

CHAPTER 1

PROBLEM STATEMENT AND DESCRIPTION OF THE RESEARCH METHODOLOGY

1.1 Introduction

This study is about computer Integrated Education in Nyanza Province, Kenya focusing on public secondary schools. Kenya is a country situated in the Eastern part of Africa. It is a multi-racial society and English is the official medium of classroom instruction from primary grade four (Ages 9-10 years) to university education and for official correspondences, but Kiswahili is the official National language. There are eight provinces in Kenya and Nyanza Province is in the Western part of Kenya. At the time of this research, there were 524 secondary schools (both public and private) in Nyanza Province. The research is concerned mainly with investigating issues involved in the implementation of computers in the classrooms. This chapter, addresses the background to the study problem, the problem identified, the objectives of the study, significance of the study and basic assumptions. In addition, it states the research questions, the conceptual framework, methods of research and definition of terms used in this study which are not familiar to those who will use this thesis, and the last part gives an overview of the thesis organisation.

1.2 Background to the study Problem

Kenya is a developing country with a fast growing school population, and there has been an increasing demand for new methods of teaching and learning to meet the needs of the teachers, students and the public at large. McAnany and Mayo (1980) report that the use of education technology is considered as promising a great deal to those who seek for radical change in educational curricular and techniques, because of its multiple effects and its apparent potential to produce and distribute quality materials in teaching and learning. McAnany and Mayo (1980) echo the recommendations put forward in 1961 when the Ministers of Education attended the UNESCO conference on the Development of Education in Africa held in Addis Ababa, Ethiopia. The report suggested that African countries in renovating their

educational systems would be well advised to study the use of the most up-to-date educational techniques and teaching aids. Thus, recent years have witnessed several major projects in developing countries to use instructional technologies such as radio, television, and films, and now the emphasis is on computers in order to keep up with developed countries.

Computers were introduced into the school systems in developed countries due to the demands by the parents for their children to be computer literate. There were many other reasons put forward by the leaders and parents for the implementation of computer education in education such as:

- To prepare students to participate fully in future society by acquiring computer literacy skills that include learning of common business tools, such as word processing, spreadsheets and database (Berson, 1996 and Yee, 2000);
- Motivational effects: the motivational function of the computer has been considered an important reason in many computer-based instructional programs. It is believed the use of computers helps to release the students from boring paper work. It motivates them to learn and students are so interested excited when they use computers (Bagui, 1998; and Ertmer, Addition, Ross and Wood, 1999);
- The use of computers makes the lesson more interesting to students, either through direct interaction or by providing the teacher with access to more interesting materials (Gibson, 2001; Liu, Macmillan and Timmons, 1998; and Myhre, 1998);
- Improve methods of teaching: the use of computers helps to bring changes in classroom practice in order to improve subject matter teaching (Rice, Wilson, and Bagley, 2001, and Dexter, Anderson and Becker, 1998);
- To widen access to experiences not easily available in the classroom (Heinich et al. 1996 and 2002; Dexter et al. 1998; and Makau, 1999);
- Teachers also enjoy using technology. It helps to improve their skills in teaching (Myhre, 1999; Simmt, 1998; and Russell, Finger and Russell, 2000).

It is potential advantages such as the above that led the industrialized nations to adopt computers in teaching and learning in the classroom. As a result of the huge claims

about the potential contributions of computers to students' learning, some of the African countries like Kenya also followed the footsteps of the developed countries and introduced computers into their education system (Hawkridge, 1991).

In Kenya, computers first appeared during the 1980's when private secondary schools and commercial institutions started computer literacy courses (Hawkridge 1983, Makau 1990). The introduction and use of computers in other institutions and work places since then has been rapid, following the technological development of simple and cheaper computers in various parts of the industrialized world. These technologies found their way into Kenyan schools and institutions of learning. There are now various types of computers in Kenya. These include mainframe computers, mini-computers, microcomputers, and laptop/notebooks (Onunga, 1997).

The private secondary schools have been teaching students various computer skills and each had its own approach to computer education. In order to provide a uniform standard of computer education in secondary schools, it became necessary to produce Secondary Computer Syllabus for schools. The Kenya Institute of Education was responsible for providing this syllabus. There is no information available to confirm that schools are using the syllabus to teach computer programs as stated in the Secondary Computer Syllabus, and whether schools are integrating computers into teaching and learning traditional subjects.

However, in 1996 the Minister for Education launched a larger and more ambitious computer education project for public secondary schools. From the point of view of the Kenya government, the main objective was to help large numbers of secondary students to be computer literate. This was in response to the perceived problem that a lack of computer skills was preventing Kenyan youths from acquiring jobs (Kyungu, 1997). However, the government project gave no indication of how computers were to be used. Whether computers were to be integrated and used to assist in the mastery of those specific curriculum areas taught in secondary schools, or whether computer education were to be an optional subject or a compulsory subject for all students in secondary school. This has led to many problems in the implementation of computer education in secondary schools (e.g. lack of uniformity in utilization, pattern of use, lack of trained teachers, lack of computer textbooks and relevant software packages).

Despite all these problems, many schools have continued to purchase computers. But it is not clear whether schools are using computers for the purposes and the objectives intended by the government.

1.3 Statement of the Problem

Several research findings on computer-integrated education from developed countries have reported the general effectiveness of computers as a method of instruction (McRobbie & Thomas, 2000: 142, Zang, 2000: 467). However, lack of information regarding utilization of computers as tools for classroom instruction in secondary schools in Nyanza province necessitated this study. No study of this kind has ever been done to determine how effectively computers can be used for instructional purposes in Kenya. It is because of lack of such knowledge that I felt encouraged to investigate the relative effectiveness of CIE in secondary schools in Nyanza Province.

By researching CIE in the case study institutions in Nyanza Province that is my home province, I was in a good position to access the schools easily. Second, a guiding principle of my research was that it should promote the use of computers in schools in Nyanza province. At the time of my research, many secondary schools in Nyanza Province (see appendices 2) had not introduced computer education. Since charity begins at home, my visit to the Provincial Director of Education (PDE) and secondary schools encouraged them to start computer education program as I observed their reactions. Third, the BEd students I train in educational technology at Maseno University in Nyanza province use some of the schools where I conducted the case study for teaching practice, so the information would be useful for future teaching practice placement of the students. However, while some of the Principals, Heads of Department and teachers were familiar to the researcher, the collection of data was undertaken objectively.

