THE EXPERIENCES OF TEACHERS IN TEACHING COMPUTER APPLICATIONS TECHNOLOGY AT THE FURTHER EDUCATION AND TRAINING (FET) BAND

BY

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DECLARATION

I, Tembalihle Fambaza declare that, this Dissertation is entirely my own work and that it has not been submitted for the degree in this or any other University. All sources used and quoted have to the best of my knowledge been properly acknowledged and indicated by means of complete references.

_____ _____

Researcher Sign Date

_____ _____

Supervisor Sign Date

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DEDICATION

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ABSTRACT

Computer Applications Technology is one of the subjects that equip learners with the new technological skills that are needed in today's life. In the past, many schools used computers only for administrative purposes. This is the case even today in some schools. Very few schools in the rural areas offer Computer Applications Technology. Those that do, face many challenges including a lack of electricity.

Computer Applications Technology helps learners acquire computer skills that improve their performance when they enter tertiary institutions. It can also help them to find jobs in companies that need people who are able to operate computers. This is particularly true for learners from the rural areas, since most of their parents are unable to pay for them to further their education at tertiary institutions. On obtaining their Grade 12 certificate, most rural learners look for jobs.

This study focuses on the experiences of teachers in teaching Computer Applications Technology in rural areas; the challenges and benefits in teaching Computer Applications Technology; the qualifications of Computer Applications Technology teachers; the use of Computer Technology in teaching; Computer Literacy teachers as motivators in learners' lives; and teachers and Computer Literacy.

The findings of this study reveal that; teachers in rural areas lack a functional Computer Literacy foundation on which to build new technology and skills. The use of computers and related technologies was not a routine part of most teachers' own educational environment. The number of years of experience and teachers' status in a school has a significant relationship to familiarity with Computer Technology. A lack of hardware and software; and a lack of knowledge and skills in using computers is a challenge. A lack of or insufficient training opportunities and crowded classrooms are one of the important problems that Basic Education schools face. Insufficient guidance and help in instructional use, insufficient technical assistance, and an insufficient number of computers are other important problems.

Most Computer Applications Technology teachers were not trained to teach computers as a subject. This could be because; even in training institutions, computers were only used for administration purposes. Greenwood (1993) notes that; many teachers entered the profession with arts-based qualifications. The introduction of computers in schools is a process which needs time to become self-generating with younger teachers who are now entering schools having used computers in their own training. In South Africa, students have only recently started taking Computer Studies as a major subject in teaching. Previously computers were studied only in certain fields like Computer Science or Information Technology.

In rural schools, it is rare to come across a computer laboratory in good condition in terms of space and the number of computers, let alone someone with knowledge of the internet. Rural schools do not have computer centres, internet access, experienced teachers and ample sporting and cultural activities to choose from. However, learners can benefit substantially from this new technology because they can be able to do their work as a group while they are not all in the same physical space. They can share their challenges as they study and prepare for class tests or examinations using the internet.

The researcher recommends that the Department of Basic Education should employ teachers who are well trained in Computer Applications Technology. A technician should be employed to service computers at schools and help teachers who are experiencing problems. The Department should encourage primary schools to teach Computer Studies so that when learners study Computer Applications Technology at high school they have a basic grounding in computers.

It is recommended that Schools ask companies for donations to enable them to buy computers. They should tighten up their security to make sure that computers are safe. Schools should organise technology specialists to train their teachers. They can use their computer laboratories to offer afternoon classes to the community and charge them for this service. This will help them to raise funds to buy more computers for the school.

CHAPTER ONE

1.1 INTRODUCTION

Computer technology is one of the fastest ways of developing the economy of a country. It allows organizations (including educational institutions) to sell their product and communicate globally using computer software. It combines audio and visual learning, which helps learners to comprehend study material. Jansen (1997) notes that an average person remembers 10% of what they hear, 30% of what they see and 50% of what they see and hear. It follows that; computer technology cannot be ignored in today's world. It is computer technology that has enabled the development of the multi-media and other effective forms of communication.

Computers have become one of the most important tools to collect valuable information, but computers need people who are computer literate (i.e. have the ability to read and write using a computer). Computer technology also requires that users are information literate (the ability to find, analyze and use information in the relevant situation). According to Turfle (1994), there are two types of computer users:-Technical and Application or End users. Technical users are primarily involved in supporting and developing the application programs used by other people. They require an extensive knowledge of computer hardware and software. The Application or End user is the most common type of user. These users may have limited knowledge of programming, but have knowledge of the application of programmes.

Greenwood (1993) observes that; computers have been used in schools for many years. This is due to the government initiatives to equip all schools with computers. During the early 1980s the Department of Education and Science (DES), as it was then called, orchestrated the provision of a minimum of one complete computer system for every primary school in the United Kingdom (UK). In 1989, the National Curriculum Council recommended that each school should have one computer in every classroom. In 1992 the Parliamentary Office for Science and Technology (POST) took this further by recommending that there should be at least one computer for every 12 pupils, an estimated additional increase in requirement across the country of more than 300 000 computers.

According to Greenwood (1993), the depth or lack of computer knowledge in schools is a matter for concern among teachers, learners and computer literate parents. Many teachers entered the profession with arts-based qualifications. The introduction of computers into schools is therefore a process which needs time to become self-generating. With the younger teachers now entering schools having used computers in their own training, the knowledge levels have snowballed to the extent that even the most "technophobic" teachers can now operate these systems and run a range of pre-loaded software packages.The results of Greenwood's study show that the successful use of computers in educational environments requires; computer – based training (CBT) using dedicated workstations. It was found that more powerful means of presenting information to the learners were needed, including photographs, complex graphics and stereo sound. This led to the introduction of multi-media.

1.2 STATEMENT OF PURPOSE

The purpose of this study is to explore teachers' experiences of teaching Computer Applications Technology in rural schools in South Africa at the Further Education and Training (FET) band.

1.3 CRITICAL QUESTIONS

1. What are the teachers' experiences of teaching Computer Applications Technology?
2. What challenges and benefits do teachers encounter in teaching Computer Applications Technology?

1.4 RATIONALE

The researcher developed an interest in this subject following informal observation of the teaching practice in rural high school. He requested and obtained permission from Computer Studies teachers to join their classes during his free periods. The researcher's purpose was to gain a better understanding of the Computer Studies programs. He attended classes with Grades 10, 11 and 12. As time went by, he observed very little progress. The learners were always busy writing notes in their books. There was very little hands-on experience. The researcher also noticed that most of the learners were unable to operate computers. There were very few learners who could operate computers well. These were mostly those who had computers at home.

It seemed as if there was a problem in these classes and the researcher wanted to know whether; it was the syllabus that the teachers are using that causes the problem. Is it because the information that teachers get from the workshops that tells them to teach the way they were teaching? Is it because teachers did not take computer literacy as a teaching subject? Perhaps is it because of the lack of computer literacy resources. What exactly are these teachers experiencing in teaching Computer Applications Technology? What challenges do they encounter?

1.5 LITERATURE REVIEW

1.5.1 The role of computer technology in learning.

Harris, Mishra and Koehler (2009) note that; we live in exponential times; digital technologies have already transformed the way people work and play. From cell phones to websites, from You Tube videos to multiplayer games like World of Warcraft, computer technology is fundamentally changing how people interact with information and with one another. Given the increasing pace of technological information, the future promises more of the same. The results of this study show that this rapid rate of change is a challenge for teachers, as technologies become obsolete almost as quickly as they arrive. These results also show that there is an increasing pressure on teachers to keep pace with technological developments. To teach Computer Applications Technology effectively, teachers need to be familiar with more than the technical aspects of technology; they need to understand its advantages and constraints in both representing content and identifying pertinent teaching approaches.

Koehler and Mishra (2008) observe that; teaching Computer Applications Technology is a highly complicated practice, using flexible and integrated knowledge. Teachers practice in a complex, dynamic environment that requires that they have in-depth knowledge of their subject matter.The Technological Pedagogical Content Knowledge (TPACK) framework describes the effective teaching of Computer Applications Technology as a critical synthesis of knowledge used by the most effective teachers. Content Knowledge (CK) refers to knowledge about the subject matter. Pedagogical Knowledge refers to knowledge about the processes and practices or methods of teaching. It includes classroom management skills, teaching strategies, evaluation techniques and the nature of the target audience. Technology Knowledge (TK) refers to knowledge about both standard technologies and more advanced technologies.

1.5.2 Living and learning in a changing world

Keengwe, Onchwari and Wachira; (2008), Kozma; (2009) and Zhao, (2009) note that; the rapid evolution of technology in the 21st century calls for a new form of learning, one that is receptive to our continually changing world. Recently there have been a spate of books and reports that criticize the current goals and practices of schooling. These authors argue that schooling needs to be fundamentally reconfigured to emphasize higher-order cognitive processes, such as critical thinking, creative problem solving, curiosity, and adaptability. The results of this study show that the involvement of learners in computer-based subjects like Computer Applications Technology can empower them with the skills that are required by today's world.

1.5.3 The impact of computers on education

Merrill, Hammons, Tolman, Christensen, Vincent and Reynolds (1992) observe that; it is hard to imagine an organization, large or small, that does not or could not advantageously use a computer in its operations. They add, however that computers are not a panacea for all the problems confronting education, nor should they or will they replace the teacher. They do believe that computers are here to stay and that they do have a significant role to play in classroom of today and in the future. The results of this study show that, computer technology is beginning to have a significant impact on almost every aspect of education.

Merrill, *et al.* (1992) note that; many teachers believe that if computer use is viewed in the same way as reading and writing, a more computer literate population will be created. Teaching computer and other technological tools as part of normal curricula and then asking learners to use these tools to complete educational activities will result in; learners who are better prepared to use technology in later life. The results of this study show that, just learners are taught how to read and write in the early years of schooling, so they need to be taught how to use a computer. Because computers offer such a wide variety of educational uses, the process of learning how to use a computer as a learning and problem solving tool takes a number of years. While teachers and researchers are still learning how and when this can be done, there can be no doubt that it is necessary.

The primary aim of a study conducted by Herselman (2003) was to assess the experiences of teachers in rural areas of South Africa by investigating various case studies such as the School Net Programme in Mpumalanga province and a possible Web Portal for rural schools. He found that rural schools and some communities lack access to quality education and resources in comparison with their urban-counter parts. The results of this study also indicate that teachers in rural schools often lack internet access and this poses challenges for the teaching of Computer Applications Technology.

1.5.4 Teachers Online but Disconnected

According to the Washington Post (2000), at Sanders Corner Elementary School in Loudoun County, the computer has become a teaching tool that is almost as basic as the text-book or the chalkboard. But; a number of teachers in the area lack the training to teach Computer Applications Technology. Washington Post cites the example of a Sixth grade teacher, Eric Fleming, who would love to convert his student's weekly newsletter into a classroom-designed Web site where parents could see what their children had learned each day. The school's hardware and software were capable of such an effort, but he was not. This shows that; it sometimes happens that schools have all the resources required to teach computers, but a lack of teacher training be a challenge.

The Washington Post (2000) further notes that, teachers and school officials were getting more help than other people in building on what they learned in technology training class. Some teachers were more motivated than others to seek such help in the first place. Some schools, like Sanders Corner, had a full-time technology specialist who regularly passed on ideas to teachers on how to conduct their lessons. Many other schools like Jermantown; had to share such person with other schools. The newspaper article observes that; there were some extraordinary teachers who pretty much taught themselves how to use computers effectively in teaching and learning. Another group was using some of the resources but was easily discouraged. Most teachers wanted to learn, but they said it took time and that they needed help.

The Washington Post investigation revealed that more than 95% of schools and nearly two-thirds of classrooms in the Washington area had computers connected to the internet. Yet in a survey conducted by the National Centre for Educational Statistics, 79% of teachers said they did not get enough help with using technology in the classroom.

1.5.5 Enhancing Writing by Using Word Processing

According to Merrill; *et al.* (1992), many teachers have selected word processing as their personal entrance into the computer world. After experiencing positive personal benefits, many are motivated to use the tool to enhance student learning, particularly by developing student writing skills. The results of Merrill, et al.'s' study concur with the findings of this study, which found that; teachers who have training and experience in teaching Computer Applications Technology produce better pass rate than those who do not have training in the subject.

1.5.6 Organising Resources to teach Computer Applications Technology

Merrill, *et al.* (1992) state that, teachers can choose the equipment configuration that best meets their curricula needs. Teachers who have become computer literate and who have access to a computer laboratory and computers in their classrooms have developed rich educational environments. For example, a teacher may use a single classroom computer, a projection system, and a word processor to accompany a brainstorming session involving discussion by the whole class. As the learners exchange their verbal contributions, the information can be categorized or placed in an outline form and displayed on a large screen. After the discussion is complete, this information can be printed out and copies made immediately, or learners can directly load the information into other computers to expand and refine the material electronically. Teachers who have access to computer laboratories can teach electronic tools such as word processing, database management and spreadsheet applications faster and more effectively. After learners master the basics of these applications, they are free to use them in class or laboratory settings, depending on which is easier and the methods available.

1.5.7 Word Processing and Development of Skills

Merrill, *et al.* - (1992) observe further that, although many teachers are using the process approach to teach writing, some teachers develop writing skills in isolation. Teachers are frequently frustrated by the lack of reinforcement or extension activities when teaching specific writing concepts such as writing a complete sentence or paragraph. The computer provides an alternative that can be cost effective and that allows teachers to easily modify activities to meet specific class and learners' needs. The findings of this study show that some teachers use software that is actually a collection of activities that have been developed by using selected word processing software. For instance, writing development experts like John Madian have produced a series of writing activities to help elementary and secondary learners to develop their writing skills. Because they are created using a word processor and are merely text files, teachers are free to modify and adapt the files to meet individual class or learners' needs. The advantage of using electronically based reinforcement for writing activities is that teachers can easily tailor the activity to meet an individual need and that a learner can more easily modify the text, whether it is during the draft, composition, or correction phase.

1.6 METHODOLOGY

1.6.1 CASE STUDY

The researcher adopted a case study approach in order to conduct an in-depth study of three schools at KwaMaphumulo, KwaZulu-Natal. The purpose was to gather information about teacher's experiences of teaching Computer Applications Technology. The schools were labelled A, B and C. In school A, the researcher observed classes during lessons and three Computer Applications Technology teachers were interviewed – one from Grades 10, 11 and 12 respectively. In school B observations and interviews were conducted with two teachers who both take classes in Grade 10, 11 and 12. In school C observations and interviews were also conducted. Three teachers were interviewed. One teacher teaches Grades 10 and 11, another teaches Grade 11 and the third Grade 12 classes.

According to Tellis (1997), a case study is designed to study one case of something, like programmes, cities or work sites, as a distinct whole with the goal of understanding the set as a distinct whole in its particular context. A case study primarily uses qualitative techniques, but does not exclude quantitative data. This research method focuses on the characteristics, circumstances and complexity of a single case. The case is valued in its own right, whist the findings can raise awareness of general issues. The aim is not to generalize the findings to other cases.

1.6.2 Qualitative research

This study is based on qualitative research, but in some cases the researcher will use quantitative methods of interpreting the data. The researcher will also use graphs and numbers to explain certain sections of the data. Wikipedia (2001) states that; qualitative research focuses on the experiences, interpretations, impressions or motivations of an individual or individuals, and seeks to describe how people view things and why. It relates to beliefs, attitudes and changing behaviour. Data can be collected through open-ended; in-depth interviews, documents, artefacts, observation and participant observation. Kreuger (1988) quoted in Lewis (1995) stated that; qualitative research taps into human tendencies where attitudes and perceptions are developed through interaction with other people.

1.7 INSTRUMENTS OF DATA COLLECTION

1.7.1 OBSERVATION

In this study the researcher is using observation as one of the tools to collect data from FET Computer Applications Technology teachers.

1.7.2 Participant observation

Walcott (1998) cited by Khoza (2001) notes that; there are three different types of participant observers. They are:

1) Limited observer – which is the role that most researchers play. The researcher; observes, asks questions, and builds trust over time, but does not have a public role other than research.

2) Privileged observer – someone who is known and trusted and given easy access to information about the context.

3) Active participant – one who has a job to do in the setting in addition to research.

The researcher is acting as a limited observer, since he does not have a public role to play in the schools other than research. The researcher asked permission to do the research; he observed in classes during the teaching and learning period, asked questions and built trust over time. The researcher will observe in the classroom in order to understand the interaction and communication between teachers and learners, the way teachers engage with their lessons or deliver them and the way learners respond to the teaching methods that are used. He will observe the conditions of the learning places themselves, be they classrooms or computer laboratories, and note the number of computers they have. The researcher will observe teacher's files and learner's portfolios and the way learners operate computers.

Van Dalen (1979) warns that; while observation can be made by anyone, accurate and fruitful observations are usually the product of considerable practice and training. He further cautions that perceptions are subject to distortions because of the observer's emotions, motivations, mental sets and so on.

However, an observation guide is developed and will be employed in a non-participatory manner. According to Cohen (2001), this requires that the researcher stays at the back of the class in order to avoid interfering with the activities. The researcher is hopeful that the negative factors associated with observation will be minimized due to his familiarity with the general teaching conditions in KwaZulu-Natal.

Participant observations were conducted in Grade 10, 11 and 12 classes in three schools. These aimed to ascertain the suitability of classrooms or the space where teaching and learning is executed, delivery or presentation of theory during lessons, practical demonstrations by teachers, learners' understanding of what is being taught, learners' participation and teacher's reinforcement

1.8 INTERVIEWS

1.8.1 SEMI-STRUCTURED INTERVIEWS

Cunningham (1993) cited in Lewis (1995) stated that; semi-structured interviews are an important part of any research project as they provide an opportunity for the researcher to investigate further, to solve problems and to gather data which could not have been obtained in other ways. Scott (1997) cited in Lewis (1995) added that; sometimes the interviewer has to wear many hats and assume different roles throughout the course of the discussion.

The researcher believes that semi-structured interviews are one of the methods suitable for this study, because they allow for in-depth discussion. This is an opportunity for the interviewer to probe and expand the respondent's responses. It will also help the researcher to alter the sequences in order to probe more deeply. The researcher interviewed three Computer Applications Technology teachers in the FET band in school A, two teachers in school B and three teachers in school C. Three Computer Applications Technology teachers in school A, two teachers in school B and three teachers in school C. Teachers are interviewed in order to ascertain their experiences in teaching Computer Applications Technology.

Gilham (2003) contends that; the semi-structured interview is the most important form of interviewing in case study research. It can be the richest simple source of data. The researcher is using the case study, because he wants to probe deeply and get more information from the respondents. Semi-structured interviews will make it possible to get a rich data, because the researcher is using open-ended questions which enable him to ask follow-up questions.The researcher probed deeply and received more information, by asking follow up questions about teachers' challenges and benefits in teaching Computer Applications Technology.

Grix (2004) notes that; the advantage of using semi-structured interviews is that they allowfor a certain degree of flexibility and the pursuit of unexpected lines of inquiry during the interview. The researcher has chosen to use this method of interviewing, because during the interview process the interviewees can also ask questions of the interviewer. That can facilitate the interview process. For example if the person does not understand the question, he or she can ask the interviewer to clarify or rephrase the part of the question he or she is not clear about.

Honey (1987) contends that; semi-structured interviews are conducted within a framework which allows for focused; conversation, and two-way communication. This means that semi-structured interviews can be used to give and to receive information. Semi-structured interviews are suitable for this study in the sense that the questions are prepared before time and it is a flexible tool, because follow-up questions can also be asked depending on the respondent's responses. Struwing and Steads (2001); concur with this view, observingthat predetermined questions are posed to each participant in a systematic and consistent manner, but the participants are also given the opportunity to discuss issues, beyond the confines of the questions. This technique therefore enables the researcher to obtain multiple responses to a set of questions and allows for detailed responses. The interviewee's responses may be constrained and influenced by predetermined questions.

1.8.2 STRUCTURED INTERVIEWS

According to Candace (2004), structured interviews are sometimes referred to as patterned interviews. This type of interview is very straightforward. The interviewer has a standard set of questions that are asked of all participants. This makes it easier for the interviewer to evaluate and compare candidates. The features of a structured interview are:

1.8.2.1 It is legitimate and reliable.

According to Kvale and Brinkman (2008), the structured behavioural interview has several strengths that contribute to reliability, validity, legality, defensibility and perceptions of fairness. On the other hand, the unstructured interpersonal interview can be one of the most unreliable and invalid methods of selection available. The validity of the unstructured interview has been reported to be lower than most other types of selection systems. Due to the potential for subjectivity and bias, on unstructured interview process leaves an organization particularly vulnerable to legal attack. The structured behavioural interview greatly enhances the quality and honesty of information gathered from employment interviews. In this study structured interviews resulted in reduced bias, because participants were evaluated on experience-related questions, which were based on the teaching of Computer Applications Technology. All candidates were asked the same questions so that everyone had the same opportunity to display knowledge and his or her experiences. In a structured interview, the interviewer makes use of a previously compiled list of questions to obtain certain information from participants. The interviewers can even ask the questions in a certain order. The response of each participant to each question is recorded. The structured interview leaves little room for adaptation to the interview situation, as the applicant is afforded little opportunity to expand on answers.

1.8.2.2 It controls the flow of the interview

According to Erasmus, Swanepool, Schenk, Vander Westhuizen and Wessels (2009) structured interviews are characterised by two essential features: careful, systematic planning of the interview and exclusive use of technically skilled interviewers. It is to be expected that a systematic approach to any problem would normally produce better results than coincidental, random procedures. An interview is planned according to the requirements of the job for which selection is taking place.Using the structured approach, the interviewer prepares a list of questions in advance and does not deviate from it. The applicant's responses are noted on a standard form. The questions are of a forced-choice nature and the interviewer notes the responses only by a check mark on the form. This type of interview is restrictive since the information gathered is narrow and the interviewer cannot adapt the questions to the applicant. From the applicant's point of view, he or she is denied the opportunity to elaborate on answers to the questions (Ivancevich, 1992, p. 261).

1.8.2.3 It makes the interview the same for everyone

Lindlof and Taylor (2002) note that; a structured interview is also known as standardised interview. The aim of this interview is to confirm that each interview is conducted using exactly the same questions in the same order. This guarantees that answers can be reliably compared. It enables the researcher to examine the level of understanding a respondent has about a specific topic. All respondents are asked the same questions in the same manner. This makes it easy to replicate the discussion. In other words, this type of research method is easy to regulate or standardise.

1.8.2.4 Questions are pre-written, reducing nervousness for the interviewer.

Patton (1991) observes that; the consistency of the process of structured interviews increases the perception of fairness by requiring the interviewer to follow a specific list of pre-determined questions. The focus of the interviewer will be on what is required that is, the experiences of teachers in teaching Computer Applications Technology. With interviews based on specific questions, there should be a greater chance of the interviewer being able to ask follow up questions and get more information.

1.8.2.5 It makes maxim use of the time allocated for the interview

When the interviewer was choosing questions to include in the interview, the time frame within which each interview would be conducted was kept in mind. The number of questions was probably fitting in the range of 20 to 25. If the interviewer wanted to ask question to which more lengthy replies were expected, fewer questions were asked overall to keep within a reasonable time frame. Generally, interviews lasted from 30 to 60 minutes.

