with the two participants. I realised that there could be valuable data that the participants were hesitant to share in the focus group interview situation, and would thus be more open in a one-on-one interview with me. Certain questions arising from the focus group interview were clarified, allowing me to "probe and ask more questions" (Berg, 2004:81). Both interviews were recorded and transcribed verbatim.

1.8.2 Data Analysis

The data analysis process began with "open coding" used in Lautenbach's study (2005), and content analysis to derive themes or categories (Strauss & Corbin, 1990). Having interviewed, recorded and transcribed data, I read the transcript, identified, highlighted and isolated tensions that influence the transfer (LeCompte, Preissle & Tesch, 1993). I then grouped, assigned and mapped these tensions, according to their relevance to the components in Engeström's expanded activity triangle, into codes that were later converted to action verbs (see figure 3.1 in Chapter 3). These codes were mapped or assigned to corresponding designations

in Engeström's expanded activity triangle model. This helped create a narrative of a particular event or situation relevant to the particular code. In turn I was also able to derive the meaning of this inquiry (Merriam, 1998). This aspect is described in more detail in Chapter 3.

1.9   TRUSTWORTHINESS

I have learned that the purpose of a research inquiry is to generate knowledge that can be used to solve or offer solutions to existing problems. It is therefore important that research is trustworthy, valid and reliable, especially in educational settings (Merriam, 1998). The trustworthiness of this inquiry is established by applying the following criteria: credibility, transferability, dependability and conformability. This is dealt with in detail in Chapter 3.

1.10 ETHICAL CONSIDERATIONS OF THE INQUIRY

This inquiry considered and applied the ethical standards set out by the Faculty of Education at the University of Johannesburg. The participants were selected because of their completion of the post-graduate CBE course and their interaction with ICT at their teaching practice. Permission to conduct the research was obtained from their principal (Appendix A). The participants were invited to participate voluntarily in the research (Appendix B) and although each signed a letter of consent, they could withdraw at any time without penalty. To protect their identities and integrity, confidentially and anonymity was ensured. They have remained anonymous in the reporting of the research with pseudonyms assigned to them and their school of practice.

1.11 CONTRIBUTION OF THE INQUIRY

I believe that this inquiry will be significantly useful in the following ways. Firstly, it will emphasise that ICT is emerging prominently in education (Oliver & Herrington, 2001) with profound implications for teaching and learning. This emergence is

affecting the way learners are being taught and the way in which educators teach. The implication of this is that educators need to take responsibility for upgrading their teaching skills and strategies and to align them with the demands of the emerging technology.

Secondly, the SMTs and School Governing Bodies at the schools will be more supportive of educators who take the responsibility of integrating computers in learning and teaching activities. Graduates of the course should be able to implement the knowledge and skills learned in the course in their teaching practice. This will have long term effects on the learners who will later be able to apply the knowledge and skills acquired at school in their personal and professional lives. O'Neill, Singh and O'Donoghue (2004) remark that, employment is imposing demands for high levels of skills and qualifications. Therefore, learners need to be prepared from an early age to cope with the emerging technologies.

1.12 THE OUTLINE OF CHAPTERS

Chapter 1 introduces and orientates the inquiry. The context and rationale of the study is discussed to give the reader an idea of what the study is all about. Concepts like the transfer of skills and knowledge are discussed to contextualise them with this inquiry. The problems statement, the aims and outcomes of the study and the research design and framework are also briefly highlighted in this chapter. The case, the participants in this study, the ethical implications and the contribution of this study are also highlighted.

Chapter 2 is the literature review, of the cultural historical theory, which focuses on social human learning. The Zone of Proximal development states that adults and educators are duty bound to teach learners so that they can internalise learned skills and knowledge and use them independently in their own contexts. Secondly, the Activity theory also states that human beings interact and make meaning with their material environment. Thirdly, the section on ICT in educational settings focuses of the implications that ICT is having in daily teaching and learning activities and how it can be used to transfer skills and knowledge.

Chapter 3 provides an overall account of how the study was conducted. It describes the research design, data collection and analysis and the manner in which the trustworthiness of the inquiry was established.

Chapter 4 consists of the research findings. The content analysis is also presented as are the findings between the subject and each element of the activity system. This is followed by a discussion on the research findings.

Chapter 5 is the final chapter of this inquiry and it consists of the overview of the inquiry, the limitations of this inquiry, recommendation for further study followed by a final word.

1.13 SUMMARY

The focus of this chapter was to introduce and to give an orientation to the study as a whole. It discusses the context and rationale, formulation of the problem statement, the aims and outcomes, research design, data collection methods, analysis and interpretation of the data. Chapter 2 reviews the literature which offers insight into the views on ICT in education, the cultural historical and the Activity theories pertaining to human learning, interaction and mediation.

CHAPTER 2:

REVIEW OF THE LITERATURE AND
THEORETICAL FRAMEWORK

2.1   INTRODUCTION

It is important to conduct a literature review because it helps a researcher find out what authors have written on the subject. It can be an overwhelming exercise, especially for novice researchers, because of the wealth of knowledge that is available. However, the research question should guide the search for the relevant reading sources. Significantly, the literature review must help the researcher to provide an answer to the research question. When I began this inquiry I needed to put it in context, and in order for me to achieve this, I 'engaged' critically with the literature. Engaging with the literature can be described as a researcher in 'conversation' with the authors. As a result, the topic can be critically examined, an argument can be developed and one can speculate on how the research questions' answers might turn out. Lastly, the literature review is used to help in providing a theoretical framework in which to understand and explain data findings (Henning, van Rensburg & Smit, 2004).

The focus in this chapter is on Vygotsky's cultural-historical theory, and authors who developed it (for example, Leont'ev and Engeström). Learning, tools, mediation and the Zone of Proximal Development (ZPD) will also be discussed. Secondly, Activity theory, which has its roots in cultural-historical theory, will be discussed to highlight activities that will identify the tensions that influence the transfer of skills and knowledge from the course to teaching practice. Activity theory also forms the framework for data analysis in chapter 4 of this inquiry, and will be discussed to explain how individuals make meaning of their human existence, and how they interact with Information Communications Technology

tools (ICT). The section in this chapter on ICT in educational settings will also be discussed in the light of societal and cultural changes, influences and the need to integrate computers as tools for teaching and learning. Lastly, the transfer of skills and knowledge and how ICT tools can be used in this regard will be highlighted.

2.2   CULTURAL-HISTORICAL THEORY

Cultural-historical theory was conceived in Moscow by Vygotsky a few years after the Russian revolution (Lantolf, 2006: [Online]). This theory was not recognised then but as time went on, in the 20th century, it began to influence the learning process in most countries. Kozulin, Gindis, Ageyev and Miller (2003) are of the opinion that it became popular because it answered questions as to what they refer to as "the agency of learning", mediation and learning potential (Kozulin, 2003) that emerged later in Western psychology and education.

The Vygotskian theory stipulates that a human being does not learn in isolation, rather as a result of social and cultural interaction with fellow human beings and the environment. "Learning awakens a variety of internal developmental processes that are able to operate only when the child is interacting with people in his environment and in cooperation with peers" (Vygotsky, 1978). This implies that the people around him/her, such as peers, parents, educators and community members, are the agents of learning because they are actively involved in the learning process (Kozulin, Gindis, Ageyev & Miller 2003). The cultural-historical theory, therefore, has an influence on teaching, schooling and education. Haenen, Schrijnemakers and Stufkens (2003) refer to the learning environment as "shared problem spaces". In the context of this inquiry, the participants had an opportunity to participate in the construction of knowledge, acquisition of skills and finding innovative ways of using ICT in teaching and learning activities. They could also solve some of the problems they encounter in and outside the teaching practice, in collaboration with other colleagues in the course.

Shared problem spaces can also refer to the effort that educators in this research took to learn to interact with ICT, with the aim of implementing it by transferring

learned skills and knowledge to their teaching practice. This is a shared problem space because, although two of them are involved in this exercise, they need the collaboration of other educators in the school to ensure that the learners acquire the knowledge and skills required to interact with ICT tools. Vygotsky stipulates that learning and development in an individual also take place as a result of interaction with more experienced adults, mediation with tools or artefacts, signs and symbols which can lead the child to a Zone of Proximal Development (Kozulin, 2003).

2.2.1 The Zone of Proximal Development

Vygotsky's remark that "what a child does with an adult today, she will do on her own tomorrow", arose from his need to understand individual learning and development (Ryle, 1999). The implication is such that adults or educators are responsible for transferring skills and knowledge to learners so that they can internalise these and use them independently. Based on these views, Vygotsky developed the concept of the Zone of Proximal Development (ZPD), which is defined as "the distance between the actual developmental level as determined by independent solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (Vygotsky, 1978:211). According to Chaiklin (1993) the ZPD is applied in developmental and educational psychology and in a variety of learning areas, including ICT and computer-mediated communications.

Whilst the participants in this inquiry were still studying at the University, they were assisted in learning how to use and integrate computers in their daily teaching and learning activities. Their learning was organised under the guidance of the experts in the field, and through interaction with their peers. Ryle (1999) believes that adults need to be ahead of development so that they can create conditions that will make learners internalise learning, therefore leading them to their ZPD. The description of this process depicts Vygotsky's theory of the ZPD, which stipulates that learning happens optimally with the aid and assistance of a more competent adult or peer. However, Chaiklin (1993) argues that as much as the competence of

the adult or expert is important, what is essential is making sure that the learner will learn and develop so that he/she can function completely on his/her own. In the context of this inquiry, by following the course, the participants were lead to their ZPDs. Having developed and acquired the knowledge and skills, they then needed to transfer them to the teaching practice. To take this further, they would also lead learners to their own ZPD, where they could also function independently.

The ZPD, therefore, recognises that an individual has the potential to learn and the ability to be influenced and be changed (Kozulin, 2003). This is in line with the cultural-historical theory that development and interaction of an individual is mediated by the tools and relations with other members of the society (Haenen, Schrijnemakers & Stufkens 2003). Learning does take place as a result of social interaction, and that knowledge is spread to other people, and the artefacts and technologies that are used are also distributed to areas where this interaction, knowledge, teaching and learning is needed and can be taken further (ibid.).

2.3   ACTIVITY THEORY

Activity theory is applied in this inquiry to bring about understanding of ICT in education. Bellamy (1997) states that Activity theory can be used to provide an "understanding of the relationship between technology and educational change". In the following sections the history, its definition and what it stipulates in terms of human learning and development in a society, will be provided.

2.3.1   The History of Activity theory

According to Engeström (1999a), Activity theory was conceptualised in the 1920s, following the Russian Revolution, and developed further in the1920s and 1930s by Russian psychologists L.S. Vygotsky, A.N. Leont'ev and A. R. Luria. At the time, as psychology was being restructured and several programmes were developed, a decision had to be made on which approach to adopt. Eventually, Soviet psychologists agreed on "the principle of unity and inseparability of consciousness (human mind) and activity", arguing that the human mind and development could

be understood in the context of meaningful, goal-oriented and socially-determined interaction between human beings and their material environment (Bannon, 1997 [Online]).

This was one of the psychological approaches that were used in education, attempting to find the connection or links between individual and social structures (Engeström, 1999a). It also provides explanations as to how culture and society came to be what they are. Vygotsky developed the concept of 'mediated action', whereby humans interact with their environment and others by means of mediating artefacts, which can be tools, language or signs (Miettinen, 1997: [Online]). According to Nardi (1996) this interaction results in development of consciousness, defined as that which an individual becomes as a result of daily interactions. In the context of this inquiry, the theory will be used firstly to identify and describe how the societal connections or links have been changed or affected by the responsibility that the participants have to transfer the learned skills and knowledge to the teaching practice. Secondly, the perceptions, attitudes and approaches (of the participants) to teaching and learning are bound to change as a result of the interactions with ICT tools during and after the course. All these change the behaviour, attitude and actions of both the participants and people within their social structures. This, therefore, may create tensions that influence the transfer of skills and knowledge that this inquiry seeks to identify and describe.

2.3.2   Activity theory defined

Activity theory has its roots in Vygotsky's cultural-historical theory on learning, which stipulates that as learners or individuals grow in a community, they interact with adults, other members of the society, educators and peers. As this interaction is taking place, learning, meaning, values and attitudes that are inherent within a learner or individual are constructed (Engeström 1987a, 1993; Leont'ev, 1974; Nardi, 1996). In this inquiry, the two participants engaged with ICT tools, learned the skills and knowledge from the experts, their peers and the tools. These tools are developed further and become complex. Societies, therefore, are faced with a need to act in a way that will ensure that they keep up with development. This is in

line with Leont'ev (1974) who states that human action does not necessarily satisfy a need; rather it is a contribution towards that need.

Activity theory seeks to understand and clarify the "unit of consciousness and activity", where 'consciousness' is what is done in daily practices and experiences acquired (Nardi, 1996:7). The two educators in this inquiry interact with ICT artefacts; or rather they use the computer daily in their teaching and learning activities. As they engage with this tool, their knowledge, skills, teaching and learning approaches, experience, and attitude undergo a change (Lautenbach, 2005). These educators do not function or operate in isolation, but belong to and work within a community made up of learners, the principal, heads of department, other colleagues and community members, all of whom are directly or indirectly involved with the school. This process is not static, rather ongoing, and can be referred to as an 'activity'.

Kuutti (1996) regards Activity theory as helping to form a framework that can be used to study human practices as development process, where an individual and the social structure operate simultaneously. This can be represented as a triangle (figure 2.1, below), made up of the 'object', 'subject' and 'tools or mediating artefact'. This concept originates from Vygotsky's ideas that human beings interact with each other by means of tools and signs. In the context of this inquiry, the subject is represented by participants who saw the need to acquire skills and knowledge to enable them to transfer these to their teaching practice. The object is to use ICT in their daily practice. The tool or mediating artefact is the computer. The outcome is the result of how the elements interact or mediate with each other. Christiansen (1997) summarises the definition of the activity system as having a structure of its own, and as undergoing continuous development and change from one form or shape to another.
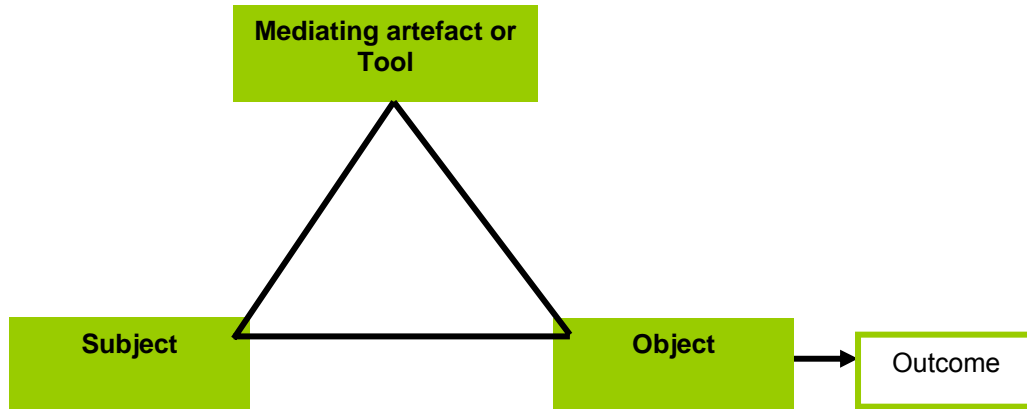
Figure 2-1: Basic mediational triangle model (Vygotsky 1978)

Leont'ev became the chief proponent of Activity theory after Vygotsky, with ideas inspired by Marx. His contribution to the theory reconstructed the mediational triangular model by incorporating collective activity and individual activity. Leont'ev (1978) believed that human beings satisfy their needs by acting collectively and in collaboration with each other. This means that an individual does not necessarily satisfy needs, but does contribute towards the satisfaction of that need. Members in a community have specific roles that they play to achieve a common goal. The summary that follows comes from Leont'ev's writings, and is used to enlighten the idea of shared work activity:

> A beater for example, taking part in a primeval collective hunt, was stimulated by a need for food or, perhaps, a need for clothing, which the skin of the dead animal would meet for him. At what, however, was his activity directly aimed? It may have been directed, for example, at frightening a herd of animals and sending them toward other hunters, hiding in ambush. That, properly speaking, is what should be the result of the activity of this man. And the activity of this individual member of the hunt ends with that. The rest is completed by the other members. This result, frightening i.e. frightening of the game, etc., understandably does not itself, and may not lead to satisfaction of the beater's need for food, or the skin of the animal. What the process of this activity was directed to did not consequently coincide with the motive of his activity; the two were divided from one another in this instance. Processes, the object and motive of which do not coincide with one another, we shall call "actions". We can say for example, that *the beater's activity is the hunt and the frightening of the game his action.* (Leont'ev, 1981:210; italics added)

Later, Engeström (1999a) expanded the mediational triangular model, adding to its complexity with other elements that were conceptualised by Vygotsky and Leont'ev. Engeström realised that human beings interact with each other collectively and collaboratively by means of tools or artefacts. There must be some form of shared activity that exists among them and the activities in which the levels of engagement take place cannot be the same. This may have been influenced by power structures or different skills, levels of expertise and competence. A group of people working together became a community, and power structures or differences in competencies gave rise to division of labour. The rules also emerged because they were needed to control, guide and direct the activity. All these can cause contradictions and internal tensions, which result in the activity changing and developing (Engeström & Miettinen, 1999).