A recent study by Azita (1999:32) in the USA recommended that greater attention should be devoted to understanding why the potential of computers for instruction remains unexplored in school settings. Azita (1999) reports that up to now not many studies have attempted to examine the reasons that technology is not being used within the mathematics classrooms. Christman and Badgett (1999:136) also suggest

that further research is necessary to determine whether computers are comparatively more effective in teaching difficult subjects areas. At the same time, Jones and Paolucci (1999:17) cite the same problem in the USA and quote a more recent editorial commenting that 'with all the studies available research on why and how the use of technology is effective remains minimal.' Moreover, Norum, Scott, and Duffied (1999:192) point out the need for more qualitative studies that look at the adoption and integration of technology by teachers emphasizing especially the value of sharing information about teachers' experiences with technology. Given that these studies are suggesting difficulties with the use of computers in First World classrooms, it is to be expected that the situation might be even more severe in Kenya. Therefore, one aspect of the present study will be to determine whether the situation is similar, and whether the reasons for lack of computer use in classrooms are similar to the reasons in other countries. This study further explored differences in attitudes that teachers could have about the integration of computers into teaching and learning being a new educational technology in secondary education.

1.4 Objectives of the Study

My general research goal is to establish an informed, up-to-date view of the use of computers in secondary schools in Nyanza Province, Kenya. Therefore, the study aims to achieve the following objectives:

- To analyse existing Computer Integrated Education policies and practices in developed and developing countries.
- To identify secondary schools in Nyanza province which have computers for my research project, and to determine the roles played by the Principals and Heads of Department in the introduction and use of computers.
- To investigate the use of computers integrated education in the identified secondary schools and establish how teachers use computers in teaching and learning in Nyanza Province of Kenya.
- To analyze and describe, through a review of literature the use of computers, the factors that encourage and affect the use of computers in teaching and learning.

- To investigate classroom teachers' attitudes, towards the use of computers and determine their views and beliefs about the value of computers in teaching and learning.
- To provide evidence on the problems and obstacles inhibiting effective implementation of computer education in secondary schools in Nyanza Province.
- To develop a model for re-training teachers in the use of computers in teaching and learning.
- To provide suggestions and recommendation for the effective implementation of computer integrated education in secondary schools, and future research on CIE in Nyanza province.

1.5 Significance of the Study

The significant of this study rests on some of these assumptions: The first is that computer integrated education yields substantial benefits for individual students both young, adults and society at large. Secondly, a major benefit of computers is in their ability to improve students' knowledge of computer productivity tools to prepare them for the world of work and future higher studies in computer science. Thirdly, computers have the potential to improve and increase students' performance in academic subjects. The study of Computer Integrated Education (CIE) in secondary schools is very important. The findings of this study would be valuable for the following people in Nyanza Province, Kenya:

- Planners in the Ministry of Education in Nyanza Province. This includes Education Officers responsible for overseeing the implementation of the Ministry of Education policies and Inspectors of schools responsible for school curriculum implementation in schools.
- Schools using computers and those new schools planning to introduce computer-based learning and;
- Other researchers.

Since 1996, many public secondary schools in Kenya have acquired computers and other support materials. This has been due to two major reasons. The first is the

realisation that one of the basic human rights is the right to education (Johnson, 2000:593), and that every child has a right to be educated, and that computers could help to provide this education to all secondary students. The second is the need for trained manpower, to prepare secondary students to participate in a technical society. This involved investing heavily in the young generation and providing them with the best possible educational opportunities. In the same general ways that computers have been used in other developing and developed countries, computers were introduced into Kenyan public secondary schools to help teach computer literacy, and to help improve students' performance in traditional subjects through improved curricula and instruction.

The demand on the parents and the government to fulfil these goals is very high which now forces the government to decide on educational priority areas. Thus, the need to justify the expenditure on computers in education arises. This requires a review of the present pattern of expenditure on educational technology and consideration of alternatives. It is necessary that the benefits derived from these programs should merit the cost of equipment, preparation and utilisation process. It is difficult to identify the costs associated with technology development and use in education. Researchers in America report that justification for cost benefits of investing in technology is examined in terms of cost-effectiveness. This includes the extent to which computers motivates students think and reason, to learn, new ideas and when students are actively interacting with computers and are enjoying what they are doing, and again if students performance in academic subjects improves (Hawks and Combre, 2000:28). This also involves training teachers to be computer literate so that they can be able to assist learners. In order for schools in Nyanza Province to decide whether to continue to invest heavily in computer technology, the schools and parents must consider evidence from research findings, and then examine how the present services can be improved and used economically by all students in the school.

The value of computers as part of students' learning is widely recognised and is in their function of providing a degree of realistic practical teaching and learning in the in the classroom. This idea has been demonstrated by Crook (1994); Pedretti, Mayer-Smith, and Woodrow (1999) and Woodrow (1998) who report that the use of computers is a good way of promoting students' standard of education, and of

enabling them to proceed to higher studies in computer technology. In contrast, there has been a lack of research studies to provide evidence concerning how teachers and students use computers in secondary schools in Nyanza Province. Similar studies by Hawkrige (1991), Makau (1990), Mwanda in progress and Kiboss (2000) conducted in Kenya were not concerned with the integration and use of computers as tools in the classroom. In fact, Hawkrige's study was a survey of computers used in Kenya and was not an investigation study in secondary schools in Nyanza Province. Makau (1990) study was about computer innovation in Kenyan secondary schools and was conducted when public secondary schools in Nyanza Province had not started using computers. Mwandas' study (in progress) is concerned with Computer Assisted Learning (CAL) in teaching and learning geography in secondary schools in Nairobi. Kiboss (2000) study was concerned with the views of a group of students and their teacher regarding the impact of a computer-based instruction (CBI) programme that involved the collaborative learning of a physics course on measurement. This study aims to fill the gap created by the absence of formal research in Nyanza Province.

Furthermore, effective implementation of national curriculum innovations such as technology in education can be facilitated by efficient management of the classroom environment together with a well-trained teaching force and qualified technical personnel to carry out the maintenance and repairs of computers. In addition, the provision of equipment, software, adequate support materials, physical facilities like classrooms are important factors that need to be considered for the effective utilization of computers. The present availability and utilisation of these factors can only be ascertained by a systematic evaluation.