1.9 SAMPLING

1.9.1 PURPOSIVE SAMPLING

Du Plooy (1995) contends that; purposive sampling occurs when researcher use his or her judgement to select the sample, which is called a purposive sample; this is also known as a judgemental sample. In purposive sampling a particular case is chosen, because it illustrates some feature or process that is of interest for a particular study although this does not simply imply any cases the researcher happens to choose. In purposive sampling the researcher must first think critically about the parameters of the population and then choose the sample case accordingly. Clear identification and formulation of criteria for the selection of respondents are therefore of critical importance. Therefore all Computer Applications Technology teachers for three schools were chosen. Three teachers from school A, two teachers from school B and three teachers from school C. In each of the three schools, the sample includedGrades 10, 11 and 12 teachers.

1.10 THEORETICAL FRAMEWORK

1.10.1 ACTIVITY THEORY

This study is based on activity theory because teachers use tools in Computer Applications Technology to enable learners to participate in activities. Tools that are used in the Computer Applications Technologyclass help teachers to deliver their lessons to the class. Kaptelnini (1995) observes that; activity theory emphasizes that human activity is mediated by tools in the broad sense. Tools are created and transformed during the development of the activity itself and carry with them particular cultural- historical remnants from their development. The use of tools is therefore an accumulation and transmission of social knowledge. The use of tools influences the nature of external behaviour and also the mental functioning of individuals.

1.10.2 Computer Applications Technology Practical exercise

Nardi (1996) notes that, during a practical exercise. Participants will be introduced to the Activity Checklist based on the principles of Activity Theory. The Checklist is a conceptual tool to identify the most important factor that is influences the use of computer technologies in a particular setting. By applying the Checklist to a series of examples, participants will get a hands-on experience of using Activity Theory as a framework for the design and interpretation of studies of human-computer interaction. The results of this study show that; practical exercise is very important in a Computer Applications Technology class, because it helps learners to be able to use a computer without the help of the teacher. The teachers who wereinterviewed reported that; learners can be enabled to use any computer programme without facing challenges and that hands-on experience can give learners confidence to perform the tasks set for them.

1.10.3 Activity Learning Theory

According to Bodker (1991), activity theory has an interesting approach to the difficult problems of learning, but it has often been presented in an abstract way, separated from the work processes to which the learning should apply. Activity theory provides a potential corrective to this tendency. For instance, knowledge creation suggests enhancement based on activity theory, in particular that the organizational learning process includes preliminary stages of goal and problem formation. Bodker, rather than viewing learning as transmission, sees the formulation of learning goals and the learners' understanding they need to acquire as the key to the formation of the learning activity. The findings of this study show that; learning itself involves many challenges. Teachers and learners face a lot of challenges in the process of teaching and learning. As a result some of the teachers become confused as to why theycannot help their learners in the way they are supposed to. Sometimes this is caused by learning environments themselves. Sometimes it is because of lack of resources. Learners end up failing their assignments. At the end of the day, teachers need to learn how to impart information to learners in a way that is going to help them.

According to Leontev (1978), of particular importance to the study of learning in organizations is the problem of tacit knowledge, which is highly personal and hard to formalise, making it difficult to communicate to others or share with others. Leontev's concept of operation provides an important insight into this problem. In addition, the idea of internalization was originally introduced as 'the internal reconstruction of an external operation. Internalization has subsequently become a key term of the theory of tacit knowledge and has been defined as a process embodying explicit knowledge into tacit knowledge'.

1.10.4 Principles of Activity Theory

According to Bryant (2005), activity theory is aimed at understanding the mental capabilities of a single human. However, it rejects the isolated human being as an adequate unit of analysis, focusing instead on cultural and technical mediation of human activity. Activity theory is most often used to describe activity in a socio-technical system as a set of six interdependent elements which constitute a general conceptual system that can be used as a foundation for more specific theories. The researcher seeks to understand the experiences of a single teacher who is teaching Computer Applications Technology in the rural schools of KwaMaphumulo.

Bryant (2005) observes that; activity theory begins with the notion of activity. An activity is seen as a system of human "doing" whereby a subject works on an object in order to obtain a desired outcome. In order to do this, the subject employs tools, which may be external (e.g. a computer) or internal (e.g. a plan). Many subjects may be involved in the activity and each subject may have one more motive (e.g. career advancement). Activity theory is a set of basic principles that constitute a general conceptual system, rather than a highly predictive theory. The basic principles of activity include the hierarchical structure of activity, object-orientedness, internalization/externalization, tool mediation, and development. The principle of "object-orientedness" states that human beings live in a reality that is objective in a broad sense. The things that constitute this reality not only have the proper ties that are considered objective according to the natural sciences but, socially defined properties as well. The basic principles of activity theory should be considered as an integrated system, because they are associated with various aspects of the whole activity. A systematic application of any of these principles eventually makes it necessary to engage all the other ones.

1.10.5 Human-computer interaction

According to Bannon and Bodker (1991), the rise of the personal computer challenged and focused on traditional systems developments on mainframe systems for automation of existing work routines. It furthermore brought forth a need to focus on how to work on materials and objects through the computer. It promoted the search for theoretical and methodical perspectives suited to deal with issues of flexibility and more advanced mediation between the human being, material and outcomes through the interface.

Bannon and Bodker (1991) note that; the cognitive science-based theories lacked the means to address a number of issues thatarose from empirical projects. Many of the early advanced user interfaces assumed that the users were the designers themselves, and accordingly built on an assumption of a generic user, without concern for qualifications, work environment, and division of work. In particular the role of the artefact as it stands between the user and his/her materials, objects and outcomes was ill understood. In validating findings and designs there was a heavy focus on novice users while everyday use by experienced users and concerns for the development of expertise were hardly addressed. Detailed task analysis and the idealized models created through task analysis failed to capture the complexity and contingency of real-life action.

CHAPTER TWO
LITERATURE REVIEW

2.1 INTRODUCTION

In this chapter the review of related literature is based on the exploration of teachers' experiences of teaching Computer Applications Technology at FET band. This will involvea review of teachers' experiences of teaching Computer Applications Technology, nationally and internationally. It will also review the use of computers in both urban and rural schools. This chapter examines the advantages and disadvantages of using computer technology in schools. It does not restrict itself to positive experiences of teachers and learners-but also explores the challenges that can be experienced by teachers and learners and how to avoid them.

2.2 A teacher and a computer

According to Woolard (2004), a teacher is part friend, confidant, motivator, coach, actor, and leader, but most of all a teacher is an individual that sparks intellect and encourages learners to pursue knowledge on their own. Teachers do not teach the same way, that is why it is encouraged that teachers share themselves in the classroom and find the method of teaching that will be most effective for them and their learners.

Woolard (2004) observers that; a computer is a tool, just as a ruler helps a learner to measure, a protractor to calculate the degrees in an angle, and a pencil and pad to capture ideas, so a computer assists learners to create, manipulate and produce various pieces of work (Woolard, 2004). Greenwood (1993) concurs with Woolard when he described a computer as an excellent tool for teaching of programming skills. There is no magic formula for producing results in our learners. For our children to succeed will take good teaching combined with good tools. The computer can either be used properly, producing great results or improperly produce disastrous consequences, depending on who wields the mouse.

2.3 Qualifications of computer teachers

Greenwood (1993) conducted a study about the lack of computer knowledge in schools. He found that, many teachers had entered the profession with arts-based qualifications. He also found that; the introduction of computers into schools is therefore a process which needed time to become self-generating with young teachers now entering schools having used computers in their own training. This study shows that, the knowledge levels have snowballed so much that even the most "technophobic" teachers can now at least operate these systems to the extent of running a range of pre-loaded software packages. This study found that most computer teachers were not trained to teach computer as a subject. This could be because even in the training institutions computers were used for administration purposes only. In South Africa, students have only recently started to take computer studies as a major subject in teaching. In most universities computers were studied in certain fields like Computer Science or Information Technology. Other students had to take short courses in Computer Literacy if they needed computer knowledge. According to teachers that were interviewed, many teachers who are teaching Computer Applications Technology have not been trained to do so. Those that have mostly did six-months or one-year courses in computer literacy.

2.4 The use of games in teaching Computer Applications Technology

Tobias and Fletcher (2011) note that computer games are a relatively recent addition to educational technology's armamentarium. The enthusiasm for computer games as instructional delivery systems has been substantial. Until recently, this enthusiasm has been under-researched. Recent reviews of research report that evidence is beginning to accumulate that games hold some promise for use in instruction. The results of this study show that there is indeed substantial empirical evidence to indicate that games are promising instructional delivery systems.

Anderson and Bevailiers (2011) reviewed a program of research in Bevailier's laboratory indicating that fast-action games may well enhance cognitive processes. The difficulty with games is that designing them to achieve specific instructional objectives is, at present, more trial and error, or hit or miss, than an engineering technology.

Another problem with games is that learners may, as suggested above, acquire more from them than specifically targeted knowledge and skills. For example, Ferguson and Kilburn (2010) determined that given the predominance of evidence from all types of studies, it seems reasonable to conclude that violent video games do indeed have an effect on aggression . While there are dissenting views regarding the effects of games with regard to aggressive behavior, the weight of the evidence supporting such an effect is substantial.

Many of today's popular culturalists advocate game play, Kenny and Gunter (2011) contend that games can teach a multitude of skills, including problem solving, language and cognitive skills, strategic thinking, multitasking and parallel processing. Gee (2007) stated that; game play marries pleasure, learning and mastery, develops a sense of agency and control and allows learners to explore relationships between values, identity, content and learning. The results of these studies show that while these popular culturalists are influencing perceptions about the role of game play in learning, there remain considerable challenges to the theories of learning and instruction embodied in school systems designed to teach large numbers of learners a standardized curriculum (Kenny & Gunter, 2011).

Peterson (2010) observes that games are important because they allow learners to participate in new worlds. They let players think, talk and act in ways that might otherwise be inaccessible to them in virtual worlds and symbols. The findings of this study show that through such experience across multiple contexts, learners come to understand complex concepts without losing the connection between abstract ideas and the real problems they can be used to solve, because they make it possible to develop situated understanding.

2.5 Teachers and computer literacy

Greenwood (1993) notes that; as a result of the successful use of computers in educational environments, computer-based training (CBT) has evolved as an activity which requires dedicated workstations; however it was found that a more powerful means of presenting information to the learners was needed like photographs, complex graphics, stereo sound; as a result multi-media were introduced. This study shows that the use of computers in schools provides good support to the teachers as they can use different ways of presenting information to learners. Learners are not easily bored by the lessons. The results of this study also show that learners get bored with monotonous way of delivering information, because some of them cannot focus or listen for a very long time. Computer Applications Technology can also use photographs to illustrate what the teacher is talking about. Complex graphics and stereo sound can also be used to change the way of teaching that is normally used, where the teacher stands in front of the class and delivers the lesson; and all learners are expected to listen.

Bialo (1996) conducted a study on teachers and computer literacy. He found that teaching of computer literacy motivates learners, enhances instruction for special needs learners, improves learners' attitudes towards learning, and motivates teachers to free learners from routine instructional tasks. Teaching of Computer Applications Technology sets learners free from depending on the teachers for their work. The findings of this study suggest that since today's learners are so interested in technology, because it is part of their lives, they become interested when technology is used in teaching. The findings of this study also show that through Computer Applications Technology learners can enjoy their learning if they are taught well and all the resources are available. Firstly, it encourages them to search information for themselves on the internet, make drawings and select pictures for their assignments and projects. Learners get motivated when they see that they can perform such tasks by themselves using computer technology.

The results of Bialo's study show that there are advantages for teachers in using different methods of delivering information to their learners other than the usual way of standing in front of the classroom and delivering the lesson. These teachers can use technological methods to deliver their lessons, like power point presentations, using pictures and photographs. Learners get bored with the same method of lesson delivery. Computer technology can enable teachers to set learners free from routine instructional tasks. In contrast, learners who are not doing Computer Applications Technology and do not have knowledge of computers have to conduct research using books and newspapers, after which they write their assignment or project by hand: changes cannot be effected thereafter.

2.6 The influence of Teachers' Technology use on Instructional Practices

According to Trimble (2003) teachers struggle with the problem of overcoming the inertia of instructional practices in the traditional classroom. In these traditional classrooms, learners are typically not provided with whole, dynamic learning experiences, but rather with limited, arbitrary activities. Schools frequently teach information in various disciplines without providing adequate contextual support with opportunities to learners to apply what they are taught. The resulting inauthenticity of classroom activity makes it difficult for children to see how school learning applies to their lives.

Bracey (2002), Collins and Dewees (2001) and Riley (2002) note that; the lack of attention to authentic experiences is particularly troubling when considering opportunities for children in poor, under-funded, often rural areas of the United States. Research points to nationwide low performance in many subject areas. The research further indicates that some geographic areas, particularly rural areas, are reporting low performance and that the achievement gap is persistent and intrinsically linked to the fact that millions of the nation's children still live in poverty.

Beeson and Strange (2003) found that; 43% of the United States' public schools are in rural communities or small towns of fewer than 25,000 people, and 31% of the nation's children attend these schools. Poverty is the largest persistent challenge rural schools face. Children in rural schools frequently do not have the same level of access to resources and experiences as children who live in suburban and urban areas. Per capita income, salaries, computer use in the classroom, school administrative costs and transportation are among the top challenges for rural schools.

Ingersoll (2004) observes that; another serious problem plaguing rural schools is difficulty in hiring and retaining qualified teachers. Ingersoll examined data regarding staffing issues in high-poverty schools in both rural and urban areas. He concluded that factors tied to the characteristics and conditions of these schools are behind the teacher shortage in those schools. His findings show that other significant factors related to staffing problems in these schools are related to inadequate administrative support, excessive intrusions on teaching time, learner discipline problems and limited faculty input in decisions related to the schools.

Clayton's (2004) study investigated the status of access to computers and the internet, programs, relevant curricula and whether teachers have the skills to use computers and related programs for teaching in rural South Africa, using the Northern Cape Province as a case study. The majority of schools in rural and township areas in South Africa either do not have access to computers and the internet, or lack adequate skills and relevant programs to exploit advantages of teaching Computer Applications Technology. The findings of this study show that the teaching of Computer Applications Technology in rural schools is inadequate. Where computers exist, they are not put to adequate use due to lack of relevant programs, problematic learner or group ratios and most disturbingly, a lack of computer skills among teachers. Of utmost significance, therefore, is more than just the provision of computers but also the means by which these can be put to beneficial use in all schools. Vibrant computer literacy programs for South African teachers, especially in rural areas, together with the provision of the necessary programs for teaching, as well as measures to protect the infrastructure are strongly recommended in this study.

2.7 Computer literacy Teachers as motivators in learners' lives

Teachers who had experience in teaching computer literacy motivated learners about their careers, which computing was likely to be a part ofJohnson's (2001) study outlines experience of a computer teacher by the name of Goddard, who suggested that it was not easy for her to make path for computer technology at school. She encouraged other teachers to make use of the school computer equipment and write whatever they liked. Goddard used this as a technique to help computer literacy teachers to become more familiar or be more at home with teaching the subject.

The findings of this study show that if computer teachers are well experienced in teaching Computer Applications Technology and they qualified to do so, it will be easy for those teachers to motivate learners about careers in computer studies. There are so many careers in the field of computer studies, but learners in rural areas do not know about them since some of their teachers are not even aware of those careers. This study also shows that Computer Applications Technology teachers can be of great benefit at schools, because all teachers these days need to be computer literate. Many school tasks, such as setting question papers, drawing up memoranda, compiling mark lists, schedules and learners' school reports are being done on computer. Computer Applications Technology teachers can therefore also motivate other teachers and guide them how to use computers at school.

2.8 The roles of teachers and learners in a Computer Applications Technology class

Reigeluth (2012) observes that the teacher's role has changed dramatically in the new paradigm of instruction from the "sage on the stage" to the "guide on the side". There are three major roles involved in being a guide on the side. First, the teacher is a designer of learner's work. The learner's work includes that which is done in both the project space and the instructional space. Second, the teacher is a facilitator of the learning process. This includes helping to develop a personal learning plan, coaching or scaffolding the learning when appropriate, facilitating discussion and reflection, and arranging the availability of various human and material resources. Third and perhaps most important in the public education sector, the teacher is a caring mentor, a person who is concerned with the full, well-rounded development of the learner. The results of this study show that a teacher is a designer, facilitator and mentor and that these are only three of the most important new roles that teachers serve however teachers with different kinds and levels of training and expertise may focus on one or two of these roles.

Ministry of Education Portal (2012) notes that learning is an active process. The learner must exert effort to learn. The teacher cannot do it for the learner. The new paradigm characterizes the learner as the worker, with the teacher as the designer of the learner's work. Second, to prepare the learner for lifelong learning, the teacher helps each learner to become self-directed and self-motivated. Learners are self-motivated to learn from when they are born to when they first go to school. The industrial-age paradigm systematically destroys that self-motivation by removing all self-direction and setting learners boring work that is not relevant to their lives. In contrast, the post-industrial system is designed to nurture self-motivation through self-direction and active learning in the context of relevant, interesting projects.

The findings of this study show that learner's motivation is key to educational productivity and helping learners to realize their potential. It also greatly reduces discipline problems, drug use and much more. Third, it is often said that the best way to learn something is to teach it. Learners can also serve as peer tutors. Therefore, new learners' roles include learner as worker, self-directed learner and teacher.

2.9 Schools start computer clubs and teach computer literacy

Zaman (1992), conducted a study in the rural schools of Malaysia. The study estimated that, 20% of the 4.2 million school children have some understanding of computer applications, such as word processing, using spreadsheets, and using some educational courseware. He also found that the rate is increasing steadily as more and more schools form their own computer clubs and teach computer literacy on their own initiative. Currently, 35% of the schools in Malaysia have computer clubs and conduct computer literacy programs. The results of this study show that the rural schools in Malaysia have benefited from the computer clubs that were started by the schools. Since the South African schools in this study seem to be experiencing problems with Computer Applications Technology, starting computer clubs could be the part of the solution to this problem. The clubs enable learners to gain a lot of computer knowledge. Teachers view it as a good thing to teach learners to operate computers, at least at a basic level. Teachers also reported that, teaching learners programming can give them confidence in their ability to control computers, and possibly lay the foundation for a career in computer sciences. Teaching learners how to use application programs can give them skills that may be useful to them as learners and even when they have moved into jobs.

Subrahmanyam, Kraut, Greenfield, and Gross (2004) note that the use of computers and computer games by children at an early age helps to develop thinking skills. Studies in the field of Psychology for example suggest that whilst computers and the internet are used widely by children for school work and to obtain information, playing games that promote cognitive skills and the use of home computers has been linked to mildly positive effects on academic performance. The teaching of Computer Applications Technology according to Yelland (2001) can also increase the mathematical achievements of children in pre-school and primary school.

2.10 Computer Applications Technology teachers need more support

The aforementioned Washington Post article (2000) observes that; a group of teachers was using some computer resources, but was easily discouraged. Most teachers wanted to learn, but they said it took time and they needed help. In the Washington area more than 95% of schools and nearly two-thirds of classrooms had computers which were connected to the Internet. Yet in a survey that was done by the National Centre for Education Statistics, 79% of teachers said they did not get enough help in teaching computer literacy. The findings of this study suggest that more support is needed by Computer Applications Technology teachers in rural schools. It shows that the Department of Education needs to take this issue into consideration.

This reading was relevant to the study in that, some schools which were previously disadvantaged have now acquired computer technology. However, not all teachers had formal training in the use of computer technology. The researcher visited schools in the rural areas where computers were only used for administration because the teachers were not able to use the computers. They could therefore not teach computer subjects. The findings of this study also show that some teachers have an onerous work load because their colleagues are not computer literate as a result they have to do the mark lists for all the teachers at the end of the term. Computer Applications Technology teachers need to produce school schedules on the computer and prepare portfolio cover pages and file dividers for other teachers and learners in preparation for CASS Moderations.

2.11 METHODS OF TEACHING

There are many methods of teaching that can be used by teachers, ranging from teacher-centered, subject-centered to learner-centered method. The following list outlines some of these teaching methods. These five methods have been singled out because they are commonly used in teaching subjects like Computer Applications Technology.

2.11.1 The five teaching methods are:

- Demonstration method
- The use of textbook method
- Question and answer method
- Lecturing method
- The Keller Plan as a teaching Method Independent Study (Programmed Instruction) (Govender, 1998).

2.11.2 Demonstration method

Demonstration involves drilling, practicing and the polishing of practical skills. It is suitable for the teaching of subjects like Computer Applications Technology, where theory is mostly put into practice by means of hardware and software. The teacher usually instructs learners on the theory by telling them about it. Another step is where the teacher shows the learners how the theory works, using certain audio-visual teaching resources. At the end learners are given a chance to do what their teacher has done (Putnam, 1998). It is very important for the teacher to follow a logical sequence of knowledge that is relevant to the learners' experience, to avoid any confusion. The method of teaching must proceed gradually to new knowledge. If necessary the teacher should even drill the learners on the new knowledge to facilitate its absorption. Once the learners master the new knowledge the teacher should proceed to the next step to avoid boredom. Teachers should remember that learners' pace of learning is not the same. One of the methods which can be used by the teachers to avoid the negative effects caused by the different pace of the learners is to allow the faster learners to help the slower learners. By so doing the learners learn by teaching others, drilling themselves and polishing the skills that they have achieved (Naicker, 1999).

2.11.3 Advantages of the Demonstration Method

- Learners get an opportunity to apply or put whatever theory was given to them by the teachers into practice. By doing so they are proving the correctness of the theory and know from the start whether it is possible to use it or not.
- The demonstration method accommodates learners' different styles of learning. People remember 10% of what they hear, 30 % of what they see and 50% of what they see and hear (Robbins, 1997). Demonstration is one of the best methods that integrates these areas (senses) of learning.
- Surveys indicate that 25% of people are mainly audio learners, 35% are mainly visual learners and 40% are mainly physical learners (Naicker, 1999). The demonstration method involves all these elements in order to reinforce whatever was learned.

2.11.4 Disadvantages of the Demonstration Method

- The demonstration method needs small groups. If the teacher has a large group, other learners may not get a chance to master the required skills. This is due to different perceptions on the part of learners and other factors (Lorenzen online, 2001).
- Teachers need a lot of time to plan and organize hardware, software and underwear. This may involve laboratories or workshops where the teacher cannot control conditions. For example, if there is a problem with a power supply in the laboratory, the teacher cannot use this method effectively. Budget and time constraints can also affect teachers.

2.11.5 The use of textbooks

One of the tools that is used in teaching Computer Applications Technology is textbooks. Textbooks are no longer called a teaching aid, but are referred to as a teaching and learning resource. As a result of those changes the name of the Textbook Method was also changed to 'The use of the textbook', because it was associated with teaching aids (Lorenzen Online, 2001).