Figure 2.2 (below) depicts how Engeström expanded the mediational triangular model and positioned the components of the triangle.
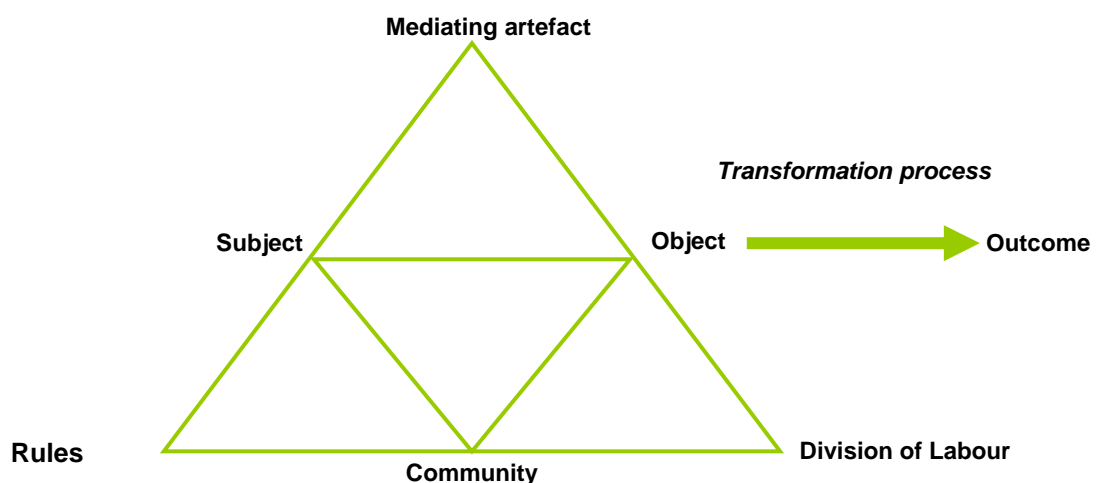
Figure 2-2: The expanded activity triangle model (Engeström 1987a)

The two participants (subjects) in the inquiry interact with ICT (object) to transfer skills and knowledge (outcome) learned in the CBE course to the teaching practice as educators. The activities of the educators are affected by the tools (mediating artefacts) that they use, school policies and regulations (rules), the greater

community that they operate within and the division of labour in the school. These interactions may give rise to tensions that can influence the transfer of skills and knowledge.

These tensions may be caused by several factors, including psychological ones (Bellamy, 1997). When educators took the challenge of interacting with ICT tools in education, a number of changes must occur. Firstly, they need support from their teaching practice, the greater community and technical assistance, so that they can solve problems should they arise, and so make the interaction with ICT tools efficient. Secondly, the rules need to accommodate the changes that ICT is bringing into educational settings. Lastly, every member involved in the school needs to contribute to ensure that the outcome of transferring skills and knowledge can be achieved. Figure 2.3 (below) depicts the expanded activity triangle that exists at the school where the participants practice and where they transfer skills
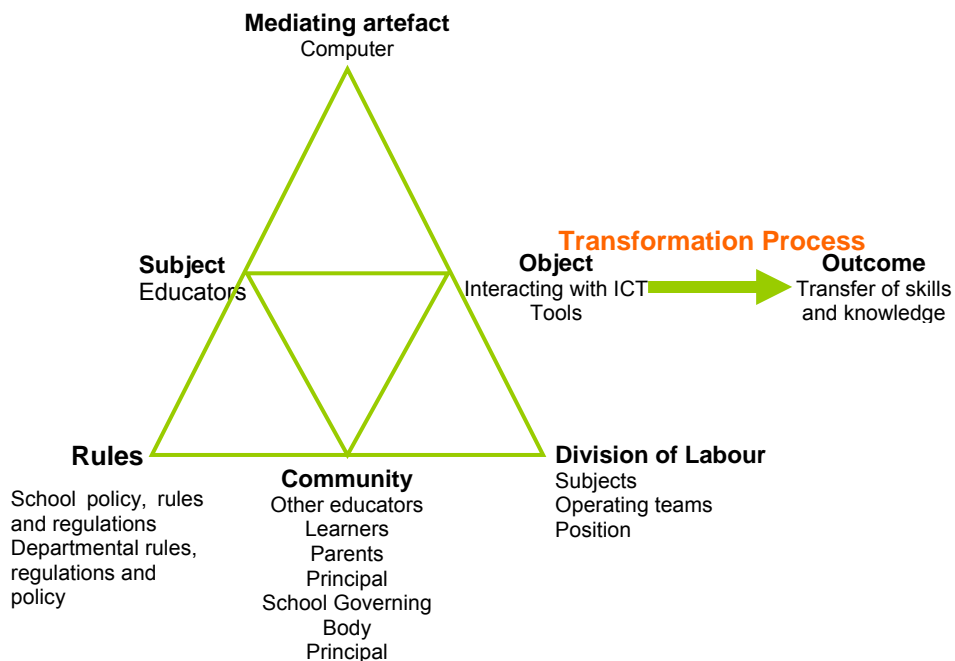
and knowledge from the course to the classroom.

Figure 2-3: An expanded representation of actions at the school (adapted from Engeström 1999a:30)

2.3.3 Tools and mediated learning

Human beings created physical and psychological tools, signs and symbols to aid them as they interact with each other and the environment. Constant interaction with these elements enables them to improve the tools to suit their lifestyles, to change the world and to change their lives. These tools and their use are then passed on and taught to the next generations, who further improve them according to their needs, and so the process continues (Lantolf, 2006: [online]). Vygotsky (1986) argued that learning will not happen unless society uses the tools that they created to help their learners learn and develop cognitively. This opinion suggests that the new generation does have knowledge and skills, but that in order for them to develop and learn further, they need the assistance and guidance of a more experienced individual to help them advance the tool.

The participants in this inquiry use computers as a tool or artefact in their teaching and learning activities. A computer is a tool that has a "mediating role", which shapes the way human beings interact with their reality (Kuutti, 1996 & Bannon, 1997). Nardi (1996) is of the opinion that the daily role of mediating artefacts and their integration into social practice needs to be understood so that as human beings interact with these artefacts they encounter problems that need to be solved. These problems motivate them to seek solutions. These solutions in turn make human beings find innovative ways of improving the efficiency of this artefact. This is evident in the "structural properties of the tool", e.g. its shape, the material used, how it is used and the aesthetics thereof (Bannon, 1997 [online]). Hence, Kuutti (1996) states that as artefacts develop they change to possess a "particular culture", which he calls a "historical residue of that development". Bannon (1997[online]) concludes that tools can be used to accumulate and transmit social knowledge and influence the way in which individuals function mentally. Participants and other educators do not necessarily have to improve the structural make of computers, but they can improve and design innovative ways of delivering learning content in a more efficient way that is compatible with learning in an ICT environment. This implies that the education process is undergoing

some changes; hence Bellamy (1997) stated that the introduction of computers can change the process of teaching and learning.

In light of the above, Kaptelinin (1996) believes that the way artefacts are used, the way in which they satisfy needs, and their developmental history, can make them more understandable within the context of human activity. In the context of this inquiry, it needs to be noted that the use of computers in education needs to be understood in terms of cultural and societal history, development and advancement. This is one of the reasons that computers should be introduced into educational settings, since they will and already do contribute to the advancement of society. There is a need that is associated with this, and that is the mastering of the use of this tool in order that the coming generation may be able to improve and enhance its efficiency in their own context, within the circumstances of their own activity. Christiansen (1996) regards tools as "roses in the garden" that need to be looked after so carefully because they "make our lives so much easier and better", and a tool as "functional as well as aesthetic", having within it an "ethical dimension of quality".

Human development can, therefore, be studied in line with the development of the tool that people use to mediate their environment. Engeström (1999b) clarifies this further by stating that artefacts should be studied as "an integral and inseparable component of human functioning". In line with this, Christiansen (1996) highlights the notion that tools need to be integrated into human activity as it is only then that they become part of us by attaining the "qualities of function, aesthetics and ethics". The emergence of computers in educational settings is unavoidable. It is a reality that needs to be embraced, so that learners and educators in schools are not left behind in personal, social and professional capabilities in a computer-mediated environment.

2.4   ICT IN EDUCATIONAL SETTINGS

The White Paper on e-Education (2003) states that ICT is challenging in terms of curriculum development, participation in the information society, cost

effectiveness, quality of education and integration in an educational setting (Draft White Paper on e-Education:2003). The introduction of computers in most South African township schools is problematic. Whilst Nardi and O'Day (1999) caution that technological development in society is becoming "inevitable", the level of preparation for this in South Africa is not yet adequate.

Raschke (2003:26) states that "The era of digital technology is rapidly producing an entirely new and uncharted, terrain of cognition and human sensibility". The role of education is, therefore, crucial in preparing both educators and learners for these changes. It is stipulated in the White Paper on e-Education (2003) that the integration of ICT in education will encourage learners to interact meaningfully with information. Cognitive skills can then develop and learners will be able to participate in the knowledge society. Therefore, both educators and learners need to acquire basic computer skills in order to add value to learning and teaching encounters. Sallis and Jones (2002) state that having the knowledge and skills in the computer age are equivalent to being "literate in the industrial age".

As noted in chapter one of this study, students in the post-graduate CBE course are offered the opportunity to study learning theories, philosophies of learning, and learning styles related to the use of Information and Communications Technology (ICT) in the classroom. According to Ager (2001) it is important that educators view such a course as a means of learning how ICT tools can enhance learning. Secondly, the knowledge of ICT can enable them to decide how to deliver learning in an interesting way. Thirdly, they will be able to engage in discussions on how ICT can benefit education and even suggest how it "could" and "should" be used. This will enable them to discover, explore and exploit the value that computers can offer in their day-to-day teaching, as well as in their professional and personal activities. This is achieved when educators engage in designing learning packages that learners can use to support their learning, and, in so doing, transfer their knowledge and skills. In these designs, learning theories, philosophies of learning, learning styles and instructional design principles related to the use of (ICT) are applied.

Hergenhann (1982) expanded that there are no answers regarding which learning theory can best be used to ensure that learning does take place. However, educators are exposed to a variety of learning theories from which they can choose, or, they can use a combination of the theories, depending on what best suits them. Here Hergenhann (1982) cautions that "there is no process more important than learning, and if that be so, one of the most worthwhile enterprises a person could engage in is to help unravel the mysteries of that process". This raises the question as to whether educators take cognisance of the importance of incorporating learning theories into their teaching activities or do they plan and teach in a way that they know works best. However, having completed the post-graduate course, my experience as an instructional designer with outcomes based education indicated to me that the level of the learners and the outcomes of the learning environment, have an influence on the way in which theory could be incorporated in the learning activity.

Smith and Curtin (1998) however, argue that contemporary children's attitudes and cognitive development are advanced and encouraged by the way that they should be taught. More specifically, they are challenged by computer-based education and media technologies that surround them. Therefore, the way that they are taught needs to guide them in making sense and interpreting their world so that they can function at social and individual levels in computer-mediated environments. These authors further argue that "school curricula and pedagogical procedures are out of step with the cognitive and attitudinal organisation of the young" (ibid.).

In order to address these concerns, the South African government is trying to make schools compatible with technological advances. Dagada (2004) points out that the Gauteng Department of Education (GDE) has installed computers in most of the Gauteng Province's schools, together with internet connections, and educators have been in training to use them in the teaching and learning environments since 2000. One of the e-Education policy clauses (White Paper on e-Education 2003) stipulates that the government was aiming at having all learners develop ICT skills by 2013. However, it is important not to focus only on

acquiring skills, because there is a learning angle that is also associated with ICT teaching and learning. Furthermore, it is required that educators and school managers need to have the knowledge, skills and support in order to integrate ICT in education.

In keeping with this initiative, educators attended three-day courses to prepare them for the use of ICT. However, from personal conversations, I gained the impression that the course was not sufficient to make them acquire the necessary skills. Whilst some dealt with the challenges by taking up further courses, for example, the CBE course, with or without government funding, the participants in this inquiry still require access and support from all structures of management and the social structure of the school, including immediate communities that are interested in the development of the school regarding integrating ICT in education. Of particular significance to this study is identifying tensions that influence the transfer of acquired skills and knowledge from the university post-graduate course to teaching practice.

2.5   THE TRANSFER OF SKILLS AND KNOWLEDGE

As indicated in chapter one, there are different views on what transfer of skills and knowledge is, especially in a computer-based learning environment. Taking into consideration the various connotations of the term, Thorndike's definition (1906) and Caffarella's approach (2002), the transfer of skills, in terms of an investment in the employee's productivity, are relevant within the context of this inquiry. There may be varying distance in terms of skills the learner has acquired in the course, and those required to carry out a job for the employer. Clark and Voogel (1985) refer to two types of transfer, namely 'far transfer' and 'near transfer'. *Near transfer* occurs when learners apply learned skills and knowledge in situations that are the same, for instance when they use a spreadsheet to develop a budget as a form of exercise in class (ibid.) and later do the same task at work. Similarly, Gagné (1954) indicates that a *near transfer* learning environment can be effective when "instructional elements" are similar to the environment in which skills and knowledge will be applied. On the other hand, *far transfer* is applicable to

situations where a learner uses learned skills and acquired knowledge in situations that are different from the course (Clark & Vogel, 1985). Here the important factor is that the learners have not only acquired certain skills, but that they must be prepared to adapt them to a new and different working environment. As Gagné (1954) argues, creating variations within the learning environment can enable learners to recognise patterns and similarities in different application environments.

Thorndike (1906) explains transfer as occurring when something learned is applied to other situations. According to his theory of identical elements, knowledge and skills learned at school should be linked to what learners will encounter outside school. Therefore, the school curriculum needs to include and emphasise those learning tasks that will enable learners to function in their after-school life. The behaviourists agree with Thorndike and claim that if, for instance, learners are trained to acquire basic computer skills, and the acquisition of those skills will enable them to apply them outside school situations, either in their professional and/or personal lives.

In line with the arguments above, the transfer of knowledge and skills needs to enable learners also to be able to transfer them beyond the classroom (Allesi & Trollip, 2001). This depends on what outcomes need to be achieved at the end of each teaching and learning activity in computer-mediated learning environments. According to Clark and Voogel (1985) the transfer of skills and knowledge is influenced by, amongst other things, the reality of instruction and methodologies. To add to this, Newman (1997) reported from microcomputer environment research that learners' knowledge and skills are acquired if the learning environment is useful, purposeful, meaningful, understandable and interactive. He adds that educators are responsible for creating such environments and encouraging learners to use the knowledge and skills outside the boundaries of the classroom (ibid.). Face-to-face teaching is more interactive because from time to time certain aspects need to be explained by using concrete examples or allowing learners to find other ways of explaining the concept and, therefore, transferring desired knowledge and skills. One might think that in a computer-

based learning environment interactions are limited to typing and moving a mouse. However, educators need to take all these into consideration and design learning material that will integrate face-to-face teaching, interacting and eventually guiding learners into acquiring a skill that is associated with the concept that is being dealt with.

The emergence of ICT in education is having a significant impact on teaching and learning abilities and knowledge acquisition in a computer-based learning environment. The importance of knowledge is such that it enables individuals to live in functional way. This means that participants in this study needed to be carefully exposed to knowledge that would enable them to cope with the expectations of their workplace. It is, therefore, essential that a new way of transferring skills and knowledge needs to be established, challenging traditional methods and replacing them with more innovative ones.

As well as acquiring knowledge, learners also need to acquire skills. A skill is the ability to do something or to perform an action in order to achieve certain proficiency levels and the ability to solve a problem. This implies that as an individual practises skill acquisition, the learning becomes repetitive, progressive and subconscious. Continuous repetition enables the learner eventually to master the skill and, as a result, executing it becomes second nature. For example, when learners have mastered keyboard skills they no longer need to look at and locate where particular keys are, because they subconsciously know the layout.

Skills may not be limited to physical abilities. For example, solving a mathematical problem, an individual must have mastered some mathematical rules and developed some mental or cognitive skills. Mayer (1999) expands on this opinion by saying that in order to solve problems, an individual needs to have learned some formula in order to calculate, or have sound knowledge of a concept, or use exciting knowledge in the subject. For instance, the participants in this study acquired skills required to design computer-based learning environments.