Moreover, in a rapidly changing society such as Kenya, the amount of knowledge and information that the learners need to gain at school increases very rapidly. It is no longer possible to rely on traditional methods of teaching alone, since it is not possible to provide students with new ideas and skills necessary to tackle some of the difficult subjects like mathematics and science. The nature of education must therefore incorporate educational technology to enhance teaching and learning in schools in order to produce skilled manpower to participate in the development of a country. Kenya National Commission for UNESCO (1993:44) recommendation indicated that the overall objective of computers in teaching and learning is to make

Kenya an electronic country by the year 2000. But this has not been realised. This calls for research studies to be undertaken into computer integrated learning, in a search for the most cost-effective approach to maximize its potential as a tool in the classroom instruction in secondary schools in Nyanza Province. In order to determine the success and usefulness of technology for teaching and learning the views of teachers must be analysed.

Two factors are particularly important and merit careful study before computers can be integrated and used in classrooms. The first factor concerns the preparation of the teachers, and the second concerns the management and planning issues such as the provision of funds for maintenance. There has been no systematic study of these issues in secondary schools in Nyanza Province. From my observation, it seems that the educators in the country believe that once the schools obtain some computers, teachers would just use them even when some of the facilities and services are not available, contrary to what happens in developed countries. For example, the issue of teachers' ability to integrate and use computers in the classroom is very significant. Providing schools with computers and putting them in the resource centre or classrooms/computer laboratories does not bring about technology integration. Teachers are key to the integration of computers, and preparing them for this role is essential.

Moreover, this study is unique because it emphasizes the teachers' role in the integration of technology in the classroom. A study by Dockstader (1999:73-74) pointed out that the role of the teacher in the infusion of technology is very important. He feels that teachers need to be well equipped with the skills of integrating computers into the curriculum. Dockstader believed that the teacher must be able to understand what technology integration is all about, why technology needs to be integrated and how to integrate it. The scholar further explained that "technology integration is using computers effectively and efficiently in the general content areas to allow students to learn how to apply computer skills in meaningful ways." Dockstader adds that computer integration is not substituting 30 minutes of reading for 30 minutes of computer skill development. It means for example, using computers to teach 30 minutes of reading or writing. It also means incorporating technology in a manner that enhances students' learning, and arranging the goals of curriculum and

technology into a co-ordinated harmonious whole. This scholar identified several reasons why teachers should integrate computers into teaching and learning. He claimed that students had an intrinsic need to learn about technology, that the use of computer technology could increase their motivation and academic engagement time, and they (computers) provided a useful way of giving students access to information. He advocated that students should develop their computer literacy by applying various computer skills as an integral part of the learning process.

In order for the teacher to be able to integrate technology into the curriculum, the skills must directly relate to the content area and to the classroom assignment and the skills need to be tied together in a logical and systematic model of teaching. In this usage, the teacher should choose a core area in a subject like mathematics or language then decide what computer skills could best be taught in this area, then choose a lesson that could be taught through computers. This requires the teacher to master the skills of lesson planning, presentation, and how to evaluate the lesson. So the integration comes when the students learn through computers and not when they are taught about them.

The greatest advantage of a computer-integrated lesson is that it enables the teacher and the students to be actively involved in learning by doing. Therefore, in view of the complexities involved in the integration and utilisation of computers, this study is very necessary for the understanding of the integration, management and organisation required for the successful implementation and use of computers in secondary schools in Nyanza province. All research seeks to answer questions. The significance of this study is that it will provide evidence on how computers are used in secondary schools, the factors influencing and determining the integration of computers from the teacher's point of views and on the problems faced by teachers and students. With this information, school administrations will be in a better position to improve the services of computer-integrated education in a more useful and worthwhile investment.

1.6 Scope and Limitation of the Study

This study aims to provide a clear picture of Computer Integrated Education (CIE), and to examine the school policy and problems facing the implementation of

technology in secondary schools in Nyanza province. However, there are various limitations that need to be mentioned. Firstly, the study focuses on the use of computers in the classroom by teachers in secondary schools, excluding primary schools and higher education institutions such as universities and teacher training colleges. Secondly the study does not involve the participation of students. Thirdly, it concentrates on case studies in a limited number of schools with computers.

This research does not claim to provide complete solutions to the problems with which teachers are currently confronted when using computers. It presents an attempt to expose, through the use of in-depth interviews, how computers are used in the classroom and the factors influencing the integration and use of computer technology in schools and the problems encountered by the teachers and students. It is hoped that the systematic study of the integration and use of computers in secondary schools in Nyanza province, and reasons for employing this technology, may provide answers to some of the questions currently being raised about the high cost of technology in education.

1.7 Basic Assumptions

This study is designed to investigate certain basic assumptions and to discover, through detailed case study whether they are valid in Nyanza Province secondary schools. These basic assumptions are designed by the researcher and are the foundation upon which this research study is based, and will guide it. The basic assumptions and the reasons for selecting them are:

- All schools with computers use them as tools for learning in the classroom. This assumption is based on the idea that teachers will be able to integrate and use computers for teaching and learning computer literacy, and integrate computers into teaching traditional subjects. It will also provide quantitative evidence of how many schools are using computers in teaching and learning. Therefore, based on this reasoning, teachers' responses are needed to give a complete picture of what is happening with computers in schools.
- Computers are effective in teaching students academic subjects and computer literacy skills. This assumption is based on empirical evidence by previous

researchers in the area of technology and is documented in a review of related literature in Chapter 2.

- Computers are used for cooperative learning in all secondary schools. This assumption is also based on empirical evidence by previous scholars (Denning and Smith (1998) and is documented in a review of the literature in Chapter 2.
- If schools are properly equipped with computer technology, teachers can integrate and use them effectively in classroom instruction. This assumption is based on empirical evidence (Mellon, 1998) and is documented in a review of literature in Chapter 3. It will reveal the number of schools working towards technology integration and using computers in teaching and learning academic subjects contained in the syllabus. Investigation of this assumption will require qualitative and quantitative data.
- The use of computers improves the quality of classroom instruction. This assumption is also based on empirical evidence and is investigated in the review of literature in Chapter 2.
- Teachers and students value computers as tools for teaching and learning. This assumption is based on empirical study indicating that teachers are keen to use computers because they offer an alternative to traditional teaching. These new methods are popular with students and it give students access to experiences that would be difficult for teachers to provide in any other way as reviewed in Chapter 2 (Myre, 1998:3-103).
- There is no difference in attitudes between the experienced and less experienced teachers towards the use of computers in teaching and learning. This supposition is based on the logic that computer attitudes refer to an individual's feeling about the personal and societal use of computers in appropriate ways. Positive attitudes include an anxiety-free willingness or desire to use the computer, confidence in one's ability to use the computer and a sense of computer responsibility (Clark, 2000).
- There is no significant difference in attitudes between the male and female students towards the use of computers. This assumption is based on empirical research findings (Young, 2000:204-211) reviewed in Chapter 3.
- Students learn effectively with computers as they do with other media. This assumption is based on the debate by researchers (Clark, 1994; Ellington,

Percival, and Race, 1993; and Kozma, 1994) discussed in Chapter 3 that it is not possible to find one media which is best for teaching and learning all subjects.