2.11.6 Advantages of the textbook method

- Textbooks usually stimulate class activities. For example, if teachers want to give learners exercises or homework, they can easily refer them to the textbook. The textbook provides learners with different ideas, which are sometimes different from those of teachers. With these new ideas they can supplement the teacher's information and refer learners to other sources.
- People who have experience in a particular field commonly prepare textbooks. They usually start with simple exercises and proceed to difficult one. A good textbook is well-arranged.
- Textbooks are also helpful to learners who want to work ahead of their teachers. They are a more reliable source than written notes. With the aid of a book, learners can critique their notes from their teacher (Govender, 1998).

2.11.7 Disadvantages of the textbook method

- Textbook words are static compared to spoken words. They are not suitable for teaching children and illiterate people. They cannot repeat whatever the teacher wants to repeat to learners in order to facilitate learning. Too little provision is made for individual differences.
- There is a danger if the teacher does not tell learners that there are many possible interpretations of the prescribed textbook. Learners will depend heavily on the textbooks and think that there is no other truth, except what is written in the textbook.

- Today's textbooks age faster than in the past; it is dangerous not to check and find out about the latest information. For example, if computer teacher orders Windows 3.1 textbooks and finds that he/she can only has access to Windows 2000, he/she will find that those books are useless. Therefore, relevant books need a lot of planning and experienced teachers, because most books are incomplete. They should only be used as teaching or learning resources, not as teaching aids that replace teachers (Lorenzen Online, 2001).

2.11.8 Question and answer method

This method is divided into two broad types of questions, because of different systems of education and training. These are reproductive and productive questions (Govender, 1998).

2.11.9 Reproductive Questions

Those questions require learners to memorize exactly what the teacher gave them. Christian National Education (under apartheid) used these types of questions, where learners were expected to memorize masses of fragmented facts. This study found that teachers are basing their teaching mostly on reproductive questions. Even at the schools where the pass rate is good most of the learners cannot apply the knowledge they have learnt in the classroom to a real life situation. Therefore, there is a danger in using only these types of questions. Learners who employ such methods will not be able to become employers. They can only expect that someone will employ them and that they will work as subordinates. Examples of these questions are that of lower order questions like What? Which? Who? and When? (Juta Online, 2001).

2.11.10 Productive questions

Productive questions are organized in such a way that they challenge learners to think critically about what is asked. These questions are of a higher order, such as How and Why questions. Outcomes-based Education (OBE) is characterised by more productive questions. As observed by Jansen (1997), one of the factors that hindered the success of OBE in South Africa is the teacher's lack of skills. If most of the teachers are products of Christian National Education, it then becomes difficult for them to accommodate the new changes that come with OBE. Productive questions marry theory and practice, which is from concrete to abstract. But in order to use the question and answer method successfully one needs to use both reproductive and productive questions (Jansen, 1997).

2.11.11 Lecturing method

Common features of the lecture method are as follows:

The lecture method refers to a single teacher presenting information to a group of learners. Information flows from teacher to learners as a one way type of communication, because learners mainly participate as listeners. However, nowadays the lecture method involves some interactive audio-visual resources such as computer presentations, videos and others which facilitate the information presented.

2.11.12 Advantages of the lecture method

The lecture method can be used to present uniform information to a large audience by one teacher within a short period of time. It is cost effective, because it does not require many teachers to be employed. It is also the best organised and systematic method of presenting content. This makes it suitable for both beginners and advanced learners (Bligh, 1972).

2.11.13 Disadvantages of the lecture method

- It requires careful preparation and presentation becauseteacher tends to be the final authority on topics discussed.
- It is not easy to judge an audience's understanding accurately, but it may promote note-making skills.
- It may do little to promote high-level intellectual skills and accommodate the individual pace of understanding. It usually promotes passive learners who just listen to one person.
- It also requires a skilful presenter of information (Costin, 1972).

2.11.14 The Keller plan as a teaching method

This method implies the division of one course into different modules. For example, a course on computer information systems is divided into the theory of the computer, word processing, spreadsheets and databases. Each of these modules has specific outcomes, clear study material and self-evaluation questions or tests for learners. These modules are suitable for individual or groups and have flexible deadlines for completion. But, the learners only move to the next module if the first one has been completed, following their own pace. The teachers change their roles to become stimulators and motivators (Costin, 1972).

2.11.15 Advantages of the Keller plan

- It promotes a good teacher-learner relationship as the teacher's role of stimulating learners motivates the learners.
- It motivates the learners through rewards of success. Once the learner passes the first module he or she becomes motivated to move to the next one. It is also easy to pass, because these modules are just like one chapter of a book to be covered for examination.
- It is flexible and inexpensive, because each module is designed like one chapter of a book. The learner follows his or her own pace to complete the module.
- Today, it is even possible to find the information for the modules in the form of an online lesson (Costin, 1972).

2.11.16 Disadvantages of the Keller plan

- It increases one subject into many subjects (learning areas); as a result the learners may take a long time to complete one subject as a course. One learning area can even be divided into as many as eight modules. But, the long periods required to complete eight modules may discourage the learners.
- It is suitable for well-motivated and mature learners, who cannot depend on a teacher's presentation.
- The teachers also take a lot of time to design the modules for the first time (Costin, 1972).

2.12 The Benefits of Using Computer Technology in teaching and learning

Adam and Burns (1999) note that; the best thing about computer technology is that all learners can benefit from it, especially learners with special needs, regardless of their age, gender, or social-economic status. Costin (1972) also mentions the fact that; the teaching of computer technology entails a change in teachers' and learners' attitude towards teaching and learning which is in line with (OBE) and the National Qualifications Framework (NQF). Christie (1996) argues that the (NQF) attempts to increase learning opportunities, and eradicate potential hindrances to learning for all South African citizens, from school to out-of-school youth and children to adults, employed and unemployed. This implies that teachers must move away from the old system of teaching and adopt a system which is learner-centred, such as the Keller Plan method. This method promotes a good learner-relationship as the teacher's role is to stimulate learners who end become highly motivated. Learners can find the information on modules as an online lesson.

This study shows that; the teaching of Computer Applications Technology can facilitate a good relationship between teachers and learners both in school and outside school, since the teacher is able to e-mail tasks to the learners, even during the holidays. The learners can do the task and e-mail it back to their teacher. Learners encounter challenges in their school work they can e-mail a question to their teacher and get feedback as soon as possible. This can help teachers to do away with the old system of teaching whereby teachers' communication with their learners was limited to the classroom setting where the teacher had to write tasks on the chalk board and the learners had to wait for school hours to ask questions of their teachers. The situation is different when it comes to schools that were visited by the researcher because the Computer Applications Technology learners at these schools can only access computers at school let alone use the internet.

According to Watkins *et al*. (1996) and Pomorina (2000), computer skills and internet technology may encourage and support effective teaching. Several studies also indicate that using educational technologies, including the internet to complete and enhance traditional instructional instruction and learning will lead to effective teaching outcomes (Summary & Summary, 1998; Ashton &Zalzala, 2000; de Villiers, 2001; Hogarth, 2001). Effective teaching refers broadly to the increased connection between effective teaching processes (such as collaboration, interaction, participation and responsibility) and teaching outcomes and objectives.

The evidence shows that providing computer skills and using the internet in teaching opens up; exciting opportunities for both learners and teachers that facilitate collaborative, project-based and authentic activities, which are otherwise not available through the traditional face-to-face mode of teaching. Effective teaching will determine effective teaching outcomes, which in turn will build human capacity and contribute to the economic well-being of our learners and society as a whole. Furthermore, the skills and knowledge that will be acquired through teaching computer skills and the internet may be advanced in the workplace. This is in line with one of the priorities outlined in the objectives of South Africa's National Plan for Higher Education. "To produce graduates with the skills and competencies required to participate in the modern world in the 21st century" (Ministry of Education, Bhengu 2001p.18)

Mfum-Mensah (2003) observes that the teaching of Computer Applications Technology does more than improve the quality of learning; also introduces learners to technology-embedded practices of the post-schooling technology-based information economy. Within the education environment, learners are able to access learning material; perhaps do course exercises, and exchange ideas with one another in real time, regardless of the diverse locations where each learner may be located. The results of this study show that teachers would also be able to communicate with others from around the globe, share information and discuss issues that affect their teaching.

2.13 Computer Technology in Teaching

Lundall and Howell (2000, p. 37); asset that, "computer technology is being used in a variety of ways to engage with teaching and learning. Traditionally technology is used to promote 'drill and practice' type exercises; to teach technology itself, not introduce new subjects like computer studies to teach basic computer skills like word-processing". This study revealed that, more recently, technology has been used to promote student-centred learning teamwork. In the latter approach, computer technology helps students acquire new communication skills at the same time it helps them learn about a knowledge domain. Learners benefit from this new technology because they can be able to do their work as a group while they are not in the same place. They can share their challenges as they study and prepare for class tests or examinations using the internet.

The results of this study suggest that, while this approach comes closer to engaging learning in ways that deepen learning experiences. It is teacher-intensive in terms of the levels of input and facilitation required. (Alexander, 1999, p. 9) observes that "it is important to recognize that student-centred learning does not alleviate teacher workloads. Teachers are still responsible for designing learning programmes that deliver content and enable the acquisition of competencies and in addition their role expands to include facilitation, guidance and the instilling of awareness in learner of their own learning patterns".

2.14 Computer Technology and Learner Performance

The educational research literature shows that learners who make use of every learning opportunity approach the final assessment task with a greater likelihood of high performance (De Vita and Heftler, 2001). Fowell, Southgate and Bligh (1999) suggested that from the teachers' perspective, using a selection of methods allows performance from different sources to be related. Seal, Chapman and Davey (2000), who investigated which types of assessment learners found most motivating for their learning, found that having a range of assessment opportunities was most motivating (Peat & Franklin, 2003).

Feedback on performance; especially that of a formative nature, has been shown to be a valuable tool in the learning process enabling learners to assess their own progress and understanding and remedy any weakness exposed by the assessment (Clariana, 1993; Macdonald, Mason & Heap, 1999; Zakrzewski & Bull, 1999). Studies undertaken by Peck and Dorricot (1994) and Van Duson and Worthen (1995), (as cited in Hopsin, Simms, & Knezek, 2001-2002) affirm that the teaching of Computer Applications Technology allows learners to organize, analyse, interpret and evaluate their work. These are higher order thinking skills that are made possible with the teaching of computer technology. Meyer (2003) reveals that there is growing evidence that technology, will improve learners' critical thinking and writing.

A study byJurich (1999) seems to agree on the degree of difference that positive teacher involvement made to the use of computer technology in schools. The study suggests a positive relationship between computer use and learner achievement, especially for those learners most in need (poorer and disadvantaged learners).

2.15 Level of Computer Applications Technology amongst teachers

According to Burge (1992), there is a considerable interest in computer courseware among today's teachers, but the interest is also coupled with lack of experience. Wilkinson (1983) suggests two different methods that can enhance computer usage:

1. A team of instructors can visit schools, hold workshops, teach demonstration classes, and give informational lectures.
2. Identify a small number of teachers who are interested in computers and help them use computers in their own classrooms; these teachers could serve as consultants to their fellow teachers.

The way teachers direct learners to use computers varies according to instructional level, school poverty level, and hours devoted to professional development. Rowand (1999) states that teachers with a higher level of professional development in the use of computers over the past three years were more likely to assign various types of work involving computers or the internet to learners. On the other hand, teachers without recent professional development were more likely to report feeling not at all prepared to use computers and the internet in the classroom. The findings of this study suggest that the insufficient training of teachers or insufficient experience may have a great effect on the learners. The researcher noticed in the schools that were visited, that the performance of teachers in terms of learner pass rate depends on their level of qualifications and the number of years of experience they have in teaching Computer Applications Technology.

2.16 Rural schools' challenges regarding Computer Applications Technology

The National Centre for Examinations and Educational Evaluation (2012) notes that Computer Applications Technology together with Information Technology is without doubt one of the most difficult subjects to administer and manage. This is particularly true because policies and practices need to honour the volatility of the technology on which the curriculum delivery of Computer Applications Technology is based. The findings of this study show that conducting the practical examinations has proven year on year to be the most stressful examination for all concerned, from learners to invigilators to administrators.

The Information Technology Institute (2012) observers that the biggest challenge facing schools offering Computer Applications Technology is the failure to maintain and develop its computer sources. Schools do not take ownership of maintaining their computer laboratories. Rural schools cannot raise funds to employ the services of third party companies to regularly housekeep, maintain and upgrade the computers so that curriculum delivery can take place seamlessly and uninterrupted. It is national policy that every learner must work on his/her own computer for four hours per week.The policy stipulates that every learner must have his/her own computer for assessment. The results of this study show that the national education department needs to look into the granting of ring-fenced funds to schools offering Computer Applications Technology, this can be via the norms and standards allocation for sustaining computer laboratories.

The National Authority for Quality Assurance and Accreditation of Education (2012) states that the provincial education departments need to look at providing additional posts to Districts for the appointment of computer laboratory administrators to attend to the housekeeping, upgrading and maintenance of computer laboratories at schools offering Computer Applications Technology within a circuit. It can be irrefutably stated that Computer Applications Technology provides learners of all communities with literally the world at their fingertips. For this to remain proactive decision-making, budgeting and foresight need to be up-front, especially when it comes to the issue of sustaining computer laboratories. The results of this study show that if the department of education fails to respond to these needs learners will not receive the tools they require to be marketable and productive in the future.

Furlonger's (2002) study on computers and rural schools found that, in most rural schools it is unlikely that one would find a computer laboratory in good condition in terms of space and the number of computers, let alone someone with knowledge of the internet. He observes that; rural scholars do not have computer centres, internet access to information, experienced teachers and ample sporting and cultural activities to choose from. He found that 50% of school children drop out before high school, mostly in rural areas.

The findings of Furlonger's study apply to what the researcher found in the rural schools he visited. Computer laboratories are very limited in terms of space. All the schools reported that they have to limit the number of learners who are doing Computer Applications Technology. Teachers reported that many learners want to do Computer Applications Technology because they said that, their parents do not have enough money to pay for tertiary education. Computer Applications Technology would enhance their employment prospects post-matric.

According to the Human Sciences Research Council (HSRC) (2005), education is recognised as a route to information and knowledge literacy and ultimately a significant step towards improving living standards and escaping poverty. Rural communities consider education the most precious gift that one can get in a lifetime. The findings of this study show that parents, principals, teachers and learners place high value on education and the benefits that they think it can bring.

The HSRC (2005) states that, whilst of South Africa's constitution emphasises equality in, and the right to education, there is evidence that inequality in the provision of education and training between urban and rural areas is acute despite (at the time of the HSRC report) ten years of democracy. The results of this study show that in rural areas education is not well-supported compared to urban areas.The physical and infrastructure conditions of schools, buildings, toilet facilities, telecommunications and equipment are poor. The Country Report, SA (2005) also notes that a continued lack of qualified teachers, the irrelevance of the curriculum, large classes, a lack of services available to teachers, and insufficient support are major challenges to quality education in rural schools.

Taylor (2007) and Pandor (2006) observe that there is evidence of schools which have no classrooms and operate under trees, or have below par classrooms with no chairs or desks, let alone computers and the internet in South Africa. The findings of these studies show that urban schools, in most cases, have most of the basic needs at their disposal, i.e. electricity, water, proper learning facilities and computers and the internet. Obviously, with a shortage of these resources in rural schools, children tend to lose interest in education, with adverse outcomes on the quality of learning. The decline in the Grade 12 final examinations pass rate is partly explained by such problems.

Umalusi (2004) notes that one of the measures of school quality is scores such as the matric (Grade 12) results in the case of a secondary school. Scientific studies confirm a direct co-relationship between quality measures, the Grade 12 results, learning conditions and access to adequate resources for learning. Many schools in rural and remote areas in underdeveloped countries including South Africa lack basic resources and ultimately reflect poor quality outputs. The results of this study show that rural and largely black schools remained under-resourced.

Taylor and Prinsloo (2005) note an example of unbearable learning conditions in a rural KwaZulu-Natal (KZN) area. Makola's (2005) findings are used to illustrate discrepancies in terms of educational resources between rural (predominantly black) under-resourced and urban (largely white and Asian) resourced schools. Taylor and Prinsloo draw on the same findings to substantiate a link between these discrepancies and the poor quality of education (measured by Grade12 results) in under-resourced schools in rural areas.

The aim of Taylor and Prinsloo'sstudy is to investigate the levels of access and teaching of Computer Applications Technology in remote underprivileged schools in South Africa, using the Northern Cape Province. The findings of this study also show that; computers and internet access depend largely on the existence of at least a building, electricity, telephone lines, and ultimately programs. Obviously school will need to secure a building, followed by desks, electricity, and telephone lines, before computers, internet and learning programs can become feasible. The impact the quality of education has on teaching of Computer Applications Technology has is, therefore, unsurprisingly low in these underprivileged, rural and largely black (African) schools.

Taylor and Prinsloo (2005)note the differences in South African schooling system in terms of class size between the urban formal schools (historically white schools), the urban informal settlements (representing the black informal townships), and rural black schools. Their study shows that 60% of rural teachers as teaching classes with more than 46 learners. The urban informal settlements show almost the same number at 58.31%. Formal schools, by comparison, reflect a completely opposite trend with less than 40 percent of the teachers (in black townships) teaching more than 46 learners in a class. The results of this study show that the number of teachers teaching classes exceeding 46 learners is less than 5%, whilst more than 60% of these teachers teach classes with fewer than 35 learners. A directly opposite trend is, however, the norm in African schools. These statistics together with a lack of basic resources such as classroom, desks and chairs as well water, sanitation, books and; electricity, let alone skilled teachers, computer resources and; learning aids, etc, have a direct negative impact on the quality of education (measured in terms of grade 12 performance) in these rural schools.

The United Nations Education, Scientific and Cultural Organization (UNESCO) (2002) observes discrepancies in the between black and white schools. It also found that schools without adequate resources produce poor academic performance. Similarly, an impressive pass rate is evident in well-resourced, urban schools. The results of this study show that most teachers in rural areas are poorly trained, with few incentives to live in the areas where they teach. Combined with startlingly limited facilities and resources to assist them in their tasks, this compromises the rights of children toeducation. The findings of this study also show that it is clear that rural areas are complex and challenging, and more is required to ensure that learners have access to the quality of education enjoyed by their urban counterparts.

The New Partnership for Africa's Development (NEPAD) e-School Commission (2005) conducted a research on the experiences of teachers in teaching Computer Applications Technology in urban schools. The study showed that there were clear differences withthe experiences of teaching Computer Applications Technology in rural schools. At a school situated in the urban area of Kuruman in the Northern Cape the school principal reported that the school has 40 computers in every class. These computers are used by learners taking specific subjects such as Computer Applications Technology, Information Technology, Science, Biology, Civil Technology and Engineering Graphics and Design. Teachers of these subjects were provided with laptops and multimedia projectors for use in the class. The school has 24-hour internet access, thus making it easy for teachers to empower themselves. The principal also reported that in terms of maintenance or technical support, one of the staff members has IT expertise. They only called an IT specialist when necessary.

The NEPAD e-School Commission (2005) reported that; the school in Kuruman is using Computer Applications Technology applications, Microsoft office and other programs that they download from the internet to teach learners. The principal said that he strongly believes that having computers and the necessary software makes a tremendous difference not only to learning but also to teaching. Explaining how human beings tend to absorb information, he said that some people use their 'eyes' to learn better, while others use their 'ears'. He said that there are still problems in the rural areas where the quality of teachers is not up to 'par'. For him supplying those teachers with relevant materials would enable them to pass the message to the learners effectively.

2.17 The growth of Computer Applications Technology

The Ministry of Education (2012) notes that if more computers were available at all the schools offering Computer Applications Technology (CAT), more learners would study Computer Applications Technology at every one of these schools. Computer Applications Technology is arguably the fastest growing NCS subject in the FET band. The results of this study show that Computer Applications Technology empowers learners with the essential skills and knowledge that they need to progress exist in the 21st century as well as the competence and confidence to engage with information and communication technologies as problem solving tools.

The Professional Academy for Teachers (2012) contends that how successful learners are in the acquisition of these skills and knowledge will depend on how determined school communities that is teachers, learners, parents and administrators are to get rid of legacies of the past and take ownership of the responsibility to invest in our youth. The findings of this study show that only those school communities prepared to do so will yield the dividends of computer literate youth capable of using computers to solve real-life, day-to-day problems. Those school communities who shirk this responsibility willproduce learners who try to solve current problems with outdated tools, while expecting them to be productive in the future.

2.18 Teachers' descriptions of the value of their choices for teaching and learning.

Larner and Timberland (1995) observe that; the overhead projector was ranked as the most essential item for teaching and learning by 16% of their respondents. Teachers considered them simple to use and efficient getting learners' attention. Unfortunately, they did not describe overhead projectors as peripheral computer devices. Printers were ranked as the second most essential item for teaching and learning by 8% of respondents. Teachers' descriptions revealed that printers are seen as something more sophisticated than a typewriter. Describing printers as a machine for printing out lesson notes and test questions shows that teachers perceived printers as useful tools that they can use both before and after lessons. The lack of any description of using a printer during a lesson suggests that teachers did not perceive printers as tools that learners can use during lessons. The keyboard was perceived as a tool for writing and an important component of computers.

Hizal (1989) observers that, there are so many hardware and software items that computers cannot work without. Selecting the keyboard as the third most essential item for teaching and learning among 25 items indicates that teachers are not familiar with computer technologies, while (33%) percent of teachers were familiar to them. In this study, significant differences were found to exist between males and females in terms of familiarity with Keyboard, Mouse, Monitor, Sound Card. Microphone / Speaker, and Digital Camera. A possible explanation for this is that most people view computer and related technologies as male domains.

According to Hargreaves (1996) the result of the chi-square analysis for positions of teachers (classroom versus major teachers) reveal that the teachers did not significantly differ in their familiarity with computer technologies. The amount of teaching experience appeared to have an effect on teacher's familiarity with computer technologies. Teachers with 16 -25 years teaching experience were less familiar with Hard Disk, CDAsan, ROM, CD, DVD, Disk Drive, Floppy Disk, Keyboard, Mouse, Monitor, Printer, Scanner, Sound Card, TV Card, Microphone, Speaker, Digital Camera, PC compatible Fax, Modem. This is not surprising because they were older and less experienced with computers than younger teachers. The results of the chi-square analysis for school status reveal that the two groups differed significantly in their familiarity with all types of technologies. Teachers who work in CES schools were more familiar with computer technologies than traditional school teachers.

2.19 Educational Computing Problems Facing Basic Education School Systems

McCannon and Crew (2000) found that; participant teachers reported a variety of technological problems facing their school systems. The most commonly cited problem (60%) was lack of hardware in basic education schools. Teachers pointed out that the main issues were insufficient resources for teachers to keep up-to-date with the emerging technologies and limited or inappropriate hardware due to lack of funding for upgrade and maintenance. The second most commonly cited problem (46%) was related to organizational factors like scheduling, lack of time, and class size. Teachers note scheduling difficulties and mentioned that their self-development activities were limited due to poor computer access during release times.

