UNIVERSITY OF CAPE COAST

USE OF ICT BY STUDENTS AND TEACHERS IN SENIOR HIGH SCHOOLS IN THE SEKONDI TAKORADI METROPOLIS

BY

FLORENCE AFFUL-DADZIE

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2010

DECLARATION

Candidate's Declaration

I hereby declare that this thesis is the result of my own original research and that no part of it has been presented for another degree in this University or elsewhere.

Candidate's Signature..... Date.....

Name: Florence Afful-Dadzie

Supervisors' Declaration

We hereby declare that the preparation and presentation of the thesis were supervised in accordance with the guidelines on supervision of thesis laid down by the University of Cape Coast.

Principal Supervisor's Signature..... Date.....

Name: Dr. A.L. Dare

Co-Supervisor's Signature..... Date.....

Name: Dr. Rosemary Bosu (Mrs.)

ABSTRACT

The purpose of the study was to find out how ICT was being used in the teaching and learning process in the senior high schools in the Sekondi-Takoradi Metropolitan area. The study was a descriptive survey. Two sets of questionnaires with Cronbach coefficient alpha values of .756 and .686, respectively, and an observation checklist were used to collect the data from 6 randomly selected schools in the Sekondi-Takoradi Metropolitan area. A total of 340 respondents in these schools, comprising 250 students and 90 teachers filled out the questionnaire. The return rates for the questionnaires were 92.2% for teachers and 98% for students.

The study revealed that most of the senior high schools had only one computer laboratory and the number of computers was not sufficient, taking the population of the schools into consideration. Also, most of the computer laboratories were not connected to the Internet but most schools had the Encater programme on their computers which enabled the students to access information. ICT was being used for most of the important jobs in the schools, such as maintaining students' records. Furthermore, application software such as Word, Excel, Power Point and Internet were taught in all the schools. Majority of teachers (68%) and students (75%) could make use of the computer and its accessories. However, most of the teachers did not use ICT in the actual teaching process. Based on the findings of the study, it was recommended that the senior high schools should increase the number of computers in the laboratories. They should also pool resources and pay for their laboratories to be connected to the Internet by one service provider.

DEDICATION

To my little daughter Gloria, whose understanding and encouragement helped me to complete this thesis.

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LIST OF ACRONYMS

AISI	African Information Society Initiative
CRDD	Curriculum Research Development Division
DFID	Development For International Development
DNA	Deoxyribonucleic Acid
GES	Ghana Education Service
ISAD	Information Society and Development
NEPAD	New Partnership For African Development
PTA	Parent Teacher Association
SHS	Senior High School
UNECA	United Nations Economic Commission for Africa
WAEC	West Africa Examination Council
WWW	World Wide Web

CHAPTER ONE

INTRODUCTION

Background of the Study

The last decade in the global arena has witnessed a tremendous growth in the area of information technology. Rapid advances in the technologies for communication media like television, computer, internet, printing and publishing have enabled us to get prompt access to required information. The computer is the most versatile machine that man has ever made (Punie & Cabrero, 2006). The use of computers at work has become very common. Now almost all the government departments and commercial organizations have accepted the computer as a major tool to renovate their functions. Computers are being used in multiple areas to solve intricate scientific problems.

People can use technology to test DNA. A special form of technology (called a global positioning system) can be used to track your movement (Haag, Cummings & Mc Cubbey, 2004). That is why Webber in his book entitled "The computers are coming" noted that:

> If every computer in the world were to suddenly go dead, planes would not fly, trains would not run, traffic light would not change, banks would have to close, space projects would be aborted and department stores and grocery stores would not be able to sell…if computers were silenced suddenly, the world

> would be thrown into instant chaos…there is little doubt, as expressed by this paragraph that the computer is an integral part of the world's activities (Shelly & Cashman, 1986, p. 18.1).

With information technology, the computer has made a significant impact on all dimensions of our daily life. Computers are being used in the offices, in manufacturing, in schools and in homes. It is easy to stand in awe of the tremendous technological achievements which have been made during the last sixty two years (Shelly & Cashman, 1986, p. 18.2). Information and Communication Technology (ICT) has become an ubiquitous component of the physical and social worlds occupied by children. It is also an important part of the private and work lives of most people, including those who support children's learning and development, whether as parents, family members or educators (Bolsatd, 2004).

To agree with the paragraph above, today, computers are used in the home to play video games, for education, application for house hold financing, computerized shopping and for banking. The use of computers is now influencing the way people play, learn and work. Today, more than ever businesses are using information (and information technology) to gain and sustain a competitive advantage. You will never find a business whose slogan is what you don't know can hurt you. Businesses understand that what they do not know can become an Achilles' heel and a source of advantage for the competition.

Tracing from civilization of man, it could be seen that rapid technological developments have given rise to a number of revolutions. From the Stone Age where sharp-edged weapons were used for defence and farming

purposes to the Industrial Revolution where the pace of industrial developments gave way for the replacement of horse power and manpower with those of machines and then from the Nuclear Revolution that leaped man from the earth to the orbit to the advent of satellite technology and service which have pushed back the frontiers of human ignorance and have brought us the information Revolution (Newhouse, 2002).We are now in the information age – a time when knowledge is power.

Information and Communication Technology (ICT) not only refers to computer technologies but also includes other technologies used for the collection, manipulation, storage and communication of information (Newhouse, 2002). ICT can also be defined as "any thing which allows us to get information, to communicate with each other, or to have an effect on the environment using electronic or digital equipment" (Bolstad, 2004). The term ICT could include cameras, and video cameras, the internet, telecommunication tools, programmable toys and many other devices and resources. Our era dubbed the "Information Age" is advancing rapidly and is determining which countries would survive economically. The direct result of the growth of global data communication networks of which the internet is an example is the key to the technology age allowing data, documents, still and moving images and sound to be stored digitally and to be accessed instantly, regardless of where they are physically stored.

Our society is changing (and in some countries already has changed) from an industrial society, in which industrial production (making of things) is the central focus, towards an information society in which dealing with

information has become a key element in the functioning of people, both in their profession and outside.

More and more manual and cognitive activities have been taken over by computers and other ICT applications. A new balance is being evolved between men and machine in the area of information retrieval and information processing. Knowledge is no longer knowing facts and theories by heart and being able to reproduce them when necessary, but knowledge has become the ability to find relevant data and to derive meaning or information form it (Aviram & Richardson, 2004 p. 54).

In many developing countries, the conditions for ICT are either non-existent or if they exist, the infrastructure are often dilapidated or are concentrated in the more affluent urban areas while those in the rural areas have little or no access to them. Ghana in line with its mission to achieve a middle-income status by the year 2020 and the role ICT would play in this endeavor, has adopted the Africa Information Society Initiative [AISI] (2004 available at www.comminit.com/en/node/12670/38), with the basic objective "to end Africa's information and information technology gap by bringing it into the information age" (Economic Commission for Africa 2000). ICT is bringing people together and bringing decision makers new tools for development but at the same time the gap between information "dos and don'ts" is widening bringing a real danger that the world's poor will be excluded from the emerging knowledge based global economy (Annan, 2002).

The key purpose of a nation's school system is to train and educate the pupils or students to acquire skills and attitudes which will assist them to make informed choices and to adjust to suit the dynamics of the world. Students who

come out from substandard school systems are mostly inadequately educated and face limited prospect in term of economic, social and political empowerment. Students with special talents are unlikely to receive the shaping they need to achieve for their outstanding potential, the over all effect is on their wider communities never benefiting from this individuals latent capacity for leadership (Annan, 2002).

Digital divide (especially the wider deployment of ICT to improve education standard in poor nations) has been widely accepted as representing a missed opportunity for developing efforts. Progress towards the achievement of the international agreed development goals is put to work to raise the standard of education and effort are geared towards supporting developing countries to enhance ICT for education (Miller, 2001).

Making the best use of ICT has become a major challenge facing our educational system. We must harness it to promote teaching and learning and improve students' attainment (World Bank, 2002). Administrators, who promote technology as a tool for collaboration and stimulation for authentic learning experience could allow for far greater students achievement than ever before (Cuban, 2001).

As children grow, they are expected to become active and self-directed members in their own local communities and also in the information society at large. Technology creates versatile possibilities for the acquisition and creation of information, for self-expression and for communication and interaction with other people locally, nationally and worldwide (Kankaanranta, 2005). In view of this ICT has become as essential and natural parts of the daily life of children. ICT is being adopted to support learning and teaching

and in guiding children to become its diversified users (Bergman, 1999). Support for the use of technology to improve student's achievement is soaring.

It is essential for achieving real access to ICT for the African continent. Furthermore, there is also a need for careful economic and policy direction to incorporate beneficial use of ICTs. This requires well-educated people ready for the information society who will then be able to mobilize an African response (for African benefit) to the global knowledge economy (Opoku-Mensah, 1999). Therefore, one of the greatest challenges for developing countries lies in education and human resource development to service the knowledge economy. This is no easy task given the resource requirements needed, not only to ensure physical access to ICTs, but also to enable the people of Africa to afford to use the technology, to see its value, and to use it.

An important development worth considering is the distribution of ICT application not only via stand-alone computers, but also in a networked environment or via the World Wide Web (WWW). Using this network, teachers can guide their students from remote locations, creating new possibilities for distance education. Among the types of application that are designed for education are:

1. The software programs in the drill and practice: The software programs in the drill and practice or tutorial category serve as an assistant for teachers by taking over some of their tasks. The software often has facilities to provide feedback to the learners and to keep track of their performance. With these applications it is possible to individualize instruction. Drill and practice software is used to automate practicing

basic knowledge and skills. Tutorials can be used for learning new educational content. The programmes differ greatly in their complexity. However, drill and practice programmes are usually quite simple, while tutorials can be very complex (Watson, 2001).

2. Simulations and modeling systems: These simulations are representations of a part of reality. By manipulating variables in these representations and studying the effects, students can gain an understanding of the reality. Through simulations it may be possible to study for reasons of safety, cost required apparatus, or scale. Simulations can be an aid in visualizing abstract concepts. They serve as a bridge between reality and the student's mental model of reality. Simulations in the twenty-first century are not developed for education only, but also many have been made for entertainment purposes, used at homes outside the school context. With modeling systems students can build their own (mathematical) model of part of reality. In doing so they may gain understanding of complex relations. Modeling systems generally do not have built-in teacher control, while simulations offer a certain kind of teacher control through the model, the display, and the framework of interactions (Cox, 1994).