- All secondary schools with computers have specific policy for the integration and the use of computers in teaching and learning. This assumption is based on empirical research findings reviewed in Chapter 3 The role played by the school administration is important in the overall integration and use of computers by the teachers and students.
- Accessibility of computers in the school has direct relationship with classroom utilization. This assumption is based on the research findings by (Carol, 1997, Clark, 2000) and is reviewed in Chapter 3.
- Students are motivated to use computers as tools in learning academic subjects. Motivation is viewed as a critical determinant of students' classroom learning and achievement in part because students who are highly motivated tend to provide greater effort and persist longer at academic tasks than do students who are less motivated (Wolters and Rosenthal, 2000:804). The researcher assumes that computers have the capabilities to motivate students to learn by providing motivational effects as indicated in Chapter 3.
- Using computers enables students to be actively engaged in aspects of their learning. In relation to this study, it is assumed that computers provide students with opportunities to learn by doing individually or in small groups as reviewed in Chapter 2.
- If secondary school teachers are trained in the use of computers they can integrate and use them in teaching and learning in the classroom. This supposition is based on the research findings reviewed in Chapter 3 Sections 3.3.1.1 (Parr, 1999:280; Scheffler and Logan, 1998:308).

1.8 Research Questions

Research on computers as tools for teaching and learning supports its integration into the curriculum (Cornu, 1996). These studies have examined the contribution of computer-integrated education in teaching and learning computer literacy skills and various school subjects (Dockstader, 1999). Some of the research findings have indicated lack of equipment, accessibility, lack of teacher training and lack of funds as

some of the obstacles to the effective integration and use of computers in teaching and learning. The main questions derived from these studies to be answered during this research are as follows:

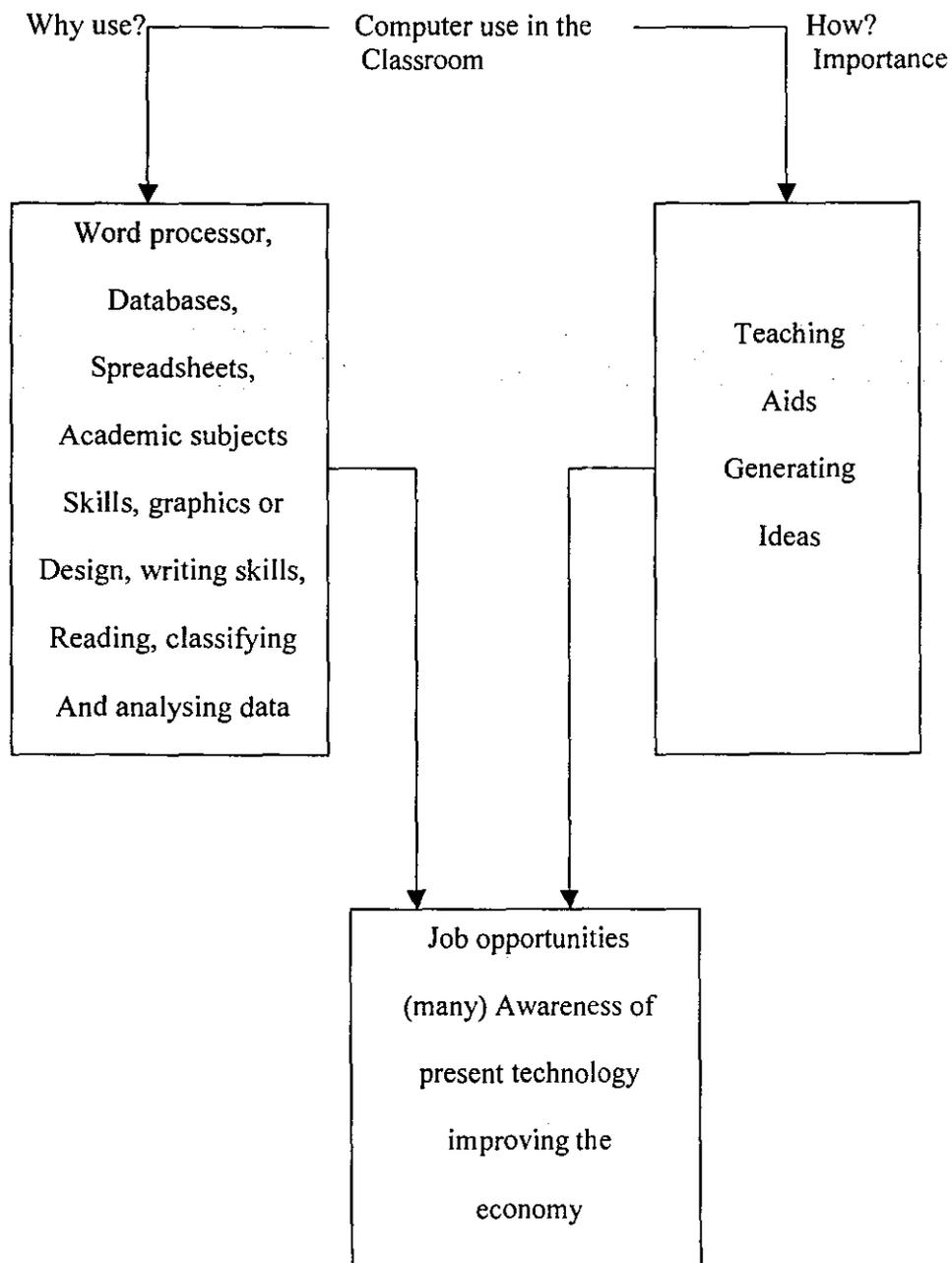
- Are computers and software available in the schools?
- How are computers being used in teaching and learning in public secondary schools in Nyanza province?
- What are the factors influencing the use of computers in teaching and learning?
- What are the needs and expectations of teachers with regards to the use of computers in teaching and learning?
- Is there a difference in teachers' attitudes, views and beliefs about the role of computer in the curriculum instruction?
- Is there a policy on the integration and use of computers in teaching and learning?
- What are the views of teachers on the motivational effects of computers on students learning?