McCannon, *et al.* (2000) also pointed out that scheduling limitations restrain computer use by both learners and teachers, and reduced the feasibility of training within school hours by the computer teacher. Easy access to computer resources for teachers was emphasized as desirable. Many teachers indicated frustration with their computer skills and felt constricted by the lack of available time during school hours to develop these skills. Class size was also mentioned as a problem. According to teachers, large class sizes make it difficult for teachers to find sufficient time for computer use.

Downs, *et.al.* (1995) observe that; the low level of teacher computer literacy was also one of the problems pointed out by participant teachers. They indicated that computer literacy implies is knowledge about proper use of computers. Teachers reported that lack of teacher training is also one of the problems that face basic education schools. This problem is partly due to the fact that many teachers currently working received their teaching certificates prior to the time when computer education was available.Some teachers noted that there is no extra financial support for computer literate teachers from the ministry.

2.20 Use of the internet in schools today

Boswell (2005) notes that; the internet was developed in the United States in the 1970s as a network for use by the Defence Department; it was known as the ARPANET. It was developed initially as an experiment and was used to support communication with the Defence Department. The usefulness of computer networking, especially electronic mail, as demonstratedby ARPANET, piqued the interest of other communities and disciplines. Hence, by the mid-1970s computer networks had begun to develop wherever funding became available.

Kenny and Gunter (2011) observe that; teachers are people like you and I. They need time to prepare for work, time to spend with their family, or simply forget about everything while reading a good book. When it comes to setting quality assessment tasks, success is measured in how much time you have at your disposal. The Computer Applications Technology teacher has to set both 150-marks theory and 200-marks practical papers from scratch in his/her own time; thistakes more than a week.

The results of this study show that using the internet in teaching Computer Applications Technology allows for subject support groups in different areas, making this task somewhat easier. Teachers get together and share their expertise to enhance their teaching practice. This group of teachers in the same geographical area have realised that there is power in working together, and set common tasks collectively. The results of this study also show that a number of overheads are required for this process to succeed. These include setting up meetings, tracking changes in different versions of the same documents emanating these documents, and exchanging these documents among the participants.

Ministry of Education Portal (2012) says that there is no Computer Applications Technology cannot be taught without computers. Each learner should be exposed to working on computers on a daily basis and have access to his/her own computer for the full duration of the contact time. This is underlined by the latest national CAT exam report. Computer Applications Technology is the effective use of information and communication technologies in an end-user computer applications environment in different sectors of society through MS-office. Computer Applications Technology equips learners with knowledge, skills, values and attitudes to create, design and communicate information in different electronic formats. The results of this study show that Computer Applications Technology is a useful life skills subject since we live in the age of computers and learners will be equipped with marketable skills to cope in an information society. All tertiary courses require the transfer of end-user applications knowledge and skills that Computer Applications Technology offers.

According to Gelernter (2001), internet access today is more easily available than ever before, with most libraries providing free access. The internet as a communication tool enables users to perform various activities from just searching for information to performing various other activities such as chatting, joining support groups and playing games, amongst others. Amichai-Hamburger (2005) concurs with Gelernter and notes that; people communicate with others from all corners of the globe every single day, but the choices made are dependent on the individual. The Computer Applications Technology teachers who were interviewed reported that; the internet is not always available in their schools. This means that their learners cannot always perform the various activities they need to perform.

According to Leiner, Cerf, Clark, Kleinrock, Lynch and Perzynski (2004), the internet has transformed the computer and communications world like nothing that came before it. The advanced research projects Agency in the U.S. Department of Defence (ARPANET) started planning for the internet during the 1950s. In August 1962, J.C.R. Licklider of MIT discussed his Gelactic Network concept where he envisioned a globally interconnected set of computers through which everyone could access data and programs quickly, from any site. In essence, this concept is really what the internet is like today. According to the findings of this study, learners are disadvantaged in the sense that they cannot access the data and programs in any site as they need them because of the unavailability of the internet most of the time.

Jordan (2007) observes that; the internet is a novelty to most users in South Africa; many people access the internet, having no prior knowledge of what it offers. Once a user is exposed to the vast array of information on the web, he/she becomes overwhelmed; the novice is therefore eager to explore as much as possible. This holds true for both young children and adults. The novice, through experimentation, trial and error or through information gained from other users, finds a niche for him/herself on the internet and becomes a regular user of one or more genres of sites. Data available on the internet is not regulated; the possibility therefore exists, that children could access information that is not appropriate for their age and needs. Jordan adds that; whether the user is accessing sites responsibly, it is a matter of concern for parents, teachers and the community at large. The respondents in this study reported that; learners need to be monitored when they use the internet at school, when it is available because, they access material that does not have anything to do with their school work like pornography, downloading music and playing games.

The World Wide Web provides a vast amount of information which most users access using the available search engines. Clark (2000) describes a few asynchronous and synchronous technologies which can be used in online research itself to gather data, e.g. e-mail lists and Internet Relay Chat (IRC) which can be used for interviews, focus-groups and online observation.

Niemand and Ransleigh (2003) state that; Internet Relay Chat (IRC) is used extremely widely by people in general these days. It allows people from various parts of the world to participate in electronic, text-based communication. Participants communicate using text messages in real-time (meaning that all users are online simultaneously) with one or multiple users; files may also be sent between users. The respondents in this study reported that, because of the unavailability of the internet most of the time in their schools they do not do their work the way they want to. For example, they mentioned that they would like to e-mail some tasks to be done to their learners, especially during the holidays, so that learners can complete these tasks and e-mail them back to the teachers. Teachers also reported that sometimes they would like to give their learners some group work through the internet if it was possible but it is not possible because of the internet challenges.

The media have revealed the positive and negative experiences that some users have had on IRC and dating sites, due to the anonymity they offer. A negative aspect is that users on these sites could be frauds, on a positive note this sense of anonymity also allows users of these sites, in a way, to get to know each other, without fear of face-to-face rejection. Bearing in mind that some users spend many hours on such sites (which could a danger to those who are not enlightened about the possible pitfalls) this study also encompassed the ethical issues associated with the use of the internet. According to Computer Applications Technology teachers, sometimes the information that learners can get from the media, more especially the internet might be dangerous if they are not monitored by teachers or parents.

A study conducted by Jones (2002) revealed that compared to the general populace, 78% of students at tertiary institutions go online just for fun. They often use the internet to browse, read e-mails, download music or send instant messages. The study also revealed that 79% of the students agree that internet usage has had a positive influence on their studies and academic progress.

The results of this study also show that college or university students have the greatest access and use the internet more than any other demographic group. Computer Applications Technology teachers reported that, their learners become excited when the internet is available and that they use it to reade-mails, download music and send instant messages. While teachers reported similar usage, they also maintained that the internet has had a positive impact on their academic work because it makes easy for them to access information for their assignments and projects even when they prepare for examinations. Teachers also reported that; the internet does not only help them in Computer Applications Technology, but also in all the subjects they teach.

An enquiry into leisure activities on the internet by Jones (2002) showed that learners were twice as likely to download music files as the general population; they are also three times as likely to have done this on any specific day. Apart from downloading music, learners also spend a lot of time chatting online or sending instant messages. DeBell and Chapman (2006), concur with Jones and note that, in schools in the United States it has been revealed that children tend to use the internet for virtually the same purpose as students at university, i.e. homework, fun (such as games), e-mail, chatting and instant messaging.

McBridge (2002) observes that; various individuals and groups access the internet for different reasons, e.g. teachers can supply learners with resources and doctors can share medical data, there is something for everyone. The phrase ‘surf the net’ is often used to refer to the act of accessing and searching the internet. Research, e-mail, downloading music / videos, games and social networking are the most commonly accessed genre of sites.

Boswell (2005) states that; internet research refers to the use of the internet for research. There is an exceptionally large range of information on the internet and; information is being added and modified constantly. The internet is widely accessed by many millions of people all over the globe and information on almost anything can be accessed instantly. The respondents reported that, the internet makes their work easy because, sometimes, when the internet is available they give learners topics to go and research for different subjects. They said that this makes learners less dependent on themselves as teachers.

According to Meyer and Pfaffenberger (2000), the following applications are already being used to a certain extent in both schools and tertiary institutions. Computer Based Education (CBE) refers to instruction in the classroom or lecture-room with the aid of computers. Firstly, teachers can use the computer to present lessons in a fascinating way to captivate the attention and interest of the learners. Secondly, computers can be used interactively, in that both teachers and learners are utilizing computers while engaging in the process of teaching and learning. Computer Assisted Instruction (CAI) is an instructional strategy whereby the computer is used to provide learning objectives and learning resources. Through the use of CMI, teachers are able to keep track of learners' attendance and performance.

2.21 E-mail use in Computer Applications Technology

McBridge (2002) notes that; electronic mail (e-mail) is a means of communication between people electronically, provided that the people who want to use it have access to the internet and an e-mail address. It is one of the cheapest ways in which one can keep contact with others for either personal or other reasons. Users send messages to others who have e-mail addresses; however, this form of communication is not in real-time, meaning that users access messages at their own convenience.

Schools offer Computer Applications Technology and Information Technology (IT). It has been suggested by Buys (2004) that computer ethics should also be addressed at school level and that both ethics and values should be taught at university. Buys further advised that the government be involved in educational programmes that will promote values and ethics related to computer usage. As the number of applications and users of the internet increases, so does the need for guidelines regulating its use.

2.22 Conclusion

The literature reviewed shows that Computer Application Technology teachers in rural areas are facing challenges due to a lack of resources. Rural schools do not have enough computers. Furthermore, the few computers they have they are not connected to the internet. Electricity is also a big problem in these schools because most of the rural areas do not have electricity. Some of the rural areas which do have electricity face constant power failures. Most teachers do not want to go and teach in the rural areas and many schools in rural areas end up employing teachers that are not qualified. According to the literature reviewed the performance of learners is seriously affected by these factors.

CHAPTER THREE

THEORETICAL FRAMEWORK

3.1 INTRODUCTION

This study is based on an interpretive paradigm and activity theory.

The interpretive paradigm is one of Spradly's analogies (1980), as cited by Khoza (2001). He accepted the interpretive paradigm as one of the predominant modes of social research. This paradigm is similar to what explorers do because they go out and explore in order to get results, analyse them and describe them. Their aim is the description of what is found. Therefore, the researcher is trying to explore then write the description of findings.

Figure 1: Research paradigm

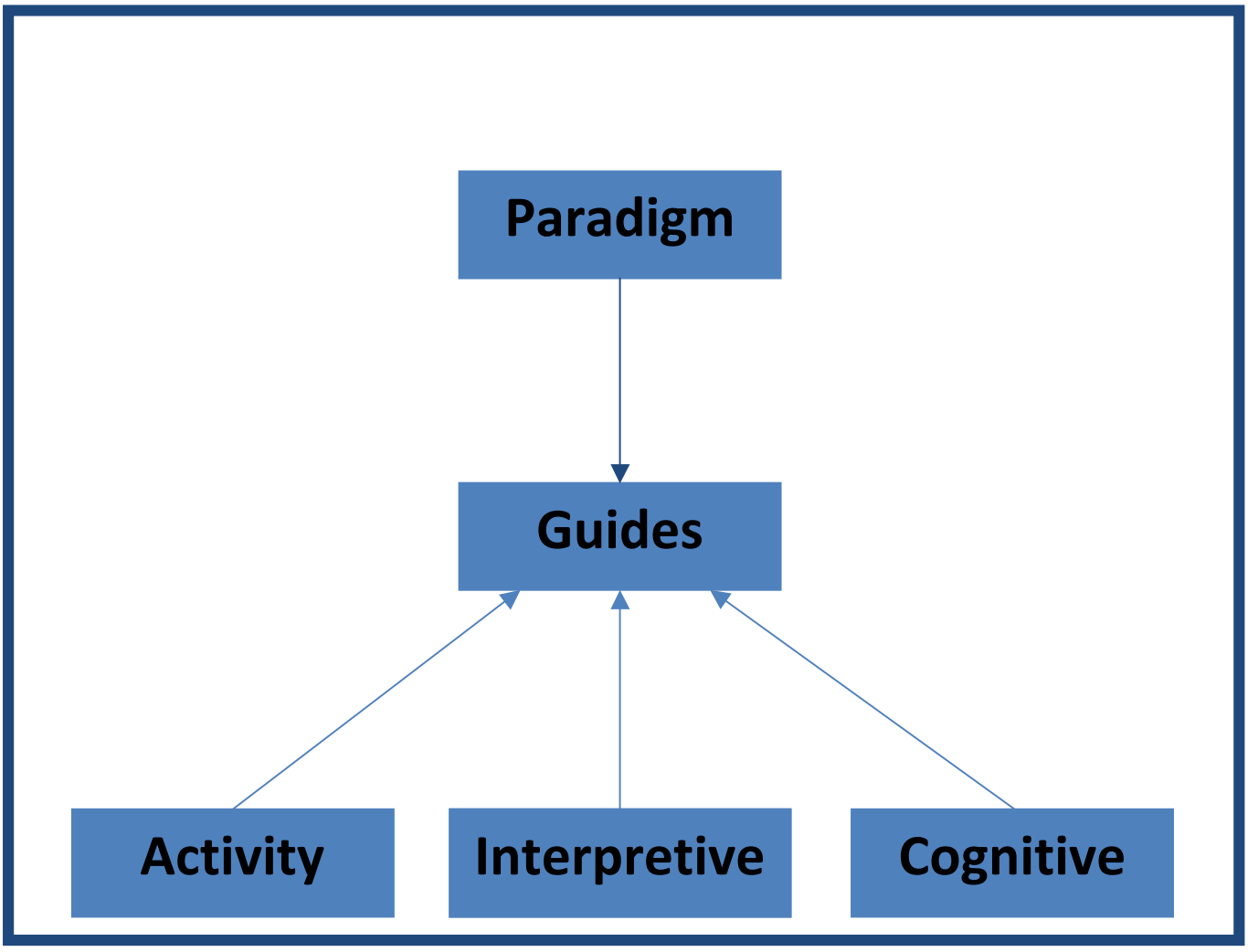


Figure 1 above is used to interpret the paradigm that is used. This study uses interpretivism as a framework of this study. The reason for using this paradigm is that the researcher wants to use the procedures of this paradigm to look at the experiences of teachers in teaching Computer Applications Technology.

3.2 Interpretivism

According to Walsham (1993) interpretive studies generally attempt to understand phenomena through the meanings that people assign to them and interpretive methods of research in Information Systems are aimed at producing an understanding of the context of the information system, and the process whereby the information system influences and is influenced by the context. To this end, Kaplan and Maxwell (1994) note that interpretive research does not predefine dependent and independent variables, but focuses on the full complexity of human sense making as the situation emerges.

Blaikie (1993) cited by Neumann (2004) states that; investigators work directly with experience and understanding to build their theory on them. The data thus yielded is glossed with the meanings and purpose of those people who are their sources. Furthermore, the theory so generated must make sense to those to whom it applies. The aim of scientific investigation for the interpretive researcher is to understand how this glossing of reality goes on at one time and in one place and compare it with what goes on at different times and places. Thus, theory becomes sets of meaning, which yield insight into, and understanding of people's behaviour. These theories are likely to be as diverse as the sets of human meanings and understandings that they seek to explain. From an interpretive perspective, the hope of a universal theory, which characterizes the normative outlook, gives way to multifaceted changes in human behaviours and the contexts supporting them.

Weber (1981) argues that; social science is needed to study meaningful social action, or social action with a purpose. He embraced Verstehen's ideas and felt that people must learn the personal reasons or motives that shape a person's internal feelings and guide decisions to act in particular ways. Interpretive social science is related to hermeneutics, a theory of meaning in natural settings. An interpretive researcher wants to learn what is meaningful or relevant to the people being studied, or how individuals experience daily life.

The intention of this study is to understand a particular social setting and see it from the point of view of those in it. The researcher shares the feelings and interpretations of the people he or she studies and sees things through their eyes. Interpretive researchers study meaningful social action, not just the external or observable behaviour of people. Social action is the action to which people attach subjective meanings; it is activity with a purpose or intent. Interpretive social science says that socially reality is not waiting to be discovered. Instead, the social world is largely what people perceive it to be; social life exists as people experience it and give it meaning. It is fluid and fragile. People maintain it by interacting with others in ongoing processes of communicating and negotiating. They operate based on untested assumptions and taken-for-granted knowledge about the people and events around them.

According to Bleicher (1980) people possess an internally experienced sense of reality. This subjective sense of reality is crucial to grasp human social life. External human behaviour is an indirect and often obscure indicator of true social meaning. ISS says that, access to other human beings is possible, but, only by indirect means: what we experience initially are gestures, sound, and action and only in the process of understanding these are the steps taken from external signs to the underlying inner life. The interpretivism approach has a tendency to look at historical events; therefore the researcher will look at the history of computer technology users against the use of computer technology by teachers and their experiences in teaching Computer Applications Technology.

Guba and Lincoln (1994) note that; pragmatic and moral concerns are important considerations when evaluating interpretive science. Fostering a dialogue between researchers and respondents is critical. It is through this dialogue process that a more informed and sophisticated understanding of the social world can be created. All interpretations are based in a particular context or situation and time. They are open to re-interpretation and negotiation through conversation. Interpretive approaches rely heavily on naturalistic methods that is interviewing and observation and analysis of existing texts. These methods ensure an adequate dialogue between the researcher and those with whom he/she interacts in order to collaboratively construct a meaningful reality. Generally, meanings emerge from the research process. Typically, qualitative methods are used.

Lyotard (1989) states that; interpretivists feel that human behaviour is highly voluntaristic in that people choose the paths they take and the decisions they make. This is centred around the belief in autonomy and free will. Drawing on the interpretivist assumptions of a subjective social reality, it would follow that the individual is, within that self-constructed reality, free to act out his or her desires as he or she wishes. The possibility of a predetermined life path does not exist. Interpretivism is the paradigm that is mostly closely allied with this study, which would be primarily subjective and qualitative in nature. The attraction to interpretivism is based in the possibility of conducting more intimate types of research. It will allow the researcher not only to observe and learn about a given situation but it will also allow the researcher to effectively become part of it in the sense that the researcher's knowledge will be closely aligned to that of the factors for both the research and the research subjects. The researcher would be most interested in conducting observational and personal interview types of research. These are typical of the interpretivist paradigm and allowance will be made for the optimum acquisition of situational understanding. This type of research would be very deep in substance and meaning.

Brink (2001) notes that; interpretivism includes the claim that interpretation is sensitive to values in the way just explained, and that it is fundamental to the nature of law. Many theorists accept that, given the law, interpretation that is sensitive to values is necessarily employed in its application.

According to Strauss and Corbin (1990) interpretivism is a way to gain insights through discovering meanings by improving our comprehension of the whole. Qualitative research explores the richness, depth, and complexity of phenomena. Qualitative research, broadly defined, means any kind of research that produces findings not arrived at by means of statistical procedures or other means of quantification. Although acceptance of interpretivism is increasing within human movement sciences, positivism remains the dominant paradigm, as it does in other social science fields.

The underlying assumption of interpretivism is that the whole needs to be examined in order to understand the phenomena. Interpretivism is critical of positivism because it seeks to collect and analyze data from parts of a phenomenon and, in so doing, positivism can miss important aspects of a comprehensive understanding of the whole. Interpretivism proposes that there are multiple realities, not single realities of phenomena, and that these realities can differ across time and places. In this study interpretivism will help the researcher deal with the realities of nature.

According to T S P (2003) unlike qualitative research, there is no overarching framework for how qualitative research should be conducted, rather each type of qualitative research is guided by particular philosophical stances that are taken in relation to each phenomenon. Interpretivism (also known as symbolic interactionism) is a microsociological level paradigm: The focus is on how people themselves define reality, how they make sense of the world, how they experience and define what people are doing. The assumption is that social structures are created through interactions among people so that patterns and standards of behaviour emerge, that is social reality is a construction by people. Its focus is on meaning assigned to actions and symbols, how meanings are learned and modified. It inquires into factors that influence how we interpret what we say and do and patterns that give rise to the same interpretation for many.

Walker and Evers (1999) observe that, in interpretive research, organizational and social realities are constructed as a product of theorizing, and this individual theorizing itself shapes and affects reality; there is no mind-independent reality to correspond with hypotheses to serve as an external reference point for their acceptability. To this end Giorgi (1997), Husen (1999) and Van Manen (1998) note that; knowledge is thus seen to be comprised of multiple sets of interpretations that are part of the social and cultural context in which it occurs. Interpretive researchers hold, consequently, that there should be openness to the understanding of people whom researchers study and tentativeness in the way researchers hold or apply their conceptions of those being studied. This type of study helps the researcher gather information from the participants.

According to Glaser and Strauss (1967), interpretive research focuses on action. Thus, it may be conceptualised as behaviour-with-meaning; it is intentional behaviour and as such, future oriented. Actions are only meaningful to teachers in as far as they are able to ascertain the intention of actors to share their experience. A large number of our everyday interactions with one another rely on such shared experiences, but what about those of the interpretive researchers? They begin with individuals and set out to understand their interpretations of the world around them. Theory is emergent and must arise from particular situations; it should be grounded on data generated by the research act. Theory should not precede research but follow it.

Blumer (1984) states that; interpretivist views have different origins in different disciplines. The interpretive paradigm developed as a critique of positivism in the social sciences. In general, interpretivists share the following beliefs about the nature of knowing and reality. Relativist ontology assumes that reality as we know it is constructed intersubjectively through the meanings and understandings developed socially and experientially.

Blumer (1984) notes that; transitional or subjectivist epistemology assumes that we cannot separate ourselves from what we know. The investigator and the object of investigation are linked such that who we are and how we understand the world is also a central part of how we understand the world and is a central part of how we understand ourselves, others and the world. By positing a reality that cannot be separated from our knowledge of it (no separation of subject and object) the interpretivist paradigm posits that researchers' values are inherent in all phases of the research process. Truth is negotiated through dialogue. Findings or knowledge claims are created as an investigation proceeds. That is, findings emerge through dialogue in which conflicting interpretations are negotiated among members of a community.

Angen (2000) observes that; interpretive positions are founded on the theoretical belief that reality is socially constructed and fluid. Thus, what is known is always negotiated within cultures, social settings, and relationships with other people. From this perspective, validity or truth cannot be grounded in an objective reality. What is taken to be valid or true is negotiated and there can be multiple, valid claims to knowledge.

Berger and Luckmann (1987) state that; careful consideration and articulation of the research question would ensure that the inquiry is carried out in a respectful manner. This requires awareness and articulation of the choices and interpretations the researcher makes during the inquiry process and evidence of taking responsibility for those choices. There should be an evaluation of how widely results are disseminated. For Angen validity becomes a moral question and must be located in the discourse of the research community. Ethical validity is the recognition that the choices that are made through the research process have political and ethical consideration. Researchers need to ask if the research is helpful to the target population. They also need to ask if it seeks out alternative explanations to those the researcher constructs. Substantive validity involves evaluating the substance or content of an interpretive work. It needs to provide evidence of the interpretive choices the researcher made.