3. Multimedia: Multimedia cases offer the possibility to study parts of reality by presenting illustrations of real world practice that can be discussed and studied from several perspectives. Multimedia cases usually combine video segments, audio, and textual commentary together with random access facilities and hyperlinks, and so create an open-ended student-centered learning environment. Though used in

many fields of study, they are increasingly used in teacher education for studying the complexity of the classroom from various points of view (Koschmann, 1996).

4. Microcomputer-based Laboratories: These provide an environment for science education. The computer is used as a support tool for students' laboratory work. Real-time data collection is possible. It becomes much easier to repeat experiments, to measure different variables at the same time, to use a very short or a very long range, to analyze data, and to represent data graphically. Instead of spending instructional time on data collection, it can be used for analyzing and interpreting data (Voogt, 1999).

5. Word Processor, Spreadsheets, Presentation Software, Graphics Software programmes: These are part of the basic application software of nearly every personal computer. Their use in education is growing fast (Becker, Ravitz & Wong, 1999). They support students in their learning process, because of their capability to structure information, and to easily present information in different modes. Research related to the use of word possessors in education in particular shows the potential of this tool to stimulate students to write and to support the writing process.

6. E-mail, Videoconferencing, Discussion Board: This software represents the increasing role of ICT in communication. They have shown to be particularly useful in the design of computer-supported collaborative learning environments (Koschmann, 1996).

7. Digital Encyclopedias and Databases: These are used as local information resources, to be compared with the function of the traditional school library. Closely related to these applications is the www as a source of information. The potential scope of available information requires that students possess excellent information management skills (Watson, 2001).

In Ghana there is support and interest across the whole education sector for the development and integration of ICT into education policy, curriculum and practice. There is a clear consensus that the introduction and use of ICT in schools should be grounded in a clear understanding of the purpose, practice and social context of the country's school. There is a growing recognition of the many different ways that ICT can contribute to, or transform, the activities, roles and relationship experienced by youth and adults in the education settings.

The Sekondi-Takoradi Metropolis in the Western Region of Ghana, for instance, has almost all its senior high schools (SHS) having computer laboratories and this is expected to boost the teaching and learning process in these schools. A study conducted revealed that 52 percent of senior high schools under the jurisdiction of the Sekondi-Takoradi Metropolitan Assembly have computer laboratories. An interview with a teacher in a private computer school revealed that parents enroll even their wards that are yet to enter the senior high schools to have training on ICT. These suggest that some of Ghana's senior high school students are learning how to use ICT. There is therefore the need for critical examination of the use of ICT by students and

teachers in the education sector, to guide future development and decision-making in this area.

Statement of the Problem

A lot of effort and numerous resolutions have been made by policy makers concerning Information and Communication Technology (ICT) to make teaching and learning easier. For example, in the Anamuah-Mensah Committee's Report (Government of Ghana, 2004) it is stated that, "it is important for students in the senior high schools to be exposed to ICT through the use of computers and that ICT should be introduced into the country's education system starting from the junior high school and upward". The committee recommended that ICT should be integrated into the curriculum and should be used in the teaching and learning process. In view of this some schools have managed to acquire their own computers through their Parent Teacher Associations (PTA) and old boys and girls associations. The majority of senior high schools which do not have computer laboratories were urged to arrange with private computer companies to install computers in their schools. Most senior high schools in the Sekondi-Takoradi Metropolis have computer laboratories.

In spite of the numerous efforts and resolutions put up by policy makers concerning ICT use to make teaching and learning easier, interviews with two teachers in senior high schools under the Sekondi-Takoradi Metropolitan area revealed that each class has a lesson on ICT once a week and that the laboratories are not made accessible to them. The question now is, are the teachers and learners making proper use of these computer laboratories to enhance teaching and learning in the schools? There is the need now to

study how teachers and students in the senior high schools, particularly those in the Sekondi-Takoradi Metropolis, are using ICT to enhance effective and efficient teaching and learning.

Purpose of the Study

The purpose of the study was to assess how ICT is being used in the teaching and learning situation and students' and teachers' opinions regarding how it is affecting the performance of students. Again, it sought to find out the extent to which Information and Communication Technology (ICT) is enhancing and facilitating effective teaching and learning in the senior high schools in the Sekondi-Takoradi Metropolis.

Objectives of the Study

The main objectives of the study were to find out the extent of use of ICT by senior high school students and teachers in the Sekondi Takoradi Metropolis in relation to teaching and learning. Specifically, the study tried to find out the numerous applications and facilities that are in place in these schools. The difficulties involved in the usage of ICT facilities were to be examined. Also, the factors influencing the use of ICT in the Senior High Schools in the Sekondi-Takoradi Metropolis were to be identified. Furthermore, the study was to find out the students' and teachers' awareness of ICT resources and the extent to which they utilized them. Also to be elicited were students' and teachers' opinions regarding how ICT affected the performance of students.

Research Questions

The following questions were formulated to guide the study:

1. How accessible are ICT facilities to students and teachers of senior high schools in the Sekondi-Takoradi Metropolis?
2. For what purposes are computers used in the Senior High Schools in the Sekondi-Takoradi Metropolis?
3. How proficient are teachers and students in senior high schools in the Sekondi-Takoradi Metropolis, in the use of computer accessories and software?
4. To what extent is ICT used to enhance teaching and learning in senior high schools in the Sekondi-Takoradi Metropolis?
5. What are the barriers to the use of ICT in the senior high schools in the Sekondi-Takoradi Metropolis?

Significance of the Study

The results of the study will provide ideas about the true state of ICT facilities and how they are being used by students and teachers. This information may help the Ministry of Education in designing and developing more effective and efficient ICT plans for the Senior High School in future. Again, the results of the study may inform authorities about problems associated with the usage of ICT so that appropriate measures will be put in place to solve those problems. The study will also provide the basis for the Ministry of Education to plan and implement in-service training and education on ICT for teachers in the senior high schools to enhance their capacity in the use of ICT as a result of rapid technological changes. Also, the results of the

study may help in the acquisition of ICT equipment and provide a basis for making decisions on the ICT programmes to be run in schools.

Delimitations

The study was restricted to the Sekondi-Takoradi Metropolis in the Western Region of Ghana. The choice of the metropolis stemed from the fact that most schools there have ICT laboratories and run ICT programmes for their students. The study was also delimited to the use of ICT in the senior high schools.

The study involved public senior high school students and their teachers because the literature suggests that much work can be done in the area of ICT in enhancing the academic performance of students. Both teachers and students therefore need a certain minimum of competence in computer use to promote teaching and learning.

Limitation

There are difficulties in keeping up with the pace at which technology changes. As a result of rapid technological changes the use of ICT requires training to enable the use of the equipments. So by the time the study ended, it is possible that there already may have been the need for retraining. Thus, some of the findings may not hold as a result of the changing pace in the field of information and communication technology.

Organization of the Chapters of the Thesis

The thesis has five chapters: The chapter one deals with the introduction of the study. The second chapter reviews literature. Chapter Three describes the methodology. Chapter Four gives the results of the study and

discusses them, while Chapter Five summarises the study, draws conclusions and makes recommendations.

Definition of Terms

Application: May be used to refer to a type of software such as word processor or generally may be used to refer to the use of computers in a particular situation.

Computer: An electronic device or machine that works or operates under the control of a stored programme, or instructions stored in its own memory. It can accept data in one form and manipulate or process data according to specified rules, to produce meaningful information or results and store them.

Computer Literacy: Concerning the knowledge, skills and attitudes which enables individuals to use computer technology to benefit them and others in relation to tasks they wish to accomplish.

Curriculum: The word curriculum comes from Latin, meaning to run a race course. Its meaning in education has come to mean a combination of the learning outcomes, pedagogy and content that students are to address. The Pennsylvania State Board of Education defines it as: "A series of planned instruction that is coordinated and articulated in manner designed to result in the achievement by students of specific knowledge and skills and the application of this knowledge".

Curriculum Framework: Documents that describe curriculum goals and objectives for learning and include direction for specific content areas, benchmarks, activities and forms of evaluation.

Interactive Multimedia: The use of a computer to control and present combinations of media such as text, graphics, video and sound. Sometimes the term is shortened to multimedia.

Learning Outcome: That which students may demonstrate as a result of what they have learned.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

This chapter reviews the literature relevant to the study. The review is done under the following topics:(a) policy on ICT; (b) the rationale for the use of ICT in schools; (c) ICT and the curriculum; (d) ICT and the students; (e) ICT and learning; (f) ICT and the roles of the teacher; (g) ICT and the learning environment; (h) gender, age and ICT; (i) Supporting Management with ICT; and (j) the Barriers to integrating ICT into the school curriculum.

Policy on ICT

Several continental leaders are seriously considering the importance of ICT for development, and there has been increasing recognition among African policy makers of the role of ICT in this regard. Since the historic Information Society and Development (ISAD) conference in 1996 (available at www.infomaworld.com/index/790983492pdf), there have been a growing number of initiatives to bridge the digital divide, with many of them focusing on the education sector. The United Nations Economic Commission for Africa (UNECA) in 1996 (available at www.uneca.org/aisi), provided a framework for Africa's digital inclusion which involve government from all over the continent, followed by the historic Africa Development Forum in 1999 (www-sul.stanford.edu/dept/ssrg/Africa/delel.html), Digital Opportunities Taskforce of the group of eight nation in 2000 (available at www.2000. ogsm. vanderbilt.edu/papers/race/science.html), which focused on Bridging the Digital Divide. All these highlight the importance of bridging the education divide through integration of ICTs in education.

Over the past three years, however, parallel regional networks and programmes to promote ICTs in school education in Africa have also been formed and these include the World Links for Development Programme (McGhee, Kozma, Toyama, & Zalles 2004) (available at ctl.sri.com/project/ displayproject.jsp?nick=worldlinks), the Department for International Development (DFID)'S Imfundo Project in 2007 (available at www.dfid.gov.uk/about-dfid). Schools on line have also consolidated their programmes in Africa over the past two years and have country project in several African countries. The New Partnership for African Development (NEPAD) was introduced in 2001 (available at www.arts.cornell. edu/ poverty/kanbul/pomepad.pdf) spearheaded by a number of heads of states in a renewed attempt at African revival.