1.9 Conceptual Framework

The conceptual framework for this study is based on a socio-learning approach because a school is a social organisation. Crook (1994:52) believes that it helps to clarify psychological issues arising within educational practice. Crook (1994) suggests that this framework could have a particular value for addressing issues relating to the educational use of new technology. The study assumes that computer use in classroom instruction has the values of increasing students' knowledge of computers as productive tools and by providing early experience with computers in the classroom either within existing school subjects or in special courses. Crook (1994:7) argues that there is a great deal of controversy over how computers could be best deployed in teaching and learning in the classroom. He felt that this could involve instruction in the use of word processors, spreadsheets, databases, and applications for graphics or design and for improving skills. This provides the reasons why there is need to encourage the use of computers within education. The tools computers create are in widespread use in everyday life so students must be helped to control and understand them within the preparatory setting of the school. Crook (1994) points out that computers are very important aid for generation of ideas. They

allow students to engage in various useful manipulative activities, for example to generate visual patterns, they can also help to develop children's' writing skills. This is reflected in new ways of presenting, composing and communicating ideas in writing. Thus, a student's spelling can be checked, the learner can also manage the overall text in a more flexible manner. It can also extend their experience of drawing, writing skills, reading skills, classifying and calculating, and experimental science. Computers can also create a greater continuity between school and work because the powerful tools that are learnt in various computer colleges are now accessible in classrooms thus equipping students with skills for jobs.

FIGURE 1.1: CONCEPTUAL FRAMEWORK



1.10 Research Strategy and Methods

1.10.1 Introduction

The research design, procedure and tools to be used for data collection and analysis are described in this section. The research methodology was designed to obtain information, opinions, and suggestions on computers as a tool for instruction in education. It includes a brief explanation of the literature review and how the field research was conducted. The collection of data was carried out using structured interviews with Officers from the Ministry of Education and Curriculum specialists at Kenya Institute of Education, questionnaires for Principals and Heads of Department and semi-structured interviews for teachers to provide empirical evidence on the use of computers in teaching and learning. Brief explanation on the administration of the instruments, the rationale for selection of data and their merits are also included.

1.10.2 Review of Literature

A large section of this thesis is based on a review of related literature, both published and unpublished. References were obtained by searching relevant indexing and abstracting services such as ERIC, Internet, and from printed library materials. Many periodicals and journals were also scanned for the purpose of this thesis. The study involved personal correspondence through electronic and print media with several researchers.

1.10.3 Field Research Procedures

The field research was conducted in three phases. The first phase was a visit to the Ministry of Education and Kenya Institute of Education and to interview key officers in charge of computer education. The second was a visit to the Provincial Director of Education in Nyanza Province. The purpose was to obtain a list of schools with computers, to seek permission to visit secondary schools to distribute questionnaires to the Principals, Heads of Department, and to arrange for interviews with computer teachers. The third phase was to conduct interviews with computer teachers using

semi-structured interviews and audio tape recording, and to collect the questionnaires from the Principals and Heads of Department.

1.10.4 Data Collection Instruments

The researcher used three methods to collect data from the Officers from the Ministry of Education, Curriculum specialists at KIE, Principals, Heads of Department, and. This included structured interviews, semi-structured interviews and questionnaires.

1.10.4.1 Structured interview method

The structured interviews were conducted to collect information from the Ministry of Education Officers and Curriculum specialists from the Kenya Institute of Education. The structured interview method was conducted because it has some distinctive advantages. For example, it is possible to achieve a complete response with different categories of a sample and ensure the validity of the results. It is also possible to collect more complex information where necessary, qualifying answers and generally obtaining results in greater 'depth.' Interview methods produce better control of the survey (Borg and Gall, 1989:451). Moreover because it involves the collection of data through direct verbal interaction between individuals, it is adaptable and the responses of the interviewee can be used to alter the interview situation. The researcher can build trust and rapport with respondents and this can increase the reliability of the information that is gathered. Interviews are used in qualitative research because they permits open-ended exploration of topics and elicits responses from the words of the respondents. But the method also has some limitations. For example, the interview cannot provide anonymity for the respondents.

Nevertheless, the researcher developed a blue print to guide the qualitative study. This was a general interview guide outlining the issues that were to be explored and some general questions that were to be asked during the interview. Mayan (1996:8) stated that an interview guide ensures that all relevant topics are covered, while enabling a researcher to build a conversation by adapting the interview to each situation and the participants. Mayan (1996) explained also that having a guide keeps the interaction focused and allows the best use of the limited interview time available while

permitting individual perspective and meaning to surface. This information encouraged the researcher to use interview method.

1.10.4.2 Semi-structured interview method

The second phase of fieldwork was an investigation using semi-structured interviews to collect data from classroom teachers using computers. I used semi-structured interviews because they allow the use of a detailed topic guide and a number of pre-determined questions on special topics: while at the same time the participants are allowed to digress and the interviewer may employ unscheduled probes (Bell, 1993:33). There were some questionnaires constructed before hand, and a list of topics was also developed to act as a framework for the interview. This method allowed me to tackle each topic in a flexible manner and the interviewees were free to elaborate on their responses. They also gave their views at their own pace. The method further enabled the researcher to use careful “probes” to encourage and motivate the interviewees to feel relaxed while trying to reduce bias. In addition, the semi-structured interview method was used because it can generate insight to be investigated further. Bell (1993:8) argued that semi-structured interview method is especially suitable when one aspect of a problem needs to be studied in some depth within a limited time-scale. The semi-structured interview method is also appropriate because it allowed the researcher to use a divers range of techniques to collect data and analyse them both quantitatively and qualitatively. Techniques such as in-depth interviews, participants’ observation and audio tape recording are very useful in collecting information during the semi-structured interviews.