According to Litlejohn (2000), human beings cannot be studied using models developed for the physical sciences because humans are qualitatively different from natural events. The interpretive paradigm supports the belief that reality is constructed by subjective perception and predictions cannot be made. Researchers who agree with this paradigm are interested in the social construction of meaning. People have free will, purposes, goals and intentions. Therefore people should be studied as active agents. People make decisions and act in accordance with their subjective understanding of the situations in which they find themselves. Social life consists of interaction processes rather than structures and is therefore constantly changing.

People understand their world through the meaning found in the symbols of their primary groups, and language is an essential part of social life. The world is made up of social objects that are named and have socially determined meanings. People's actions are based on their interpretations, in which the relevant objects and actions in the situation are taken into account and defined. One's self is a significant object and like all social objects is defined through social interaction with others.

Litlejohn (2000) states that; interpretivism is characterized by seeing the social world from a highly subjective view-point. It places the emphasis of explanation in the subjective consciousness of the social participants instead of the subjective observer. In terms of interpretivism, the general rules and external structure of society do not exist and the aim of social research is to investigate the meanings and interpretations of social actors in specific situations. Because of the highly subjective nature of interpretive research, studies tend to be small in scale and emphasis is placed on the validity and insight of the research, rather than simply the outcomes or results.

According to Angen (2000), the ontological aspect of interpretivism holds that social reality is the result of interactions between actors in a real social context; the social world, according to interpretivism, cannot exist outside of the independent minds of social actors. The social world is more than the subjective construction of individual human beings who, through the development and use of common language and the interaction of everyday life, may create and sustain a social world of interpretively shared meaning. Given this view of social ontology, the experiences of actors in any social context must then be nominalised, a process of subjective interpretation rather than a physical perception of the real material world.

Angen (2000) states that; epistemologically, interpretivism is anti-positivist in nature,given that the social ontology of interpretivism is highly relativistic and exclusive to the actors directly involved in the social activities. Knowledge and understanding can only be obtained by having the same frame of reference as the actor; consequently, such knowledge is distinctly subjective to the actor's reality. Methodologically, the interpretivist takes an ideographic approach to the study of society. As opposed to a nomathetic approach to a methodology, interpretivism requires a more detailed and through analysis of the social situation. An ideographic approach requires firsthand knowledge and a complete analysis of the subjective accounts of the actors or situation.

Figure 2: Activity theory

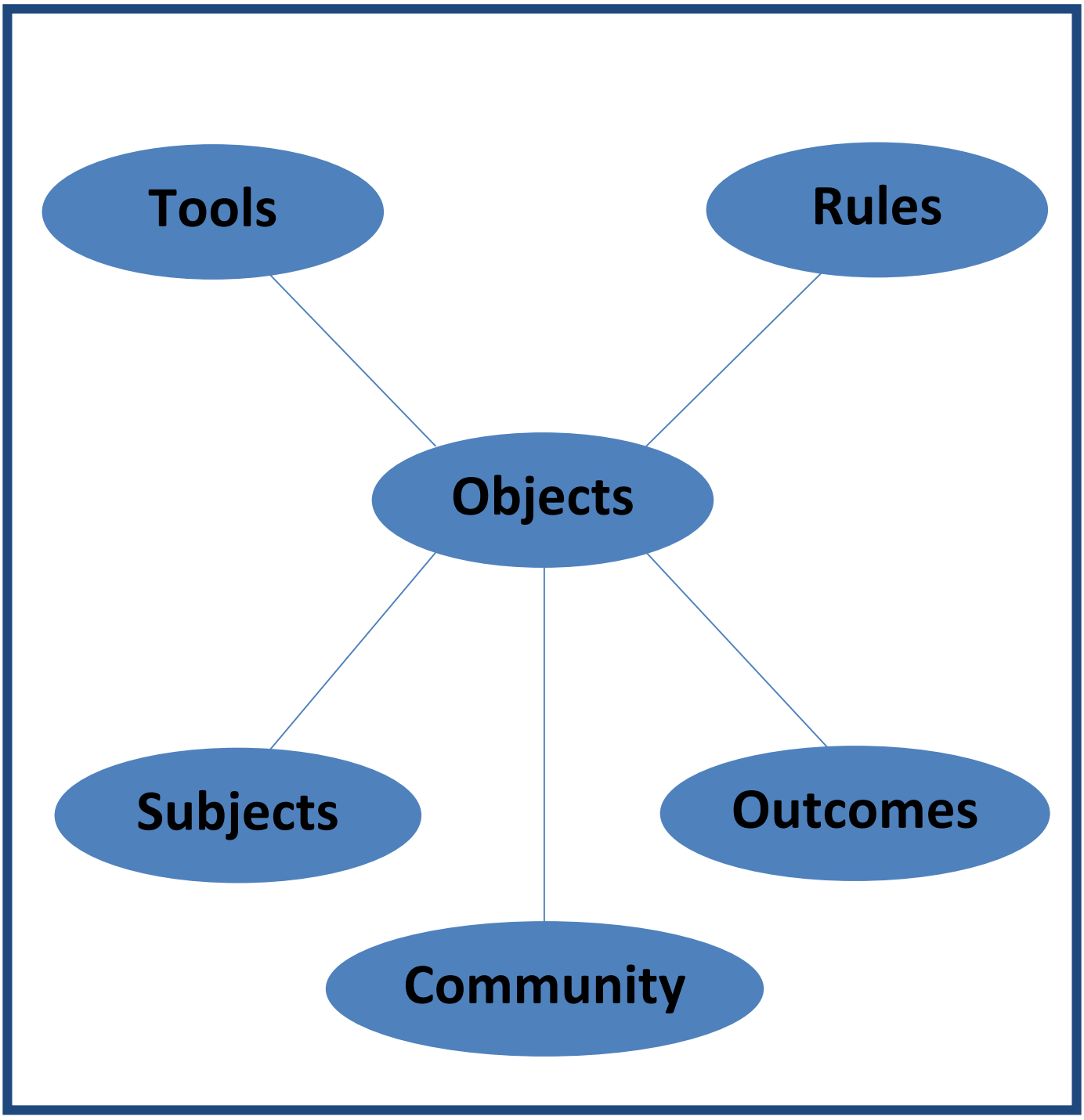


Figure 2 shows the objects, tools, rules, subjects, community and the outcomes that are used in this study.

Littlejohn (2003) contends that; Engestrom'sactivity-theory model defines the principle of engaging subjects (participants) towards the achievement of a certain goal or object. Engestrom (1999) states that; an activity is undertaken by human beings who are motivated by the solution of a problem. The purpose of that activity is regarded as the object and is mediated by tools involving the community. There are rules and established procedures to achieve an outcome. These procedures are explained as follows.

Objects

The object is regarded as teachers' experience of teaching Computer Applications Technology. The following table shows number of years the teachers have been teaching Computer Applications Technology.

Table 1: Respondents' years of experience in teaching Computer Applications Technology

RESPONDENTS	**EXPERIENCE**
3. Respondent 1	14 years
4. Respondent 2	5 years
5. Respondent 3	8 years
6. Respondent 4	7 years
7. Respondent 5	12 years
8. Respondent 6	3 years
9. Respondent 7	15 years
10. Respondent 8	9 years

Tools

These are the properties used for teaching Computer Applications Technology. In this study, the tools are as follows:-

- Computers
- Printers
- Textbooks and references
- Scheme and record books
- Preparation books
- Syllabus
- Time table

Subjects

Subjects are the research participants or teachers who use the tools to teach Computer Applications Technology. In this study the subjects are:-

Eight Computer Applications Technology teachers from three schools.

Rules

Rules are the ways, procedures and teaching methods used in teaching Computer Applications Technology by the schools. In this study the rules are:

- Subject framework from the Department of Basic Education
- Theoretical method of teaching
- Practical method of teaching

Outcomes

Outcomes are the expected results or development of findings. In this study the outcomes are:

that teachers expect their learners to be able to create their own documents, worksheets and presentations.

Community

Littlejohn (2003) states that; the community is the people or stakeholders involved in school as an organisation. These are government and non governmental agencies that make change happen. In this study the community are:

- Parents of the learners
- Youth of the community who volunteered for security in schools.
- Ex-learners of the schools who organise computer donations for their schools.
- Government and private companies who donate computers to the schools.

3.3 Activity theory

3.3.1 What is Activity Theory?

Bannon (1991 p.4) states that; "activity theory is a powerful and clarifying descriptive tool rather a strongly predictive theory. The object of activity theory is to understand the unity of consciousness and activity. Activity theory incorporates strong notions of intentionality, history, mediation, collaboration and development in constructing consciousness." He addsthat; activity theorists argue that consciousness is not a set of discrete, disembodied cognitive acts and certainly it is not the brain, rather consciousness is located in everyday practice: you are what you do and what you do is firmly and inextricable embedded in the social matrix of which every person is an organic part. The results of this study emphasize the importance of practice in Computer Applications Technology because learners will easily be at home with computers if they get hands-on experience. The teachers interviewed also reported that; it can be of great benefit to the learners if they get time to practice for themselves what they have learned in the class, so that if they encounter some problems they areable to bring them to the attention of the teacher.

Kaptelnini (1995) notes that; activity theory emphasizes that human activity is mediated by tools in a broad sense. Tools are created and transformed during the development of the activity itself and carry with them particular culture-historical remains from their development. The use of tools is therefore an accumulation and transmission of social knowledge. Tools use influences, the nature of external behaviour and also the mental functioning of individuals. The results of this study suggest that; teachers use computers as tools to teach Computer Applications Technology and enable learners to participate in activities. Tools that are used in the Computer Applications Technology class help teachers to deliver their lessons to the class and help learners to understand their lessons easily because they also practise what they have learned in the class.

Leont'ev (1978) observes that; the relationship between human agent and objects of the environment is mediated by cultural means, tools and signs. He introduced an emphasis on the division of labour as a fundamental historical process behind the evolution of mental functions. Mediated by tools, work is also performed in conditions of joint, collective activity. The distinction activity, action and operation became the basis of Leont'ev's model of activity.

This study shows that; tools create a good relationship between teachers and learners. Sufficient computers and the internet create a conducive environment for the teaching and learning of Computer Applications Technology. The availability of sufficient resources enables good communication between teachers and learners. Communication seems not to be good in these rural high schools since they do not have enough computers in their schools and the few computers they have are not in very good condition; there are always some that are not working.

According to Nardi (1996), in activity theory, artefacts are mediators of human thought and behaviour; they do not occupy the same ontological space. People are not reduced to 'nodes' or 'agents' in a system; 'information processing' is not seen as something to be modelled in the same way for people and machines. Activity theory proposes that activity cannot be understood without understanding the role of artefacts in everyday existence.Activity theory is concerned with practice, that is, doing and activity, which significantly involves the mastery of…external devices and tools of labour activity.

I agree with Nardi because most of the time computers are not the part of the lives of learners in the rural areas because they only operate computers while they are at school and only during the Computer Applications Technology period. Even in that period the teacher sometimes has to teach them the theory and get them to write notes, which are written on the board; this means they are not going to touch computers. Then, after school, the computer laboratory has to be locked and they cannot do the practice. Those who are schooling in towns, even if they do not have computers at home, can use computers in the libraries or go to the internet cafes in town.

3.4 Aims of activity theory

Kim (2002) states that, activity theory is aimed at understanding the mental capabilities of a single human being. However, it rejects the isolated human being as an adequate unit of analysis, focusing instead on the cultural and technical mediation of human activity. Activity theory is most often used to describe an activity system as a socio-technical system made up of a set of six interdependent elements which constitute a good general conceptual system that can be used as a foundation for more specific theories.

The results of this study suggest that; it is good for learners to work in groups because it is an opportunity for them to help one another where they lack some information without a teacher being involved. Teachers interviewed reported that; group work can bridge the gap between the slow learners and the fast learners in the process of practicing together. But at the end of the day Computer Applications Technology teachers need to observe the capability of a single learner in operating the computer, which is not possible because of the limited number of computers they have. It is found that other learners in the group are not participating; only one or two people who are working in the group.During the final examination a person has to work as an individual.

Kaptelnini (1995) states that; tools or tool mediation are the artefacts or concepts used by subjects to accomplish tasks. Tools shape the way human beings interact with reality and reflect the experiences of other people who have tried to solve similar problems at an earlier time and who have invented or modified the tool to make it more efficient. This experience is accumulated in the structural properties of tools, that is shape and material, as well as in the knowledge of how the tool should be used. The findings of this study expose the issue of human beings interact with reality and reflect their experiences, because when learners learn a lesson in the class, they relate that information to what they know or the real life outside the school; teacher should use examples drawn from their community. Teachers interviewed reported that; the challenge they are facing is that in the rural areas there are no computers; even in the shops they only use calculators. They also reported that, in most of the homes, there are no televisions. Learners should be able to use their experiences outside the classroom as well as exercise what they were doing in the class.

3.5 Internalization and externalization

Ryder (2005) states that; activity theory differentiates between internal and external activities. It emphasizes that internal activities cannot be understood if they are analysed separately from external activities, because they transform into each other. Internalization is the transformation of external activities into internal ones. Internalization provides a means for people to try potential interactions with reality without performing actual manipulation with real objects like mental simulations, imaginings and considering alternative plans. This study suggests that externalization transforms internal activities into external ones. Externalization is often necessary when an internalized action needs to be repaired or scaled. It is also important when collaboration between several people requires their activities to be performed externally in order to be coordinated.

Du Plooy (1995) observes that; computers are commonly used in libraries, offices, hospitals and businesses of all sorts for much of the clerical work that was previously done by hand, like indexing, filling, billing, retrieving and so on. The findings of this study suggest that; there is a significant connection between internalization and externalization in learning. For teachers to deliver their lessons successfully it is important for them to externalize what they teach in the classroom. This could involve using examples that arerelated to that subject in the outside community or taking learners out and exposing them to places whereby Computer Applications Technology is being used. This makes it easier for them to understand their lessons. Teachers reported that it motivates learners a lot because they see computers being used everywhere in the world.

3.6 Activities

Verenikina (1998) states that; tools are social objects with certain modes of operation developed socially in the course of labour and are only possible because they correspond with the objects of a practical action. He adds that activity theory begins with the notion of activity. An activity is seen as a system of human doing whereby a subject works on an object in order to obtain a desired outcome. In order to do this, the subject employs tools, which may be involved in the activity and each subject may have one or more motives. This study suggests that the tool mediates between the activity and the object. The tool is at the same time both enabling and limiting; it empowers the subject in the transformation process with the historical collected experience and skill crystallised in it, but it also restricts the interaction of the perspective of that particular tool or instrument; other potential features of an object remain invisible to the subject. This study also suggests that as computers are as tools used in many work places, learners can be motivated if they are exposed to places where computers are used to perform very big and serious businesses. That can motivate them to know that Computer Applications Technology is preparing them for the business world in the future.

3.7 Principles of activity theory

According to Bodker (1991), activity theory consists of a set of basic principles which constitute a general conceptual system which can be used as a foundation for more specific theories. These basic principles of activity theory include object-orientedness, the dual concepts of internalization or externalization, tool mediation, hierarchical structure of activity, and continuos development. The principle of object-orientedness states that human beings live in a reality which is objective in a broad sense; the things which constitute this reality have not only the properties which are considered objective according to the natural sciences, but socially or culturally defined properties as well.

Rajkumar (2005) states that; activity theory's emphasis is on social factors and interaction between agents and their environments. This explains why the principle of tool mediation plays a central role within the approach. First of all, tools shape the way human beings interact with reality. According to the above principle of internalization or externalization, shaping external activities ultimately results in shaping internal ones. Secondly, tools usually reflect the experiences of other people who have tried to solve similar problems at an earlier time and invented or modified the tool to make it more efficient. This study shows that the experience is accumulated in the structural properties of tools, that is shape and material, as well as in the knowledge of how the tools should be used. Tools are created and transformed during the development of the activity itself and carry with them a particular culture largely the historical remnants from that development. So, the use of tools is a means for the accumulation and transformation of social knowledge. It influences the nature, not only of external behaviour, but also of the mental functioning of individuals.

According to David (2002) in human activity theory, the basic unit of analysis is human (work) activity. Human activities are driven by certain needs where people wish to achieve a certain purpose. This activity is usually mediated by one or more instruments or tools. This shows that an activity is undertaken by a human agent (subject) who is motivated towards the solution of a problem or purpose (object), and mediated by tools (artefacts) in collaboration with others (community). The structure of the activity is constrained by cultural factors including conventions (rules).

3.8 Levels of activity theory

Verenikina (1998) observes that; the levels of activity theory are characterized by their purposes. Activities are oriented to motives; that is, the objects that are impelling by themselves. Each motive is an object, material or ideal.

Ryder (2005) states that; activity differentiates between internal and external activities. The traditional notion of mental processes corresponds to internal activities. Activity theory emphasizes that internal activities cannot be understood if they are analyzed separately, in isolation from external activities, because there are mutual transformations between these two kinds of activities, internalization and externalization. It is the general context of activity which includes both external and internal components that determines when and why external activities become internal.

David (2002) notes that; in human activity theory, the basic unit of analysis is human (work) activity. Human activities are driven by certain needs, where people wish to achieve a certain purpose. This activity is usually mediated by one or more instruments or tools. The findings of this study show that an activity is undertaken by a human agent (subject) who is motivated toward the solution of a problem or purpose (object), and mediated by tools (artefacts) in collaboration with others (community). The structure of the activity is constrained by cultural factors including conventions (rules).

3.9 Human creativity

Bodker (1991) observes that; human creativity plays an important role in activity theory, that human beings are essential creative beings in the creative activity with a non-predictable character. Bodker also analyses the importance of creative activity, contrasting it to routine activity, and notes the important shift brought about by computerization in the balance towards creative activity. The respondents reported that the, teaching of Computer Applications Technology encourages learners to be creative in the use of computers. For example, if learners were taught how to draw a picture on the computer, after that they can draw any picture with any shape or colour using the computer.

3.10 Learning and tacit knowledge

Engestrom (1987) notes that; activity theory has an interesting approach to the difficult problems of learning and, in particular, tacit knowledge. Learning has been a favourite subject of management theorists, but it has often been presented in an abstract way, separated from the work processes to which the learning should apply. Activity theory provides a potential corrective to this tendency. For instance, Engestrom's review of Nonaka's work on knowledge creation suggests enhancements based on activity theory, in particular suggesting that the organizational learning process includes preliminary stages of goal and problem formation not found in Nonaka. Lompscher, viewing learning as transmission, sees the formation of learning goals and the learners' understanding of which things they need to acquire as the key to the formation of the learning activity

3.11 Cognitivism

According to Gestalt (1967) and other researchers such as Edward Chase Tolman of the United States, and Jean Piaget (1896-1980) of Switzerland, cognitivism is the study of how people see and understand the relation of the whole to the parts that make up the whole. Organisms respond to specific stimuli. The organization of the sensory environment influences the organism's experience. The concept of insight was introduced when Gestalt psychologists based their theories on experimental observations of behaviour. They established laws and principles of computer technology that were tested before, and then applied them to real-world situations. The study follows the steps of the psychologists' perceptions of the useof computer technology in technical subjects. Therefore, the theory of cognitivism also helps the researcher to understand the sensory environment that influences the organism's perceptions and assists in formulating the policy and principles.

According to the Learning Domain (2003), once developed, this account will help in understanding how other aspects of mental life, including intentionality, the emotions and subjectivity, are produced and supported by this level. This programme has been highly productive during the second half of this century and presently cognitivism exerts a great influence over much of psychology and other related disciplines. It is this effort towards after a formal theory that shows the degree to which cognitivism inherits the positivist programme of modernist science. The effort through a programme of theory development, is to make perfect computer simulation and empirical investigation, a unified, formal and mechanistic account of a particular level of mental life, that is, of rational cognitive processing.

Researchers at Georgia State University (1999) state that; cognitivism, like any other science, is in a constant state of development. Specific, peripheral issues turn over rapidly, while more general, central topics such as memory, experience and reasoning remain comparatively stable. Although subject to more measured development, these central topics, along with a distinctive methodology, maintain cognitivism's persistent identity. The lively activity of peripheral topics combined with longer-term movements of the central ones gives the development of the whole an amoeba-like character. While movement of the central issues to some extent generates the activity in the more peripheral ones, the peripheral topics are more reactive to the wider intellectual milieu, and transmit directive influences back to the centre. These influences include the image of science on which cognitivism models itself. This image is changing. The modernist unitary discipline, dominated by the reductionist; Cartesian mechanism is giving way to a postmodern pluralist discourse in which reductionism is balanced by emergence, and mechanism is tempered with Whitehead inorganicism.

Cognitivism, like behaviourism, emphasizes the role that environmental conditions play in facilitating learning. According to Kristindottir (2001), instructional explanations, demonstrations, illustrative examples and matched non-examples are all considered instrumental in guiding learning. Similarly, emphasis is placed on the role of practice with corrective feedback. Up to this point, little difference can be detected between these two theories. However, the 'active' nature of the learner is perceived quite differently.

According to Good and Brophy (1990), cognitive theorists recognize that much learning involves associations established through contiguity and repetition. They also acknowledge the importance of reinforcement, although they stress its role in providing feedback about the correctness of responses over its role as a motivator. However, even while accepting such behaviourist concepts, cognitive theorists view learning as involving the acquisition or reorganization of the cognitive structures through which humans process and store information.

Brophy (1990) notes that; cognitive theories stress the acquisition of knowledge and internal structures and, as such, are closer to the rationalist end of the epistemology continuum. Learning is equated with discrete changes between states of knowledge rather than with changes in the probability of response. Cognitive theories focus on the teacher's conceptualization of learning processes and address the issues of how information is received, organized, stored, and retrieved by the mind. Learning is concerned not so much; with what learners do, but with what they know and how they come to acquire it. The learner describes knowledge acquisition as a mental activity that entails internal coding and structuring. The learner is viewed as a very active participant in the learning process.

According to Good and Brophy (1990) the environment can be classified on the part of the teachers as: the methods of teaching (lecturing, grouping and etc), the condition of the classroom (e.g. chalkboard, charts in the classroom, teaching equipments, and learners' computers), and communication between the teacher and learners during the presentation of the lesson and thereafter. The relevance of practical work that should be done by the learners and the lesson that has been taught by the teacher are in line with the curriculum or program of study. From the learner's side; the environment means questions from the learners, the results of their homework and tests, and the practical skills that the learner shows at the end of the lesson. If, all the above environmental conditions are acceptable then the informative processing of learning is acceptable in terms of cognitive theories.

The cognitive approach focuses on the mental activities of the learner that lead to a response and knowledge, the processes of mental planning, goal-setting, and organizational strategies. Cognitive theories contend that environmental 'cues' and instructional components alone cannot account for all the learning that results from an instructional situation. Additional key elements include the way that learners attend to, code, transform, rehearse, store, and retrieve information (Striebel, 1995). Learners' thoughts, beliefs, attitudes, and values are also considered influential in the learning process. The real focus of the cognitive approach is on changing the learner by encouraging him/her to use appropriate learning strategies.

3.12 Conclusion

Activity theory is used in this study because Computer Applications Technology teachers have to use tools, that is, computers, to teach learners. Computers act as the medium of communication between teachers and learners since learners have to operate computers to do their activities. Therefore, the teaching of Computer Applications Technology depends entirely on computers. Sufficient technological resources can produce a good education in Computer Applications Technology.