There are many issues that require consideration when describing how the role of ICT in education is currently conceived. In recent years, many governments throughout the world have adopted plans that have varying degrees to address the issues described. These plans are largely similar in their intentions regarding the major direction from a system which is, and are essentially plans for reforming education from a system which is mainly teacher-direct to one that encourages the more student-centered learning. However the nature and scope of the strategies for initiating, guiding and implementing these policy plans differ between countries partly as a consequence of varying socio-economic circumstance, depending on the national priorities, and cultural context as well as the variety of policy goals and implementation strategies adopted by different countries.

From the above, it could be seen that many countries are making effort to bridge the educational divide by integrating ICT into education though many issues require consideration when describing the role of ICT in education.

Varieties of Policy Goals

The establishment of a comprehensive national educational policy for ICT in education is a relatively recent phenomenon. While some developed countries may have developed Information Technology (IT) master plan that encompassed educational component about a decade ago or more, most IT-in education master plans emerge within the past few years. World Bank Report, (2002) pointed out that many governments stand at the threshold of the twenty-first century without clearly define plans and strategies about the use of educational technologies. The fact remains that, looking at the potentialities of ICT, no country can afford to ignore the need to introduce ICT into the education system. However reports pointed out that many countries are investing heavily in this area without having clear plans and objectives (Pelgrum & Law, 2003).

Though there are wide variations in terms of the structure of the education systems and other economic and social contexts, there are also strong similarities in the pathways of change in terms of the goals for introducing ICT into the school curriculum. According to Pelgrum & Law (2003), the introduction of ICT into the education would go through different phases starting with teaching about computers, then moving towards teaching with, and then towards integrating ICT in teaching and learning.

In the policy that aims at delivering an IT-literate workforce for national development, there emerged a need to produce a general workforce that is literate in basic IT competencies. As a result of this, some countries began to introduce computer literacy-oriented curriculum at the primary level. This goal is still very prominent in many educational master plans. For example, the South Korean recently release on ICT in education master plan declared that the Korean government will establish a comprehensive and nationwide information and communication infrastructure to reinforce ICT in education to help grow the information and communication industry (Korean Ministry of Education, 2000). It went on to say that the government will also provide additional resources for educational policy to enhance the peoples' information literacy in the bold vision to make the nation the most computer-literate in the world by the year 2002.

According to Warkins & Biggs(1996), in policy to enhance education effectiveness and in conjunction with the increasing interest in using computers to enhance learning, computer-aided learning (CAL) software began to be published to address the need of this growing education market. Also, Warkins et al., (1996), stated that many national ICT policy plans published in recent years include strategies to increase the availability of, and access to electronic learning resources for schools. They added that, it is interesting to note that in countries heavily influenced by the Confucian Heritage Culture, their national ICT implementation has tended to include a new role for IT literate teacher that is not generally found in other countries. Moreover, with the increasing attention paid to social constructivist models of learning and the advances in computer-mediated communication.

There has emerged exploration in the use of ICT to support the development of knowledge–building communities of learners who do not simply take in knowledge as created by others, but who engage actively in collaborative meaning-making and the construction of a personal understanding that can be shared with others (Scardamalia & Bereiter, 1994).

Scardamalia and Beriter (1994) again pointed out that, the concept of knowledge communities and learning organizations have become popular as societies move from the industrial era into the information age. They added that in these developments it is important to note that, the use of technology is not simply to make learning effective in the traditional sense but a good basis for the realization of a more demanding goal using ICT to support educational change and reform.

Another important educational policy related to the use of ICT is to extend the educational provision and to improve equity in educational opportunities. The World Education Forum (2000) brought out that the new information and communication technologies are important strategies to help achieve the education for all goal. However, the Dakar Framework for Action (2005) also caution that to be effective, the technologies (ICT) combine with more traditional technologies such as print and radio broadcast to achieve better effectiveness. The technology used should be justified on educational grounds in relation to the expected impact derived from the medium chosen for delivery (Pelgrum & Law, 2003).

Rodriguez and Wilson (2000) pointed out that the equity issues are also of concern in the more developed countries. They cited studies in developed countries that suggest that information technology can cause

substantial increase in inequity and some countries have explicit policies to ensure that society does not create new inequalities because of the emergence of a digital divide between those who know and those who do not know. ICT should be encouraged in open learning provisions to provide greater opportunities for citizens to pursue lifelong learning.

In the report of the Anamuah-Mensah committee (Government of Ghana, 2004) it was recommended that certain subjects need to be introduced into the curriculum of the SHS and these include ICT and Entrepreneurship. It was recommended that in the Business Programmes, ICT should be introduced, in the technical programme, ICT should be introduced as an optional subject and in the General Act Programme. It should be an elective subject, taking into account the global development.

The Anamuah-Mensah committee ((Government of Ghana, 2004) also recommended that schools that are not able to set up their own computer laboratories should arrange with privately owned computer companies to install computers in their schools, and teach computer studies in accordance with ICT syllabus provided by GES until the schools are able to acquire their own computers. The GES in collaboration with the CRDD and West African Examinations Council (WAEC) was entreated to arrange to start both core and elective ICT programmes. Schools with computers were to be given qualified teachers to mount ICT programmes based upon GES approved syllabus. In the medium term, the committee recommended that every SHS connected with electricity should be provided with computers by the Ministry of Education (MOE), Parent Teacher Associations (PTA) and old students Associations or

through private participation to set up computer laboratories within three years (Government of Ghana, 2004).

Rationale for ICT Use in Schools

Education and training are fundamental to achieving priorities for a country's economy in the Twenty-first Century. A country needs to be "enterprising, innovative, adaptable and socially responsible participants in the information economy" and will be at a serious disadvantage in the global knowledge economy if it fails to produce workers, professionals and managers with the skills to work in the online environment (NFIE, 2001, p. 11). Adequately qualified ICT students and ICT-rich learning surroundings will intensify students learning across the curriculum and this has given rise to the need for ICT competent teachers. Three main rationales bring up the use of ICT in schools. One is concerned with the organizational productivity of the school. The second is also concerned with technology literacy and the third is concerned with support for learning ICT (DEST, 2002, p. 38).

Over the past few decades there have been major transformations occurring in the formal education sector, as well as in other areas that are important for enabling people to develop new capabilities necessary for the knowledge/information society (Mansell & Welin, 1998; Butcher, 2003). These changes are partly due to the development of ICTs, as well as the forms of networking, knowledge sharing, and interactive learning that ICTs facilitate (Happell, 2000). Haddad and Draxler (2002) noted that change is required of schools (and education systems more broadly) which were originally developed in the context of the industrial age and which now must meet the educational needs of the current global knowledge environment.

Becker (2000) cited the need for computers to be used to solve regular curriculum problems that occurs. This implies that the computers being problem solving machines could be used to solve typical school problems especially those problems concerning student learning, teacher's instruction and school administration. Becker (2000) suggested that for the implementation of the curriculum, educational technology should be selected. This is on the basis, that it has the best characteristics and this is to be used effectively and efficiently.

Lankershear and Snyder (2002) also argue that students learning would be made more effective and there will be an increase in their output if a teacher selects the most appropriate, educational technology. If part of the curriculum is not completed as a result of technology, then the outcome of that learning situation will be zero (yielding no productivity). There are situations where certain technology should be used because it solves major problems in teaching and learning but Lankshear et al., (2002) also bring out that while it is important to consider educational productivity, it should not be the only consideration in deciding to choose a technology. The use of some technologies are expensive than others, the procurement, installation, maintaining and support users of ICT are relatively more expensive and this must be compared with the potential outcomes.

The information age has brought with it a new context in which schools must function. As such, Haddad and Draxler (2002, p8), state that ICT enable learning to be moved from a school building into a knowledge infrastructure (schools, laboratories, radio, television, internet, museums), from classrooms to individual learners, from a teacher (as provider of

knowledge) to a teacher (as a tutor and facilitator) and from a set of textbooks and some audiovisual aids to multimedia materials (print, audio, video and digital).

The computers support communication beyond the classroom walls and enable schools and communities to provide an environment for co-operative learning (high order thinking skills and solving complex problems). School administrators use computers to access and manage information, it is a major tool used in society without which job opportunities is limited and organizations within society use them to work more efficiently and effectively. McKenzie (1997) is of the view that, it is important to question the kind of information being accessed, how that information is presented, what is being done with it and when it becomes too much.

From the literature reviewed on the rationale for the use of ICT in schools, it can be deduced that although integrating ICT into education has a number of positive effect, in deciding to choose a technology for a school, issues such as procurement, installation, maintaining and support users of ICT are to be considered since they are relatively expensive.

Accessibility of ICT Facilities

Butcher (2003) noted that many early development projects in the area of ICT set out to ensure that as many people as possible had a computer within walking distance, often using telecentres or other means of shared community access for delivery. However, it is only more recently that studies into the complexity of access which includes use and value of the technology have been done. A recent example is a study done by Bridges.org on real access. This study showed that real access criteria should include the following

categories: physical access, appropriate technology, affordability, capacity, relevant content, integration into daily routines, socio-cultural factors, trust, legal and regulatory framework, local economic environment, macro-economic environment, and political will (Bridges.org, 2002).

A worldwide survey on computers in education by Pelyrum and Anderson (1999) shows a rapid decline in student computer ratios in all levels of education between 1995 and 1999. Despite this fact, the actual access and use of computers in schools is still limited.

Becker (2000) cited figures from the United States of America which show that only about one third of the teachers use computers on regular basis, although majority has a computer in their classroom. The physical infrastructure is but one aspect to be considered. The same applies in the context of education. Physical access to computers is a fundamental starting point, but alone will not lead to computer use or enhanced learning outcomes. Teacher training is one essential requirement for successful use of ICT in education (Haddad & Draxler, 2002).

In some other part of the world, efforts are being made to make ICT and its resources available for its integration into education. Wood and Trinidad (2001) in their study of ICT and education at Sevenoaks Senior College pointed out that the curriculum development system comprises three distinct parts which are the Document Publishing and Management software, a html text editor and a Webct, the Web-based front and for the delivery of courses. The curriculum development system enables teachers to develop online curriculum with limited knowledge of WEBCT or HTML writing.