However, Brown and Lautenbach (2005) find that educators at classroom level are "failing to transfer skills to the classroom". These researchers, lament that equipping schools with computers will be a wasted effort if the knowledge and skills are not transferred optimally. The next session examines ways in which such transfer might proceed.

2.6   HOW CAN ICT TOOLS BE USED TO TRANSFER SKILLS AND KNOWLEDGE

Nardi and O'Day (1999) define a 'tool' as something that is made to fit the hands and minds of human beings so that they can use it to solve problems. However, lack of knowledge of how this tool can be used, and the lack of skills to use it, can turn it into a meaningless object (Zhao, 2003). The story below was told by Aesop and I found it clarified the concept of a tool as a technology that can do something essential to make ends meet.

> A thirsty crow found a pitcher with some water in it, but so little was there that, try as she might, she could not reach it with her beak and it seemed as though she would die of thirst within sight of the remedy. At last she hit upon a clever plan. She began dropping pebbles into the pitcher, and with each pebble the water rose a little higher until at last it reached the brim, and the knowing bird was enabled to quench her thirst (Aesop, 1912: 17)

According to Ager (2001:9) ICT might be misunderstood because its use is "versatile" and varied. It is significant to be able to isolate where it is most needed. In this inquiry the participants need to integrate learned ICT knowledge and skills transfer by applying them in the difference contexts of their teaching practice.

From the research conducted by Van Der Westhuizen and Lautenbach (2004) it was stated that educators in the post-graduate course should be able to use the skills they acquired - *hitting upon a clever plan* - to design learning packages that could be used to support teaching and learning environments. Ideally, they would be empowered to design learning packages in which they could apply the

theoretical component of learning and learning strategies, and evaluate other learning packages, based again on the theoretical knowledge that they learned.

From my experience, these ideals do not easily translate into practice. Most township schools are burdened with overcrowding in classes, causing problems to educators who are unable to attend to all learners at once or teach them efficiently. However, since they are aware of this problem of overcrowding, and since they have acquired the skills and knowledge for designing learning packages, they can help to relieve the problem. While the educator attends to one group of learners, the other can continue, for example, interacting with ICT, using the learning packages that educators have designed.

While computers allow learners to complete tasks that could have otherwise been done using a pen and paper, its more important use is as a tool for enhancing learning by application of analytical concepts (Ager, 2001). Cognitive tasks encourage learners to explore and discover deeper meaning of what they are learning, and to make connections between prior and new knowledge by recalling what they learned and then connecting it to the new. Adding to this the theoretical part of the CBE course, as mentioned by Van Der Westhuizen and Lautenbach (2004), firstly, influences educators to plan, and to create good, innovative and interesting learning packages. Secondly, it challenges educators to create exciting and challenging pedagogy, through learning that builds, exploits and directs computing to optimal usage (Sallis & Jones, 2002).

The ICT skills and knowledge that participants have acquired are transferable because they can help to solve some of the learning problems that learners have and, in turn, empower them. The evidence can be seen in the research that Van Der Westhuizen, Oosthuizen and Van Rensburg (2004) conducted at a certain school in which learners had reading problems that affected their academic performance. The researchers implemented software for a developmental reading programme that learners could use to develop reading skills. After the reading programme, it was reported that the learners were reading more as evidenced by more books being borrowed from the media-centre. The learners developed higher

order thinking skills, formed associations of concepts, developed meta-cognition, deduced information and improved memorisation skills, which they could transfer to the classroom for solving mathematical problems and writing assignments. However, the researchers also reported some limitations that computers had for learning purposes, and argued that alternatives needed to be found to cover these limitations. This should be an indication that the use of ICT for teaching and learning purposes should not be regarded as an answer to all educational needs. Provision still needs to be made to accommodate that which ICT cannot achieve.

Nardi and O'Day (1999) conducted research at a high school in 1995, in which learners used computers as tools to create their artwork. They recreated their photographs using *Adobe Photoshop*. One of the projects that the learners undertook was to design compact disc (CD) covers. The educators in this school firstly focused on what the learners could do with the computers. Secondly, by having a structured curriculum, the learners were prepared for systematic work. This made them competent in using computers so that they could do their artwork. Thirdly, photography lessons were integrated with computer training to help them acquire computer practical skills. Lastly, the educator involved in this class had technical support for the installation and maintenance of computers when necessary. It was evident from their research findings that the educators at the above school transferred their skills and knowledge to their teaching practice, because most of the learners produced creative designs. This exercise enabled them to use the technology to apply what they had been taught and to explore and discover some computer operations independently. It is apparent also that the educators were given the support that they needed, to integrate ICT without major hindrances.

In line with the argument above, ICT can be used to help educators and learners help themselves in the teaching and learning encounters. Educators use their knowledge and skills to enrich teaching environments. On the other hand, learners receive transferable skills and knowledge that they will apply in similar or different contexts.

2.7   SUMMARY

This chapter focused on the cultural-historical theory and the people who conceptualised it, positing that learning is the result of collaboration amongst human beings. The ZPD emphasises that since they learn with and from each other, adults, who have already acquired the skills and knowledge, transfer them to children to empower them to function independently in various contexts. Activity theory, which is rooted in the cultural-historical theory, highlights how individuals make meaning of their human existence, and how they interact with ICT tools. In this process they are confronted with cultural and societal changes and improvements that challenge them to rethink the way that they have been operating. This is bound to create tensions, which in the context of this inquiry, influence the outcome - the transfer of skills and knowledge to teaching practice. ICT was discussed to indicate the impact that it has on educational settings, the transfer of skills and knowledge and how ICT can be used to transfer skills and knowledge.

CHAPTER 3:

THE RESEARCH DESIGN AND METHODOLOGY

3.1   INTRODUCTION

The purpose of this chapter is to focus on the research design type; data collection and analysis methods; methodological norms, such as trustworthiness; and the ethical aspects of this inquiry. The research design takes the form of a generic, qualitative case study and data were collected by means of a single, semi-structured focus group interview and follow-up interviews with the selected participants. The framework of this inquiry is based on both cultural historical and Activity Theory. This inquiry examines two selected educators who are postgraduates of a CBE course and are now interacting with ICT tools in their teaching practice. The type of methodology that is employed in this inquiry aims to highlight the tensions that influence the transfer of skills and knowledge from a postgraduate course to teaching practice.

3.2   THE CONTEXT OF THE INQUIRY

This section focuses on the participants selected for this inquiry and the context and content of the post-graduate computer-based education course for which they were enrolled.

3.2.1   The participants

The participants in this study were two educators who were students in the CBE course mentioned above who are now practicing educators at a certain Gauteng school. One educator teaches accounting and business economics subjects, while the other offers technology and natural science subjects.

Prior to registering for the postgraduate course, the educators had already obtained a Further Diploma in Education (FDE), now known as Advanced Certificate in Education (ACE) in the area of CBE. This course also involved the acquisition of basic computer skills and learning and teaching using a computer. Upon completion of the FDE course, they had an idea of what teaching and learning with computers entailed. However, their skills were not yet optimally developed.

Although there are two computer laboratories with a total of 50 computers at the participants' school, only one laboratory is used. The other computer laboratory is not functional as yet because there is no software installed nor is there a network connection. The computers in the functional computer laboratory are installed with Microsoft office packages and they have an Internet connection allowing them to log on to Gauteng Online.

In addition, there is a typing room where learners are taught typing skills, however, only those who take commercial subjects receive typing lessons. This typing room will be phased out when the second computer laboratory is functional. Even then this computer laboratory cum typing room will only be accessed by learners who are doing commercial subjects such as typing.

3.2.2   The course

The CBE course for which the participants registered is a part-time post-graduate course to be completed over two years at the University of Johannesburg. It consists of a variety of modules, which includes the core modules, namely Educational Computing Foundations, Computer Based Teaching and Learning, Development of Multimedia Instruction, Development of Web-Based Instruction, and Computer Skills for Educators. Besides these core modules, the educators were also trained to acquire advanced computer skills using MS Word, MS Access, MS Excel and MS PowerPoint amongst others.

The theoretical components of the course exposed the students to the concept of learning and knowledge acquisition using computer technology. The students explored this concept in detail and were given the opportunity to learn about learning theories, philosophies of learning, and learning styles related to the use of Information and Communication Technology (ICT) in the classroom. The practical components encouraged the student to design computer based learning packages with Macromedia Authorware and MS FrontPage software. At the time of designing the learning packages, appropriate methodologies and teaching and learning theories were applied.

3.3 QUALITATIVE RESEARCH DESIGN FOR THIS INQUIRY

The research design for this study is a generic, qualitative case study. As people in societies interact with each other and mediate with social artefacts, they continually make meaning of their environment, but also encounter problems. Qualitative research aims at creating an understanding of the human phenomena and social problems as they (human beings) understand them in their own context (Leedy, 1997; Merriam, 1998; Berg, 2004 & Marshall & Rossman, 1999) and for this reason my inquiry aims to identify the tensions that influence the transfer of skills and knowledge, gained through completing the course, to teaching practice.

Having completed the Computer-Based Education course, and having acquired the skills and knowledge, I personally experienced obstacles in integrating computers in teaching and learning activities as a practicing educator. Therefore I became curious, needing to understand if other educators experienced the same problems in integrating computers into their teaching practice. Merriam (1998) points out that researchable questions and the urgency to improve the teaching and learning practice is motivated by researchers finding themselves in similar situations to mine. A qualitative research approach is considered best suited in such circumstances and so this inquiry will not only seek understanding of the social phenomena, it will also produce explanations of the tensions experienced by the participants in their school using a qualitative approach.

Mason (1996) is of the opinion that qualitative researchers should be conscious of the role that they play in the research because they cannot separate themselves from the evidence that they will be gathering. In Chapter one, I elaborated on my motives for carrying out this research, therefore, my role in this regard will firstly be to satisfy my curiosity; secondly, to establish how the tools of ICT can be used in educational settings to all the participants' and learners' advantage; and lastly, to identify the tensions that influence the transfer of skills and knowledge from the course to teaching practice. Mason (1996) argues that qualitative research should also offer explanations, and not only descriptions and explorations, because these are not "neutral, objective or total". This inquiry can therefore, be used to offer explanations as to the actions and behaviours of both the participants and the immediate community surrounding them, after they (the participants) graduated from the course. According to Mason (1996) qualitative explanations can also be employed to generalise the study to situations of similar settings.

3.4   THE CASE STUDY AS RESEARCH DESIGN FOR THIS INQUIRY

A case study allows researchers to study a particular person, a social setting, event or a small group of people in order to understand how individuals "operate or function" within their environments (Berg, 2004). Adelman et al. (1980) and Leedy (1997) agree that a case study focuses on the smallest "single phenomenon" which is "bounded by time and activity". This characteristic of being "bounded" means that there is a limit to the number of people to be interviewed, and there is an amount of time within which the study can be carried out (Smith, 1978 as cited by Merriam, 1998).

According to Bless and Higson-Smith (1995), a case study, is "a way of organising social data, looking at the object to be studied as a whole and inquiring about a complex social science issue about which little is known" and the issues that need to be addressed are usually the "how" and the "why" ones (Carson, Gilmore, Perry, & Gronhaug, 2001). Furthermore, Gall, Borg, and Gall (1996) describe the purpose of a case study as that which offers descriptions, development of

explanations and evaluation of the phenomena, hence a case study has the potential of creating knowledge. Merriam (1998) explains that a case study can also be employed to describe or analyse an instance that is a cause for concern. Hypothetically in this case study, the two participants are interacting with computers and 'unknowingly' transfer skills and knowledge that they learned during the CBE course to their teaching practice. However, there are tensions that influence this transfer and create a "cause for concern" or what Stake (2003) refers to as the "unit of study".

A case study may be used to gain an in-depth understanding of the situation and develop meaning for those involved in an educational setting (Merriam, 1998). Coupled with the above descriptions, the use of a case study as a methodology for this inquiry, with the "unit of study" being the tensions that influence the transfer of skills and knowledge to their teaching practice, is appropriate.

Olson (1982) explains that case studies highlight factors that complicate the situation. It is apparent from this inquiry that the emergence of ICT in education has impacted on educators and communities in different ways. Some of them embrace the change and make preparations to implement it. However, other people resist the change and develop negative attitudes. Case studies indicate how different personalities and differences in opinion can influence the outcome. The findings offered in Chapter 4 indicate that some educators who developed an attitude towards interacting with ICT with a result that their actions and opinions discouraged and created tensions that influenced the transfer of skills and knowledge in their teaching practice. Reasons why "innovations" fail or succeed may also be highlighted in case studies. The use of ICT in teaching and learning is an innovation, but if it is not supported, it is bound to fail. This becomes evident in the findings in Chapter four. Case studies also have the potential of generating knowledge (Stake, 2003) and lastly offer descriptions, development of explanations and evaluation of the phenomena (Gall, Borg & Gall, 1996). I hope that the findings will generate sufficient knowledge as to what is occurring in some South African schools regarding ICT. This can perhaps encourage further research where the problems can be treated and a new perspective gained to

encourage and help educators embrace this innovative way of teaching and learning.

3.4.1 Description of the case

The two participants are currently practising educators at a certain Gauteng school. The one participant, whom I will name Peggy, teaches accounting and business economics subjects. The other one, Brenda, who is a member of the School Management team in the capacity of Head of Department for the Technology learning area, offers technology and natural science subjects.

The participants initially registered for a Further Diploma in Education (FDE) now known as Advanced Certificate in Education (ACE) in the area of Computer Based Education (CBE). This course focused on basic computer skills and modules on principles of teaching and learning with computers. Upon the successful completion of this course, the participants were eligible to register for a post-graduate course in CBE.

Prior to completing the course, the participants had no computer skills and did not realise the value of such a course in helping them to interact with ICT and to integrate it in their educational settings. Since I was also a student registered for the FDE course, we had many discussions and we were all looking forward to acquiring skills that would prepare us for careers other than teaching. Many participants wanted to leave the teaching profession, but did not feel prepared for the market outside the education fraternity. However, upon completion of the FDE course, we had an idea of what teaching and learning with computers entailed and considered ourselves sufficiently skilled to interact with them and to integrate them in our teaching and learning. We became hopeful that the introduction of computers into the educational setting would enable us to use the skills and knowledge in our teaching practice. This could have perhaps motivated us to change our minds about leaving the teaching profession, and continue with post-graduate study by registering for a B Ed (Hons) in Computer Based Education.

The two participants were purposively selected, based on successful completion of their Honours degree in CBE, and their continued use of computers in their day-to-day practice as educators, within the locality of their school. Following my experience after completing my FDE in CBE (see Chapter 1 Context and rationale of the inquiry) and subsequently a B Ed (Hons) in Computer Based Education, I became concerned that the students did not transfer the skills and knowledge to their teaching practice as optimally as is expected. In our NRF research project's proposal, we argue that the failure to transfer skills and knowledge could be influenced by the post-graduate programmes, the participants themselves, and/or the environment in which they work, which could hinder the effective transfer of skills and knowledge. This inquiry will therefore focus on identifying the tensions that influence the transfer to the participants' teaching in the school environment.

The participants have explained that not all educators at their school have computer skills. One educator has completed an ACE course in CBE, but from reports, he does not seem to integrate computers in his own teaching practice. The principal has taught himself to use a computer, and two white educators are skilled in using computers. One of them is in charge of the computer laboratories and the other one teaches typing as a subject to learners in the higher grades who take commercial subjects. The rest of the educators do not know how to use computers, nor are they studying the CBE course or any related ICT course.

There is no time allocated for computer work in the school timetable. The educators and learners take turns to visit the laboratory, but not as often or as regularly as would be required. This is a problem because the number of learners per class is high and the limited number of computers in the laboratory cannot accommodate all of them at the same time, which means the learners take turns to work at the computer or share a computer. Whenever the learners come to the laboratory to use computers, they must log in. In most cases, they have forgotten their username and passwords. The participants must then go through a process of giving the learners log-in rights, so eroding the computer usage time. The result is that by the time the period comes to an end, no optimal work has been completed.

As most educators at the school do not have computer skills, their teaching practice is affected as they have yet to make full use of Gauteng online and the learning material offered for all learning areas. Many learning areas are compromised as a result of this. The participants have their own time-tables and subjects to attend to, which means that the participants make use of the computers by taking their learners in their respective classes to the laboratory. Learners who do interact with ICT are, to a large extent, those who take commercial subjects, particularly as this group is taught by Peggy, who specialises in commercial subjects.