The focus of this study is rural areas that face the challenge of poverty. Rural schools are confronted by the challenge that most families cannot afford even minimal school fees. Most of the learners are exempted from paying their school fees because of their family situations. These schools depend on donations for computers because they are regarded as no fee schools and cannot buy computerswith their own funds. The lack of resources impacts on the way teachers are working. The lack of resources affects the performance of learners in Computer Applications Technology.

CHAPTER FOUR
METHODOLOGY

4.1 INTRODUCTION

This study used the qualitative research method. Merriam (1998, p. 23); states that qualitative research seeks to "understand situations in their uniqueness as part of a particular context and the interaction there". Denzin and Lincolm (1986) assert that qualitative research is multimethod in focus, involving an interpretive naturalistic approach to its matter. This means that qualitative researchers study things in their natural setting, attempting to make sense of or interpret phenomena in terms of the meaning that people bring to them.

A case study is used in this study because thorough research needed to be undertaken in three rural high schools at KwaMaphumulo. The researcher wanted to explore teachers' experiences of teaching Computer Applications Technology. There was one case study. Falling under this case study were three different high schools. Interviews and observations were used conduct the study. This chapter explains how data were collected from the three different schools and the challenges that were experienced by the researcher while conducting the study.

4.2 Case study

This case study was done in three rural high schools in KwaMaphumulo area. An in-depth study was conducted into teachers' experience of teaching Computer Applications Technology in rural schools. The schools were referred to as school A, B and C. According to Stake (1995), quoted in Gray (2003), a case study is the study of the particularity and complexity of a single case, coming to an understanding of its activities within particular circumstances.

Bauer and Gaskell (2003) state that; the definition of a case studydepends on the context in which the research is taking place, for example, an educational setting. Bauer and Caskell (2003) add that defining a case depends on a claim and a circumstance that can refer to an individual, a group, an office, a class or a school. All those are regarded as single cases. Moskowitz and Birman (1985) state that; there could be many such cases in a cluster of a number of schools in different districts.

A case study is an extremely widely applied method of research in the social sciences. Case studies can be used in educational research to examine the characteristics of an individual unit, though not of a large sample or a total population. To arrive at a generalization, the study was extended to include a number of schools as a sample. Case studies are mainly carried out for training purposes, especially by novice researchers. Their advantage is that they can be conducted by a single researcher without the need for a full research team. This is the methodological approach that is simple and straight forward for new researchers. Cohen *et al.* (2001); regard the case study as an approach with interpretive methodologies. Researchers could gather information, from a small group within a class, to the whole school, from family backgrounds, capabilities, attitudes and relationships. The disadvantage of a case study can be that it yields a huge amount of information. The researcher felt that it was not easy to reach saturation.

4.3 Instruments for data collection

The following instruments were used to collect data from three schools at KwaMaphumulo: A cassette recorder and a cassette were used to record all the interviews; semi-structured individual interview questions were also used. Lastly, non-participant observations were used to get an understanding of how teachers deliver or engage with their lessons and how they use computers to teach their learners.

4.4 Method of collecting the data

4.4.1 Sampling

4.4.2. Interviews

The purpose of interviews, according to Patton (1990), is to gather information which is not directly observable. Interviews may be regarded as questionnaires that are conducted verbally. Interviews are the 'favoured digging tool' for qualitative researchers. Face-to-face encounters between researchers and participants enable the researcher to gain some insight into the perceptions, views, experiences and lives of participants through their own words (De Vos, *et al*., 2002). Notes are taken or the interviews are often recorded on tape and then transcribed before analysis (Taylor, 1984). The flow of data often depends on how unobtrusive the method of recording actually is (Stevens, *et al.,* 1993). It is imperative that researchers allow the participants the freedom to verbalise their thoughts without imposing their personal views on them (the participants). Interviews also facilitate validity checks and triangulation. They further allow the researcher to discover the subjective side to the issues at hand.

There are three types of interviews that may be used, viz. structured interviews, unstructured interviews and semi-structured interviews. A structured interview includes a schedule of questions in a particular order; the same wording and procedure must be applied for all participants. An unstructured interview is very open-ended and therefore encourages the participants to raise and explore issues as they wish. Semi-structured interviews are a combination of both structured and unstructured interviews and a great advantage of this type of interview is that it allows the researcher the freedom to move in directions that are most productive (Seaman, 1991). This form of interview is very flexible; hence for the purpose of this study, semi-structured interviews were used.

4.4.3 Semi-structured interviews

In this study semi-structured interviews were held between the researcher and the teachers. The researcher led the interview and asked participants probing questions. The participants came up with open-ended responses of their experiences of teaching Computer Applications Technology and the researcher transcribed the interviews. According to De Vos (2002) semi-structured interviews are likely to be lengthy, and to contain a high degree of engagement; for this reason they are likely to yield material of considerable interest.

The researcher did not experience problems in conducting these interviews as he studied the questions well preparing for the pilots he held before conducting the research. The interviews were conducted in English as the three schools were using English as the medium of instruction and communication. This made the transcription work much easier for the researcher. During interviews some teachers claimed that they were not comfortable the tape-recorder especially on the policy-related issues concerning the government. The researcher then came up with the idea of giving the interview questions to the participants and allowing them to choose which questions they wished to answer.All the questions were open-ended and straight-forward. As a result, the participants came up with a lot of useful data not expected by the researcher. However, the researcher 'kept an eye' to ensure that all the responses would focus on the study and address the critical questions.

According to De Vos, *et al.* (2002), semi-structured interviews contain the element of both structured and unstructured interviews. In structured interviews there is strict adherence to the wording and order of the questions while unstructured interviews consist of open-ended questions which may be presented in any order. The degree to which the interview is structured is dependent on, amongst others, the topic and the type of information required (Sarantakos, 2005). Semi-structured interviews are conducted with a fairly open framework which can be used both to furnish and obtain information. They allow for focused, conversation, and two-way communication (Tool 9, 2005).

Semi-structured interviewing starts with more general questions or topics. These questions then become the basis for more specific questions which may or may not be prepared in advance (Sarantakos, 2005). Semi-structured interviewing is guided only in the sense that part of the interview is directed by the prepared schedule. The schedule increases the richness of the data and makes data production fairly systematic for each participant (Cohen, *et al*., 2002).

Most questions are created during the interview, allowing both the interviewer and the person being interviewed the flexibility to probe for details or discuss certain issues. Probing allows for the researcher to dig deeper and follow up on topics raised by the participant. The researcher may constantly ask the participant to elaborate or clarify issues until he/she is satisfied that he/ she understands fully what is being said (Taylor, 1984).

The participants act as the researcher's observer of goings-on that the researcher cannot observe personally; they are the eyes and ears of the researcher. The setting for the interview can either enhance or limit data production. The ambience, according to De Vos, *et al*., (2002), created for the interviews should therefore be one that would be suitable and pleasing to the participants. The researcher should create comfortable environment in which the participants are asked non-directive questions first in order to learn what is important to them and then progress to questions that are more focused on the study (Taylor, 1984). Interviewers should possess skills not only to encourage the participants to talk, but to also absorb what is being said (Stevens, *et al*., 1993). Paying attention and showing an interest in what is being said could also help promote an agreeable atmosphere, thereby producing rich data.

The limitation of this form of data production is that participants may be shy about revealing certain information and may therefore hold back. This could however be overcome by making participants feel comfortable in the knowledge that they are not being judged and that anonymity is guaranteed (De Vos, 2002).

School A

In school A the researcher interviewed three Computer Applications Technology teachers. These teachers were chosen because they were the only teachers that are teaching Computer Applications Technology in that school. The teachers teach Grade 10, Grade 11 and Grade 12 classes respectively in Computer Applications Technology. According to Babbie (2001), the purpose of sampling is to select a set of elements from a population.

First Step

On 9 April 2010 the researcher went to the school to ask the principal for permission to conduct the research. The appointment was at 10h00. The researcher had to explain to the principal why and how he was going to interview teachers. He also explained what is going to be done with the information that was collected from the school. The school principal allowed the researcher to conduct the study in the school. The principal told the researcher that he should meet one of the Computer Applications Technology teachers first. So the researcher came back and met the teacher.

Second Step

On 16 April the researcher went back to see three Computer Applications Technology teachers. All these teachers agreed to be interviewed. The researcher came back on 19 April to conduct the interviews. Lunch breaks were used to conduct the interviews. Lunch break was from 12h00 to 13h00. Interviews were conducted one day a week over three weeks. Teachers agreed to a tape recorder being used. The interviews took place in the Deputy Principal's office.

Final Step

On 19 April the researcher went to the school to interview the teachers. He used individual semi-structured interviews. The interviews went well. The researcher also observed one lesson given by the teacher that he was interviewing on that day.

School B

In school B the researcher interviewed three teachers. He used semi-structured interviews.

First Step

The researcher had an appointment with the school Principal on 23 April 2010. The appointment was at 10h30. The Principal gave the researcher permission to conduct the study at the school. The Principal gave the researcher the Head of Department's cell phone number so that he could make an appointment with her for the dates and times. The researcher met the Head of Department on 26 April at 11h00. The H.O.D. called the three Computer Application Technology teachers. They all agreed to be interviewed. It was agreed that the interviews would takeplace on 3 May, during lunch break.

Step Two

On 3 May the researcher went back to the school. He interviewed the teachers in the computer laboratory. The interviews were conducted during the lunch break. Lunch break was from 12h30 to 13h00. Interviews were conducted on one day a week over three weeks. The researcher used individual semi-structured interviews. One lesson given by the teacher that was being interviewed was observed. The researcher was allowed to use a tape cassette recorder.

School C

In school C the researcher interviewed two teachers. He used semi-structured interviews.

First Step

In school C the researcher phoned the school to make an appointment. The secretary gave the researcher the Principal's cell phone number. The Principal referred the researcher to one of the Computer Applications Technology teachers. The researcher went to school to meet that teacher. There were two Computer Applications Technology teachers. They allowed the researcher to interview them.

Second Step

The interview took place on 6 May. The interview, which was conducted in the computer laboratory, went well. It was conducted during the lunch break from 12h00 to 13h00. Interviews were conducted one day a week over three weeks. One lesson given by the teacher being interviewed was observed.

4.5 Observation

4.5.1 Non-participant observation

In this study the researcher used non-participant observation because his intention was to sit on the class and observe what teachers experience when they teach Computer Applications Technology in order to identify the challenges that teachers face. The researcher included the following in the observation schedule: The number of computers in a class, number of learners in a class, working individually, in pairs or in groups, layout of the classroom or laboratory, resources used during the lesson, how the resources were used and any problems due to resources issue. The observations were conducted for one day a week over two weeks.

From what the researcher observed at the three schools at KwaMaphumulo, some of the teachers lack computer skills and training. There is a lack of resources in the school computer laboratories. The schools do not have enough computers. Due to the lack of computers they admit a limited number of learners for Computer Applications Technology. But even with the reduced number, there is a shortage of resources. One might find 15 computers for 25 learners; of the 15 computers, five are not working. Learners are sharing computers. They do not have the internet. There is also a lack of hands-on experience, because most of the time, learners are writing notes on the board, and using their class work books, chalkboard, text books and dictionaries.

According to Bless and Hison-Smith (1997), simple observation also called non-participant observation, is the recording of events as observed by an outsider. For example, an outsider placed at the road junction can observe cars passing or pedestrians crossing the road, the speed of the cars, the number and causes of accidents and so on. But this method has some weaknesses. People who feel that they are being observed may change their behaviour, become uneasy or stop activities altogether. Thus, although simple observation is based on the assumption that the observer merely records facts without interaction with the observed, in fact the observation itself introduces biases as people become aware of being observed. According to Easeit-eng (2000) when the researcher is observing a lesson or an activity it is very important to have an observation schedule. This schedule is intended to act as a checklist. It is also intended as a guideline or a reminder to be alert and on the lookout for certain things. Some of the factual information can be recorded immediately. Researchers should try to introduce themselves to the learners and explain their role. It is also necessary to outline the reason for their presence. The researchers should try to be as unobtrusive as possible during the observation and simply make notes about what they see.

4.6 Conclusion

This chapter outlined how the researcher negotiated with the School Principals to get permission to conduct the study in the schools. Based on the case study performed by the researcher, as highlighted in this chapter, the next chapter will examine the findings from the three schools that were visited.

CHAPTER FIVE
5.1 FINDINGS

5.1.1 INTRODUCTION

This chapter presents an analysis of the data that was collected in the three different schools. It provides answers to the critical questions outlined in chapter one. All the participants in this study provided an indication are giving an indication about the experiences of teachers in teaching Computer Applications Technology in rural schools at FET band. Following on the data analysis, recommendations are put forward to address the challenges teachers are experiencing in teaching Computer Applications Technology.

As discussed in chapter four of this study two data sources, that is semi-structured interviews and participant observations were analysed. Eight teachers participated in the study. The findings are organized into the following critical questions:-

- What are the experiences of teachers in teaching Computer Applications Technology?
- What challenges and benefits do teachers encounter in teaching Computer Applications Technology?

5.1.2 Semi-structured interviews

The researcher interviewed a total of eight teachers in the three schools. The schools are referred to as school A, school B and school C. In school A three Computer Applications Technology teachers were interviewed. In schools B and C two and three teachers respectively were interviewed. The analysis is presented in the form of quotations and graphs. The quotations from the data are referenced as R1, R2 and R3 for school A, R4 and R5 for school B and R6, R7 and R8 for school C. R represents respondents and the number represents the identity of the respondent.

Table 2

ANALYSIS OF THE RESPONSES FROM THE INTERVIEWS

Schools interviewed	Formal Training in Computer Applications Technology	Teachers' experience in teaching Computer Applications Technology.	Performance in terms of learners' pass rate.
School A			
Respondent 1	Yes	14 years	Very Good
Respondent 2	Yes	5 years	Fair
Respondent 3	Yes	8 years	Good
School B			
Respondent 4	No	7 years	Poor
Respondent 5	Yes	12 years	Fair
School C			
Respondent 6	No	3 years	Fair
Respondent 7	Yes	15 years	Very Good
Respondent 8	Yes	9 years	Good

5.1.3 What are the experiences of teachers about teaching Computer Applications Technology?

The findings show that teachers with longer experience and formal training in Computer Applications Technology are producing better results in terms of learner performance in Computer Applications Technology than those who have less experience and do not have formal training.

Teachers' experiences of teaching Computer Applications Technology

Figure 3

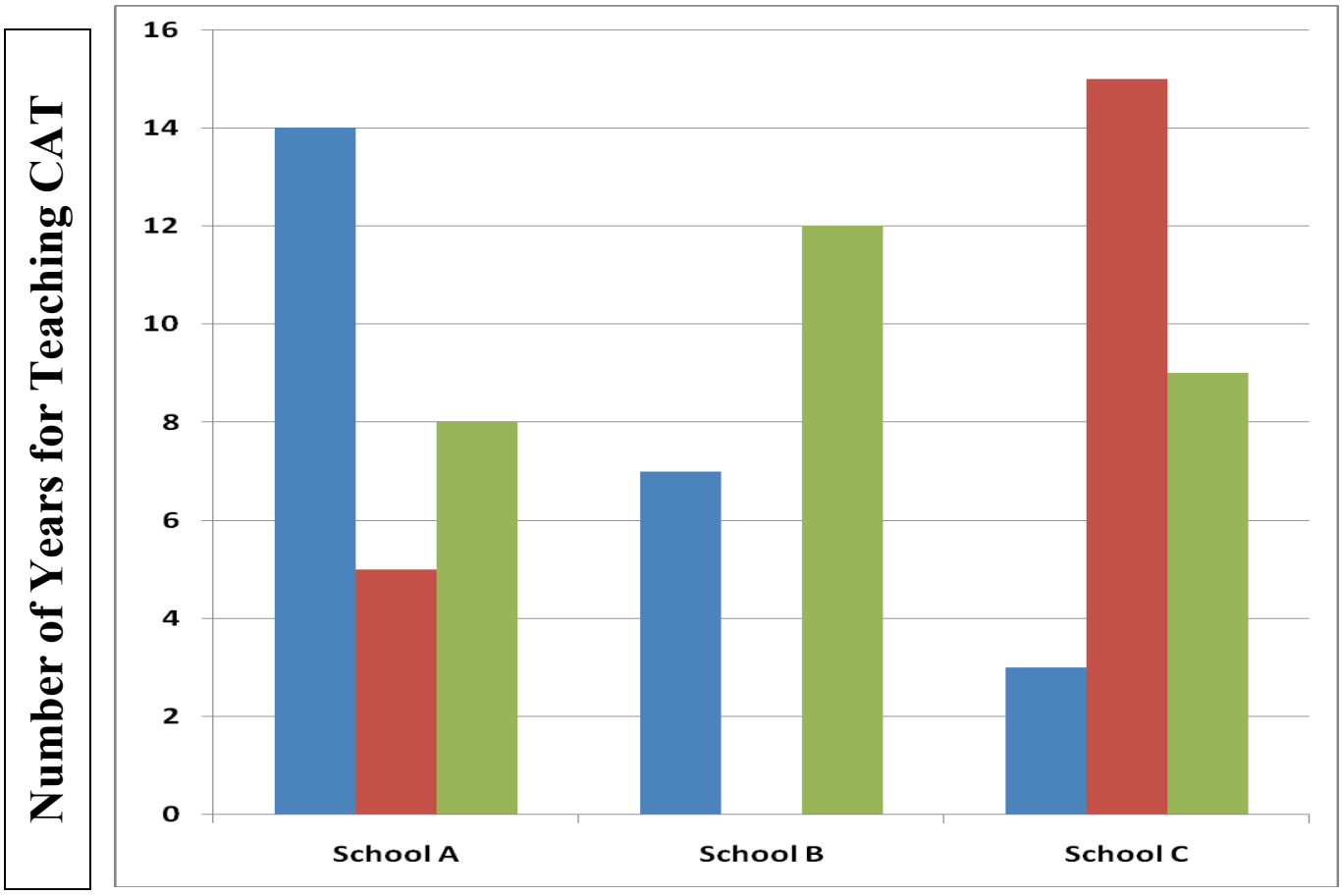


Figure 3 shows the experience of teachers in teaching Computer Applications Technology. This graph is based on three respondents in school A, two respondents in school B and three respondents in school C. In school A, respondent 1 had 14 years experience, respondent 2 had 5 years experience and respondent 3 had 8 years experience; in school B respondent 4 had 7 years experience, and respondent 5 had 12 years experience. In school C respondent 6 had 3 years experience, respondent 7 had 15 years experience and respondent 8 had 9 years experience.

I have been teaching Computer Applications Technology for 14 years. This is my third school. In the first school I taught for three years. In the second school I taught for four years and I have been in this school for seven years ***R1.***

I have been teaching Computer Applications Technology for five years and this is the only school that I worked for ***R2.***

I have been teaching Computer Applications Technology for eight years. I was teaching in an SGB post in another school, in another province for two years and it is the sixth year now in this school ***R3.***

I have been teaching Computer Applications Technology for 7 years and I have been teaching it in the same school ever since I have started to work ***R4.***

I have been teaching Computer Applications Technology in another school for 6 years and I have been teaching in this school for 6 years ***R5.***

I have been teaching Computer Applications Technology for 3 years and this is the only school that I have worked for ***R6.***

I have been teaching Computer Applications Technology for 15 years. I have been teaching in this school since I have started 15 years back ***R7.***

I have been teaching Computer Applications Technology for 9 years. I have been teaching in another school for 4 years and I have been teaching in this school for 5 years ***R8.***

Respondents' Formal Training in Computer Applications Technology

Figure 4

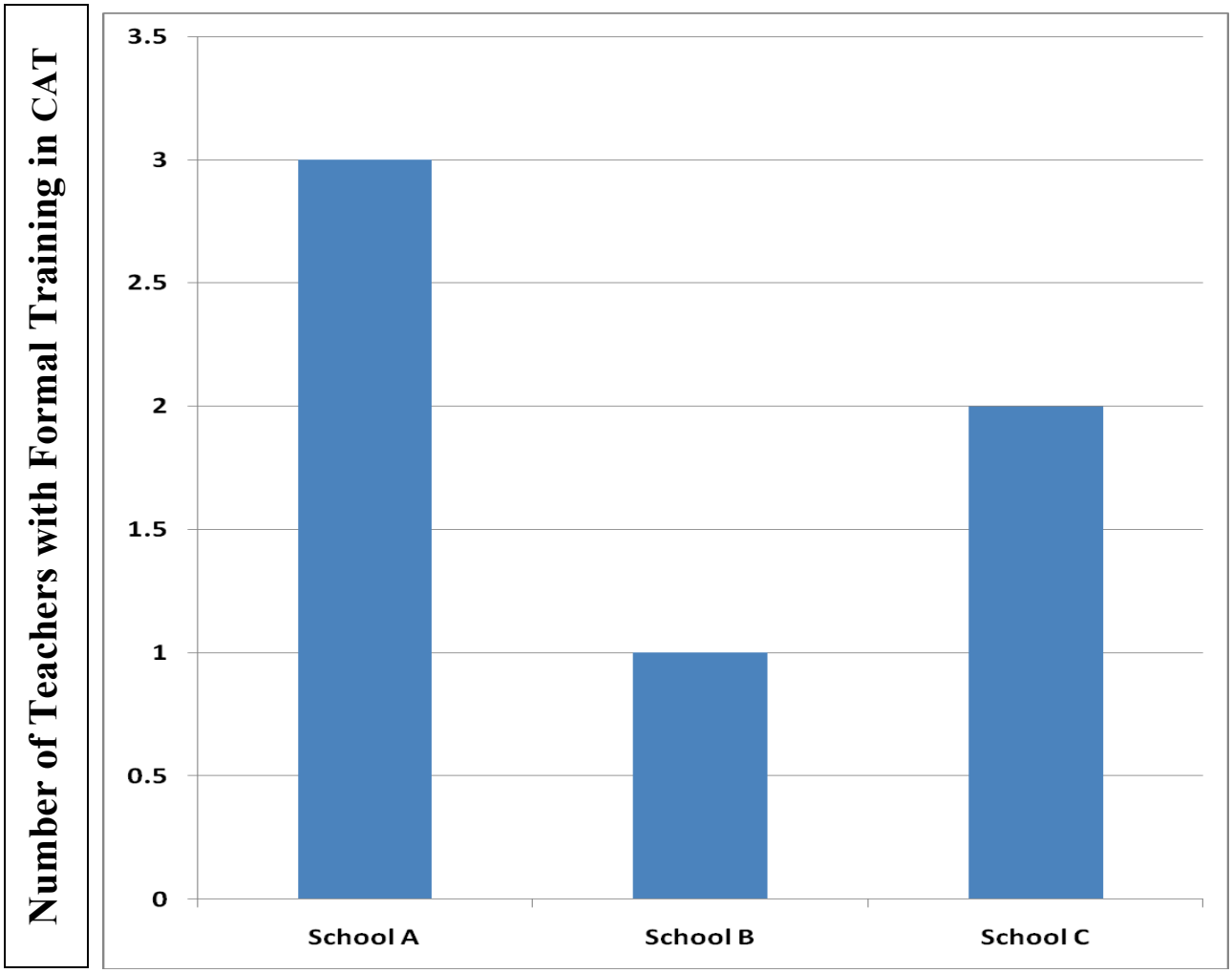


Figure 4 shows the number of teachers with formal training in Computer Application Technology. School A had three respondents, school B had two respondents and school C had three respondents. This graph depicts the total number of respondents who have formal training in Computer Application Technology. In school A all the respondents had formal training in Computer Applications Technology. School B had two respondents; one respondent had formal training in Computer Applications Technology. School C had three respondents; two of them had formal training in Computer Applications Technology.