Again Wood and Trinidad (2001) pointed out that Sevenoaks communication system involves an innovative ICT infrastructure that connects two hundred desktop computers and provide a wireless network for laptops. There is a computer to student ratio of 1:2 and every staff member is provided with a laptop computer. There is also a teacher librarian/webmaster which is responsible for the library and web administration as well as staff profession development and online curriculum development.

Integrating ICT in Education

There is now strong focus on the development of ICT policy and integration of ICT in curriculum and practice across the whole education sector. ICT has become an important concept in primary, secondary and tertiary education. Smeets (2005) noted that in most developing countries, policy and curriculum support for the development and integration of ICT in schools have lagged behind but the situation is beginning to change as researchers, academics and practitioners have aim to support the integration to enable the users to make well informed decision and choices. There is therefore no doubt that individuals' ability to access and process information is said to become the determining factor in their integration of ICT not only into the working environment but also into their social culture environment (Delores, 1996).

Smith, Hardman and Higgins (2006) are of the view that the delay attentions to ICT in education present some advantage for the sector. The growth and development of ICT in the schools have sometimes been driven by the desire to get more technology and technological infrastructure into schools without sufficient attention given to the pedagogical purposes for introducing

the technology or the supporting conditions and resources that might enable the technologies to contribute towards better teaching and learning experiences.

While Smith et al. (2006) and many writers are of the view that ICT can help pupils to learn and teachers to teach more effectively, Cuban & Kirkpatrick (2002) also said that research has uncovered many examples in which wide spread rollout of ICT in schools has not helped teaching practice or students learning experience in any meaningful way. They go on to say that simply providing ICT equipment to schools or teachers and putting ICT in the curriculum will not necessarily make a difference, what makes the difference is the way in which these equipment and other resources are used.

According to Kozma (2005), educational reforms including the integration and implementation of ICT at best, need to be systematic in nature and focus on the overall changes resulting from technology intensive interventions.

Kozma (2005) is of the view that policies both local and national are important to the success of any innovations therefore policies should be provided to give a more focus vision of how technology could be used in the school and classrooms. There should be plans and programme allocated to equipment and other resources to accomplish the vision. Teachers should be provided with professional development skills in the integration of ICT into the curriculum.

According to Becker et al. (1999) the computer is one of the range of technologies that are available to teachers and students and they argue that apart from some exceptional schools, the computers had little impression on what happens in the classroom. Much debate has been raised over the reasons for this minimal impact of the computers in schools and in the classroom. Technologies such as radio, projections and televisions have had little effect on the experiences of students and teachers in schools over the last decade where large amount of money has been spent on these resources (Becker et al., 1999). It is important therefore that our scarce resources to support learning in school are not wasted. There is therefore the need to take care in choosing the use of computer to support learning Nutsukpui (2006).

Educational technology should be developed with the objectives to solve problems, improve standard of living and to crease productivity. This has been the historical aim of technology (Becker et al., 1999). It is of sound judgment therefore that educational technology is to develop to meet these aims or objectives, thereby increasing productivity in teaching and learning. Educational technology should influence educational outcomes and cost particularly as it is difficult to calculate or estimate their values. Even so it is important to consider the concept of educational productivity with regard to the effect ICT may have.

As the availability of computer hardware is increasing, it should be the important aim of teacher not to occupy fully themselves in the machine, but make primarily their aim to focus on their role as educators through the extending of their imaginations with the awareness that they will do everything within their powers to achieve more of their goals with the

developments in computer technologies. As a result of this Collis (1989) recommends the thorough examination of the rationale for using ICT before beginning to use computers in schools and classrooms.

From the reviewed literature on integrating ICT into education, it could be seen that, while some are of the view that ICT should be implemented now, some say that the delay intensions is an advantage to the sector. Again, some say that ICT has helped in teaching and learning whilst others say it has not. The import of these is that care should be taken when choosing ICT to support teaching and learning, considering our scarce resource.

The extent to which ICT is used to enhance Teaching and Learning

This section discusses ICT and the curriculum, ICT and student, ICT and learning, ICT and the role of teachers and ICT and the learning environment.

ICT and the Curriculum

The Chamber's Dictionary (Chamber Harrap, 2006) explains curriculum as a course of study at a school, college, university etc. Newhouse (2002) refers to curriculum as coming from Latin meaning to run a racecourse. Blurton (2000) defines it as a series of planned instruction that is co-ordinated and articulated in a manner designed to result in the achievement by students of specific knowledge and skills. Newhouse (2002) again goes on to define curriculum in education as a combination of the learning outcomes pedagogy and content that students are to address. It has been argued that the curriculum and ICT co-exist where ICT helps in transmitting the curriculum and at the same time assists in changing the content of the curriculum.

According to Pelgrum and Law (2003), three distinctive roles are generally differentiated for ICT in the curriculum: learning about ICT, which refers to ICT as a subject of learning in school curriculum such as computer (or ICT) literacy, computer science and information literacy; learning with ICT, which refers to use of ICT, including multimedia, the Internet or the web, as a medium to enhance instruction or as a replacement for other media without changing the beliefs about the approaches to and the methods of teaching and learning; and learning through ICT, which refers to the integration of ICT as essential tool into a course/curriculum, such that the teaching and learning of that course/curriculum is no longer possible without it.

The effect of ICT is seen on both declarative and procedural knowledge in that the current curriculum and models of teaching and learning were not designed to accommodate the increasing rapid widening quality of knowledge (Riel, 1998). This is to say that the quantity of declarative knowledge is growing rapidly, through the efficiency of ICT and at the same time ICT is providing the instruments to readily assess knowledge. Riel (1998) posit that the technology itself has added quantities of declarative knowledge to the skills and knowledge required in society and working places which is now different from when school was instituted. Students now require flexible and general sets of procedure knowledge rather than specific bodies of declarative knowledge.

Evidently the curriculum must remain relevant to societal and workplace needs. It is reasonable for "…children's school-based learning later" (Lankshear et al., 2002 p. 130). Becta (2002) supports the fact that the

effect would be glearing in almost all disciplines of learning but there will be a substantive degree of variation between the disciplines. Fullan (2001) brought out that there have been large effects of ICT on mathematics and science. "…dynamic model in interactive multimedia that provides visualization and analytic tools are profoundly changing the nature of inquiry in mathematics and science. These changes affect the kinds of phenomena that can be considered and the nature of argumentation and acceptable evidence (Becta, 2002, p. 215).

Research indicates that due to the teacher, there is more venation in the area of the curriculum. "What people need to learn to be able to fit into the changing social, economic and cultural mainstream life" includes ICT related practices (Lankshear et al, 2002, p. 126).

Many educators have recommended the outcomes-based curriculum as requiring assessment processes associated with students profiling through records of achievement (Cuban, 2001). This permits assessment to come out naturally from the task but not being an additional feature of the curriculum. A range of assessment tools are encouraged to be used which could give a more vivid and accurate picture of a leaner bringing out the formative and summative values. Cuban (2001) said that use of a range of assessment implies the use of some sort of maintenance of learner activities, and portfolios. This brings out the need to help teachers to do this with computer support to adequately implement the profiling through records of achievement.

Eddie (2000) supported the idea that curriculum is a way in which learning can be assessed. The focus on strictly followed paper-based examinations and prescribed learning outcomes are not appropriate to

facilitating ICT to learners and so ICT use has been reduced by learners. Schagen and Hutchison (1994) pointed out that at the school level, a variety of different methods are used to reward learners. This was particular with the United Kingdom where assessment-based level of learning outcomes was being used. There were a number of national curriculum assessment tests, which were taken by students of selected ages. The reliability of these test, showed that in most cases, pupils of similar ability could be assigned levels due to the context or construction of the test (Schagen and Hutchison 1994). They quoted Reeves (1992) as stating that attempts at national testing in the USA have similarity gathered a greater amount of criticism with report that teachers reaction range from ignoring to cheating.

ICT and Students

Papert (1987) claimed that most people especially children have very little of the systematic and process thinking embedded in computers in their culture or environment, when he made available the role of cultural background in living and in developing concepts to use the potential of computers. He therefore said that non-threatening computer environment in which students can examine, control and use in a skillful way to bring out their own potential and that of the computers should be supplied or provided for them. This, in his view, would enable students to develop a workable framework for the use of computers.

When a person knows how to go about getting the appropriate software and hardware, knows how a computer could be used to help perform a task at hand, enjoys working with the computer to perform a given task and has the knowledge required, then he or she is likely to always use computers. Some

knowledge as to the use and functions of the computer system needs to be acquired in schools when computers are to be used in the societies, especially in the field of work (Loveless, 2003).

According to NFIE (2001, p. 120) "the use of ICT in schools should have a positive effect on students in terms of supporting their learning and providing them with relevant technological literacy". This points to the fact that individual needs of the students need to be addressed. Increased motivation for learning and technologies, increases skill and technology capabilities views are among the findings of the road ahead study NFIE (2001 no. 407). This finding brought about improved achievement in the academic performance of the students and product of the students in other cases.

However, Kimbell (1994) points out that there is the need for programs which will allow students to build up the skills needed to use the computers. He added that there is a vast difference between the concepts of computer literacy and that of the ability to use the computer. What he meant was that the computer literate person should be in the position to use the computer effectively and also understand its roles and other implications in the society. He asserted that all these (the above) are as a result of technology and enterprise learning area in which the development of skills in handling materials are involved. Means and Olson (1994) are also of the view that, since the computer is seen as a real-life tool applicable to future employment, its use should lend authenticity to the students' work and promote attitudes important to life-long learning. This requires students to focus on the technology process rather than the systemic development of prescribed list of skills.

Kimbell (1994) used the word computer literacy to cater for both the awareness and the literacy of computer but the term literacy was used to concern a person's ability to recognize an application in which the choice of a computer is appropriate and the ability to use computer for that application (Shelly & Cashman 1986). Computer literacy is necessary in order for a person to function and be successful in this high technological society. Today, education in computer literacy can begin in a very young age and continue for the rest of a person's life. Learning about computers and how to use them has become a high priority for many students in the world as it is required that it contributes to the society which is to a large extent dependable on computer technology and makes substantive use of computers and associated technology.

In terms of computer expertise of the students, Rowe (1993) defined two groups of students, the top and bottom 20% when she found out that children differ greatly in the use of the computer in both its efficiency and effectiveness. She developed a set of indicators for effective use of computer that were used to profile match and created four groups of students. She named those who intertwine learning and computer use and were confident computer uses as orchestrates. Those who see the computer as a separate area of learning she named as amplifiers. Those who view computers as non-essential, that they are mainly used for calculation and word processing, she named as the machinists and finally those who made limited use of computers, mainly copying others and using drill and practice package she named as the preservators.