3.5   METHODS OF DATA COLLECTION

Merriam (1998) defines data as information that is found where the research is being conducted. LeCompte & Preissle (1993) understand data to be information that is relevant to what needs to be studied and which can be collected and used to provide answers to research questions. To further define data, Merriam (1998) states that qualitative data is information that exposes the participants' feelings, opinions, experiences and how they understand their situation. There are various ways of collecting data, and Lincoln and Guba (1985) suggest that researchers need to know first hand how are they going to collect data and which tools are going to be used for collecting it. Data for qualitative research can be collected in many ways, for instance through interviews, observations and extracts from documents (Patton, 2002 [online]). For this inquiry, data was simply collected by means of a semi-structured focus group interview and two individual interviews.

3.5.1   The semi-structured focus group interview

Interviews are usually used to gather information about certain aspects of life regarding people's feelings, their opinions, experiences, behaviour and meaning (Denzin 2001; Rubin & Rubin 1995). Patton (as cited in Merriam, 1998) explains that these domains are not always directly observable and cannot be measured.

As a result, interviewing people gives researchers the opportunity to penetrate these unobservable and immeasurable domains to extract information.

A focus group interview and follow-up interviews were employed in the study to give the participants an opportunity to share information in a form of a conversation. A focus group interview is a "carefully planned discussion designed to obtain perceptions in a defined area of interest in a permissive, non-threatening environment" (Kreuger, 1988) used in exploratory research where the purpose is "to obtain information of a qualitative nature from a predetermined and limited number of people" (Kreuger, 1988). Interviewing the participants in the focus group proved useful as it yielded data that exposed their experiences regarding their interaction with computers in their teaching practice, which in turn helped to answer the research question and expose the tensions that influence the transfer of skills and knowledge. The participants shared information regarding their experiences, opinions, personal changes, influences and feelings regarding their interaction with ICT tools at their school (Wilkinson, 2000). Secondly, they also discussed the changes that they experienced in the execution of their duties since graduating from the course. All these elements are unobservable and immeasurable domains that can be exposed in a focus group interview.

There was one main open-ended question that was posed to the participants. The purpose of that question was to initiate a conversation and generate discussion (Billig, 1987). While facilitating the discussion, I allowed the participants to share as much information as possible, without interfering. I only intervened when I needed clarification on certain issues. According to Henning, Van Rensburg and Smit (2004) data is regarded credible and believable as long as it is not polluted by the researcher interfering with the process. In order to direct and manage the conversation process, I also prepared sub-questions to ensure that all aspects relating to the main questions were covered. Gubrium and Holstein (2002) state that, the researchers need to guide and direct the interview process to maintain focus and to avoid going astray. It can be noted that the type of questions I used were structured, open-ended and flexible in order to initiate a conversation

(Merriam, 1998), which Rubin and Rubin (1995) maintain is an appropriate method of data collection used in qualitative research.

3.5.2   Individual semi-structured interviews

Individual semi-structured interviews were also carried out with each of the two participants at their homes as interviewing "is the best technique to use when conducting intensive case studies of a few selected individuals" (Merriam, 1998: 72). In hindsight, I sensed that there are valuable data that I could have left out that the participants were hesitant to share in the focus group interview, particularly as one participant is a member of the School Management Team. As a result, the purpose of carrying out individual interviews was to make sure that each participant had an opportunity to share data and I wanted to clarify issues that had arisen in the focus group interviews, reinforcing the idea that researchers are allowed to probe and ask more questions and saturate the data (Berg, 2004).

Both interviews were recorded and then transcribed verbatim as Merriam (1998) states that "verbatim transcription of recorded interviews provides the best database for analysis".

3.6   DATA ANALYSIS

Bassey (1999) states that, data analysis is a meaningful and trustworthy conclusion that a researcher draws from raw data. The researcher, however, needs to "support" and indicate what has been done to reach a particular conclusion. Mouton (1996) refers to data analysis as a process of reducing data to manageable portions so that patterns and themes can be identified. Berg (2004) also states that in order to establish themes and patterns, data need to be accessible and understandable. Part of the underlying framework of this study is Activity Theory which was employed as an analytical lens (Lautenbach, 2005), a suitable method for data analysis in qualitative case studies (Nardi, 1996).

After I collected data and recorded the interviews, I transcribed them verbatim into a Word document. In some instances the participants responded in Setswana, and I transcribed in that language. For the sake of non-Setswana language users, I provided translations and tried as far as possible to translate exactly as they had reported the data in order not to interfere or pollute it. I read the transcriptions several times and began the process of analysis (Creswell, 2002).

Data were thereafter coded to form categories which reduced it to small and manageable portions (Wilkinson 2000; Creswell, 2002; Bassey, 1999 & Berg, 2004). The data were coded by focusing on, amongst other things, the participants' feelings, needs and actions as they related their experiences about interacting with ICT at the school. I used the process of open coding to develop categories. This enables the researcher to narrow inductively or reduce data into themes or categories (Creswell, 2002), so "bringing it all together" (Mouton, 1996:161).

The method of coding and content analysis used in Lautenbach's study (2005) was followed in this inquiry. I converted the codes into action verbs and mapped them or assigned them to specific areas or components of Engeström's expanded activity triangle model (1987a) see figure 3.1. To clarify this, I looked at the subject for instance, and from the data, I isolated everything that translates to a tension that could influence the transfer of skills and knowledge, and converted that into an action verb. To support this, Merriam (1998) explains that coding is a process of assigning specific areas of data to certain designations which can be in the form of certain words, letters or numbers. This process was followed so that understanding, interpretations and meanings can be formulated without getting lost in the data and losing the essence of the research question (Berg, 2004).
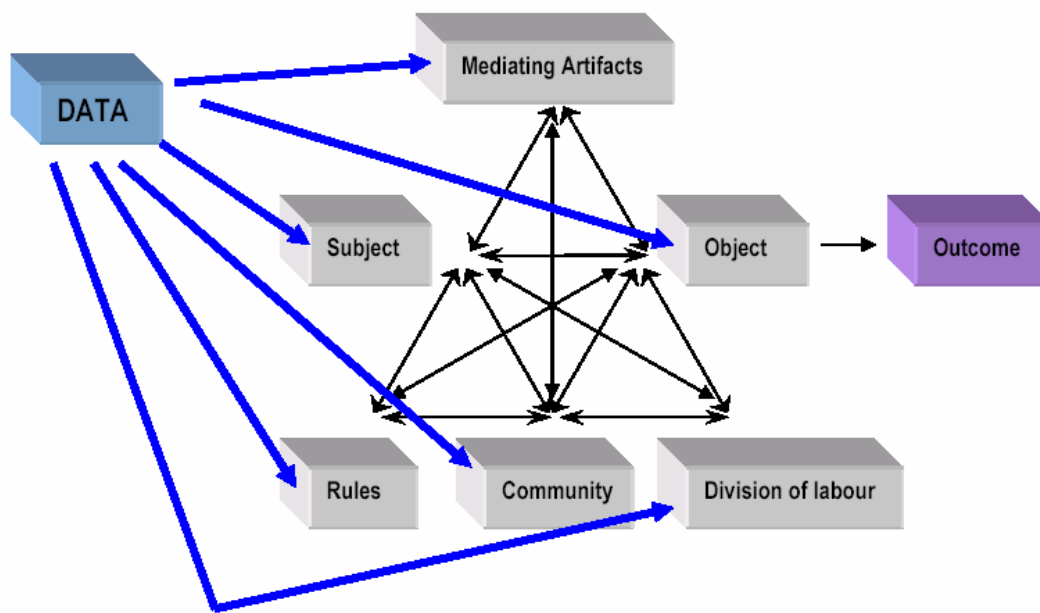
Figure 3-1: Activity theory used as a data analysis tool (Lautenbach, 2005:34)

3.7   THE TRUSTWORTHINESS OF THE INQUIRY

The concept of trustworthiness in research has been used by Guba and Lincoln (1985) to substitute the methodological norms of validity and reliability. Establishing trustworthiness of the research is to ensure that the research is credible, trustworthy, and has quality. Lincoln and Guba (1985); Healy and Perry (2000) and Carson, Gilmore, Perry and Gronhaug (2001) indicate that the following criteria can be used to establish trustworthiness: credibility, transferability, dependability and confirmability of findings. In addition, Krefting (1991) pointed out that truth-value, applicability, consistency and neutrality are criteria that can also be applied in or to any type of research. Carson *et al.* (2001:197) also states that trustworthiness can be earned when research demonstrates "transparency" of the findings. In light of this, the criteria indicated in Guba's model (see Table 3.1) motivate the use of the mentioned strategies to establish the trustworthiness of this inquiry.

Criterion	Qualitative approach	Quantitative approach
Truth-value	Credibility	Internal validity
Applicability	Transferability	External validity
Consistency	Dependability	Reliability
Neutrality	Conformability	Objectivity

Table 3-1:   Guba's comparison of criteria by research approach (Krefting 1991:217 quoted in Lautenbach, 2000)

Lincoln and Guba (1985) believe that researchers need to find a way of attracting the attention of the "audience" that the research seeks to address. This can be established by addressing the needs and concerns of the participants and aids them in understanding their situation and motivating them to do something about the situation (Leedy 1997). Carson *et al.* (2001) confirms this by stating that "qualitative research is able to get close to the phenomena under investigation" and therefore it is able to determine changes and development and the quality of the inquiry. In the context of this inquiry, the emergence of ICT in educational settings should be embraced without hindrances or barriers because it signifies that emerging technologies require that members of the society, especially those in education, need to prepare and align themselves with the changes. Trustworthiness can, as a result of this, be established if the research question is answered and, in turn, the audience is motivated to act on embracing the impact of ICT in educational settings.

3.7.1   The credibility of findings

The data and data analysis of findings can only be deemed credible if they are believable, accurate, and trustworthy to the participants and to the researcher Lautenbach (2000). Creswell (2002) suggests triangulation, member checking and auditing the correctness of the study to render the inquiry credible. The credibility of this inquiry was enhanced by my involvement and experiences as an educator immersed in the change that was introduced by teaching and learning with ICT tools in township schools. I personally witnessed the impact that it had on the management of the school and colleagues who were feeling unsettled at the

prospect of having to use ICT tools in teaching and learning activities, and I have reported it as accurately as possible.

Triangulation, according to Denzin (1978), Leedy (1997) and Freeboy (2003) is the use of varied methods and data collection techniques in a single study. Mouton (1996) indicates that using one method can be a disadvantage because each method has limitations. To overcome this, triangulation ensures that each method covers the limitations of the other. Creswell (2002) elaborates further that triangulation enables the researcher to produce a credible and accurate study, since data is collected using more than one data collection method. Secondly, each segment of information is examined and "evidence will be found to support each theme" (Ibid.).

In this inquiry I have employed the focus group interview and individual follow-up interview methods to yield sufficient data collection and analysis. I am aware that there are slight differences if any, between the two types of interviews, but the one interview session was conducted with both participants simultaneously and the other one was held individually with each participant. In addition to both interviews being used to elicit information, as detailed above, the reasoning allowed me to find a way of applying triangulation (Merriam, 1998), saturating data and ensuring that each participant was at liberty to yield data that could not be revealed in the presence of each other.

After transcribing the interviews, I applied member checking by asking the participants to check if the data that they yielded was recorded and transcribed correctly and accurately (Merriam, 1998). In line with this process, Creswell (2002) suggests that participants can be asked to check to ensure that the description is complete, realistic and the interpretations fairly represent the truth as they know it or as near to their knowledge and understanding as possible. Leedy (1997) adds that this process will also confirm and support the manner in which each participant's experiences were interpreted. This would mean that if I had misinterpreted data, it would offer me an opportunity to make corrections, revisions and add new insights should they emerge. Schwandt and Halpern (1988) offer a

guide to criteria against which the credibility of the study can be measured, which include the grounding of questions in the data, the logical inferences, appropriateness of the themes, and justification of decisions, methodological shifts and the researcher's bias.

3.7.2 The transferability of findings

Findings are transferable if they can be applied to a similar case that is being studied, but it is not safe to assume that the outcome of the research will be comparable or applicable to other similar groupings of participants (Lautenbach, 2000). This can be achieved if this inquiry can be generalised to other settings, where other practising educators who are graduates of the CBE course are interacting with ICT tools or use computers for teaching and learning. My similar experiences (described in Chapter 1) and those recorded in this study allow me to suppose that this inquiry will be transferable because other practising educators, who graduated from the course, should be experiencing similar situations in their own teaching practice.

3.7.3 The dependability of findings

According to Guba and Lincoln (1985), Clont (1992) and Seale (1999) dependability of findings corresponds to, or is closely linked to reliability and consistency in order to establish the trustworthiness of research. Ultimately, the research findings need to enable the researcher to conclude that these findings are constant with or typical of the case that was studied (Lautenbach 2000). In a qualitative inquiry, findings are dependable when they are consistent as stated above. When I conducted follow-up interviews, I found that the data yielded in the focus group interview, were consistent with the data in the individual interviews. I did however, find additional data in line with what was previously reported in that if the participants were hesitant to share certain issues in the focus group interview, they were open to discussing these individually, as well as other queries that had arisen in the focus group interviews and needed clarification.

3.7.4   The confirmability of findings

The confirmability of findings can also be done by employing the audit trail (Merriam, 1998) or "inquiry audit" as suggested by Lincoln and Guba (1985). Bassey (1999) describes an audit trail as a record that firstly, enables an auditor to check the research stage by stage in order to certify that the conclusions are justified and secondly, that other researchers can use the research to make their own interpretations and or assumptions.

3.8   ETHICAL CONSIDERATIONS OF THE INQUIRY

Ethical standards that are set out by the Faculty of Education at the University of Johannesburg were taken into account and applied during this study. Bassey (1999) drew my attention to, amongst other things, ethics regarding democracy, respect for truth and respect for persons, as was the case with the selected participants in this inquiry.

The participants were two female educators purposively selected as they had completed the post-graduate CBE course and both were teaching at the same school. The participants were invited to participate in the research on a voluntary basis understanding that they could withdraw from the research at any time without penalty. They were asked to participate in a focus group interview as well as an individual interview. Permission to conduct the research with two educators was gained from the principal of the school (Appendix A) where after, the participants were sent a letter explaining the research and the purpose of the research and requesting their participation (Appendix B), which the educators signed, consenting to participate in the research. The participants were assured of confidentially and anonymity in the reporting of the research. Pseudonyms were assigned to them to safeguard their privacy and their identities. The name of the school was protected as were their characters and integrity in and out of the school where they practise as educators.

3.9   SUMMARY OF THE CHAPTER

This chapter focused on the research design, which is the planning and the manner in which this inquiry was carried out. The context of the inquiry is facilitated by the description of the course and the two participants. Their involvement and operation in their teaching practice is discussed in detail. The qualitative design section deals with research methods, how data was collected and which data analysis procedures were followed. Methodological norms, such as the trustworthiness of this inquiry, are also described. The criteria that were followed to establish this are also provided and the ethical considerations of this inquiry were described in detail.

Chapter 4 will provide the research findings and the discussion of findings which will help in identifying the tensions that influence the transfer of skills and knowledge from a post-graduate course to teaching practice.

CHAPTER 4:

THE RESEARCH FINDINGS: TENSIONS THAT INFLUENCE SKILLS AND KNOWLEDGE TRANSFER FROM A POSTGRADUATE COURSE TO TEACHING PRACTICE

4.1 INTRODUCTION

In this chapter, I discuss the data analysis and research findings of this inquiry. The interview transcripts were derived from a single semi-structured focus group interview and an individual follow-up interview with each participant. I will briefly elaborate on the process and procedures conducted during the analysis and interpretation of the transcripts. Data in this inquiry have been organised in such a way that the codes incorporate action verbs like implementing, using, transferring, teaching, guiding, helping, focusing and several others following Lautenbach's (2005) method of coding (based on the work of Cathy Charmaz, 2003). The codes (which can also be seen as actions) were, then, categorised, arranged and subsequently assigned to specific areas or components of Engeström's expanded activity triangle model (see figure 3.1.). This order was used to answer the research question and to formulate understanding, interpretations and meanings (Berg, 2004:37).

4.2 CONTENT ANALYSIS OF THE SEMI STRUCTURED FOCUS GROUP INTERVIEW

The semi structured focus group interview included the two selected participants who were interacting with ICT tools at their work place. As mentioned earlier, the codes were derived from analysis of the raw interview transcripts and

supplemented with action verbs. The aim of this analysis was to expose the tensions that exist within the activity system (See figure 4.1 and 4.2). One of the participants, *Brenda*[2], is a member of the School Management Team (SMT) and teaches technology and natural science. The other, *Peggy*, teaches accounting and business economics. They are both graduates of the CBE course that was offered at the Rand Afrikaans University (RAU), now called the University of Johannesburg (UJ).

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[2] Pseudonyms were used to protect the identity of the participants.