I have been using computer for 17 years, including the 3 years of training in a Training College. My qualifications as I teach Computer Applications Technology is that, I have done a three year course certificate in a Training College after that I did a 3 year diploma of teaching in a College of Education ***R1.***

I have been using computer for 9 years, including 4 years of a degree in a university. My qualification as I teach Computer Applications Technology is a bachelor's degree specializing with Computer Studies ***R2.***

I have been using computer for 9 years, including a one year of training in a Training College and that is my qualification as I teach Computer Applications Technology ***R3.***

I have been using computer for 7 years. My first time to use computer was when I started to teach Computer Applications Technology. I was employed as an SGB teacher since the school was still looking for a qualified Computer Applications Technology teacher. As the time went on I ended up being employed without formal training or qualifications for teaching Computer Applications Technology. So, I do not have qualifications as I teach Computer Applications Technology ***R4.***

I have been using computer for 15 years including the three years of training in a Training College. My qualifications as I teach Computer Applications Technology is that, I have done a 3 year certificate in a Computer Training College ***R5.***

I have been using computer for 5 years. I have been working as a receptionist in a private company for 2 years. After that I have been employed as a Computer Applications Technology teacher. I do not have qualifications as I teach Computer Applications Technology I was only employed because of the computer experience that I had ***R6.***

I have been using computer for 19 years. For 1 year I have been working in a shop whereby I was using computer. For 3 years I have been using computer in a Computer Training College and I have been teaching Computer Applications Technology in this school for 15 years. The qualifications I have as I teach Computer Applications Technology is that, I have done a 3 year certificate from a Computer Training College ***R7.***

I have been using computer for 12 years including the 3 years of training in a Computer Training College. I have been teaching Computer Applications Technology for 9 years. I have been teaching in another school for 4 years and I have been teaching in this school for 5 years ***R8.***

Most respondents feel that; teaching Computer Applications Technology is a good experience, especially in a world so pre-occupied by the use of technology. They feel that it is of benefit to them and their learners because as the technology becomes more advanced they are part of those new technological advancements. A few of the teachers do not feel good about teaching Computer Applications Technology; they feel that it is very challenging as it is not their area of specialisation.

What I feel about teaching Computer Applications Technology is that, it is a very interesting subject to teach because it updates you with the new developments of technology. It makes work easier for you as a teacher and for learners because of the use of internet though there are challenges that we face but it is a good subject ***R1.***

Oh! It is an interesting subject to teach but the problem is that conditions are not conducive for us to teach the subject because of a very limited number of computers in my school. As a result learners are sharing computers ***R2.***

I feel good about teaching Computer Applications Technology because it is a great advantage to our previously disadvantaged learners since it enables them to be able to pursue the scarce skills careers. That makes them to have wide choices of careers and to be easy to get jobs ***R3.***

I do not feel happy about teaching Computer Applications Technology because I am always not comfortable about teaching the subject. I do it because I cannot find another job. My biggest problem is the practical part of it. I am always stressed when I have to go to moderations ***R4.***

What I feel about teaching Computer Applications Technology is that, it is a nice and interesting subject to teach. As much as it is good for learners it is also developing my technological skills as a teacher. It makes me to be able to keep up with the new technological developments ***R5.***

I do not feel good about teaching Computer Applications Technology because of many challenges that we face as the subject teachers. Most of the times it is very stressing when the practical tasks have to be written, and there is no electricity and the learners are panicking and complaining. What I can say is that, the conditions are not conducive for us to teach the subject because of a very limited number of computers that we have and the problem of the internet that is always not available ***R6.***

What I feel about teaching Computer Applications Technology is that, it is an interesting subject to teach because it is helpful to both teachers and learners. The skills that you get from the subject are always helpful to you in your life generally. Yes, there are challenges like in any other subject, there is no big deal about them ***R7.***

I feel good about teaching Computer Applications Technology though there are challenges that you encounter but you always learn a lesson even in those challenges. The only thing that you need to do is to be patient. Otherwise it is a very cool subject to teach ***R8.***

Almost all the respondents reported that their aim in teaching Computer Applications Technology is to help their learners acquire the skills that were previously not available to them. They highlighted the fact that Computer Applications Technology is one of the subjects that is offered in previously disadvantaged schools, like their rural high schools.

My aim of teaching Computer Applications Technology is to help learners to become computer literate so that they can be able to face challenges in the job market since computers now are being used in all departments and businesses, in the public and in the private sector ***R1.***

My aim as I teach Computer Applications Technology is that, our learners are coming from the poor and disadvantaged families. When they pass grade 12, most of the times, there is no money for them to go to the tertiary institutions. So, that grade 12 certificate with Computer Applications Technology helps them to apply for some jobs in order to save money and further their studies ***R2.***

My aim of teaching Computer Applications Technology is to empower our learners about the scarce skills that were not available to them in the past since it was rare to find a black learner doing courses like Information Technology and Computer Science ***R3.***

My aim as I teach Computer Applications Technology firstly, I would like to register in a tertiary institution and do a diploma or degree in teaching specializing with Computer Applications Technology. I believe that may be that can boost my confidence of the subject and make me to enjoy teaching it. I want to do that because I can see that learners are enjoying it a lot ***R4.***

My aim as I teach Computer Applications Technology is that I want to help many children in my community so that they can be able to achieve their goals in life. Many learners want to do Computer Applications Technology but we cannot take them since we have such a limited number of computers. They want to do it because they see a lot of learners who were doing Computer Applications Technology in our school getting jobs with their matric certificates ***R5.***

My aim as I teach Computer Applications Technology is that I want to produce good results more especially in grade 12 so that my learners can be taken in tertiary institutions and do courses like Computer Engineering, Computer Science and Information Technology ***R6.***

My aim as I teach Computer Applications Technology is that, I want to encourage our learners and make them to be aware of those careers in the computer technology field that were not available to them and make them aware that now the doors are open for them to pursue those careers as long they get the good results. I want to encourage them to perform well so that they access the bursaries that are available since most of them are coming from the families that do not have money to pay for their school fees ***R7.***

My aim of teaching Computer Applications Technology is that I like to help our learners change their family backgrounds because we are in the community whereby it is not easy for these children even to pass grade 12. There is a high rate of teenage pregnancy and they do not come back to school after that. Boys leave the school early saying that they are looking for jobs without even having matric certificates. What I notice now is that, they realize that a matric certificate with Computer Applications Technology is helping them ***R8.***

Most of the respondents recognize the support that they get from the Department of Basic Education. They said that the department gives them a good support that makes their work easier since, they get all the material that is required as a guideline on how to approach their syllabus, how to set and what tasks need to be done. A few of the respondents did not feel the support that they get form the department is sufficient.

Yes, we get support from the Department of Basic Education. For example we attend the workshops and get the material from the subject advisors. We get material like CDs for practicals from the subject advisors; we get Subject Assessment Guidelines (SAG) and Learning Policy Guidelines (LPG). We attend cluster meetings whereby we get support from one another as teachers and invite the subject advisors if we need them to join us in the cluster. Subject advisors also visit us in our schools to check the progress. We also go to moderations, cluster moderations where we moderate one another's work as teachers under the supervision of the cluster coordinator who is one of the teachers in the same particular group. That teacher is responsible for giving the report to the subject advisor. We also go to the departmental moderations where the subject advisor is checking our work, that is master portfolios and learners' portfolios and correct us if necessary ***R1.***

We get support from the Department of Basic Education because subject advisors always want to make sure that all schools are operating on the same level in terms of the material they are getting from the department. They recommend the textbooks that we can use. So, we feel that we do have a source of strength ***R2.***

We get a good support from the Department of BasicEducation since we have started to teach Computer Applications Technology. They really care for us because our subject advisors are always encouraging us to write the letters to the municipality and request the electricity supply not to be disturbed during the Computer Applications Technology practical tests or examinations ***R3.***

The Department of Basic Education is giving us the support though it is not enough because they only give us the documents in the workshops. They do not do anything about the shortage of computers that we are facing in our school. The department cannot even send and pay for the person who can come and fix the computers that are not working ***R4.***

The Department of Basic Education is giving us the support because they give us the material in the workshops. They employ the security that looks after our computers and all the school resources ***R5.***

About the Department of Basic Education I am not too sure whether they give us support or not, all I can say is that they do what they are doing to the other schools. There is nothing special that they are doing for us ***R6.***

The Department of Basic Education is giving us enough support. They try their level best to improve the performance for all schools. If we have a complaint about something as Computer Applications Technology they take that into serious consideration. They monitor our progress time and again. If we seem to be stuck with something they help us through our honorable subject advisors ***R7.***

We get a good support from the Department of Basic Education. I really appreciate the material that we get from workshops even the training they give us is very helpful. I still remember when I was new in the field I benefited a lot from the department's workshops:- they made me to be a matured Computer Applications Technology teacher ***R8.***

According to the respondents, because their schools are in areas where many people are not educated and are not financially stable, they do not get very good support from the community when it comes to Computer Applications Technology. But the support is forthcoming at the level the community is able to provide. Some of the respondents mentioned that their community members volunteer for security to look after school property and the computers because they reported that their computers were being stolen. Some of the respondents reported that they even have people who help to fix their faulty computers. However a few respondents claimed that they are not getting any kind of support from their communities.

We do get support from the community since we have a person in our community who knows how to fix the computers. When our computers have a problem he comes to fix them free of charge. The only challenge is that he is not always available because he is working and staying in Durban otherwise he is helping us a lot ***R1.***

Yes we do get support from the community because the community members also help us a lot in terms of security. We used to have a big problem that the computers were being stolen in the computer laboratories at school at night. Though we have the school security guards they were being threatened by the thugs. We called the meetings with the community, they started to volunteer in security, after that our problem was solved ***R2****.*

We do get support from the community because the owner of the shop that is next to our School has offered to help us any time we have a problem of the electricity since he has got the generators. So, he helps us a lot when there is no electricity and we need to write a Computer Applications Technology practical test or examination ***R3.***

We do not get any support from the community as we teach Computer Applications Technology ***R4****.*

We do get the support from the community as we teach Computer Applications Technology. When there is no electricity the community members who have generators help us when we are doing a practical test or examination ***R5.***

There is no enough support that we get from the community because most of the people here are not educated let alone to talk about computer and internet. They do not support in any way instead they try to steal the small number of computers that we have ***R6.***

The community is supporting us because they encourage us to continue with the good work that we are doing. They can hear that their children are happy about doing Computer Applications Technology. It is just that they do not have money to donate towards this subject or the knowledge of fixing the computers when they have a problem or the computer knowledge in general otherwise they give us support ***R7.***

Yes, there is support that we get from the community because even in the meetings they always talk about making our computer laboraties safe so that our computers will not be stolen. They do give the little support that they can give ***R8.***

All the respondents from all schools reported that, they have a very limited number of computers in their computer laboratories. They also reported that the computers they have were old computers that were donated by certain companies when they started to teach Computer Applications Technology. The biggest challenge that is being faced is that some of the computers are always not working; that makes shortage of computers worse.

We have 33 computers in our school, 30 computers in the computer laboratory, one computer in principal's office, one computer in the secretary's desk and one computer in the staffroom for teachers, respondents from school ***A.***

We have 22 computers, 18 computers in the computer laboratory, one computer in the principal's office, one computer for the secretary, one computer in the HOD staffroom and one computer in the staffroom for teachers, respondents from school ***B.***

We have 22 computers, 18 computers in the computer laboratory, one computer in the principal's office, one computer for the secretary, one computer in the HOD staffroom and one computer in the teacher's staffroom, respondents from school ***C.***

The three schools that were visited by the researcher reported that, due to the limited number of computers, they also admit a limited number of learners to the Computer Applications Technology class. They said that some of the learners beg to take the subject but because of the small number of computers, they are unable to accommodate them.

We do not take more than 45 learners per class in all classes and in all grades that is from Grade 10 to grade 12. Learners are sharing computers, respondents from school ***A.***

We do not take more than 30 learners per class in all grades, that is from Grade 10 to Grade 12, respondents from school ***B.***

Since we have few computers in all classes that is Grade 10, 11 and 12 we do not take more than 35 learners per class but still our learners are sharing computers, respondents from school ***C.***

In all schools teachers reported that they use different name brands of computers.

We use Samsung and Hewitt Package computers, respondents from school ***A.***

We use Sahara computers, respondents from school ***B.***

We use the Sahara computers, respondents from school ***C.***

The three schools that were visited by the researcher are running their application software in different operating systems.

We run our application software in windows 98 and 2000, respondents from school ***A.***

We run our application software in windows 2000, respondents from school ***B.***

We run our application software in windows 2000, respondents from school ***C.***

5.2 What challenges and benefits do teachers encounter in teaching Computer Applications Technology?

All the respondents reported that the most severe challenge that they are experiencing is the shortage of computers in their schools and that the computers that are always not working. The learners therefore have to share computers. This makes the situation difficult for the teachers, especially when they have to do practical tasks.

We experience challenges like the shortage of computers because our learners have to share computers and most of the times you find that some of our computers are always not working on top of that limited number of computers ***R1****.*

The greatest challenge is about computers that are not working. It happens that it is only 25% of computers that is working; most of them are not working. At that time we can only teach the theory, we cannot teach the practical ***R2.***

Our challenge is the computer virus and the disks that are easily damaged. Learners come with their flash disks that have virus and computers are affected. It is the burden of the school to clean the virus using the school money ***R3.***

We are facing a big challenge in our school more especially about the limited number of computers. Since our learners have to share computers, they are not getting an opportunity for hands-on experience. As a result there are very few learners who can operate computers without any problems. Learners start Computer Applications Technology in Grade 10 up until they reach Grade 12 but still they are not able to operate computer without problems ***R4.***

We experience a great challenge of the electricity power failure, which might be caused by the over use of computers. We use very old computers. We use second hand computers that were donated by a certain company. Learners have to share computers. If learners are not properly monitored, they tend to do other work on the computer other than what is required of them. The internet seems to aggravate the problem. Learners visit explicit sites which should only be accessed by adults ***R5.***

The challenges that we experience as we teach Computer Applications Technology is that, firstly I have a personal challenge about the subject that, I am not comfortable about teaching the subject since I do not have a formal training for the subject. This challenge makes my learners to lack a lot in the computer practical. On top of that there is a lack of resources to teach Computer Applications Technology which is also another challenge because I was going to ask for my learners to join the practical classes of my colleagues ***R6.***

The challenges that we are experiencing is that, the internet is always down. The computers freeze sometimes because they are overused. We have to wait for the computers to get right sometimes which wastes a lot of our teaching time ***R7.***

The challenges we are experiencing is that, learners want to use the internet if they did not finish the project at hand. Learners tend to rely on the internet and use the library less. Learners would not concentrate on the topic being taught at that moment. They would be playing games and download other unnecessary information not relevant to the subject ***R8.***

Respondents reported that the benefits of teaching Computer Applications Technology include the use of internet when it is available, which makes it easy for them and their learners to research information. Respondents reported that they can communicate very easily with their learners and the learners can communicate easily with other learners using the internet.They also reported that a further benefit is that their computer skills are always updated since technology is always advancing and it is easy for them to catch up with these developments.

It is beneficial to teach Computer Applications Technology because we as teachers can research information from the internet. Teachers and learners can store information in the computer for future use ***R1****.*

The benefit of teaching Computer Applications Technology is that, it saves time for us as teachers and learners because we can visit different libraries on the internet to find books that are available for the subject ***R2.***

It is beneficial to teach Computer Applications Technology because it helps learners to be able to get more information in the internet and not to rely on the books as the only source of information. It enriches the child's mind ***R3.***

It is beneficial to teach Computer Applications Technology because computer technology is worldwide and the learners are benefiting from the high technology that is provided to them by the subject ***R4.***

The benefits of teaching Computer Applications Technology is that, it makes teaching very easy since the learners are able to research the information from the internet and do their own projects and assignments ***R5.***

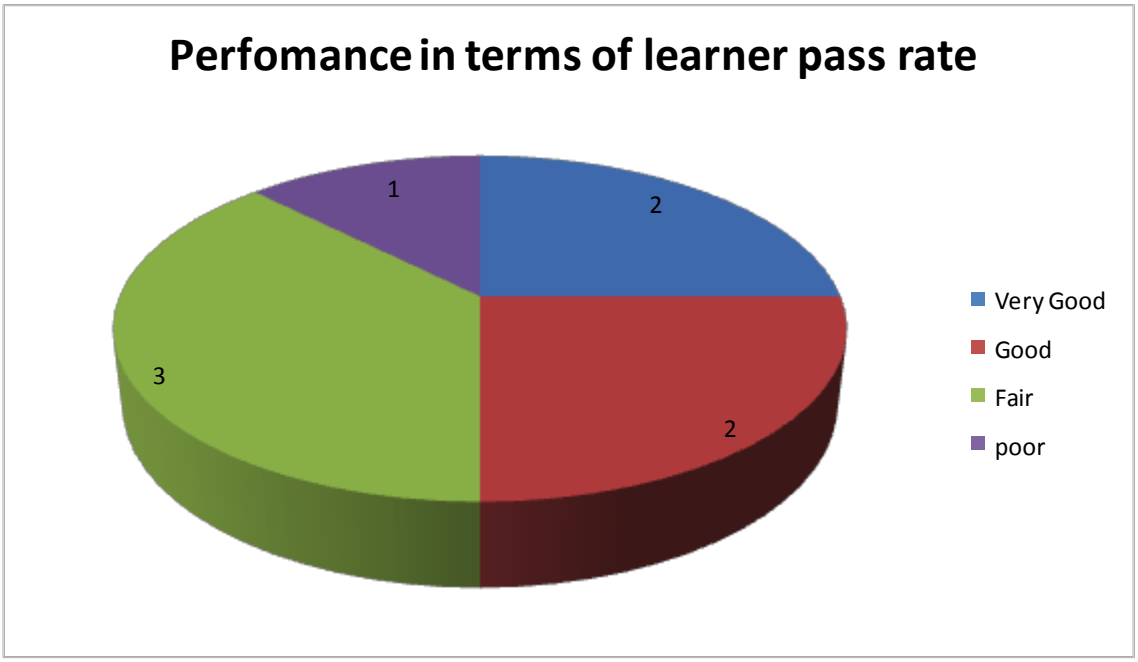
The benefits of teaching Computer Applications Technology is that, firstly as a teacher who do not have a formal training in Computer Applications Technology I have gained a lot of knowledge about the computer use. Though I am not yet comfortable with the use of computer more especially the practical part of it but I am too different from the time I started to teach the subject. At the same time it is so helpful to the lives of our learners, they really appreciate the skill that they get from Computer Applications Technology ***R6.***

I benefit a lot from teaching the subject Computer Applications Technology because I have done the computer course 15 years back and there are always new technological advances that are taking place. To teach this subject it helps to update my computer technology skills. As a result I am able to operate any computer system with the latest technological developments. It is also of very good benefit even to our learners as they were not familiar with the use of computers because of the disadvantaged families they are coming from ***R7.***

The benefits of teaching Computer Applications Technology is that, this subject helps improve the performance of other subjects since learners start to be able to use different libraries from the internet and do their own research about the information they need to use in their school work and we as teachers it is easy for us to give them assignments and projects without fear that they might not get the information that is needed from them ***R8****.*

PERFORMANCE OF TEACHERS IN TERMS OF LEARNERS' PASS RATE

Figure 5



This chart shows the performance of teachers in the three schools that were part of the case study. Eight teachers that were interviewed, three from school A, from school B and three from school C. The performance of the teachers is evaluated in terms of learner performance, i.e. pass rate under the categories "very good", "good", "fair" and "poor". Across the three schools one teacher showed poor performance, three fair performance, two good performance and two very good performance.

The performance of my learners is very good in spite of all these challenges, because I am using a lot of my time in doing the extra classes so that I can teach them in different groups since we have a limited number of computers. Sometimes I am taking one group in the morning and another group in the afternoon, so that every learner can have enough time for hands-on experience. Sometimes I use my laptop to teach them that particular lesson that I want to teach at that point in time ***R1.***

The performance of my learners is fair because of the challenges that I am facing more especially the lack of resources in our school ***R2.***

The performance of my learners is good though I am facing these challenges but I make some efforts to work very hard to teach my learners every time I get ***R3.***

The performance of my learners is poor. I do not have enough time to work with my learners because I cannot make time for extra classes. Learners cannot make time to practice the computer because after school all the gates are closed at school, even during the week end they cannot make time to practise computer ***R4.***

The performance of my learners is not good but it is fair. The problem is that our school is too far from where the learners are coming from. Therefore, we cannot organize morning and evening classes because learners cannot have transport to go home. Sometimes I try to make sometime and teach them using my laptop though that is not enough to use one computer in such a big group of learners ***R5.***

The performance of my learners is fair. I think it is because I have never done Computer Applications Technology as my major or teaching subject. The subject is really challenging me more especially the practical part of it. Most of the times I am always teaching theory as a result my learners are lacking a lot on the side of the practical. My colleagues help me sometimes and teach my classes the practical ***R6.***

The performance of my learners is very good in Computer Applications Technology. It is about dedication, sacrifice and commitment from my side as a teacher and the learners because at times we do not close during the holidays, we do the morning and afternoon classes even Saturday classes if we still have a lot to do. I make it a point that we finish the syllabus on time in both theory and the practical then after that we start the revision ***R7.***

The performance of my learners is good in Computer Applications Technology because the pass rate is good even in Grade 12. I try by all means to spend time with my learners for teaching, practising and revising the previous question papers ***R8.***

Outcomes are the expected results or the developmental findings. Almost all schools were expecting the outcome that their learners would be able to create their own documents.

The outcomes that we expect as we teach Computer Applications Technology is that, we expect our learners to be able to create their own documents, worksheets, database and presentations, respondents from schools ***A, Band C.***

Teaching methods are very important for this study because they can either hinder or motivate learners in the process of learning. This means that teachers should make sure that they are using the most suitable methods of teaching that motivate learners in order to achieve the outcomes easily. Methods of teaching are flexible, just like all other variables that are controllable. Teachers are using teaching methods that are relevant to Computer Applications Technology that is, the practical and theoretical method.

We use theoretical and practical approach methods in teaching Computer Applications Technology, respondents from schools ***A, B and C.***

Teachers have to follow some rules that are guidelines to them as they teach the subject. The researcher also wanted to establish the rules that are being followed by these teachers in teaching Computer Applications Technology.

The rules that we use in teaching Computer Applications Technology is Subject Framework from the Department of Education, respondents from schools ***A, B and C.***

Tools are the properties used for teaching Computer Applications Technology. Teachers need the tools to do their work, that is, to teach Computer Applications Technology effectively.