In a report by SRI International, Crawford and Vashey (2002) revealed that on a palm pilot study in schools, it was found out that students require a more flexible and responsive access to the use of ICT and that it is more likely it will lead to a greater engagement and enhance learning out comes. An important issue is that most students like using computers with about 5% who do not like using computers at all.

A study conducted by Loader and Neville (1991) with a year Eight class, using computers in Australia revealed that almost all the students had good ICT skills and positive attitudes. The tendency was there for the students not to depend mostly on their teachers but to work by themselves. In 1991, they (Loader et al) presented another report where about 95% students liked using their computers and preferred completing their work on their computers to using papers and pen.

From the literature reviewed in the area of ICT and students, it can be seen that, if the use of ICT would have a positive effect on the students in terms of supporting their learning, it should be recognized that the abilities of children differ greatly and therefore students require a more flexible and responsive access to the use of ICT. This would encourage them as most students have positive attitudes towards the use of ICT.

ICT and Learning

Moore (2000) opined that, the computer is a support tool in the learning environment and so its effects on learning can not be isolated. Many researches have been made over the decade (Not necessarily related to using computers) where decisions about suitable application of computers to learning have been made. The relationship between students' characteristics,

learning environment, behaviour and schooling outcomes are crucial and need further research (Bayraktar, 2002). Yet, there has been much research which reveals that these relationships best fit in the context of educational computing.

Instead of starting with a decision concerning computer support, an approach where teachers identify what problems are associated with preceding learning environment and tailoring the use of computer ends with the decisions should be adopted. In a report from the impute CT2 conducted in the United Kingdom by Becta (2002 p.3), it was found that there is no consistent relationship between the average amount of ICT use reported for any subject at a given stage and its evidences of effectiveness in raising the academic performance.

Rather than providing cross age tutoring programmes, increasing instructional time, and reducing class size from 35 - 20, it was seen that west Virginia's basic skill/computer education programme was more cost-effective in promoting and improving students achievement (Mann, Shakeshaft, Becker and Kottkamp, 1999). Becta (2002) also argued that in more than a third of all the comparison made between pupils expected and actual scores, the difference in attainment associated with the greater use of ICT were vividly present. To Becta (2002), given the right conditions for access and participation, much gain in students learning is recorded with ICT. It is better to start the use of ICT with the consideration of its impact on learning and the curriculum (Gareis, 2006).

Schacter (1999) clamed that the students who used computer based instruction scored higher percentage than students who did not use computer

based instruction on a test of achievement. He observed that while there was no direct link between using ICT and students learning it, it was still clearly shown that there could still be an indirect significant positive effect of the use of ICT on learning.

Rieber and Welliver (1984) argued that the media is the final step in instructional design and not the first because different instructional situation calls for different instructional elements. This argument came about as a result of the criticism on the media comparison studies. They claimed that the media were of no value applied to research into the use of educational television and so many questioned their value to educational ICT research. Rieber et al., (1984) again quoted the education task force report of the USA government (1984) which suggested that one of the four important points for improving the use of technology in schools is the identification of instruction problems and the development of realistic solutions.

While an argument can be put in place to provide a solid rationale for the use of ICT theoretically, consideration should be given as to whether in practice, ICT has a positive effect on the learning (of students and teachers). This report reviewed the effect of ICT on learning. While it would be useful to be able to make a direct connection between the use of ICT and learning outcomes, reputable education researchers today agree that a direct link exists as learning is mediated through the learning environment and ICT is one of the elements of that environment and that the effect of other elements on learning can not be entirely removed or ruled out.

It has been widely recognized that harnessing the power of modern technology for learning purposes requires that appropriate learning strategies

be developed that harmonise effectiveness in learning with the technology role (Kearns & Papadopoulos, 2000). From all the above, it could be seen that ICT and learning outcomes has a link. Therefore, appropriate strategies should be put in place for its integration into education.

ICT and the Roles of the Teachers

According to Collis (1989, p.17), "many elements of the traditional school organization would and should remain regardless of information technology's potential". Collis therefore argued that there is always the need for human to human interaction and motivation and so teachers would always need to be instructional leaders. Means and Olson (1994), also counter argued that the main neglected reason why computers have not altered the curriculum is the way it is predicted by the influence of traditional teaching methods and routines of practising teachers.

Becta (2002) also brought to the fore that it would be necessary to produce systematic evidence that the teaching practices is being supported by computer use such as learning based on discovery and problem solving. But Riel (1998,) argued that the use of computer systems to provide just in time learning massively undervalue the role of the teacher. He pointed out to the fact that, in handling conflict, multiple perspectives and students understanding of the need for these inter- dependence would have to be developed. The effective use of technology involves many teachers' decisions and direct involvement (Annan, 2002).

The potential of computers may disturb some teachers who worry about their own influence and roles in the classroom and there is the need to encourage teachers to avoid developing a resistance based on this conception,

to reflect on the effect of ICT as a whole. Gregorie, Brasewell and Laferriere (1996) pointed out that teachers are less likely to take on the role of content export and there is the risk of losing their established influence over the values and direction of the classroom activity if they increase by corporate with other teachers and distant team teachers from any field with any expertise to work in the classroom.

If it is the aim to use ICT to involve students in a more cross – discipline project – based learning, it would require teachers to have a wider range of knowledge on so many disciplines and this makes clear that the role of the teacher would continue to be crucial. The composition of the teacher role is likely to change and this will require a range of skills and knowledge. Therefore teachers need to be well skilled in directing students through the huge quantities of rich information. Teaching ICT capabilities is a challenging one as it requires teachers to not simply teach how to perform tasks using ICT but also to allow students to learn and explore why, when and where to use ICT (Loveless, 2003).

Rieber et al. (1984) noted that the lecture and test – based model of teaching and learning is itself the product of introduction of a technology. They pointed out that technological development and the transformation of learning has a clear link and therefore challenged participants in school-based learning to adopt and apply the technology and the model of teaching and leaning that will yield result. This appears to explain why teachers need to reflect on how they put their influence to use in their classrooms as their roles in the use of ICT in schools are crucial.

ICT and the Learning Environment

The committee on development in the science of learning (Annan, 2002) completed well researched theories of learning and strategies for providing learning opportunities and therefore stated that several groups have reviewed the literature on technology and learning and conclude that it has great potential to enhance students' achievement and teacher learning but only if it is used in the proper way. It has been argued earlier that ICT as a component of the learning environment is a mediator of learning and that while it is difficult to measure and demonstrate directly the effect of ICT in schools on learning, it is possible to connect the two (as a component and as a mediator).

Students can use ICT as a tool to investigate deeply the real world, access information even outside their own classroom and analysis and interpret the information that they get (Gregorie et al., 1996). They added that what could be learnt is broadened and deepened.

Web education, tele learning, electronic mail and tele tutoring, have become possible because of ICT and has changed the face of education (Dzapkasu, 2005). Increases in telecommunications technology have enhanced personal and group interactions in distance education. With or without meeting face to face, computers and audio conferences have permitted the introduction of class discussions. The distance learner can now have almost the same instructional contact and interaction as the student in school. The modern teleconferences and World Wide Web have provided a rich expansion of both information and contact that was not prevailing. This is one advantage that the web technology has over the traditional way of distance instruction.

Students' engagement with the curriculum would increase as they are given the necessary opportunity to create their own ideas (Riel, 1998). Riel added that the computer software could be used to provide student with learning expensiveness as they interact with the computers using them frequently. The leaning process as it is understood will better facilitate the development of student conceptual framework and assist in deeper learning styles as students have more influence on the learning process. These activities could be more responsive to the students needs.

The use of computes has increased and it is providing learning experiences when and where they are needed. The opportunities being offered to students is bringing out greater independence not only in terms of when and how to learn but also on what they learn (Cradler & Brieghforth, 2002). Cradler and Brieghforth described the computer as inducing learning independence. So teachers should provide students with access to software that allow the learners the ability to select different learning experiences (Gregorie et al., 1996).

Gregorie et al. (1996), and (NFIE) 2001, brought out the provision of the scaffolding for the assistance of highly - level thinking. They drew attention to the increasing range of software tools that could be used to support the development of higher level thinking skills such as analyzing, synthesizing and applying. It was found out that students learn more in less time and produce more when they use the computer properly. As a result of this (Schacter, 1999), referred to the scaffolding tools prescribed, as Elections Performance Support Software (EPSS).

NFIE (2001) stated that, interaction and personal lifestyle where individuals are responsible for their actions, including learning and respect for the abilities of others in the learning environment of ICT. It went on to say that, the interventions facilitate the accomplishment of a specific product or goals through people working in groups and studies have found ICT as providing good team- based support for work.

Many studies have found that the computer-based instruction could increase achievement. In most traditional learning situations, it is not possible to provide each student with an instructor or to design learning experience spelling for that students but the interactive nature of the computers system provided the opportunity to develop software which will simulate the role of an instructor (Riel, 1998). Riel added that the intelligent tutoring software might use information about the student to recommend appropriate sections of tutorials for the students. Riel (1998) again agreed that the use of ICT in learning is extrapolated to the support of a learning community. Teachers are thus, urged to consider providing a range of activities that would enable students to become critical thinkers and problems solvers. In doing this, Annan (2002) and Schacter (1999) prescribed the use of computer for the analysis of data, presentation of data, linking of data or information simulation of environment and conditions for the support of interactive communications.

Software, with their interactive and multimedia feature could be used to enable students understands concepts, ideas and provides experiences in a variety of ways to students. Miller (2001) cautioned that it is difficult to allow students to be sufficiently active as participant and pointed out that students are often passive spending a lot of time listening or reading. It goes on to say

that, children are more likely to be interested, attentive and achieve wider range of learning outcomes if they could be active and provided the tool to increase their productivity.

Studies have shown increase in achievement in special needs of students when computers are used. They could be provided with computer support for learning activities jeered towards their individual needs. Eddie (2000) added that, the use of online technologies is often to provide more individualized programme and the computer software could be used to support such programme for students who require individualized learning. For students who are physically handicapped, varieties of input and output devices such as the modified keyboard and mouse – drives could be used to enable their involvement in the same learning activities as others students computers provide the only environment which such students could manipulate and the only tool that reduce their level of disability (Nutsukpui 2006).