Subject
Not implementing what they learned
Not using computers in daily learning activities
Not transferring knowledge and skill learned
Using available admin computers after school
Teaching basic computer skills is impossible
Frustrating because it's impossible to help all learners in one period
Restricted to practising learned skills and knowledge
Guiding learners to search information on Gauteng online
Using computers to do type lesson plans
Computers making life easier
Using chalkboard to teach
Making copies
Frustrating for them
Not appreciated
Wanting to leave the teaching profession
Offering to teach other educators
Feeling strongly that everyone at the school must learn how to interact with ICT.
Feeling strongly that SGB must have the knowledge regarding ICT
Preparing time-table for the school
Helping learners is sometimes not possible
Focusing on integrating computers in learning is impossible
Designing and installing tutorials is not possible
Wishing that they could do more
Needing to do more work in the computer laboratory.

Follow-up interview: Brenda
Empowered by skills learned
Feeling suppressed
Losing acquired skills
Feeling unrecognised and unacknowledged
Unsure of what policy stipulates
Not designing tutorials
Making suggestions, but having them rejected all the time

Follow-up interview: Peggy
Changing personally and professionally to a certain extent
Using computer to help HOD with computer work
Cannot advise on integrating computer for teaching and learning
Using old policy
Revising policy
Not transferring skills and knowledge
Taking only the learners whom she teaches to the computer laboratory

Mediating Artifacts
Limited use of Gauteng online
Every educator knowing how to use ICT tools (computer)
Feeling strongly that must have own computers
Using the Old System of teaching
Planning lessons, hand outs, chalkboard
MS Word tools
Using software to draw time-tables
Limiting resources
Wishing to design tutorials and install them
Typing for commerce learners
Using Computer Application Technology (CAT), which teaches the same skills that participants learned
Participant's emphasise that they must be given a chance to work with CAT

Rules
Using ICT after school or whenever the facilities are available
Not allocating ICT sessions in the time-table
NCT emphasizing that the learners must complete a project using a computer
Dept of Education not employing more educators
No designing and installing of tutorials possible on Gauteng Online, even for the school
Providing of limited computers by government
Giving white educators preference over participants
Lacking in planning, knowledge, support and resources
Always locking one computer laboratory
Visiting the computer laboratory once every 3 weeks
Typing only possible for commerce learners (and CAT next year
Overcrowding by learners
Rejecting and suppressing suggestions to integrate ICT at the school

Figure 4-1: Initial codes from content analysis of the two participants' interview relating to the mediating artifacts, the subject, and rules within the activity system (Lautenbach, 2005).

Community

Learners
Using ICT when doing a search
Wishing to learn
Frustration of having to share
Not sufficiently skilled
Interacting sufficiently with ICT impossible
Accommodating in the computer laboratory is impossible
Former learners still come to ask for assistance
Asking for assistance to complete projects
Not receiving knowledge and skills
Disrupting lessons out of curiosity
Feeling neglected and left out
Interacting with ICT by commercial subjects learners

Educators
Resisting learning to use ICT
Lacking in knowledge about the benefits of CBE
Mocking participants
Sending learners to ask for assistance
Preferring white educators over participants
Feeling inferior
Surprised at what can be done using ICT
Asking why it must be the chosen few
Training for 3 days is sufficient to learn computer skills

School Management Team
Not interested in learning how to use UCT
Lacking in knowledge, skills, input and support
Resisting input and suggestions

School Governing Body & Immediate Community
Lacking in knowledge about ICT and CBE
Resisting change
Poor background
Inability to pay school fees
Lacking in support of ICT integration
Not prepared to help in making sure that the school is sufficiently resourced

Object

Not enough computers to deliver ICT
Shortcoming regarding the use of computers and ICT
People are tired of participants and ICT

Division of labour
Allocating of subject restricts ICT interaction
Suppressing input and suggestions
Preventing opportunity to roll-out ICT interaction to all learners
Discriminating against learners who do not take commerce as a subject
Not clearly defined
Discriminating against black CBE educators
Preferring white educators over their black counterparts
Restricting allocating ICT interaction

Figure 4-2: Initial codes from content analysis of the two participants' interview relating to the community, the object, and division of labour within the activity system to indicate tensions that exist within the system (Lautenbach, 2005).

From the coding of raw data and subsequent mapping of the codes onto the Activity Theory triangle, the following tensions that influence transfer of skills and knowledge were identified.

4.2.1 Tensions between the Subject and Mediating Artefact: Computer (Tool)

Regarding the subject (teacher) interacting with the tool (computer), it is interesting to note that the participants somehow seemed to focus more on the teaching of computer skills. They expressed the need to teach these basic skills, even though the focus of the CBE course was on the use of the computer for teaching and learning. Evidence of this can be found in the following quotes "**I stayed there in the computer room. I used to wait for them in the computer lab: alone for the whole week. No one attended until I gave up**", and **"We made an arrangement with the teachers to help them in the afternoon".** They believe that **"it should be a basic requirement for all the teachers to acquire the skills**. Brenda thought that perhaps she could use her position to ensure that educators get to use computers by instructing them to use computers in everything they do: "**I even went to the extent of instructing my subordinate that everything, including lesson plans, must be typed".** This is consequently creating further tension because the tool (computer) seems to be causing power struggles between the subject and the educators who report to her.

The tensions mentioned above are further compounded by the fact that the subjects were unable to use the ICT tools at their school due to the lack of computers. They referred to "**some shortcomings in our working place**" and "**there are only 3 computers at the administration office, which we are possibly only able to access after school**" and "**Brenda would like to have her own computer lab: and I also want a computer laboratory: where we can apply our skills**". The participants were, furthermore, not content with having to use the computer after school hours, **"or when we are free and no one is using the computer by then.**" A further tension is also evident in the participants' need for personal computers and printers, which are seen as tools that would, in their opinion, make their educational practice much easier. Where computers were available for use by the participants in the schools, another tension was revealed when they expressed **"not having the same tools at the school we were used to".** Participants do not seem to be aware of the fact that the software available to them can also be used to design effective teaching and learning materials as

evidenced in **"We don't have programs that we can use to design tutorials, but we have Microsoft Word, PowerPoint, Spread Sheet".** In this case they are referring to the fact that they were taught with sophisticated authoring software that is no longer available to them at the school.

Besides the limited resources (tools) at the school, overcrowding in the classrooms made it difficult for the participant to handle large numbers of learners in a computer laboratory that was unable to accommodate them all. "**The computers are only 25. They are only 25 neh, and there is no single classroom here that has less than 40 learners you see. They are 40+ in the classes. So even if you take them up there they still have to share 4 or 3 learners to a machine. At the end of the day they get destructed and it is frustrating for a teacher when trying to help them with the computers under such conditions".** This tension was further compounded by the "locked door syndrome" where headmasters or other people in management positions kept the computers under lock and key: "**we do not have access to the lab as much as we want to".**

With regard to the tools that they use for teaching, the participants reported that they still use the traditional teaching tools that they used before completing the CBE course, for instance the chalkboard. Even though they express dissatisfaction with having to use these tools, there was still the expectation by the participants that teaching would change automatically with little or no input from them: "**But for teaching purposes nothing has changed so far because we still teach using the black board, we still have to do the copies like before. Unlike what we have learned we thought that maybe things will change and we will interact with the learners through the computer but is still the same nothing has changed so far.**" It is as if they actually expect computers to provide the answers to all of their teaching problems. On the other hand, they also express the fear that they are losing the knowledge and skills learned in the CBE course through **"lack of use".** One states **"I feel I am losing some of the skills that I have acquired".**

Despite the limitations reported above, participants did acknowledge some positive aspects regarding the tool. They felt empowered and said that the course had changed some aspects of their professional and private lives. Peggy stated that, professionally, the course had changed her in the following ways: "**Yes. For me I can do some of my management work using a computer. I am also able to save my work and it makes my life easy. It's not like before when I had to set a test from the beginning. I can save my documents and access them whenever it is necessary and I only download question papers from the previous years and make changes here and there**" and "**It's like I mentioned previously that I use it on my classroom activities like lesson plans, tasks worksheets, and all those things and I don't have to spend a lot of time on things. For instance I save my tests, next time I do similar lessons I change it there and there and this saves me a lot of time.**" On a personal level, she noted a number of specific changes: "**It has changed my life in different ways for instance… personally I can do my planning, using it to do my budget, management of my things".** Brenda also shared how her private life has changed since she graduated from the course having acquired computer skills. This is what she reported: **"For instance my husband is writing a book. Instead of someone typing his work, I am typing it for him… and the skills are there".** The subjects' exposure to the tool has resulted in a tension with a positive consequence in this case which can best be described as '*empowerment through the tool'* which has given the participants the ability to do new things and to become more effective in their day-to-day practice as educators.

From the evidence above it is apparent that the participants were expecting their teaching to change automatically on completion of the CBE course. Clearly, that there are still many challenges that they need to overcome. Computers will not solve their problems without the participants making an input by using resources (however limited they may be) that are available to them. They need to isolate their problems and identify how the tools can be used to solve these problems (Zhao, 2003). While this section shows that the participants were aware that tools need to be used for teaching and learning, the fact that they reported only restricted use of computers in their school indicates that they were not quite able

to transfer knowledge and skills effectively to their teaching practice. While the findings in no way refute Rascke's (2003) observation that digital technology is producing a yet-to-be-explored terrain of cognition and human sensibility, and Nardi and O'Day's (1999) argument that this development is inevitable, the level of preparation for this in the township school in question seems to be inadequate.

4.2.2 Tensions between the Subject and the Object (using ICT for teaching and learning)

The participants reported that they were not using ICT to their full potential in their daily tasks as educators. Some of the tensions between the subject and the tool, as illustrated in the previous paragraphs, are compounded and emphasized when looking at the object in the activity system. This object is "using the tools of ICT for teaching and learning". A major tension that is evident is that the two educators are not using the tools of ICT optimally in their daily practice: "**we are actually not implementing a lot of what we learned**" and **"we are not using them in our daily activities"**. It is interesting to note that they are, however, very much aware of these shortcomings as illustrated by the following comment: "**Hmm we are not transferring the skills that we learned".**

A major tension that emerged from the analysis of the data is caused by the two subjects spending their time at the school trying to get other staff members to use ICT in their teaching. *They seem to be more concerned with teaching other educators basic computer skills* than focusing on using computers in their teaching. They misguidedly believe that it is their task to get all other educators at the school up to their level of expertise with ICT and that they are obliged to teach basic computer skills: **"They must hire other teachers to teach my subjects, and then maybe they can move me to teach computers."** They also try to explain or provide possible reasons for these educators' lack of interest in using ICT: **"…they are scared of the unknown. They are too what…"** whereupon the other replied **"…naïve?"** It is as if they have *the need* to help other educators at the school to uplift themselves and to 'get them on board': **"It should be a basic requirement for all the teachers to acquire the skills".** These educators, on the other hand, put up a lot of resistance, which may be linked to 'feelings of

inferiority' or perhaps a fear of using technology in their teaching: **"computer is the last thing they want to learn"**. Despite this resistance, the subjects spend most of their time trying to uplift their colleagues and are genuinely concerned that these colleagues should be more interested.

As much as computer skills are a requirement for effective interaction with ICT, I maintain that it should not be the participants' main focus to teach basic computer skills to their colleagues. They should rather focus on teaching using the technology at their disposal and using the concept of 'teaching by example', to uplift their colleagues. This is a subtle difference in approach where a 'pull' effect is suggested in place of the 'push' effect they are currently using to influence other educators to use ICT in their teaching.

4.2.3   Tensions between the Subject and the Rules

A number of tensions between the subjects and the rules that govern and guide the activity system as defined this inquiry became evident through closer analysis of the data. The first tension pertains to the fact that the participants were expecting the rules or policy regarding allocation of duties to be revised once they completed their studies. They were expecting to be allocated teaching duties related to teaching with computers and interacting with ICT: "**We are still teaching the subjects that we were initially employed to teach"**. This tension was aggravated by the subsequent allocation of subjects (which were not related to their new areas of expertise) creating attitudes and beliefs they were *not good enough* and that perhaps their skills were found to be questionable. The following quotes confirm this: "**I am frustrated because I love working and I am not given a fair chance"** and "**I want to do more and I want to transfer the skills to the learners but I am suppressed".** The previously mentioned misconception that it is their role to uplift everyone around them with regard to basic computer skills is highlighted in the quote: **"The department of education maybe needs to employ more teachers so that we can be able to focus on computers. So when I leave to teach computers there is going to be shortage in my department here at school".** The participants were further frustrated by the

decision that they will not be involved in the teaching of Computer Application technology (CAT) despite their qualifications and eagerness to be involved. They express dismay that **"in our school it is being given to a typing teacher".**

This tension is caused by the fact that there are no updated policies and they are currently working on outdated ideas and rules at the school. Participants confirm this by saying: **"I don't remember exactly anything on that clause. I will have to look into that to refresh my mind. Its 3 years down the line, we have not checked on the policy. With the new subjects, I am not sure what is going on there".** One participant recognises that the school policies need to be updated: **"I think the policy needs to be revised after the introduction of computers because we are still using the old policy. If the policy can be revised they can try to change, like that teacher who is teaching typing, maybe we can get a chance to teach computers".**

Other tensions seem to emerge from all forms of policy, rules and regulations within the activity system. The National Curriculum Statement (NCS), for example, expects that learners complete their projects using technology: **"The problem is NCS emphasises the issue of technology. It emphasises that we do other tasks using a computer"** but conflicting and outdated policies at school level add to the frustrations of the teachers on the ground. Participants feel restricted in their interaction with ICT, even when it comes to seemingly simple issues like the allocation of time for using computers at the school. Computer work is not allocated in the school time-table, however, participants do visit the computer laboratory **"…one teacher will always go with one class in a cycle of 3 weeks so you see it is not effective."** Tensions arise from the subjects being allocated insufficient time to use the computer laboratory and the lack of a definite guiding policy on the use of ICT for teaching and learning.

Rules imposed by other stakeholders like *GautengOnline* also create a number of tensions in the activity system as illustrated by the following quote: **"We cannot even put programs there… we are barred. Even if you have a tutorial you cannot install it there. They barred us from installing other learning**

programs". Such restrictions are limiting and play a definite role in how the activity system functions.

Engeström realised that human beings interact with each other collectively and collaboratively by means of tools or artefacts as long as there is some form of shared activity that exists among them within the boundaries as prescribed by the rules that govern the system. Rules need to be flexible enough to accommodate future changes, and to be redirected accordingly. A number of factors pointed out by Bellamy (1993) regarding the use of ICT tools in educational settings are borne out in the findings above, notably that rules are made to give direction and regulation. However, when the social structures, tool use and needs change, the rules also need to assimilate these changes. From the responses of the participants, it is evident that the rules of the school are not accommodating the integration of ICT.

4.2.4 Tensions between the Object and the Community

This section differs slightly from the preceding paragraphs where the subject is compared with some other component of the Activity System. In this case the subject will be incorporated into the greater ICT community at the school and be discussed as another one of the components of this community. The tensions between the subject and the object (using ICT for teaching and learning) have already been discussed, and because the object is a shared activity concerning the entire ICT community at the school, the tensions between the subject and the community will not be repeated here and the focus will be on the tensions between the object (shared goal) and the community as a whole.

The greater community of the school constitutes learners, educators, the School management Team (SMT), the School Governing Body (SGB), the immediate community of parents and other interested parties and stakeholders. Various role players in this community are of the opinion that ICT in education is essential, but a number of tensions arise when trying to implement and use ICT in the teaching and learning process. On the one hand, for example, participants in this study are

of the opinion that **"we should be provided with the resources so that each and every learner can have his or her own computer".** However, a tension arises here because in many cases school fees are not being paid by parents, with the subsequent effect on purchasing power: "**Our school fees are only R250 a year and only a third is paying those fees. So we don't have money. Our school lacks financial support".** The participants also reported that the community living around the school could not afford to support the school because they firstly have limited knowledge regarding ICT and secondly: "**The background here is a very poor one".** Brenda did, in fact, try to look for assistance from outside the borders of the school and she reported that: "**I targeted the companies where I order equipment for technology. I order from them each year and I am their customer. So I thought they will consider my application but … I thought that they will maybe supply us with computers. I have tried that. But they are not interested in adopting us and supplying us with computers".**

The learners are also part of this greater ICT community and are mostly interested in interacting with ICT and using it to learn. ICT is relatively new for this particular group and there are tensions that influence the use of this tool. The participants expressed how learners feel about this: **"They are very keen, they are very keen. It's so pathetic. They are all interested but they don't have ample time to go to the computer lab. It's so pathetic".** A major tension in this regard is caused by the fact that not all learners get an opportunity to use the computer laboratory and it seems that access is limited to those who study commercial subjects (access is determined largely by subject choice): "**I only teach three subjects and it is those learners that get a chance to go to lab and because I teach economics".** Educators at the school are very aware of this imbalance: "**my learners benefit more than the others".** This tension manifests itself as a feeling of 'unfairness' when it comes to the use of the computers in the school: **"…it's unfair for other learners who don't benefit, the others feel they are left out and not taken care of because they don't benefit. So when we are busy in class, the other students disturb us, like continuously knocking on the door. They want to know what we are doing".** This is a tension that not only impacts

on the transfer of skill and knowledge, but also on the future of all learners. The participants seem well aware of the fact that the learners are not getting a 'fair deal': "**Our learners as it is… they are going out to institutions but they do not have the basic skills and it gets very frustrating for them**". They wonder "**how are they going to cope?**" and admit that the education is not equipping them with the necessary skills needed to cope in the new technological society: "**They don't know anything**".