1.10.4.3 The Questionnaire Survey method

The second phase of field research was a questionnaire survey developed to collect information and to elicit qualitative and quantitative data from Principals and Heads of Department in public secondary schools. Although the questionnaires completed by Heads of Department differed to a certain extent from that of Principals, they contained many common questions on the use and integration of computers into teaching and learning. The draft questionnaires were piloted with four Principals and four Heads of Department. There were no major errors to be corrected so the

information contained in piloting questionnaires formed part of the actual data collected from the participants. I used questionnaire surveys because they have the following advantages:

- The method can be used to gather information from a large or small number of people;
- it is cheaper to administer questionnaires;
- it reduces biasing errors that might result from the personal characteristics of an interviewer and the variability in their skills;
- and the absence of an interviewer provides greater anonymity;
- the method also permits wider geographical contact and the time required to collect the data is much less (Cohen and Manion and Morrison, 2000; Nachmias and Nachmias, 1992; Wallen and Fraenkel, 2001).

However, questionnaires cannot probe deeply into the participant's opinions and feelings. Again, once the questionnaires are distributed, it is not possible to modify the items, even though they may be unclear to the participants. Murioki (1995:321) also reports that "respondents can easily lie about essential details, particularly those pertaining to personal matters." Equally, responses can be quite unpredictable and hence frustrating to a researcher because "they may also provide insufficient information. In many cases, respondents have to be followed up, that can be an arduous and time-consuming exercise. But a response rate of between 25 and 50% is generally considered to be reasonably adequate." The format of the questionnaire I developed and distributed to participants formed part of the appendices. The questionnaires were hand delivered by the researcher.

1.10.5 Sources of Data

The investigation focused on Officers from the Ministry of Education and Kenya Institute of Education, Principals of secondary schools, Heads of Department and teachers. The schools included rural, urban and suburban settings. The criteria for the choice of institutions was based on:

- Schools with computers;
- Urban, suburban and rural areas;
- Accessibility and;
- Principals, HODS and teachers' willingness to participate in the investigations.

Four categories of secondary schools were selected for this study in order to enable the researcher to conduct comparative analysis on the pattern of the use and integration of computers, and to collect quantitative and qualitative data. The institutions included:

- Public secondary schools;
- Girls secondary schools;
- Boys secondary schools and;
- Mixed secondary schools

At present there are two main types of secondary schools in Kenya. These are public and private schools. Public schools are those built and run by parents through the Parent Teachers Association (PTA) and Board of Governors (BOG), and the community on a collective effort through fund raising. The bulk of the development including physical facilities and equipment is the responsibility of the parents and the community. Public secondary schools are further grouped into National, Provincial and District. The National schools admit students from all over Kenya. The Provincial schools draw three quarter of students from their own provinces, and fifteen percent from different provinces. The district schools cater for students within each district area. The public schools are further classified as Girls boarding, Boys boarding, Boys day, and Mixed secondary schools. Mixed secondary schools cater for boys and girls. The schools are within walking distance of the students' own homes and are mostly day schools. The schools that participated in the investigation were drawn from the list obtained from the Director of Education in Nyanza Province. The details of the fieldwork and selection of case study institutions are explained in Chapter 4.

1.10.6 The Sample of the schools that participated in the investigation

The field research institutions included twelve girls, seventeen boys and one mixed secondary schools that had computers according to the list the researcher obtained from the Provincial Director of Education in Nyanza Province (Chapter 4 for details). These figures match Bell's (1993) suggestion that thirty is a reasonable number for a research investigation in education. The participants consisted of thirty Principals and 90 Heads of Department. However, after visiting the schools to distribute questionnaires, the researchers identified only 25 schools with computers, 20 schools in which computer education was taught, and each school had only one computer teacher who took part in the investigation. There were also five schools that had computers and used them for administrative work only. Therefore, only 25 Principals and 89 Heads of Department completed and returned the questionnaires to the researcher. Table 1.1 summarises the sample institutions, location and the actual number of teachers who took part in the research.

Table 1.1: Secondary schools in which the study was conducted and respondents

Location	Schools	Principals	Heads of Department	Teachers
Urban	7	7	28	3
Suburban	3	3	12	3
Rural	15	15	49	14
Total	25	25	89	20

It should be noted that the number of Officers from the Ministry of Education and Curriculum specialists is not included because they were not part of the field investigation.

1.10.7 The Pilot Study

After designing the research tools for Principals and Heads of Department a pilot was carried out in two schools, one Boys' and a Girls school. Two Principals and eight Heads of Department took part in the exercise each representing department of

Humanities, Languages, Maths and Sciences. The aim was to evaluate the research instruments and improve them. The pilot study helped me to develop the experience to administer the research tools and the necessary procedures before conducting the actual research. The piloting data collected from Principals and Heads of Department were analysed. The responses were classified into categories according to a coding scheme and amendments made as required. Since there was no any major alteration the piloting questionnaires were included in the main research data.

1.10.8 Administration of research questionnaires

Once the research tools were ready, arrangements were made with various groups of people before investigation into the research problems was undertaken. This was important because of four reasons. Firstly, the objective of the study was to be explained to the interviewees. Secondly, I had to seek permission to visit schools to conduct the interviews and to administer questionnaires. Seeking permission before investigation into the research problem is undertaken was very essential. It was very necessary for the researcher to obtain the consent and cooperation of the participants who were to provide the information. This was an important stage in this research project due to the nature of the data required. Bell (1993:52) emphasized the importance of consent to conduct a study and stated that no researcher can demand access to an institution, an organisation or to materials. Permission to carry out the research was absolutely essential for me. It enabled me to explain to the people concerned a clear picture of what the research entailed, stating clearly the purpose of the visit, the objective and nature of the research, its practical application, the design, and methods and procedures to be used in data collection. This included explaining also the type of participants to be interviewed, time for the interview and any other data to be collected. Third, I had to apply for access to copies of relevant official publications or documents on computers in education. Fourth, I had to assure the interviewees of the confidentiality and anonymity in their contributions (Bell, 1993, Cohen and Manion, 1994).

I also wrote four different letters to the interviewees and people concerned with this study (see appendices 3-6). One letter format was addressed to the Ministry of Education and the second was addressed to the Director of Kenya Institute of

Education regarding the intended interviews on the use computers in secondary schools. The third letter was addressed to the Provincial Director of Education (PDE) Nyanza seeking permission to visit schools for the purpose of research. The fourth letter was addressed to the Principals of secondary schools. This was an informal letter concerning the visit and subsequent arrangements and distribution of questionnaires to Principals and Heads of Departments, and asking Principals to inform computer teachers about the intended interviews with them.