Gender, Age and ICT

Male and female students of different age groups are affected by the use of ICT. The issue of gender and age has been an important topic within the research on ICT. This is because ICT and ICT professions are often held to be repelling to women in particular but are associated with their male counterparts.

Even in their childhood, boys tend to destroy their toy cars plans and guns. Such curiosity, boldness and fidgeting in them has commonly been held as an important step toward becoming an ICT acquired position and skills due to their curiosity with machines. Most women view computer task as being too complex but high demand for job on the job market and their desire to be

employable have driven most women, nose deep into acquiring computer skills (Dzapkasu, 2005).

Passig and Levin (2000) who researched gender differences in the preferences to varying designs of multimedia learning interfaces, found a significant difference in the level of satisfaction between boys and girls depending on the design of the learning interfaces. Girls could ignore their own abilities as a tendency to express their computer knowledge in terms of insecurities. On the other hand boys easily talked about themselves as computer proficient and tended to express themselves in terms of self-confidence, even when they were not. The products aimed at everybody are most often based on the male user because girls' fear clearly contrasts the dominant design practice. Martin and Hearne (1989) as in Dzapkasu (2005) also viewed gender participation in ICT in this direction as they said that female tend to remain at the word processing level leading only to clerical use whereas males tend to reach upwards.

On the issue of age and ICT use, Baltes (1987) stated that research conducted by Australia's council on the ageing receded that older adults are attracted to technology products to enhance their capacity for independent living. They are therefore the strongest growing group considering the use of ICT. They recognize the ability of ICT to improve their social well being and help them to gain greater autonomy.

On the other hand, it is said that ICT is paramount in supporting and improving the quality of education of the youth. It is of immense interest that students or the younger groups develop and have the skills required making effective use of ICT and having adequate access to new technologies. This is

because ICT developments are changing the way people carry out their daily activities (Melenhorst 2002). The multimedia interface are user friendly and reduce the effort that one would have to put in the achieve targets and therefore the youth enjoy using it to their satisfaction.

Baltes (1987) is of the view that as one grows older; the body loses strength or energy and has low mental stimulation. Due to this older people aspire to use their mental and physical faculties more economically than young people. Younger people have all the strength, energy and high mental stimulations to strive deep into the use of ICT without any struggle. Therefore the essence of the youth using and appreciating ICT is in the right direction since it will help them to use to the full, their mental and physical resources more efficiently and effectively.

Peer support, positive experiences, encouragement and the desire to extend their knowledge have been the main driving forces in the use of ICT by the youth. The younger generations are motivated by family and friends, their own intrinsic fear of being left behind and the challenges they face by the technological world to take and build up more interest in the use of ICT in and out of school. It is believed that ICT can empower them and offer them greater autonomy in the future (Dzapkasu, 2005).

Supporting Management with ICT

Management and administrative task are nowadays being done increasingly by computers. Newhouse (2002) is of the view that databases are maintained to include a large amount of information about each student in the school which could easily be retrieved and analyzed when the need arises. Computers have the potential of improving the efficiency of many tasks done

in the school. They could be used as a tool by the classroom teacher for the preparation of his lessons and management of his teaching resources. The networked systems provide opportunity for a range of people (parent, staff, administrators and students) to have access to information where necessary. In the secondary school particularly, the use of ICT software to support time tabling has become important. Newhouse (2002) claimed the allocation of student, staff and room are done in the school as it seems to be very complex and time consuming.

As a result of the increase in the use of computer by many schools and organisations, management and administration of schools should change and become computer-literates as we live in a world which is dynamic and change is a sure factor. The computers themselves though powerful tools, and user friendly, their impact cannot be felt until one has access to use them (Oshagbemi, 1988).

Improvement in quality is often equated with an increase in the number of qualified workers/personnel. There is no doubt that expansion and improvement cost money. Educational planner therefore must adopt a technique that increases opportunities for education management to have access to computers and connectivity to the web although it may be costly (Dzakpasu 2005). The issue of access to information technology in the education set up is an important aspect of the information revolution and information delivery in schools which ensures that management and students are provided with opportunities to have easy access to ICT facilities.

Potential of ICT in Education

The Panel on Education Technology (1997) brings to the fore that a shift from teacher-controlled towards more students controlled arrangement of the learning process can be facilitated by ICT. It says that many of the current ICT applications are used to facilitate teacher-controlled arrangement of the learning process. Applications of ICT are adapted to the existing education beliefs and teaching routines and are being used just as a substitute for other media.

Brummelhuis (2000) is also of the view that the beliefs and attitudes of teachers towards their teaching practice have not changed and basically in the secondary school, the teaching and learning process itself has not changed. Itazkan (1994), also noted that the use of ICT as a substitution of current teaching and learning activities can be seen as the first of three phases through which the new technologies generally diffuse and these three phases are the substitution phase, the transition phase and the transformation phase.

According to Itazkan (1994), in the substitution phase, the technology replicates or automates the existing practices and technology is used for existing educational activities. For example, drill and practice exercises on the computer. In the transition phase new instructional methods begin to evolve, like the use of e-mail to communicate with peers. Here technology is used for activities for which it was not necessarily brought in and this challenge old instructional practice. In the transformation phases, the technology provides completely new instructional situations and the old customs become obsolete. Here the instructional task, for which the technology was originally acquired, may no longer be desired.

What all these phases mean is that the continuing use of ICT for substituting existing practices will not contribute to solutions for today's problem in education. Therefore, carefully planned actions are needed to get beyond ICT use just for substitution. A student-controlled, constructivist approach to education can be realized through the use of the new technologies in transition phase.

Brummelhuis (2000) also explained that the teacher controls teaching and learning by testing the whole class at the same time, doing whole class teaching, having all students working at the same time and on the same content with the teacher being the most important source of information. The student-controlled teaching and learning is also characterized by student frequently applying self-monitoring, students working at their own pace and students working in groups or individually. Brummelhuis version clearly shows that ICT in education gives room for students to bring out their own initiatives, creativity and participate fully in the learning process. This in turn will boost the achievement level of the students.

The new learning environment is characterized by student centred learning, multi-sensory simulation, multimedia, collaborative work, information exchange, active/exploratory inquiring based learning, critical thinking and informed decision making, proactive response and authentic real world context. From the two learning environments, it could be seen that the new learning environment which make use of ICT will contribute to solution for today's problems in education. The Internet, for example, is entering the classroom at a rate faster than books, newspapers, magazines, movies,

overhead projectors, or even televisions (Leu, 2000) and teachers as well as students should harness it to improve the quality of education.

Jonassen (1996) concurred that when tools such as databases, spreadsheets, and multimedia, e-mail and network search engines are utilized to complete projects requiring students to use information to solve problems, there is greater potential to promote cognitive development. According to Loveless (2003), internet access in schools has enabled students to use technology to communicate with others, both within the school or in the wider world.

There are growing possibilities for building and exploiting information bases. Possibly most importantly, it becomes essential to develop effective strategies for storing information in ways that allow it to be very easily manipulated for future purposes. Loveless (2003) is also of the view that, the value lies not in possessing information, but rather in developing the skills and capabilities which are transferable and adaptable to enable students to make appropriate and beneficial use of ICT in the real world as well as in the academic setting. She added that, the capacity of ICT to deliver information or to communicate with a mass of students in quite individual ways opens up the possibility of tailoring pedagogy to the needs of the students in time and place without the limitations imposed by peer groups.

ICTs can be used to support a range of communication strategies, especially easy asynchronous communication between educator and learner, and amongst learners. Where appropriate, this communication can be extended to include groups of people rather than just individuals. A major component of this strength is the capacity to support many requirements for communication

to ensure effective management and administration of the system (Butcher, 2003).

Butcher (2003) pointed out that, ICTs can be used to immediate, up-to-date resources, using one or more media, to large numbers of educators and learners, easily and relatively cheaply. Changes made to resources are immediately available to educators and students without incurring major additional distribution costs. Resource distribution should, however, not be mistaken for education. An additional benefit that ICTs can bring to designers of online learning resources is the huge resource base that resides on the Worldwide Web.

From the above, it could be seen that, ICT can provide educators with a range of very interesting opportunities for creating resources that allow learners different levels of interactivity. This can lead to the creation of interesting and exciting interaction of learners with educational resources.

Barriers to ICT Integration

George and Jones (2001, p.606) stated that "individuals within an organization may be inclined to resist change because of uncertainly, selection perception and force of habit". People may be forced to kick against on idea which will bring about change because they are anxious and hesitant about what the outcome of the change will be. That is why Kennedy (1988, p.329) said that "it is not just enough for people to act differently in the course of change but in addition, they may be required to change the way they think about certain issues, which is deeper and more complex change".

Koontz and Weihrich (1990) gave reasons why people resist change. To them, people want to feel secure and have some control over the change so

if they do not know what to expect, this may cause fear and induce them to resist the change. They went on to say that, people may resist change if they do not know the reason for the change. Dennis and Wixom (2000) also explained that "people do not always adopt an innovation, even if adopting it is logical and beneficial".

In an observation, Bitner and Bitner (2002) added that barriers to ICT can be centered on the support networks that are available to the school. These include internet connectivity, support from the teachers, the administration, technical service and students as well. This is to say that whereas the role of the teacher is crucial in the success of integrating ICT, the support system is a factor on which the success of the programme highly depends. This brings to the fore that the technical and curriculum areas need to be provided with support that is both on site and on going.

Another barrier to ICT integration in the schools or organizations is the development models. According to Marshall (1993), whilst the vision for many peoples' foundation for ICT was a constructivist perspective, technology's pioneers was not necessarily adopted by those who were providing professional development or those who were using technology in their classroom. Professional development is centered on instructional methods of integrating ICT, which is aided in changing the thinking of pre-service teachers about the use of ICT and its role in students learning. There had been arguments that, teachers change their views of ICT integration from thinking they would teach about technology to support student learning (Beyerbach, Walsh & Vannatta, 2001). However, teachers do not require proficiency in a large variety of technology application, for successful

integration of ICT in teaching and learning but rather they need to feel comfortable and confident in instructional methods of ICT integration.