In contrast, the positive attitude of many learners within this school community, and even some learners from previous years, has led to a tension that can be seen as a positive aspect: "**…they see the need because they are always here. They e-mail their CVs; they make applications… so the centre is very good.**" The usefulness of a centre that caters for the broader ICT community is also noted: "**…that computer lab is used for something good that can benefit a few of the community members**".

The other educators at the school also form a major part of the greater ICT community at the school. They all have differing opinions on the use of ICT in teaching and learning, which in itself is the cause of a tension that continuously changes the dynamics of the activity system. For example, one participant claims that "**Our colleagues are not interested and they think that computers are for the chosen few. They always question as to why should a particular person use a computer**". Despite this comment, it is also noted in the analysis of the data that only some educators resisted learning how to use ICT. Others, on the other hand, wanted learners to complete their work using the computers but did not have the personal 'know how'. In this case they gave learners projects and sent them to ask for help from Peggy and Brenda: "**because we are the people who know about computers**". Although this is a positive sign that other educators are also getting involved in an indirect way, it is interesting to note from informal conversations with the participants that there is one other educator at the school who also completed the Advanced Certificate in Education: CBE, with no interest at all in applying his knowledge and skills in this field.

There is also a tension created by the apparent lack of input from the SMT and SGB. This is once again aggravated by the seeming lack of faith in these bodies by the participants who state: **"Well like I mentioned before… there is a lack of knowledge even from SMT. Lack of input, support and interest from them and the SGB alike"**. A severe criticism of these bodies is that **"They don't know anything about computers and they are not making an effort to push so at it should be implemented."** This lack of insight is evident throughout the activity system: **"Yes, lack of knowledge from up there to the last teacher".** This inherent lack in knowledge, unwillingness to support the implementation of ICT, and resistance to change are major retarding factors in the implementation of educational technologies for teaching and learning at the school.

In general, there seems to be an overall lack of support from the greater community within this activity system: "**Lack of proper management, lack of support from school management, SGB, local business people, and even big business… and the government said they must make an input! Especially in this area they can identify schools around with needs and provide for those needs".** Taking this into consideration, there is a possibility that the ideal interaction with ICT tools at the school will take a long time, despite the government's vision to have all learners 'computer skilled' by 2013 (White Paper on e-Education, 2003). Nardi and O'Day (1999) have already reported that educators can transfer knowledge and skills successfully with the necessary support from headmasters, parents, management bodies and colleagues. Nardi (1996) stated that the activities that people engage in make them what they are, and it is also documented that people learn from each other through tool mediation (Nardi, 1996; Bannon, 1997; & Christiansen, 1996). While this may be true in some circumstances, it is evident that in this study certain tensions exist that prevent such mediation from taking place.

4.2.5   Tensions between the Subject and Division of Labour

Peggy and Brenda are both junior educators at the school. Their newly learned skills and knowledge have not been beneficial to them at all back in the school

context. Their experience with ICT is currently overlooked and they are not comfortable with the way duties are allocated at the school. They point out that the school is unable to recognise the extent to which they could enrich teaching and learning activities through interaction with ICT. As mentioned earlier, they are worried that their lack of interaction and practice with the tools will make their skills and knowledge they learned during the course redundant. The evidence of this can be found in this sentence: "**They do not want to give us the chance. Basically I have looked at the CAT manuals, it has all the skills that we have. I don't now how did it come that they are not giving it to me**.

Brenda is a member of the SMT, but cannot influence the integration of computers in teaching and learning due to her lowly status. A tension arises when people like Brenda are more skilled than those above them on the hierarchy, but are not able to influence decision making due to this position: "**In the management team there are two of us who are computer literate. They are not computer literate and our voice is not audible enough because we are juniors in the School Management Team.** Once again it is the SMT as a whole that has to make decisions: **"…we cannot do it alone. We cannot come with a plan. It must be accepted by the whole SMT. If it's not accepted by the SMT, there is nothing that we can do".** This implies that individuals that are in higher positions have the power to compromise progress and innovations in the school because of lack of knowledge, insight and inability to view situations in the long term. It is, however, evident that the participants have tried to make changes at the school but they report limited success: **"We tried, but I told you that lack of knowledge is one of the challenges. We are two against a majority of people who will say this is too much work. They will say we have to get this and that; there is too much negativity, but I think as we mentioned people's attitude is beginning to change after the graduation ceremony. They are starting to send children to us. Based on that, maybe we can press for implementation, but each time we are shot down".**

This limited success is, however, overshadowed by frustrations caused by this tension between the subjects and the division of labour and has led to Brenda

thinking about leaving teaching: "**It's frustrating and I feel like leaving teaching and go somewhere else where I can be more appreciated.**

Ideally, all educators and stakeholders in the school community can progressively acquire the necessary skills and knowledge through collaboration to enable them ultimately to participate in the shared activity of interacting ICT into their teaching practice (Vygotsky, 1978; Engeström, 1999b & Leont'ev, 1978). The clear division of labour, on a vertical scale in this case, seems to be the limiting factor that retards this process. There does not seem to be shared activity among the people with a common goal in mind (Leont'ev, 1978). Even the imbalance caused by the teachers lower down on the scale with greater ICT skills than those in higher positions does not seem to have any effect at present.

4.3   DISCUSSION OF THE FINDINGS

This discussion of the finding is based on the objectives stated in Chapter 1 and is used to finally answer the question that guided this inquiry, namely, what are the tensions that influence the transfer of skills and knowledge learned in a postgraduate course in computer-based education to teaching practice? The literature review in Chapter two has been reflected in the discussion where necessary to illustrate how the tools of ICT can be used in an educational setting to achieve this aim. Secondly, cultural-historical and activity theory, which formed part of the theoretical framework of this inquiry, have also been discussed with reference to specific actions within the system and how these actions led to tensions that influenced the outcome in the system. Activity theory was, furthermore, used as both a theoretical lens and a data analysis tool in this inquiry. The tensions described in this chapter, for example, were identified by focusing on how the elements of the activity system influenced one another and the impact these tensions had on the outcome (the transfer of skills and knowledge to teaching practice: see figure 4.1). All of this must be seen in the light of the discussion presented in paragraph 2.4 on the role of ICT in educational settings.
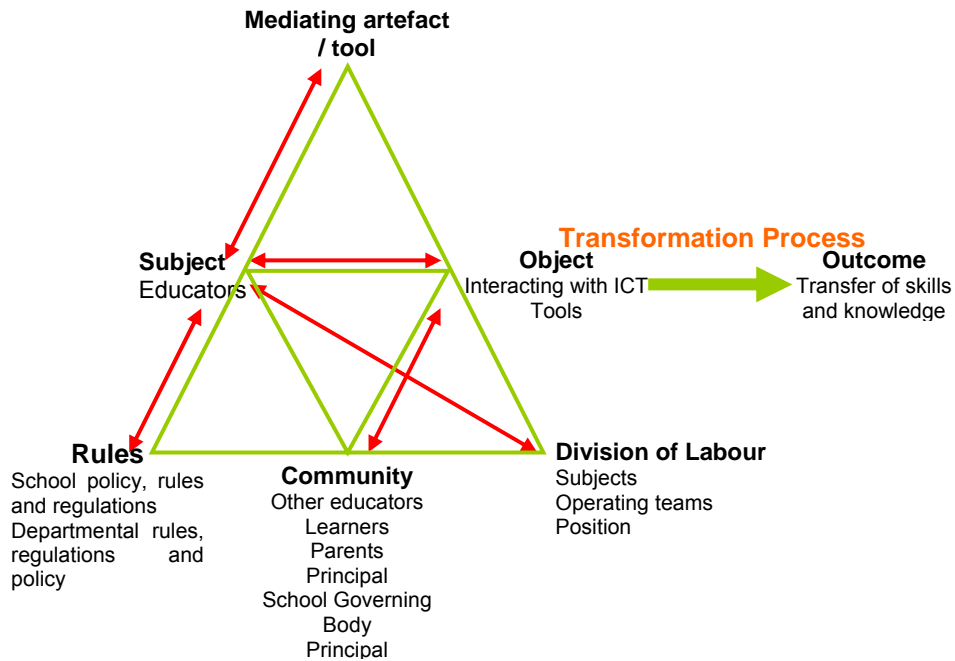
Figure 4-3: **Tensions influencing and impacting on the transfer of skills and knowledge (red arrows indicate specific tensions discussed in this chapter).**

A major finding of this inquiry is that somehow, the participants who completed the CBE course seemed to focus more on the *teaching of computer skills* when they got back to their schools than on the use of the computer for teaching and learning. They strongly expressed the need to uplift their colleagues first, so their focus was not on teaching and learning with technology. What they learned in the CBE course was not used in their classrooms because of this unexplained desire to empower those around them. This phenomenon is further highlighted by one of the participants who went so far as to try to *force* colleagues to use computers in their daily tasks as educators in the hope that this would empower them more and get them up to a certain level of expertise.

The finding mentioned above is further complicated by the fact that the participants were unable to use the tools of ICT at their school effectively in their day-to-day tasks due to the lack of computers and the absence of sophisticated authoring software that they were familiar with. *Participants do not seem to be aware of the fact that the software available to them can also be used to design effective teaching and learning materials.* It is as if they have forgotten the potential of the Microsoft Office software like MSPowerPoint, MSExcel and MSWord, as well as

the many other software packages they were exposed to during the CBE course (some of which are freely available to educators). If these software packages or tools are put to use and integrated into daily practice, participants may discover their potential and find innovative ways of using them (compare Nardi, 1996). This readily available software could subsequently form an integral part of the teaching and learning process (see paragraph 2.3.3).

Besides the limited resources (tools) at the school, overcrowding in the classrooms made it difficult for the participant to handle large numbers of learners in a computer laboratory that was unable to accommodate them all. This is the reality of the participants at the school, however, the available tools could be used to mediate this reality (Kuutti, 1996) and satisfy teaching and learning needs under the circumstances (see paragraph 2.3.3). It is interesting to note that the participants were dissatisfied at having to use the 'traditional teaching tools' that they used before completing the CBE course while, on the other hand, they did little to improve their own situation. It is as if they expected their teaching practice to change automatically on completion of the CBE course with little or no input from themselves and to provide the answers to all of their teaching problems. They also expressed the fear of losing the knowledge and skills learned in the CBE course through lack of use. It is evident from the findings that Peggy and Brenda were not practicing the skills and knowledge they learned during the course. Although they tried to make changes at the school, they report limited success. This makes them believe that their input, experience and contribution regarding interaction with ICT were overlooked by the school. As a result, the integration of ICT in their teaching practice at the school failed. What they should be concerned with, is using ICT optimally in their daily teaching practice by discussing, exploring and exploiting it to their advantage (see Ager 2001; and paragraph 2.4). In doing so, they can make sense of their reality and function socially and individually in computer-mediated environments (compare Smith & Curtin 1998)

On completion of the CBE course, the participants were expecting the rules and policies regarding allocation of duties at the school to be revised. They had the expectations that they would be allocated with teaching duties related to teaching

with computers and interacting with ICT, but this did not materialise. Subsequently, feelings of frustration, suppression and inadequacy emerged as a result of expectations that did not bear fruit. To add to this, other tensions seem to emerge as a result of outdated policies, rules and regulations within the school and its immediate community. Policy changes and implementation need to be in line with changes in the school activity system so that they can direct the activities within the system to ensure that the outcomes (in this case - the transfer of skills and knowledge to teaching practice) are achieved. The rules at the school however, seem to be rigid and unaccommodating, hence the participants' frustration at their inability to make any input since the completion of their CBE course.

In order for the school activity system to function and produce desired outcomes, all stakeholders (the greater ICT community) need to perform their duties optimally in a shared activity that is similar to the primeval collective hunt (Engeström 1999b; Leont'ev 1981). If one component is not performing well, then the efficient functioning of a related component of the system will be affected and the transfer of skills and knowledge could be influenced by the tensions that emerge from the dysfunctional activity. Learners are also part of this community and the activity system of the school. Their access to the computer laboratory is determined largely by subject choice, which creates a feeling of unfairness when some learners are left out. This tension impacts on their future because seemingly their education is not equipping them with the necessary skills to cope in the new technological society. These learners are not led to their zones of proximal development and they do not internalise learning and use it independently in computer-mediated environments (compare Ryle, 1999; Chaiklin, 1993; and Clark & Vogel, 1995).

The other educators' lack of interest, resistance, and unwillingness to support the implementation of ICT also creates tensions which continuously change the dynamics of the activity system. This could be confirmed by the one educator at the school, who has completed an ACE course, but takes no interest in interacting with ICT to practice and apply his skills and knowledge in his teaching practice. Interestingly, there are some educators who do not have the 'know how', but send

their learners to ask for assistance from the participants who are seen to be the experts in the field.

In general there seems to be an overall lack of support from the greater community within this activity system. This, however, seems to be in contradiction with the ideas of the cultural historical theory, which stipulates that human beings learn, practise and solve problems in a collective and collaborative manner (see Kozulin, Gindis, Ageyev & Miller 2003:2; Leont'ev, 1994). Poverty partially explains the parents' inability to pay school fees, but parents' limited knowledge regarding ICT in education further compounds this issue. These factors hinder the school from providing sufficient ICT resources.

Although Brenda is a member of the SMT, her lowly position as an educator does not allow her to influence integration of ICT in the school setting. The division of labour is not well aligned with technological expertise and know-how resulting in senior staff with no technological abilities and knowledge overpowering and inhibiting the implementation of ICT at the school. Consequently, the participants feel frustrated, suppressed and have expressed views of wanting to leave teaching to find other jobs where they will be acknowledged and appreciated.

Despite the reported limitations, participants did acknowledge some positive aspects regarding the tools. They felt *empowered to do new things and to become more effective in their day-to-day practice as educators and also in their private activities.*

4.4   SUMMARY

Open coding and an interpretive content analysis approach was used in this inquiry to expose the tensions that influence the transfer of skills and knowledge from the CBE course to teaching practice. The codes were mapped onto the expanded model of an activity system, as shown in Figure 3.1. The inherent tensions between the various components of the activity system were then exposed. The analysis reported in this chapter discloses the major tensions

derived from the semi-structured focus group interview and individual semi-structured interviews with the participants.

In Chapter five, I will present an overview of the study, highlight the limitations of the inquiry and suggest recommendations for further research.

CHAPTER 5:

OVERVIEW OF THE INQUIRY, LIMITATIONS, AND ISSUES FOR FURTHER RESEARCH

5.1   BRIEF OVERVIEW OF THE INQUIRY

In keeping with the increased importance of computers in education, educators registered for the postgraduate computer based education (CBE) course offered at the University of Johannesburg. This course equipped them with computer skills and the knowledge to use technology in their professional teaching and learning activities. From the cohort of educators who completed the course, two graduates were purposely selected as participants in this inquiry.

The participants interacted within an activity system of the school (described in Chapter 2) with ICT tools, other educators and learners and the community, which consisted of parents and other stakeholders with an interest in the school. However, this interaction created tensions because the context of the participants was now different from that of their counterparts. Based on this activity I arrived at this research question: **What are the tensions that influence the transfer of skills and knowledge learned in a postgraduate course in computer-based education to teaching practice?**

The two graduates of the above-mentioned course are presently teaching at a Gauteng high school. They belong to the social matrix identified by school, community and surrounding environment. They interact with ICT within this context and experience various situations in their attempts to do so. It is my contention that the frustrations and failures that they are experiencing in the attempt to transfer learned skills and knowledge to their teaching practice are directly or indirectly influenced by the activity in their school system.

The research design for this study was a generic, qualitative case study, which aided in creating understanding of the tensions resulting from their attempts to transfer skills and knowledge, gained through completing the course, to teaching practice. A case study was, therefore, used since the inquiry focused on the two participants at their school.