1.10.9 Data Collection Procedures

I started my fieldwork by visiting the Ministry of Education office and Kenya Institute of Education in Nairobi to make appointments and to deliver the letters for permission to conduct the interviews and visit the schools. Secondly the researcher visited the Provincial Director of Education in Nyanza Province to seek permission to visit schools with computers. After receiving the letter from the Provincial Director of Education (see appendix 7) the researcher visited the schools to distribute questionnaires to Heads of Department and the Principles, then made arrangements to conduct semi-structured interviews with 20 classroom teachers who were teaching computer education at the time of this research. I used audio tape recorder to collect teachers' responses. The specific answers from the interviews and questionnaires were collected and included in the analysis and discussion of the results in Chapter 6 and 7.

1.10.10 Data Analysis

Mayan (1996:9) reports that data analysis is the most time-consuming part of the research. At this stage, the researcher "probes emerging patterns comparing and contrasting data, trying to fit pieces and bits of data into different categories." This requires thorough preparation and organisation. Thus, all of the information gathered from secondary and primary sources was analysed in the following order:

The structured interview method Analysis:

Data collected from the Ministry of Education and Kenya Institute of Education was analysed through the use of simple tabulation and description of the findings that formed Chapter 5.

Questionnaire method Analysis:

For the open-ended and closed questions contained in questionnaires for the Principals and Heads of Department, analysis was done by the statistics unit of the University of Pretoria using “Statistical package: SAS version 8” that involved grouping of data into categories of different research questionnaire topics. The interpretations, description and the data analysis was carried out by the researcher using description, graphical expression and tabulation. The data analysis combined qualitative and quantitative methods, and is presented in Chapter 6.

Semi-structured interview method Analysis:

The data collected from the computer teachers using semi-structured interviews and audio tape recording was also classified into categories according to a coding scheme. The data analysis combined qualitative and quantitative methods. Qualitative analysis was used for the interpretation of documents, discussions and interviews. The quantitative data analysis was based on simple tabulation of responses to various points. A detailed analysis of all the data collected from semi-structured interviews with computer teachers are presented in Chapter 7.

1.11 Definition of Terms

In this section, definitions are given only to key terms related to CIE. Other concepts will be described in substance where they appear in the text.

Closed-ended question: Is a structured survey questionnaire where the alternative answers are listed and the participants have to select only one from among them.

Co-operative Learning: refers to learning environments that are believed to promote active learning as students talk and work together toward some goal rather than

listening passively to a lecture. It is also believed to foster respect for diversity, to enhance achievement, and to advance language skills (Denning and Smith, 1997:178). Cooperative learning is not just putting learners to work in groups to solve some common problem. Rather, for an educational environment to be called cooperative it must have the following elements:

- Positive interdependence between students seeking mutual goals collectively,
- Face-to-face interaction between students,
- Each students accountability for mastering the material to be covered; and
- Appropriate use of interpersonal and social skills by students (Denning and Smith, 1998:178).

Cooperative learning in Computer Integrated Education involves students working in groups at the computer to perform a task. Sometimes the learning activities are designed around existing software such as spreadsheets, word processors, and hypermedia/multimedia programs.

Computer Integrated Education: refers to the incorporation of computers into the whole school organisation. This means the total integration into subjects; integration in teaching; integration in learning; integration into the profession of the teacher; hardware and software integration, and integrated environment. It also means using computers effectively and efficiently in the general content areas to allow students to learn how to apply computer skills in meaningful ways (Doctsadder, 1999:73).

Facilitation of Learning: In teaching and learning the teacher acts as a facilitator of learning by creating a supportive classroom environment in which students interact and learn with computers effectively. This requires the teacher to:

- Provide learning task and presentation;
- React to students' responses and provide feedback; and
- Help the students to accomplish learning tasks by serving as a tutor until learning outcomes are realised by the learners (Alberts, 2000: 39), and
- Help students to set goals for learning with computer technology

Induction Course: This is school based orientation program for any new teacher posted to a school. Especially newly appointed teachers need to be introduced formally to the use of technology programs in their present schools to be familiar with the school regulations and general organisation patterns and policies. This includes classroom management and techniques of curriculum implementation.

In-service Course: An on-going teacher education program of activities designed to develop the knowledge, skills and experiences necessary for practising teachers to carry out their work more effectively in the integration and use of computers in teaching and learning.

Instrument: In research, an instrument is a device or procedure for systematically collecting information. Common type of instruments includes tests, questionnaires, rating, scales, checklists, and observation forms. It also refers to the conditions under which it is used, when it is to be used, and by whom it is to be used (Wallen and Fraenkel (2001:81).

Mediation of Learning: In teaching and learning the teacher as the presenter of the lessons derived from the national curriculum mediates between the aims of education and student's learning needs. This includes integration and use of computers as a vehicle through which a message could be passed to students. The medium mediates between the teacher and the learner (Ellington, Percival and Race, 1993, Stuart and Tatto, 2000).

Pre-service Course: This refers to training student teachers at the University or Diploma colleges on the use and integration of computers into teaching and learning.

Secondary Education: In Kenya secondary education is a four-year course. Students join secondary education after completing eight years of primary education and obtaining the minimum entry pass marks at a national examination held at the end of every year. At present secondary schools in Kenya are of two categories. These are public and private schools. The secondary school curriculum includes Mathematics, Sciences (Biology, Chemistry, Physics), Agriculture, Languages (Kiswahili, English, German, French and Literature), Agriculture, History/ Government, Home Economics, Business Education/Economics, Religious Education, Social Ethics, Physical Education and Technical subjects.