It is suggested that teachers need to reform their concept of teaching to be able to see how computers could be used as a tool for the construction of knowledge, instead of instruction in the classroom management (Schmid, Fresmire and Lisner, 2001). They hold on to the fact that, accessibility of the computer in the classroom is limited especially the 'one user' design of the educational software. Therefore it is difficult to find ways to cater for the individual needs of the students.

An important limitation of many educational software programmes is that it only covers minor parts of the curriculum (Van Den Akker et al., 1992). This makes it less attractive for teachers to invest their efforts (and budgets) in applying new media in their instruction. In an international study, Pelugrum and Anderson (1999) show the difficulties of integrating computers into classroom practices. Not only are many educational software programmes quite isolated, but it also appears that teachers lack the competence of integrating computers in their instructional processes. Compared to the early 1990s, at the start of the twenty-first century many teachers have received training in basic ICT skills and knowledge. However, very few have been fortunate to receive continuous education that centered on the pedagogical use of ICT in instruction. Olson (2002) argues that the use of ICT in schools often does not fit into the existing teaching culture and that it may even undermine the teacher's sense of efficacy. The use of ICT often assumes a change in pedagogical approaches and classroom management strategies, implying that teachers have to change their routines (Saltzinger, Jackson & Burd, 2002).

Godfrey (2001, p.16) stated that "to become confidence, critical and creative users of ICT teachers must have access to professional development programs that enable them to have multiple skills, both, in the use of technology and in task design." Therefore teachers need, not only the ICT skills, but also the models of best practice and knowledge to support learning.

Many of those schools that do have computers still do not have access to the internet, which is an important requirement for supporting networking for learners and teachers, as well as for collaborative learning, the internet can provide a wealth of learning resources, access to which is, at present, very limited for many African education institutions. In Ethiopia, example, only nine of the 12,000 primary schools had internet access at the end of 2001, and ten of the 424 secondary schools (Jensen & Sarroco, 2002). Further, the costs of internet access can be prohibitively high for many schools, both in Africa and elsewhere. In a study conducted in the US, it was shown that subsides to schools for internet access (which ranged from 20-90% of costs depending on school characteristics) led to 66% more classrooms with internet (Goolsbee & Guryan, 2002).

Lundell and Howell (2000) noted some factors that prevent schools from using computers for teaching and learning. Among these factors were: insufficient funds, insufficient numbers of computers, lack of computer literacy among teachers, lack of subject teachers trained to integrate computers into learning areas; the absence of properly developed curricula; lack of resources for teaching computer skills.

Lack of follow-up support is also another barrier to ICT integration because activities often take place from the school site. Mauze (2002)

suggested that in order for ICT integration to be effective, in class assistance, support must be provided and it must be context specific. He suggested that programme designed to help teachers to integrate ICT into their classrooms should be introduced and demonstrated. Hand-on and discussion of the implication that the demonstrated applications have on teaching and learning should be done. Mauza (2002) again reported a number of factors for successful integration. He claimed that as teachers acquires skills in ICT, they find it easy to incorporate strategies to integrate ICT into the curriculum, taking into consideration, access to equipment and creativity in the curriculum design. He recommends that teachers would need to recognise the benefits of ICT in the teaching and learning process before they will be willing to implement it in the classrooms.

Looking at the literature reviewed above, it is of much importance to bear in mind that follow-up support, insufficient funds, insufficient computers, lack of internet connectivity and unwillingness to change on the part of teachers can be barriers to the integration of ICT into education, and therefore they should be looked at when considering the use of ICT in schools. These were the issues that were of interest to the present study.

CHAPTER THREE

METHODOLOGY

This chapter describes the methodology of the study. It describes the research design, population, sample size, sampling procedure, research instrument, data sources, data collection procedure, pilot-testing of the instrument and the data analysis procedure.

Research Design

The study is a descriptive survey. It is a descriptive survey because according to Polit and Hungler (1995), it observes, describes and documents aspect of a situation as it naturally occurs. The descriptive sample survey is used to assess the frequency of the use of ICT by student and teachers in the Sekondi Takoradi Metropolis. The study tried to find out whether the teachers were using ICT in their daily teaching and learning activities.

Gay (1997) claimed that the descriptive survey technique is useful for investigating a variety of educational problems which normally includes opinion, assessment of attitudes, demographic information as well as conditions and procedures. The descriptive sample survey enables one to collect data from members of a population in other to find the status of that population with respect to one or more variables.

The descriptive survey also allows responses to be collected from a very wide range of people. This is so because it is primarily describing,

observing and documenting aspect of a naturally occurring situation (Polit & Hungler, 1995). The descriptive survey was preferred to other designs because it provides the true state of affairs of a given situation. People's perceptions are explained and accurate pictures of events are provided as a large number of individuals are asked the same set of questions.

The descriptive survey also has some disadvantages and among them are that it intrudes onto people's privacy. It again cannot establish cause and effect relationship (Best & Kann, 1998).

Moreover, the descriptive survey design was considered an appropriate tool since the study focused on students and teachers and their use of ICT in the learning environment. Since the populations were literate, it was assumed that the design would be appropriate in determining the existing attitudes of students and teacher use of ICT collected from the respondents were expected to be used to describe the existing rate of use of ICT by students and teachers in the Sekondi Takoradi Metropolis and the problems associated with ICT use.

Population

Population of the study was derived from students and teachers of all the eleven public senior high schools in the Sekondi Takoradi Metropolis which are Fijai Senior High School, St John's School, Archbishop Porter Girls Senior High School, Takoradi Secondary Technical School, Sekondi College, Takoradi Secondary School, Ahantaman Senior High School, Diabene Secondary Technical, Adiembra Senior High School, Bompeh Secondary Technical and Methodist Senior High School. The purpose of this population was to derive the facts that would help to give meaningful conclusion to the study. The numbers of students in the schools ranged between 411 and 1486

while the numbers of teachers ranged between 25 and 76. Altogether, there were 11392 students and 567 teachers in the schools of interest to the study (Table 1).

Table 1

Distribution of the Population

School	Students Population	Teachers Population
Adiembra High	839	41
Ahantaman High	1,036	45
Archbishop Porter Girls	799	41
Bompeh High/Technical	1,036	54
Diabene High/Technical	411	25
Fijai High	1,232	53
Ghana High/Tech. School	1,137	50
Methodist High	875	51
Sekondi College	1,486	69
St. John's School	1,219	62
Takoradi High	1,322	76
Total	11,392	567

Sample

The sample consisted of 250 students and 90 teachers selected from six schools. This sample size was chosen because, according to Sarantakos (1988), for a population of 2800, a sample size of 338 can be used. Also, for a Population of 15 000, a sample size of 375 can be used while for a population

of 20 000, a sample size of 377 can be used. Since the population of the study falls within, the stated populations and the sample size to be used, the sample size of 340 was considered appropriate for the study. Table 2 shows the distribution.

Table 2

Distribution of Sampled Schools

School	Sampled Students	Sampled Teachers
Sekondi College	49	15
Bompeh	40	15
Fijai	43	15
GSTS	40	15
Takoradi	32	15
St. John	46	15
Total	250	90

Sampling Procedure

A multi-stage sampling procedure was followed. Six out of the 11 schools were randomly selected using the lottery method. This method involved assigning a number to each school, writing each number on a piece of paper, folding the pieces of paper up and putting them in a bowl. The contents of the bowl were shuffled and a person not associated with the study was requested to pick one piece of paper. Once a piece of paper was picked, the number on it was noted and that piece of paper was discarded (not replaced). The bowl's contents were again reshuffled before another piece of paper was drawn and

the number on it noted. The process continued in this manner till the six schools were selected. The schools corresponding with the selected numbers became the schools sampled for the study.

The next stage of sampling was the selection of the teachers. This was also done by using the lottery method. I obtained the number of teachers in each sampled school. Numbers were written on pieces of papers and placed in a bowl and the teachers were asked to pick the numbers. Whenever a number was picked, it was recorded and discarded. The process continued till 15 numbers were drawn. Teachers whose numbers on the list coincided with the numbers drawn were included in the sample.

The third stage involved the selection of the students. This was again done by using the lottery method. The students from the sampled schools were asked to pick from a bowl of folded pieces of papers bearing numbers as described n the preceding paragraph. The process continued till the required number of students from that school was obtained. Students whose number on the list coincided with the numbers drawn were included in the sample.

Research Instrument

The data collection instrument for the study was a questionnaire for students and teachers and an observation checklist. The reason for researcher using the questionnaire was that it is widely used for the collection of data and it can be given to a large number of respondents at the same time. The respondents would be able also answer the items on the questionnaire at their own convenient time. Again, questionnaires are less expensive. Since no instrument has been found that specifically measures the level of students and teachers' use of ICT in the Senior High Schools the researcher developed her

own questionnaires. This was facilitated by using the literature and using the issues raised in the background of the study to write items that would elicit information to answer the research questions. As a result of this six set of questions were constructed.

The questionnaire consisted of six main segments (Appendices A & B). The first section consisted of respondents' personal data, (in the case of teachers, their work experience and present rank in the Ghana Education Service and in the case of students their class). The second section dealt with the availability, adequacy location, and accessibility of ICT facilities in the schools. The respondents answered questions on the location of ICT in the school, it availability, and its adequacy to meet their individual use. This section also looked at the types of computers used in school, whether they were networked, and the type of accessories that were available to them.

The third section is concerned with the purposes for which the computers in the schools are used. This looked into the types of ICT applications or the programs that were run in the schools. It covers the rationale for ICT use in schools. The fourth section related to the application of ICT in teaching and learning. This looked at the extent to which ICT is used in teaching and learning and how effective and efficient it is used. This is a four point likert scale type of questions such as with responses very often, often, quite often and not at all.

The fifth section elicits information on the constraint in the application and use of the facilities. Of interest here are problems encountered in the use of ICT and what authorities do to solve those problems and opinions about the availability of the ICT facilities in the schools.

According to Sarantakos (1988), observation is an indirect method of data collection since in most cases it collects information without the full knowledge of the respondent. Often even if the respondent knows that he or she is being observed, the actual nature and purpose of the observation is not known. As the observation employs the vision as its main means of data collection, the researcher will be able to observe what actually take place. An observation checklist (Appendix C) was used to find out if computers are available in the schools, how accessible they are to the students and teachers, the purposes for which the computers are used in the schools, students and teachers proficiency in the use of computers, and how computers are being used to enhance teaching and learning.