Emerging from the transcription, coding and analysis of a single focus group interview and two individual interviews, the findings of this inquiry have been presented in Chapter 4. Activity Theory was used as both a theoretical lens and data analysis tool in this inquiry. This chapter highlights some of the most important findings, identifies the limitations of the inquiry, makes recommendations for further research, states the contribution of this inquiry, and offers a final word.

5.2   MOST IMPORTANT FINDINGS

The most important finding of this inquiry was that the participants focused more on the *teaching of computer skills* when they got back to their schools than on using the computer for teaching and learning. They did not transfer the skills and knowledge learned during the course to their teaching practice owing to a lack of resources**,** although they were exposed to other available ICT tools that they could use in innovative ways **(see paragraph 4.2.1)**. Their efforts to make changes were fruitless and this created fear that they might lose their skill and knowledge **(see paragraph 4.2.3)**. To compound this, the classrooms were overcrowded with learners, and the number of computers available in the computer laboratory could not accommodate them all **(see paragraph 4.2.1)**.

The outdated rules and policy at the school prevented them from practicing in ICT related fields **(see paragraph 4.2.3)**, and this created frustration and a desire to leave the teaching profession **(see paragraph 4.2.5)**. This was compounded by lack of recognition and appreciation by school management, and lack of interest from both other educators and the community **(see paragraph 4.2.5)**. Resistance

and unwillingness to support the implementation of ICT by these groups were also significant.

5.3   LIMITATIONS OF THE INQUIRY

Being a novice researcher, with generous, but not limitless time and resources, I was not able to follow up on all graduates of the CBE course. Participants included only two educators at a single school who had completed the CBE course. I am confident that the research is transferable to similar situations elsewhere, though I cannot confirm that the findings of this research can be generalised to all other educators who completed the CBE course.

The interview sessions could have been compromised by my lack of experience, although I had in the past attended workshops on conducting interviews for research. I tried as far as possible to use the skills that I learned in the course, but I sometimes found myself interrupting the participants as they were conversing, and this could have compromised some valuable data.

Coding and analysis were also confusing at times because of my inexperience and having to use open coding for the first time. I sometimes struggled to decide which code belonged to a certain category and that could have compromised the data analysis process. However, after repeated reading of the transcripts and reflection on my research aims, I managed to develop codes adequate for this inquiry. I identified tensions that influenced the transfer of skills and knowledge as reported in Chapter 4.

5.4   RECOMMENDATIONS FOR FURTHER RESEARCH

As highlighted in Chapter 4, and above, "a major finding of this inquiry is that the participants who completed the CBE course somehow seemed to focus more on the *teaching of computer skills* when they got back to their schools than use the computer for teaching and learning". They expressed the need to uplift their

colleagues first (this is a point I cannot explain without doing further research) and their focus was not on teaching and learning with technology, but rather on basic computer skills. What they learned in the CBE course was not used in their classrooms because of this unexplained desire to empower those around them. This phenomenon could be investigated further to explain the actions of educators who go back to schools after completing degrees at a higher education institution.

A further issue for research is the continued 'blocking' of progress at the schools by those in positions of power. It is apparent that senior people at the schools, often without any knowledge and recognisable skills regarding ICT in education, have difficulty in changing their ways.

Another good topic for research will be the failure of ICT graduates to implement and innovate using any technological tools available to them. Too many educators in this position seem only to rely on the familiar tools (that they used in their training) and do not see the potential of software and other technological tools available at the schools.

Outdated policies and ideas can also be examined because many educators are hesitant to recognise innovative ways of teaching and learning that could be implemented successfully. Furthermore, educators who are appropriately qualified have their skills and knowledge compromised and become redundant as a result.

5.5   THE CONTRIBUTION OF THIS INQUIRY

In Chapter 1 I provided a rationale for carrying out this inquiry. I mentioned that when I was still a practising educator, and while I was completing my FED, which is now known as the ACE, I found that I could not integrate the skills and knowledge that I was acquiring at my teaching practice. There were various reasons that prevented me from doing so. Looking back, I can identify with some of the experiences of the participants in this inquiry. This inquiry confirms that there are educators who have graduated from the CBE course who also have not

transferred skills and knowledge from the course to their teaching practice. These findings have profound implications for the integration and use of ICT in schools.

This inquiry can contribute towards enlightening the reader of this inquiry about the potential uses of ICT tools in education, the importance of transfer of skills to educational contexts, and the need for support for educators who have the skills, knowledge and the potential to make learning effective using technology. This inquiry can also provide reasons for other educators to register for the CBE course or, at least, to acquire computer skills for their personal and professional benefit. Educators, however, need to understand that the importance of teaching and learning using computers is not about making learners acquire skills. It has more to do with knowing how to apply teaching and learning principles in a computer-mediated environment.

Parents and other role players within the school activity system also need to change their mind-set and learn more about how computers can enrich their children's lives personally and, in later years, their professional lives. Secondly, they need to regard computers as a need and an extension of who they become once they establish a relationship with them. Lastly, they need to support the integration of ICT at their schools so that they can also contribute to the information-rich environment and prepare for their children's future in a computer-mediated environment.

5.6   A FINAL WORD

Integrating computers in education can offer a very different and exciting teaching and learning experience. Educators who have qualified in this field need to be given the opportunity to practice their new skills and to use knowledge for the betterment of their practice. School managers need to be far sighted enough to recognise that education demands that computers be integrated in educational settings, otherwise schools will not move effectively into the digital era. Before the emergence of computers I used to think that they were only used by 'intelligent people' who worked in offices. It did not matter to me whether I knew how to use

one because it never made any impact my life. This is probably similar to the perceptions of many of the parents whose children attend the school under research. Little did I know how much I would come to rely on a personal computer to facilitate a number of functions, both in my professional and personal life. I believe that people nowadays are beginning to regard computers as a necessity. If so, it makes sense to integrate computers effectively and successfully into education, because they play such an important role in teaching and learning in most, if not all, sectors of society.

The participants in this inquiry worked hard to complete the course. Having come so far, they cannot be denied the opportunity to practice and develop their skills further. Lack of practise and application might render their skills and knowledge redundant. This is indicated by their frustration and desire to leave the field of education owing to lack of appreciation and under-utilisation of their qualifications.

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APPENDIX A

LETTER OF CONSENT

The Principal and the School Governing Body

Lefisha High School

28 Kagiso Street

Krugersdorp

1740

I am currently studying in the Department of Mathematics, Science, Technology & Computer Education (Faculty of Education) at the University of Johannesburg and I am engaged in a research project. The aim of the inquiry is to explore the knowledge and skills transfer from a postgraduate course in computer-based education to the classroom.

With the introduction of computers in most South African schools, it has become necessary for educators to become equipped with computer skills so that they can use technology in their professional, teaching and learning activities. To this end, a number of educators have enrolled for the postgraduate computer based education (CBE) course that is offered at the University of Johannesburg. Two of your educators have completed this course.

Research is a means of generating knowledge about areas that we are not familiar with. Not much knowledge has been generated with regard to computers in education, especially in Township schools. This inquiry seeks to study educators' experiences regarding teaching and learning with computers as they transfer their skills and knowledge to their practice in the classroom.

Having provided you with the background to my inquiry I, hereby, ask permission to conduct this research at your school. I have elected two participants from your school who were post-graduate students in the Computer-Based Education course.

The procedure that is going to be followed in order to complete this inquiry is detailed below:

I will visit the school on the day that is convenient to you and the participants to conduct the interview. The participants who consent to be interviewed will be informed of my intention to have the interview tape-recorded for data analysis purposes. These tape-recorded interviews will be analysed and will be stored in a locked facility. The participants are at liberty to withdraw from the study should they wish to at any time and they will not be persuaded or convinced to stay on. There will be no pressure on them to provide responses should they feel uncomfortable. I will also ensure that the participants will not be caused any harm. Their identities will be protected by allocating pseudonyms for the purpose of coding and analysing data. I guarantee that all information (either personal or professional) will be regarded as confidential.

Accordingly, I hereby request that you as the principal of the school sign this document in the space provided below, in order to indicate that you are *au fait* with the conditions stated above, that you are aware of this research and that you are giving me permission to conduct this research at your school. This letter needs to be signed and dated as it forms part of the requirements for ethical research as mandated by the Ethics Committee of the Faculty of Education.
Thanking you in anticipation

_____

BP VILAKAZI

I, the undersigned, …………………………………….., do hereby indicate that I have read and understood the aim and reasons for undertaking the above-mentioned research as contained in the attached letter. I hereby give my written consent to BP VILAKAZI to continue with the inquiry at this School.

Date:

APPENDIX B

LETTER OF CONSENT

The Educator / Participant

Lefisha High School (Not the real name of the school)

28 Kagiso Street

Krugersdorp

1740

The Educator

I am currently studying in the Department of Mathematics, Science, Technology & Computer Education (Faculty of Education) at the University of Johannesburg and I am engaged in a research project. The aim of the inquiry is to explore the knowledge and skills transfer from a postgraduate course in computer-based education to the classroom. With the introduction of computers in most South African schools, it has become necessary for educators to become equipped with computer skills so that they can use technology in their professional, teaching and learning activities. To this end, a number of educators have enrolled for the postgraduate computer based education (CBE) course that is offered at the University of Johannesburg. You are one of the educators who have completed this course.

Research is a means of generating knowledge about areas that we are not familiar with. Not much knowledge has been generated with regard to computers in education, especially in Township schools. This inquiry seeks to study your transfer of skills and knowledge to your practice in the classroom. Having provided you with the background to my inquiry I would like to invite you, with your consent, to form part of this study. Your participation will take the form of being part of an interview where you will share information in a form of a discussion.

This interview will be recorded again with your consent for data analysis purposes. This tape-recorded interview will be analysed and it will be stored in a locked

facility. Please note that even if you do agree to be part of this study you are at liberty to withdraw from the study at any time, without any pressure to provide reasons. I will also undertake all possible means to ensure that you as participants are not caused any detriment by partaking in this study and I will accordingly allocate a pseudonym to all participants to protect your identity and to guarantee that any information revealed, either personal or professional, will be regarded as absolutely confidential. In addition, it is my belief that there are a number of possible benefits for you as participant in this study. Being part of this study you will be privy to the outcomes of the research as they emerge and will be given the opportunity to comment on your interview and thus inform the study

I hereby request that you sign the attached document, in order to indicate that you are *au fait* with the conditions stated above and that you have consequently given your permission to take part in this inquiry and to be interviewed by me. This letter must be signed and dated by you the participant as it forms part of the requirements for ethical research as mandated by the Ethics Committee of the Faculty of Education.

Thanking you in anticipation

_____

BP VILAKAZI

I, the undersigned, …………………………………….., do hereby indicate that I have read and understood the aim and reasons for undertaking the above-mentioned research as contained in the attached letter. I hereby give my written consent to be interviewed by BP VILAKAZI.

_____

Participant: Peggy   **3RD May 2006**

Participant: Brenda

Researcher: R

Researcher: The main question is how are you implementing what you learned in the Computer Based Education course in your everyday day practice at school?

Brenda: We are actually not implementing a lot of what we learned all because of some shortcomings in our working place.

Researcher: What does this mean?

Brenda: The implementation is very low.

Peggy: I can say I can be able to type my lesson plans using the available resources, meaning that there are only 3 computers at the administration office where by we can be able to only access maybe after school.

Researcher: So are you saying you are not using them in your daily activities?

Brenda: Yes. we are not using them in our daily activities.

Researcher: And you only access them after school?

Peggy: Jaa, we only access them after school.

Brenda: Or when we are free and no one is using the computer by then. Basically lack of recourse is hampering the delivery in this particular school.

Peggy: Nna the only time I implement ke ga ke fa bana research bailo researcher like maybe ba batla information ka economic systems ba ilo batla more information. Ke for bana in education.

Translation: The only time I implement is when I give the learners a topic to research on. For instance, when they need to research on economic systems. It's for learners in education.

Brenda: But still I think even for research the resources that we have are very limited.

Peggy: Very limited

Brenda: Because we are using the Gauteng Online center. How can you expect learners to able to do research when they don't know the Basic computer skills? You see, so if we had the chance of teaching them the basic skills of how use the computer how to access so you find that the whole period when we are with them when we have given them research is fruitless you have to come back another day again and it is very time consuming.

Peggy: Exactly

Researcher: So we can safely say that you are not actually transferring the skills that you have acquired to the teaching practice because of the problems that you have mentioned?

Peggy: Yes, we are not actually transferring the skills that we have acquired.

Brenda: Hmm we are not transferring the skills that we learned.

Peggy: We have learned computers but we can't teach. Ok maybe the Spreadsheet I can be able to use it as an individual during my spare time when I am doing my general work but I can't get my learners to use it. OK our learners can do the work by opening files. Most of the time we use it for our own purpose more than….

Brenda: Transferring skills to learners.

Researcher: Although you use computers for you own purposes, are you saying that computer use is still limited?

R & B: Jaa, Jaa.

Brenda: Still limited, very much because we do not have resources basically.

Researcher: But now has anything changed in your lives since completing the course? Can you say something has changed?

Peggy: Jaa nna for nna something like the management of my work ke kgona to save my work and it makes my life very easy. It's not like before where I had to start afresh ke sete test. I can save my documents and access them ga ke batla. like ke ga ken a le di question paper from previous year's ke a di download and be ke etsa di changes mo le mo.

Translation: Yes. For me I can do some of my management work using a computer. I am able to save my work and it makes my life easy. It's not like before when I had to set a test from scratch. I can save my documents and access them whenever it is necessary. I only download question papers from the previous years and make changes here and there.

Brenda: But for teaching purposes nothing has changed so far because we still teach using the board, we still have to do the copies like before unlike what we have learned we thought that maybe things will change and we will interact with the learners through the computer. but is still the same nothing has changed so far.

Researcher: But what is your opinion about computers?

Brenda: My opinion was that it should be a basic requirement for all the teachers to acquire the skills. Number 2 we should be provided with the resources so that each and every learner can have his or her own computer. Like I say earlier on I mentioned the Gauteng online. The computers are only 25. There are only 25 neh and there is no single classroom here that has less than 40 learners you see. They are 40+ in the classes. So even if you take them up there they still have to share 4 or 3 learners to a machine at the end of the day they get destructed and it is frustrating for a teacher when trying to help them with the computers under such conditions.

Researcher: So then let me take you back again to the same question But regarding your development: what has happened to your development as a Computer Based Education graduate.

Peggy: I think there is a slight change.

Brenda: There is a slight development as teacher in the sense that I can type my own work.

Peggy: Hmm, jaa.

Brenda: Whatever I can do for myself but when it comes to the school itself there is no development here. Nothing has changed. We are not imparting the knowledge at all. And I think the other thing that is

supposed to be done is that the management of the school has to be technologically inclined.

Peggy: Maybe le allocation ya time-table need to consider computer learning. ga computer e ka ba allocated mo time-table it can be taken seriously

Translation: If computer learning can be allocated in the time-table, it will perhaps be taken seriously.

Brenda: Because in our school we are only three who have done this course though the other one has not yet done Bed. Honors neh but he has done the diploma but he is not using computers but his work.

Researcher: Hmm

Brenda: So I think basically the problem lies basically with the management of the school. If they were technologically inclined they would know what are the needs of the school are they would know how to do a needs analysis of the school maybe the will ask the SGB: also to get involved. Maybe they would ask the SGB: of the school that we need this and that

Peggy: Because our learners as it is they are going out to institutions But they do not have the basic skills and it gets very frustrating for them.

Brenda: Hmm

Brenda: How are they going to cope?

Peggy: They don't know anything.

Researcher: Are you saying the SGB: as part of management do not know anything about computer Based education?

Peggy: They don't know anything about computers and they are not making an effort to push so at it should be implemented

Peggy: As Brenda says that our school management if eka ba yona ba raise this and make it a priority le SGB: and go tla utlwagala gore bone ba feela yang. Le input ya bone gore how we can involve ourselves to make implementation a success.

TRANSLATION: As Brenda suggests that if our school management make this a priory and raise this issue with the SGB: maybe the SGB: will give their opinion of what could be done so that we can involve ourselves in the implementation of teaching and learning with computers.

Brenda: So because they don't have the skills ha bana background, they are comfortable with the old system.

TRANSLATION: They do not have skills. They do not have background; They are comfortable with the old system.

Peggy: Even the staff they don't care because the other time Brenda: offered her services to staff members who are interested in acquiring computer skills.

Brenda: I offered one hour everyday after school

Peggy: But no one is interested.

Brenda: I stayed there in the computer room. I used to wait for them in the computer lab: alone for the whole week. No one attended until I gave up.

Brenda: So they are scarred of the unknown. They are too what….

Peggy: Naïve

Brenda: Naïve. They are scarred of the computer. To most of them computer is the last thing they want to learn.

Brenda: I remember when we started this course.