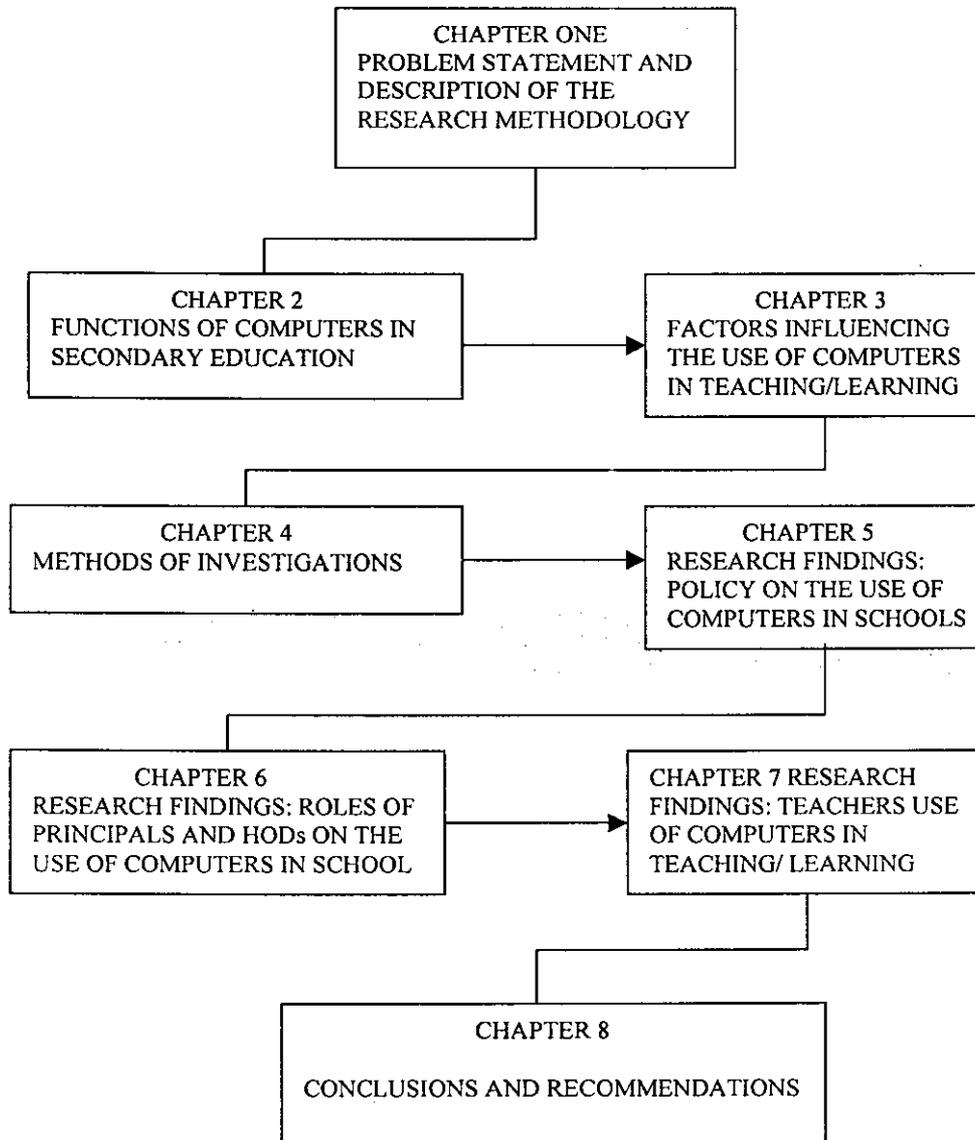
Open-ended question: Is a survey question that does not include a list of alternative answers to select and the participants have to answer in their own words.

The sample: A sample as it is used in the research literature means any group on which information is obtained regarding the research problem being investigated. Often it is selected from a large group. The large group is called population.

1.12 Plan of the research project on the use of computers in secondary schools

The research programme on the use of computers in secondary schools in Nyanza Province for this study has been discussed as displayed in the following Figure 1.2.

Figure 1.2: Research project plan for this study



1.13 Organisation of the Thesis

The main text of the thesis consists of eight chapters as shown in figure 1.2 above, each addressing a different aspect of Computer Integrated Education (CIE). Chapter 1

opens with a discussion of a broad introduction of the research study that outlines the subject, purpose and objectives of the study, the research problem and sets the scene for what is to follow by explaining and describing the general issues in this research. Chapter 2 describes the roles and function of the computers in the learning environment and provides an overview of the way in which the computer has been used as a tool in teaching and learning process in secondary education. Chapter 3 is concerned with practical problems that arise when computer-based innovations are introduced and integrated into the curriculum for instruction, discussing the major factors that facilitate and affects the use of computers in teaching and learning in the classroom. The concept of motivation, accessibility and availability, attitudes, teacher preparation, cost-effectiveness, and administrative support are reviewed. Chapter 4 shifts attention and presents a model to be used to assess Computer Integrated Education (CIE) in secondary schools in Nyanza Province. This includes a discussion of the research methods and strategies to be used in the field research to collect data from the Officers from the Ministry of Education, Kenya Institute of Education and in secondary schools in Nyanza Province. Chapter 5 contains the research findings on the government policies regarding the use of computers in public secondary schools. Chapter 6 presents data analysis and a discussion of the findings from Heads of Department (HOD), and Principals' responses to questionnaire survey on the use of computers. Chapter 7 describes the research findings of a case study with computer teachers. The final chapter of the thesis, Chapter 8, is devoted to a summary and discussion of the main research findings and recommendations for action and further research.

1.14 Summary

This chapter has described an outline of the research project on computer-integrated education to be undertaken in Nyanza Province of Kenya. It has explained what is involved in the study and all the requirements for the field research. This has included a brief discussion of the background to the study problem, the problem identified, the main objectives of the study, the research questions and basic assumptions guiding this research. The main part of the chapter has explained the significant of the study, methods of data collection, and provided definition of various terminologies related to computer-integrated education.

The chapter has also discussed briefly the characteristics of the computer that distinguishes it from other media employed in teaching and learning. These qualities include amongst others the capabilities of the computers in mathematical calculation and scientific experiments. It has further explained the main objectives for the introduction of computers in secondary education in both developed and developing countries as that of teaching computer literacy skills and in teaching and learning those traditional subjects such as mathematics, sciences, languages, social studies and graphics.

The value of computers as an integral part of students' learning to help promote standard of education and quality of learning has been noted (Woodrow, 1998:4-6, Pedretti et al. 1999: 131-143). The challenge is on knowledge and level of computer integration for effective utilisation by the teachers. This can only be achieved if the computer is totally integrated into the curriculum content areas and not as a substitute for example "30 minutes of reading for 30 minutes of computer skill development" (Dockstadder, 1999:73). The chapter explained also that integrating computers implies using them to teach for example "30 minutes of reading or writing." Moreover, the potential of computers in teaching disadvantaged students has also been identified.

The crucial role of the teacher in the integration and use of computer technology has also been explained (Dockstadder, 1999:73-74). Teachers must be trained and supported in order to incorporate fully the use of computers in classroom instruction (Whitefield and Templeton, 2000:70-80). This includes in addition, the support from the administration and the school community. Chapter 2 examines further the evidence from relevant literature both secondary and primary on the functions and utilisation of computer as a tool in the school classroom.