The tools that we use to teach Computer Applications Technology are the computers since the subject is based on computers ***R1.***

The tools that we use in teaching Computer Applications Technology are textbooks, preparation books and scheme and record books ***R5.***

The tools that we use in teaching Computer Applications Technology are the subject policy documents, syllabus and the timetable ***R7.***

Most of the respondents reported that it is necessary for them to have Computer Applications Technology in their schools because it helps their learners to acquire the skills that were not available to them before. They reported that it opens more doors of employment opportunities to their learners.

It is necessary to have Computer Applications Technology in our school because our learners were previously disadvantaged, so it is good that they get the opportunities that were not available to them before ***R2.***

It is necessary to have Computer Applications Technology in our school because it equips our learners with new technological developments ***R4.***

It is necessary to have Computer Applications Technology in our school because it is one of the subjects that helps our learners to get jobs easily ***R5.***

It is necessary to have Computer Applications Technology in our school because we need to equip our learners with the computer technology skills that are of great advantage in today's living ***R6.***

It is necessary to have Computer Applications Technology in our school because we need our learners to be able to operate any computer system without any problems even if they are not doing careers in the computer field if they do not want to but it is good for them to be knowledgeable about these new technological developments ***R7.***

It is necessary to have Computer Applications Technology in our school because to have a subject like this in our school though at the present moment we do not have enough resources but we are going there. It really shows that the education system of this country has improved from favouring a certain group of people as it use to happen before. Today education is being equalized it is just shortage in our side because of where we come from, that old system of education ***R8.***

All the respondents reported that they teach MS Word, Excel, Access and Presentation.

The programs that we teach in Computer Applications Technology are MS Word, Excel, Access and Presentations respondents from school ***A, B and C.***

Some of the respondents had a very positive attitude about the future of Computer Applications Technology in their schools. For example some respondents reported that they have approached companies to donate computers to their schools. Others reported that they are busy raising the funds so that they will be able to buy more computers. They reported that the intention is to see all the learners in their schools who are interested in taking Computer Applications Technology getting that opportunity.

The future of Computer Applications Technology in my school is that, I need to see all of our learners who want to do Computer Applications Technology being able to do it since it has been so helpful to our previous Grade 12 learners. Learners who were coming from very disadvantaged families managed to get jobs because of their Grade 12 certificate with Computer Applications Technology. Learners have managed to save money so that they will be able to pay for their school fees in the tertiary institutions ***R1.***

Computer Applications Technology has got a very bright future in our school because even at this point in time we have started to write letters to the different companies asking them to donate computers so that we will be able to take a bigger number of learners to do the subject ***R2.***

The future of Computer Applications Technology in our school is promising because it is the only subject that is helping our learners to be employed mostly. As a result our ex-Grade 12 learners who were doing Computer Applications Technology have promised to donate some computers and they have talked with the companies that they are working for to donate computers to our school ***R3****.*

The future of Computer Applications Technology in our school is that, we would like to continue with the subject because of learners who like to do it. We will continue with the subject with the hope that the government will give us support, like giving us the computers ***R4****.*

The future of Computer Applications Technology in our school is that we want to produce 200 Grade 12 learners a year with Computer Applications Technology in their matric certificates ***R5.***

The future of Computer Applications Technology in our school is that we need to see all the learners who are doing Computer Applications Technology being able to operate computers without any challenges ***R6.***

The future of Computer Applications Technology in our school is that, we are being involved in a lot of things that will make us to have enough computers in our school. We wrote letters to the companies asking them to donate computers to our school. We are not just waiting for those donations only, we do our level best to raise funds in our school by hosting different occasions in order for us to make a lot of money to buy computers so that every learner who is interested in doing Computer Applications Technology can be able to do it ***R7.***

The future of Computer Applications Technology in our school is that, we need a great improvement in the subject. For example we are working very hard to get enough resources to teach the subject like enough computers. We are also looking forward to upgrade our qualifications as Computer Applications Technology teachers so that every one of us will have thorough knowledge of the subject ***R8.***

5.3 Non-participant observation

In this study the researcher used non-participant observation, which involved sitting in on classes and observing what teachers experience when they teach Computer Applications Technology. He wanted to witness the challenges that teachers are facing when they teach Computer Applications Technology. The researcher included the following in the observation schedule: The number of computers in a class, number of students in a class, working individually, in pairs or in groups, layout of the classroom or laboratory, resources used during the lesson, how the resources were used, and any problems due to resource issues.

5.3.1 Interaction and communication between teachers and learners

The interaction and communication between teachers and learners was good in all the schools. Learners were able to answer the questions when their teachers were doing revision after the lesson. Even during the lesson, learners were asking questions of clarity and they were answered properly. Mostly, learners used isiZulu to communicate with their teachers whether they were asking questions or making comments about the lesson. Teachers were teaching in English and responding to the learners' questions in English and doing Code Switching in school A and school C. In school B both respondents were teaching in isiZulu and mixing English in here and there. When the researcher asked them why they were doing this, they responded that; their learners would not understand very well if they teach in English.

5.3.2 Ways teachers engage with their lessons or deliver them and the way learners respond to teaching

In all three schools, it was noticed that the; ways teachers deliver their lessons and the way learners respond to teaching was good, especially when it cameto theory. In practical sessions, the challenge was that learners were sharing computers. Some learners could not get their hands - on computer. Otherwise the delivery of lessons was good,especially in schools A and C. In school B it was noticed that; teachers are always teaching theory. Respondent 1 reported that; he has a problem with teaching the practical.

5.3.3 Conditions of the learning places, classrooms or computer laboratories

The conditions of the classrooms and computer laboratories were good in all three schools. The only problem was the lack of resources in the computer laboratories. All three schools that were visited had a number of computers that were not working. They also reported that; they always have a number of computers that are not working.

5.3.4 Lay out of the classrooms

The layout of classrooms was good; teachers were not experiencing any challenges as they were using the classrooms when they were teaching theory. There was enough furniture and space in the classrooms in the schools that were visited.

5.3.5 Suitability of classrooms or space where teaching is executed

The space is suitable in all schools both in terms of the classrooms and in the computer laboratories. The other advantage was that, teachers were limiting the number of learners in their classes because of the shortage of computers. So they have enough space.

5.3.6 Resources used

In all three schools, there is a shortage of computers in the laboratories. The number of computers is very small compared to the number of learners. The internet is not always accessible. Non-availability of the electricity is a big challenge during the practical tasks, tests and examinations.

5.3.7 Ways learners operate computers

Learners were sharing computers because there are fewer computers than learners. As a result some learners are not able to operate computers. It was noticed that, every time the teacher tells the class to do something on the computer, it is always the same learners who are operating computers. This is the only group of learners that can operate computers without problems. When the researcher asked teachers about this, they responded that these are the learners who have computers at home.

5.4 Data interpretation

Experience refers to the previous knowledge of a person. Previous knowledge is the knowledge that a person has acquired through past experiences and exposure. In the schools that were visited by the researcher learners do not have previous knowledge of computers because they start to do this subject in Grade 10. Most of the learners come from the surrounding primary schools where there are no computers. Some teachers had never done a computer course before; they only encountered such courses, at tertiary institutions. Those that have taken a computer course have done so in education.Some of the teachers have done computer technology in education.

Dewey quoted in SCIMAST Classroom Compass (1995) notes that education depends on action; knowledge and ideas emerge whenlearners draw them out of experiences that have meaning and importance to them. Jacqueline and Martin Brooks (1993) stated that; by reflecting on our experience, one can give his or her interpretation of the world. Each person generates rules and mental models to accommodate new experiences. Learning therefore, is simply the process of adjusting mental models to accommodate new experiences.

According to the findings of this study, teachers with more experience and formal training in Computer Applications Technology are producing better results in terms of learner performance than those who have less experience and do not have formal training.Twenty percent of the teachers interviewed reported poor performance in terms of producing learner' results. These teachers also reported that they do not have formal training or qualifications for Computer Applications Technology. As a result, these teachers do not feel good about teaching Computer Applications Technology unlike the 80% of the teachers who have more than seven years experience of teaching Computer Applications Technologyand have formal qualifications in Computer Applications Technology. All these teachers reported that it is very interesting for them to teach Computer Applications Technology and that their learners have a good or very good pass rate. Forty percent of this 80% achieved good results, and another 40% achieved very good results.

Some of the teachers had used computers for a long time even before they entered tertiary institutions. Others started to use computers in tertiary institutions and a few started to use computers when they were teaching. They had never had an opportunity to use computers before and they did not have formal training in Computer Applications Technology. Eighty percent of the teachers interviewed had been using computers for more than seven years and 20% for less than seven years.

Six of the teachers interviewed feel that it is very interesting to teach Computer Applications Technology these are the teachers that have had more experience in teaching Computer Applications Technology they are also qualified to teach the subject.Two teachers reported that they do not feel good about teaching Computer Applications Technology. They reported that it is challenging them a lot more especially when it comes to teaching practicals and preparing for moderations.

Respondents reported that they face a great challenge in that they do not have enough resources, for example there is a shortage of computers. In school A they reported that there are 30 computers in the computer laboratory, and they do not take more than 45 learners per class. School B that they have 18 computers in the computer laboratory and they do not take more than 30 learners per class. In school C they reported that they have 18 computers in the computer laboratory and they do not take more than 35 learners per class.

Some of the challenges that are faced by the respondents in addition to too few computers are that some of the computers are always not working. They also reported computer viruses and disks that are easily damaged. There is also the challenge of the Computer Applications Technology learners who do not have a background or foundation in the subject because they did not do it at primary school. They all start Computer Applications Technology in Grade 10. Power failures, which might be caused by the over use of computers are another challenge. One of the biggest challenges that were reported is that learners tend to visit explicit sites which should only be accessed by adults. The Internet is always down and computers freeze because they are overused.

Respondents reported that they have to wait for computers to come right and that this sometimes wastes a lot of teaching time. Learners who do not concentrate in the class and only want to play games were also reported as a challenge. Learners also tend to use library less and use a lot of internet. They also download unnecessary information that is not relevant to the subject.

Respondents reported that they benefit from teaching Computer Applications Technology; for example, both teachers and learners research information from the internet. They reported that teachers and learners can store information in the computers. Another benefit visiting different libraries on the internet to find books that are available for the subject saves time. Teaching Computer Applications Technology helps improve performance in other subjects, since learners are able to search for information they need on the internet for their projects and assignments.

5.4.1 Information delivery and past experience

When learners interpret new information, they use their past experiences to construct knowledge. Since the teachers do not have a good experience of teaching in these previously disadvantaged schools, it makes it difficult for the learners to form an understanding of what they learn in the Computer Applications Technology class.

5.4.2 Resources

Resources are needed to construct knowledge. The schools that were visited by the researcher were under resourced. Since the schools do not have enough resources, it is not easy for the teachers to deliver information to the learners in a satisfactory way. Collagen cited in Blackledge and Hunt (1989); stated that to construct knowledge one needs resources, such as libraries, television, computers, magazines, oral sources, written sources and others. Learners use these resources with the aid of the teacher. Teachers are encouraged to facilitate rather than control and dominate.

5.4.3 ACTIVE PARTICIPATION

Resources will help learners to be actively involved in a lesson. When the researcher observed the lessons, there was active participation from the learners. Learners still see the teacher as a source of information. If there is no active participation, learning will not be interesting to learners. If they are not interested they will not be able to form an understanding of what is being taught in the class.

Apple cited in Blackledge and Hunt (1989); stated that learners are not expected to absorb knowledge. They are given a chance to think creatively and be actively involved in classroom activities. Dewey quoted in Blackledge and Hunt (1989), stated that physical action and hands-on experience may be necessary for learning. People need to take part in activities which engage the mind as well as the hands.

A teacher is the facilitator of learning. In schools that were visited by the researcher, teachers were not facilitating; instead they were feeding the learners information. Learners were not given a chance to think creatively and interpret what they had learnt in the + their learners rather than relying on another's set of data.

5.4.4 Interviews

The researcher visited three schools at KwaMaphumulo area. All three are teaching Computer Applications Technology in Grade 10 to 12. Eight teachers were interviewed; three from school A, two from B and three teachers from school C. All these teachers reported that they experienced challenges because of the lack of resources in rural schools. In school A they reported that they had 33 computers in the laboratory for 45 learners per class. In school B they reported that they have 22 computers in the laboratory for 30 learners per class and in school C they reported that they have 28 computers in the laboratory for 35 learners per class. In all these schools the respondents reported that it is rare to find all the computers working at the same time. Some computers are always not working.

In terms of learner performance, two teachers rated themselves very good, two teachers good, three teachers fair and one teacher poor. In terms of qualifications, in school A three teachers have done computer studies in education, and in school B one teacher has done computer studies in education and one has done a computer literacy course. In school C two teachers have done computer studies in education and one teacher has done a course in computer literacy.

5.5 Conclusion

The analysis of the findings of this study; reveal that there is a dire need to improve the resources for teaching Computer Applications Technology.

According to the data that were collected for the study, the researcher can conclude that the teachers who are teaching Computer Applications Technology in rural schools are facing significant challenges. The reason they face those challenges is because there are few computers in their schools. Learners have to share computers and they do not get enough hands-on experience. Electricity is sometimes not available. Sometimes they cannot access the internet. Another challenge is that computers get damaged time and time again. This causes an event greater shortage of computers. It is not easy for teachers to do the practical assessment tasks.

CHAPTER SIX

6.1 RECOMMENDATIONS

Arising out of the exploration of teachers' experiences of teaching Computer Applications Technology the researcher offers the following recommendations:-

6.1.1 To the Department of Basic Education

- The Department of Basic Education should employ teachers who are well trained in computer as a subject, even if they do not have education as a qualification at that moment in time.

- The Department of Basic Education should organize technicians to service computers in schools and help if the teachers are experiencing problems.

- The most important factor that should be taken into consideration is the fact that most learners in the rural areas do not have money to study at tertiary institutions after they have passed matric. Computer Applications Technology can enable them to get jobs after they have passed Grade 12, because most of them do not achieve good enough results to qualify for bursaries, possible because of the lack of resources in their schools. By doing Computer Applications Technology they can obtain jobs and save in order to further their studies, since most of their parents are not working cannot afford the fees for tertiary institutions. The challenge is that they are disadvantaged in studying Computer Applications Technology because of the limited number of computers in their schools.

- Primary schools should be encouraged by the Department of Basic Education to teach computer studies, so that by the time learners get to high school they are all computer literate. This would make things easier for the high school teachers.

6.1.2 To the schools

- Schools must make sure that they find good computer teachers who are going to help the learners.

- Schools should have a computer laboratory that is in good condition. The schools that do not offering Computer Applications Technology should try to raise funds so that they can start off computer studies. If they do not have enough money to buy computers they could ask companies donations in order to be able to purchase computers.

- Schools that have computers need to tighten up their security to make sure that the computers are safe.

- Schools have to organise technology specialists to train their teachers so that they do not fall down in their teaching, because this can have adverse effects on learners.

- Schools have to give enough support to learners from families who do not have computers at home. Schools should organise for someone to look after these learners after school or on Saturdays in computer laboratories so that they get enough time to practise. That will help to bridge the gap in terms of performance between learners who come from well-to-do families, those who have computers at home and the learners from poor and disadvantaged families whose only contact with computer is during the Computer Applications Technology period at school.

- Schools, in co-operation with the Department of Basic Education have to ensure that a computer technician is available when there is a problem with the computers. The Department of Basic Education has to be involved since schools are complaining that they do not always have money to pay the technicians when the computers are not working.

- The school management should make sure that all the computers at the school are working. Computers should be connected to the internet, so that learners are able to use e-mail to communicate with other learners around the world. The internet can also help them find information for their school projects and assignments.

- The schools should be encouraged to buy computer programs that can be used in different learning areas. Teachers should be made aware of the computer programs that can be used in their learning areas.

- The schools can also use their computer laboratories, to offer afternoon classes to the community and charge them. This will help the school to raise funds to buy more computers. Acommunity that is computer illiterate will benefit from such afternoon classes.

6.1.3 To the teachers

- Teachers who have not done short course in computers like introduction to computers and advanced certificates lasting two weeks, three weeks or a month should not be employed.

- Teachers who have done Computer Literacy, Computer Studies, Information Technology and Computer Sciences should be encouraged to do a course in education if they still want to work for the Department of Basic Education so that they have the teaching methods.

- Teachers and learners in schools should have equal access to the computer laboratory. Teachers should be allowed to book the computer laboratory and use it for their learning areas; this will benefit the school as a whole.

  Computer Studies should be offered by all primary schools, so that all the learners are at the same level in terms of computer technology.

6.1.4 Limitations

The study has the following limitations:

Some teachers tried to give the researcher only positive answers in order to impress him. Other teachers were afraid that the researcher was trying to expose their weaknesses and felt uncomfortable, and hence hid some information. Some of the teachers seemed to be intimidated by the fact that they do not have the qualifications to teach Computer Applications Technology. The respondents tried to use the opportunity to express the things that they were unhappy with. They took it as an opportunity to send the message that they aredissatisfied to the Department of Basic Education. They ended up reporting alleged unfair treatment on the part of their Principals, Heads of Departments and Subject Advisors. Such information may be misleading, and might not relate to the critical questions. The limited funds available for the project affected the quality of this project and prolonged it.

6.1.5 Conclusion

The study took about 12 months. It involved eight (8) Computer Applications Technology teachers who are teaching Grades 10, 11 and 12 in the rural areas of KwaMaphumulo in the Province of KwaZulu-Natal. These teachers were busy with other commitments, but they responded very well. This high level of participation showed that the respondents understood the importance of this research topic. It has come to my attention that learners in rural schools are benefiting a lot from the teaching of Computer Applications Technology. They are empowered to find jobs, since most of them come from poor and disadvantaged families. The Department of Basic Education in South Africa needs to give special attention to the education of learners who are doing Computer Applications Technology in rural areas. The teachers are working in very difficult conditions because of the lack of resources. I recommend that the Department of Basic Education support these schools with resources like computers, projectors, internet connections and books so that teachers are able to deliver their lessons successfully and their learners can perform to their full potential.

This study is of relevance to all schools that are offering Computer Applications Technology in rural areas. TheDepartment of Basic Education officials under whose jurisdiction schools that offer Computer Applications Technology fall are encouraged to take note of the experiences that were shared by the teachers interviewed in this study. The experiences of these teachers reflect that schools in the rural areas are being neglected, as the literature that was reviewed has shown that schools that offer Computer Applications Technology in the urban areas are at a great advantage in terms of having enough resources to teach the subject.

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6.2 APPENDIX A

SEMI-STRUCTURED INTERVIEWS

INTERVIEWS WITH COMPUTER APPLICATIONS TECHNOLOGY TEACHERS.

1. How long have you been teaching Computer Applications Technology?

2. In how many schools have you been teaching Computer Applications Technology?

3. For how long have you been using the computer?

4. How do you feel about teaching Computer Applications Technology?

5. What qualifications do you have as you teach Computer Applications Technology?

6. Do you experience any problems in teaching Computer Applications Technology?

7. What are the benefits of teaching Computer Applications Technology?

8. How is the performance of your learners in Computer Applications Technology?

9. What is your aim about teaching Computer Applications Technology?

10. What outcomes do you expect as you teach Computer Applications Technology?

11. What teaching methods do you use in teaching Computer Applications Technology?

12. What rules do you use in teaching Computer Applications Technology?

13. What tools do you use in teaching Computer Applications Technology?

14. Do you think it is necessary to have Computer Applications Technology in your school?

15. Why do you use computer in teaching Computer Applications Technology?

16. What programmes do you teach in Computer Applications Technology?

17. Do you get any support from the Department of Education?

18. Do you get any support from the community?

19. How many learners do you have in your Computer Applications Technology classroom?

20. How many computers do you have in your school?

21. What type of computers do you have?

22. In which operating system do you run your application software?

(Windows 95, 98, 2000 or XP Professional)

23. What is the future of Computer Applications Technology in your school?

6.3 OBSERVATION SCHEDULE

Observation schedule was used as a guideline when the researcher was observing lessons in schools at KwaMaphumulo.

Date: _____

Time: _____

Observation Lesson: _____

OBSERVATION	NOTES
Interaction and communication between teachers and learners.	
Ways teachers engage with their lessons or deliver them and the way learners respond to teaching methods that are used.	
Observing conditions of the learning places, classrooms or computer laboratories.	
Lay out of the classroom.	
Suitability of classrooms or space where teaching is executed.	
Resources used.	
Ways learners operate computers.	
Number of learners per class.	
Working individually/ pairs/ groups.	
Number of computers per class.	
Teacher's files and learner's portfolio	
Questioning for assessing learners' participation and teacher's participation and teacher's reinforcement skills.	

131 Parkgate
108 St Andrew Street
Durban
4001
09 April 2010

Dear Participant

I am undertaking a research project on "experiences of teachers about teaching Computer Applications Technology at FET band." Therefore, it will be highly appreciated if you could read this document, sign the declaration below and email it as an attachment to my email address tembailihle.fambaza299@gmail.com or fax it to 0313093337.

The research is trying to look at the experiences of teachers about teaching Computer Applications Technology at FET band in rural schools. The intention is to review the use computers in rural schools. It does not only cover good things that can be experienced by teachers and learners. It also covers challenges that can be experienced by teachers and learners and how to avoid them.

Please take note of the following issues:

24. There will be no limit on any benefit that the participants may receive as part of their participation in this research project;
25. Answer all the questions;
26. Respond to each question in a manner that will reflect your own personal opinion;
27. Your identity will not be divulged under any circumstances;
28. There are no right or wrong answer;
29. All your responses will be treated with strict confidentiality;
30. Real names of the participants will not be used, but symbols such as A, B, C or X, Y, Z... will be used to represent participant's names;
31. The participants are free to withdraw from the research at any time without any negative or undesirable consequences to themselves;
32. The participants will not be under any circumstances forced to reveal what they don't want to reveal; and
33. No video or video recording will be made.

This research is supervised by Dr SB Khoza. His telephone number is (031) 260 7595 at the University of KwaZulu-Natal and his email address is khozas@ukzn.ac.za

Thank you for your support, co-operation and valuable time: Best wishes from

T. Fambaza
University of KwaZulu-Natal
Tel.: (031) 309 2019
Cel: 082 758 6402
Email: tembalihle.fambaza299@gmail.com

Please sign the following declaration and include your full names as indicated:

I..... (Full names of participant)
I hereby confirm that I understand the contents of this document and the nature of the research project, and I consent to participating in the research project.

I understand that I am at liberty to withdraw from the project at any time, should I so desire.

....
SIGNATURE OF PARTICIPANT DATE

62 Ferguson Road

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DURBAN 4001

Tel: 072 442 7896

Email: deanne.collins30@gmail.com

Income tax number: 0526066204

24 August 2012

This is to confirm that I have edited the dissertation, "The Experiences of Teachers in Teaching Computer Applications Technology at the FET Band" by Tembalihle Fambaza, student number 200301334.

Yours sincerely,

(Ms) Deanne Collins (MA)