Peggy: Hmm

Brenda: There were no computer labs and we used the ones in the office. There was gossip that we are privileged. They think that a computer is something sophisticated that it's for the chosen few and not for them.

Peggy: Hmm it belongs to certain people…Batho ba ratang dilo.

TRANSLATION: People who are forward who are too big for their boots

Brenda: Jaa exactly.

Peggy: And problem ke gore ko NCS they emphasise taba ya technology.

TRANSLATION: The problem is NCS emphasises the issue of technology

Brenda: Hmm. yes.

Peggy: So like today akere o bone ne go na le Mem bana ba gage bana na le project ya computer but o ba romela ko nna or to the other teacher because ga itse and ga ana le interest. Ro na re na le problem because bana batla ko rona and o thole gore rona re busy.

Translation: like today did you noticed that Educator (Madam) sent her learners to me because they have a project that they have to do and they must use a computer. She does not know how to use a computer and she has no interest what so ever. We are having a problem as it is because, learners come to us and we cannot help because we are busy with other things.

Brenda: Right now during lunch about 3 came to me and they learners were asking me to help them. I asked them that who gave them the task and they mentioned Madam so and so. Then I said she is the one who is supposed to ask me and she is the one who is supposed to be up there with you. They went back to her and she said she cannot come there because we are the people who know about computers.

Peggy: One of the things given opportunities we are not saying they must master the thing just to know how to use basically.

Brenda: I even went to an extent and I instructed my subordinates that everything even lesson plans must be typed only two of them and the white educators; they are the only people who adhered to that requirement. The others were not even interested to even attempt to type out their work or come for the help that we offered.

Peggy: Hmm

Researcher: What can you tell me about learners?

B&P: They are very keen, they are very keen.

Brenda: It's so pathetic because they are all interested but they don't have ample time to go to the computer laboratory. It's so pathetic. They are interested but they don't get ample time to go to the computer

lab: and use those computers. And I am telling you if they could get the opportunity they could excel.

Peggy: Like the grade 12 the few that get an opportunity to go to the lab: when they are there they do not want to go out. They have learned so much.

Brenda: Hmm

Peggy: They do have skills. They have learned so much. They know how to create folders they know many things to edit text and they learn fast in technology.

Researcher: So am I correct when I say that the learners are interested they are keen to learn computers, but you are sort of prevented from imparting your skill to them

Brenda: Exactly.

Researcher: There is something that is seriously influencing your transfer of skills and knowledge to the learners

Peggy: Yes yes. But you know what I can raise is that if I have to be moved from my subjects to teach computers no one is going to teach them . The department of education maybe needs to employ more teachers so that we can be able to focus on computers. So when I leave to teach computers there is going to be shortage in my department here at school

Brenda: It is going to be a problem but going back to Gauteng online they say it must be used by everybody all learners and all educators as a research as a library actually but they still needs other skills. We cannot even put programs there we are barred. Even if you have a

tutorial you cannot install it there. They barred us from installing other learning programs.

Researcher: What can you tell me about the heads of departments here at school?

Brenda: Well they fall under the management team. In the management team there are two of us who are computer literate. They are not computer literate and our voice is not audible enough because we are juniors in the School Management team. You see so like I said if one of us can be heard. And also lack on knowledge from the SMT

Peggy: Hmmm

Brenda: Well like I mentioned before there is a lack of knowledge even from SMT, lack of input, support and interest from them and the SGB: alike. Even the community around here has no interest. Well this is also an underprivileged community. White areas are much better of than we are they have enough money and resources.

Peggy: You see if we had more money more computer laboratory could be installed so that more learners can get an opportunity. But we have to rely on those that are given to us by the government

Brenda: But also some of this year I made 3 applications to ask if they can to adopt my learning area and asking for computers. But I haven't received a response until now.

Peggy: Is it the people in this community here?

Brenda: No. I targeted the companies where I order equipment for technology. I order from them each year and I am their customer. So I thought they will consider my application but I thought that they will

maybe supply us with computers. I have tried that. but they are not interested in adopting us and supplying us with computers.

Peggy: Do you mean that the community around here is incapable of helping in that regard?

Brenda: The background here is a very poor one so that is why we ventured to big business people who are well established.

Peggy: Hmmm

Researcher: What else can you tell me regarding other teachers around here?

Brenda: Jaa you know with other teaches around here there are still other people who have inferiority complex so they will think that a man and white man for that matter knows more that a lady and being black so they will prefer him to use the computers rather than giving me the opportunity. I also wanted to highlight that fact there are teachers who are computer literate. This one knows about computers and he is a man and he is white. he doesn't have a problem but it is people here who prefer that him over us.

Peggy: Hmmm

Brenda: Because you are black and you are a lady

Peggy: Like yesterday when I was doing a memo with the grade 12, when I was showing them how to do some of the things. Other black colleagues were surprised that I did that with the learners. As Brenda says that the people around here think that ke makgoa fela a itseng rona ga re itse sepe. Ba re ba ntse ba sokola ke le teng so they were surprised gore I can do that with the learners. It's like Brenda says that white people know more than us.

Interpretation: As Brenda says that the people around here think that its whites only who know things. The black people know nothing. They (Black colleagues) commented that they didn't know that I can produce a computer typed memo and they have been struggling whilst I am here to can help with such things

Brenda: I still want to say that basically even our colleagues are not interested and they think that these computers are for the chosen few. They will always questions gore why tshwanetse e be mang o usang di computer? But if it's that gentlemen they do not have a problem.   Its white people who know more than us around here.

Translation: Our colleagues are not interested and they think that computer are for the chose few. The always question as to why should a particular person use a computer. But if its that white gentleman then there is no problem

Researcher: Am I correct to say that they don't understand what the course entails?

Brenda: Yes, lack of knowledge from up there to the last teacher.

Peggy: But our principal, I can speak for him. Our principal taught himself how to operate computers. He is trying to learn.

Brenda: Jaa ena he has no problem as such but the implementation part of it.

Peggy: Yes the implementation part of it, he lacks knowledge.

Brenda: We actually do not have a support structure that can say or give our principal an implementation plan. So he can be the manager but he cannot run the school alone. I think if we can start with the

management things will improve and if we can get sponsor so that every learner can have a computer. But the problem is vandalism. We need to upgrade first to secure the computers.

Peggy: We need more human recourse. They need to employ more teachers who are computer literate because the two of us, we cannot cope.

Brenda: Unless we are taken out of the subjects that we are teaching and we are allocated only computers maybe we can manage if we concentrate only on the subject. Even if we can say design lessons for other subjects so we know that today the learners are doing a task on Biology tomorrow they are doing something else but using computers then we integrate learning areas but we concentrate on computers while the other teachers are still learning the skill. Because they say the have got the skill when they trained for 3 days. 3 days ya Gauteng online is nothing to teach you everything you need to know.

Researcher: Is there anything else?

Peggy: Have you seen the CAT Manual?

Brenda: No the manual or are you talking about the CAT? Typing is being phased out. This year it is being done by grades 11 and 12 only. CAT is a computer application technology and it is going to start at grade 10. It has all the skills that we have learned. But in our school it is being given to a typing teacher you see, so those are some of the barriers that we have. We cannot use our skills because they are being given to other people.

Researcher: Well feel free if you still want to share something more with me

Peggy: Nna ke Batla go shera something good like our former students they see the need because they are always here.

Translation: I would like to share something good. Our former students see the need because they are always here.

Brenda: They use Gauteng online for many things. They e-mail their CV they make applications so the (computer lab:) center is very good and another positive thing is whenever they need help they always arrange with us even though we lack resources but that computer lab: is used for something good that can benefit a few of the community members. The grade 12 make application and we help them. So I can say there is a slight development in that regard.

Peggy: Slight development

Brenda: But we would like to see more we would like to apply the skill more than that.

Peggy: Every learner having a change to use a computer

Brenda: But you know the CAT lab: stays for the whole year without much use. It is a white elephant. The one that is maybe operating this year is the Gauteng online one.

Peggy: Is it the one that is always locked?

Brenda: Yes it is new. The CAT must be installed on that one.

Peggy: If they can remove type writers in the other class and install computers then we will end up with 3 computer labs.

Brenda: Hmmm

Peggy: Brenda would like to have her own computer lab: and I also want a computer laboratory: where we can apply our skills.

Brenda: We also need to look at the time-table because according to our school one teacher will always go with one class in a cycle of 3 weeks so you see it is not effective.

Peggy: Another thing we attended a course where we learned how to draw a time-table and this course has helped us so much because the two of us we are able to draw a time-table for the whole school.

Researcher: What are you using?

Brenda: There is a program that we bought from another company and we use it to draw time-tables.

Peggy: So that is the positive side of it.

B&P: Yes

Brenda: But nna to my side I am frustrated because I love working and I am not given a fair chance. And I would like to give it out more. It's frustrating and I feel like leaving teaching and go somewhere else where I can be more appreciated.

Peggy: Am I right to say that you have challenges that you need to confront.

B&P: Yes a lot

Brenda: What would you say those challenges are?

Peggy: Well ke question ya di resources.

TRANSLATION: Well it's a Question of resources

Brenda: Lack of knowledge, support and attitude of the other teachers who keep on thinking that computers are not for them they are for the chosen few. Lack of proper management, lack of support from school management, SGB, local business people and even big business and the government said they must make an input. Especially in this area they can identify schools around with needs and provide those needs.

Peggy: Even the number of learners is a problem. In a period it is impossible to help each learner individually. because we have large numbers in our classes. I mean ba bangwe ba tswa mole re ise re ba thuse.

Brenda: I mean our school fees is only R250.00 a year and only a third is paying those fees. So we don't have money our school lacks financial support.

Peggy: Well I think we have covered almost everything that I needed to know.

Researcher: Thank you very much for being part of this study. As I mentioned in the letters I will bring you the transcript so that you can read it and make correction if perhaps I misunderstood something in my interpretation and analysis. But all the same I really appreciate your input.

Follow up interview

Brenda's story

Researcher: Can you please tell me how the CBE course has changed your life personally?

Brenda: I am empowered because I have got the skills. I can maneuver the machines, whatever programs that are there. I am empowered. I am able to do things on my own that I have learned. I feel am on par with this changing technology

Researcher: Are you saying that even here at home you can get into the computer and work?

Brenda: Exactly. For instance my husband is writing a book. In stead of someone typing his work, am typing it for him. It goes back to what I said, I am empowered, and the skills are there. Things like the research project that I did. I am able to advice him when he does research. I can also try to help him before it goes for editing

Researcher: Interesting. What about professionally?

Brenda: Professionally I can say in type my own lesson plans, do my own task sheets for my learners, but I still fell I am suppressed because of the challenges that I mentioned earlier on (first interview). I want to do more and I want to transfer the skills to the learners but I am suppressed, I fell I am losing some of the skills that I have acquired.

Researcher: Remember you told me (first interview) that you prepare timetables for the school, why are you not including computer learning?

Brenda: They (SMT) insist that it is not in our curriculum, but they want to introduce it into grade 10 as CAT (computer applications

Technology). As I said before the typing teacher is going to teach CAT. They do not want to give us the chance. Basically I have looked at the CAT manuals, it all the skills that we have. I don't now how did it came that they are not giving it to me. As I mentioned before some people suffer from some inferiority complex.

Researcher: Am I correct when I say that typing does appear on the time-table?

Brenda: Exactly. The new one is CAT computer applications Technology, but it given to the typing teacher.

Researcher: What does your school policy say about who qualifies to teach a particular subject?

Brenda: No I don't remember exactly anything on that clause. I will have to look into that to refresh my mind. Its 3 years down the line, we have not checked on the policy. With the new subjects, I am not sure what is going on there.

Researcher: How do other people see you at school since you completed the course?

Brenda: From the beginning of the year, it did not have much impact. Some educators come to ask for help, like I say they are using the Gauteng Online Center, it is being used by some teachers and learners, so they ask me to go and help them. People are starting to recognize me as somebody who has the skills,

Researcher: Remember you said sometimes you can't help all the time?

Brenda: We made an arrangement with the teachers to help them in the afternoon.

Researcher: Do you mean the educators or the learners?

Brenda: The educators, But they come to us through the learners.

Researcher: Are you designing any tutorial that assist in you teaching activities?

Brenda: We don't have programs that we can use to design tutorials, but we have Microsoft word, Power Point, Spread Sheet. But Gauteng online has good tutorials

Researcher: Is NCS the national Curriculum Statement?

Brenda: Yes

Researcher: In the first interview I heard that it is putting emphasis on technology, I want to understand, technology as a subject or as in computers.

Brenda: It emphasises that we do other tasks using a computer.

Researcher: You told me that the principal taught himself to use computers, but there is an implementation problem at the school. Why can't you help him?

Brenda: We tried, but I told you that lack of knowledge is one of the challenges. We are two against a majority of people who will say this is too much work. They will say we have to get this and that, there is too much negativity, But I think as we mentioned people's attitude is beginning to change after the graduation ceremony, they are starting to send children to us, based on that, maybe we can press for implementation, but each time we are shot down

Researcher: Is there anything else that you would like to share with me?

Brenda: Well, I think I told you everything that concerns me about this matter.

Researcher: Thank you very much for agreeing to do this follow-up interview. It is
            greatly appreciated

Follow up Interview

Peggy's story

Researcher: Can you please tell me how the CBE course has changed your life personally?

Peggy: It has changed my life in different ways for instance personally I can do my planning using it to do my budget, management of my things.

Researcher: Does it mean that you have personal files.

Peggy: Yes if have a file for school fees, my budget and different things

Researcher: Can you please tell me again how has the CBE course changed your life professionally?

Peggy: It's like I mentioned previously that I use it on my classroom activities like lesson plans, tasks worksheets, and all those things and I don't have to spend a lot of time on things. For instance I save my tests, next time I do similar lessons I change it there and there and this saves me a lot of time. In Economics I teach my learners how to type their assignments, to improve their skills.

Researcher: How do other people see you since you qualified from the course?

Peggy: They utilise me, for instance if they have got projects that I have to do for my HOD.

Researcher: Remember you told me (first interview) that you prepare timetables for the school, why are you not including computer learning?

Peggy: You mean to allocate in the timetable?

Researcher: Yes

Peggy: The problem is human resource, if we allocate it, who is going teach it. We have a large number of learners and a few teachers. If we allocate it to ourselves, the other lessons that we teaching are going to suffer. Initially we were not employed to teach computers. They must hire other teachers to teach my subjects, and then maybe they can move me to teach computers.

Researcher: Remember in the first interview you told me that your development since the CBE course is slight. What did you mean?

Peggy: Yes, we are not using computers 100 %. If it can be allocated to us we can do a lot of work, not only computer skills, we can do other things. Learners do not know everything that they need to know about computers. They just know how to research and a few things.

Researcher: Tell me more about NCS, the National Curriculum Statement?

Peggy: They emphasise that learners do their projects using computers

Researcher: You told me that the principal taught himself to use computers, but there is an implementation problem at the school. Why can't you help him?

Peggy: The problem is Brenda and me; we can not do it alone. We can not come with a plan. It must be accepted by the whole SMT. If it's not accepted by the SMT there is nothing that we can do.

Researcher: Let's talk again about the challenges that you have since completing the course.

Peggy: Well the first one is the resources. Like when you look at that computer lab, the computers are only 25 and we have got a roll of +−1500 learners and the minimum in a class is +−40 so you find that some learners do not really get a chance to use a computer and some of them have never been to that lab. Even if you take one class they will have to share. We also need more teachers. We are very few and we are not coping. The other thing is the timetable also does not allow us to use the computer lab fully.

Researcher: What does your school policy say about who qualifies to a particular subject?

Peggy: I think the policy needs to be revised after the introduction of computers because we are still using the old policy. We are still teaching the subjects that we were initially employed to teach. If the policy can be revised they can try to change, like that teacher who is teaching typing, maybe we can get a chance to teach computers.

Researcher: Tell me more about your transfer of skills and knowledge

Peggy: We are not really transferring, because we do not have access to the lab as much as we want to but my learners benefit more than the others because I only teach three subject and it is those learners that get a chance to go to lab and because I teach economics.

Researcher: Am I right to say that you out of all the teachers are able to take your learners to the computer lab because you have got the skills that they don't have, therefore your learners have an advantage over the rest?

Peggy: I don't even take them everyday maybe once in a cycle of 3 week and it's unfair for other learners who don't benefit, there others feel they are left out and not taken care of because the others don't

benefit. So when we are busy in class, the other students disturb us, like continuously knocking on the door. They want to know what we are doing.

Researcher: Are you saying the same thing applies to Brenda, she also takes her own learners and those that do commercial subjects.

Peggy: Yes, and it's a small group.

Researcher: Thank you very much for agreeing to do this follow-up interview. It is greatly appreciated.