Pilot-Testing of Instrument

In order to get the validity, reliability and appropriateness of the questionnaire instrument, a pilot-test of the instrument was conducted at Mfantsipem School and the Oguaa secondary technical school all in Cape Coast. According to Leedy (1989, p. 43), "All questionnaires should be pre-tested on a small population". This made the pilot-testing very necessary; as it revealed poorly worded questions, ambiguities and helped to bring out whether there will be any items that respondents will have difficulties understanding. The reason for selecting Cape Coast was that it has the same

characteristics as the district of study. The two sets of questionnaire had cronbach coefficient alpha values of .756 and .686, respectively.

Data Collection Procedure

Before embarking on the data collection exercise, the researcher collected a letter of introduction from the Institute for Educational Planning and Administration (IEPA), made copies and gave them to the heads of the various schools sampled for the study. After sampling, the students and teachers were given questionnaires personally by the researcher. The questionnaires were collected back after seven days. The personal contact with students and teachers helped the researcher to explain some portions of the questionnaire to them when they demanded it.

The return rate of the questionnaire for teachers was 92% and that for students was 98%. Table 3 show the distribution of respondents by gender.

Background Information on Respondents

Personal Data

Table 3

Distribution of Respondents by Gender

Gender	Teachers Frequency	%	Students Frequency	%	Total	%
Male	66	79.5	127	51.8	193	58.8
Female	17	20.5	118	48.2	135	41.2
Total	83	100	245	100	328	100

Table 3 shows the distribution of the respondents by gender.

Table 3 shows that 66 (79.5%) of teachers were males. On the other hand 17 (20.5%) were females. Even though the study was not meant to find out how many women teach in senior high schools, the result reflects the number of female teachers at the senior high level. The table also reveals that out of the 245 students 127 (51.8%) were males and 118 (48.2%) were females

The issue of gender is an important topic within the research on ICT. This is because many people hold the view that ICT is repelling to female and associated with male counterparts. Passig and Levin (2000) pointed out that concerning ICT, there is a significant difference in the level of satisfaction between boys and girls depending on the design of the learning interfaces. About gender participation in ICT, Martin and Hearne (1989) as in Dzapkasu (2005) said that females tend to remain at word processing level leading to clerical use where males tend to reach beyond that. Also Table 4 shows the distribution of students' respondents by age**.**

Table 4

Distribution of Students by Age

Age range	Frequency	%
13-15	26	10.6
16-17	186	74.7
18 and above	36	14.7
Total	245	100

Table 4 shows that, the range of 16-17, being 186 (74.7%) are the highest respondents. This is followed by age range of 18 and above which had

the total respondents of 36 (14.7%). Twenty six (10%) of the respondents fell within the age range of 13-15. The age distribution of the teachers is shown in Table 5.

Table 5

Distribution of Teachers by Age

Age range	Frequency	%
25-35	51	61.4
36-45	29	34.9
46 and above	3	3.6
Total	85	100

Table 5 shows that out of the 83 teacher respondents, 51 (61.4%) were aged between 25 and 35 years. This is followed by 29 respondents in the age range 36-45. There were only 3 respondents (3.6%) in the age range 46 and above. Table 7 shows the distribution of teachers by status.

Table 6

Distribution of Teachers by Status

Status	Frequency	%
Head of Department	8	9.6
Teacher	75	90.4
Total	83	100

It can be seen from Table 6 that 8 (9.6%) of the teacher respondents were heads of department and the majority of the teachers 75 (90.4%) were also teachers in the various departments. This shows that both teachers and heads of departments were represented in the research.

Data Analysis Procedure

The data that were collected were analysed using the Statistical Product and Service Solutions, Version 16.0. Each copy of questionnaire was given a serial number and a code for easy identification before scoring the responses. The variables were coded and tabulated. Descriptive statistics were used, providing the opportunity to make precise statement and described things in an objective manner. Mean perceived level of ICT use by students and teachers and standard deviations were computed. Frequency distribution tables were used to present the distribution of respondents' view. Based on the research questions the data were analysed as indicated in Table 7.

Table 7

Data Analysis Procedure

Research questions	Respondents	Questionnaire Items	Analyses
1. How accessible are ICT facilities to teachers and student in Sekondi Takoradi Metropolis in the western region of Ghana?	Teachers Students	8 – 15 7 - 14	Descriptive statistics, percentages, means, and standard deviations.
2. For what purposes are computers used in the Senior High Schools in the Sekondi Takoradi Metropolis in the western region of Ghana?	Teachers Students	16 15	Descriptive statistics, percentages, crosstabs-male/female students/teachers against the purpose of use.

Table 7 continued

Research questions	Respondents	Questionnaire Items	Analyses
3. To what extent is ICT used to enhance teaching and learning in second cycle institutions in the Sekondi Takoradi Metropolis?	Teachers Students	23 – 26 22 – 25	Percentages, compare opinions relative to study using chi-square
4. What are the barriers to the use of ICT in the second cycle institutions in the Sekondi Takoradi Metropolis?	Teachers Students	27 26	Percentages, cross tabs in terms of gender and status.

CHAPTER FOUR

RESULTS AND DISCUSSION

This chapter presents and discusses the results of the study. The results are presented in accordance with the sequence of the research questions.

Research Question 1: How accessible are ICT facilities to students and teachers of second cycle schools in the Sekondi Takoradi Metropolitan Assembly.

This question was meant to find out how available ICT facilities were to senior high school students and teachers in the Sekondi Takoradi Metropolis. To answer the research question, questionnaire items were used to find out computers available in schools, the types of computers, ICT facilities, where the resources could be located, the number of computers in the laboratories, the numbers of computer laboratories in the schools, whether the laboratories were hooked to the net, and whether computers were assessable to teachers and students. Table 8 shows availability of computers to the schools.

Table 8

Availability of Computers in the Schools as reported by Teachers and Students

Computer availability	Teacher Frequency	%	Students Frequency	%
1-100 computers	58	69.9	206	84.1
101-200 computers	25	30.1	39	15.9
Total	83	100	245	100
	Mean = 81	SD = 8	Mean = 66	SD = 5.5

On the issue of the availability of computers to the schools, Table 8 shows that 58 (69.9%) of the teacher respondents said the schools had between1-100 computers, while 25 teachers (30.1%) indicated that the school had 101-200 computers. On the part of the students, 206 (84.1%) indicated that the school had 1-100 computers while 39 (15.9%) indicated that the schools had 101-200 computers. In the opinion of the teachers, on the average, there were 81 computers with a standard deviation of 8 computers. In other words, each school in the Sekondi-Takoradi Metropolis sampled had 81 computers, give or take 8 computers, suggesting a minimum of 73 computers and a maximum of 89 computers, on the average. On the other hand students sampled felt that on the average, the sampled schools had 66 computers give or take 6 computers, suggesting that a minimum of 60 computers and a maximum of 72 computers.

The findings of the present study suggest that Isaac's statement cited in Butcher (2003) that out of the 35000 senior high schools in Ghana only 500 had computers, depicting that 1.43% of the schools having computers, is no longer the case. Warkins and Biggs (1996) pointed out that many ICT policies published in recent years include strategies to increase the availability and access to electronic learning resources for schools. Ghana's policy on ICT has this important element. One can therefore say that, ICT in Ghana has changed positively since the Isaac's report. Table 9 shows the types of computers used in the schools.

Table 9

Types of Computers in the Schools as Reported by Teachers and Students

Computer type	Teachers Frequency	%	Students Frequency	%
All types	1	1.2	2	.8
Compaq, Hp, Dell, IBM	43	51.8	48	19.6
Compaq, Hp, Dell, Toshiba	-	-	108	44.1
IBM, Compaq, Dell	28	33.7	42	17.1
Dell	11	13.3	15	6.1
IBM, Dell	-	-	2	.8
IBM, Compaq, Hp Compaq	-	-	28	11.4
Total	83	100	245	100

As Table 9 shows, 2 (.8%) of the students respondents indicated that their schools had all the types of computers. Over two-fifths of the students respondents 108 (44.1%) indicated that their schools had Compaq, Dell, Hp and Toshiba. This was followed by 48 (19.6%) of the students who indicated that the schools had Compaq Hp, Dell and IBM.

On the part of the teacher respondents, the majority of 71 (84.5%) indicated that the schools had Compaq, Hp, Dell, and IBM and 1(1.2%) of the teacher respondents indicated that the schools had all the types of computer. From the responses of the respondents, both teachers and students, it could be seen that the schools use a variety of computer and the two categories of respondents did not seem to have the same ideas on the types of computers available in the schools. Table 10 shows the location of ICT facilities in the schools.

Table 10

Distribution of location of ICT Resources

Location of ICT resources	Teachers Frequency	%	Students Frequency	%
Laboratory	1	1.2	11	4.5
Head of department's office or head teacher's office	21	25.3	81	33.1
Laboratory or head teacher's office	61	73.5	120	49.0
Assistant head teacher's office	0	0	33	13.5
Classroom	0	0	0	0
Total	83	100	245	100

Table 10 describes the location of ICT resources in the sampled senior high schools in Sekondi-Takoradi Metropolis. Only one (1.2%) of the teacher respondents and 11 (4.5%) of the student respondents indicated that the computers were located only in the laboratories. The majority of 61 (73.5%) teacher respondents and nearly half of the student's respondents (120 or 49.0%) indicated that the computers were found in the laboratories or the head teacher's office. None of the respondents indicated that there were computers in the classrooms.

It is evident from Table 10 that in all the schools sampled, no computers were in the classrooms, suggesting that computer- assisted teaching in the classrooms was not done. Table 11 shows the number of computer laboratories in the schools.

Table 11

Number of Computer Laboratories Used by both Teachers and Students as Reported by Respondents

Number of computers	Teachers Frequency	%	Student Frequency	%
1	69	83.1	191	78.0
2	8	9.6	46	18.8
3 and above	6	7.2	8	3.3
Total	83	100	245	100

From Table 11, 69 (83.1%) of teachers and 191 (78.0%) students indicated that the schools have only one computer laboratory. Eight (9.6%) and 46 (18.8%) teachers and students respectively indicated that the schools

had 2 computer laboratories. Six (7.2%) of teachers and 8 (3.3%) of students also indicated that the schools had three or more computer laboratories. Table 12 shows the number of computers kept in the computer laboratories.

Table 12 reveals that 63 (75%) teachers and 174 (71.1%) students which represent the majority of the respondents indicated that their schools had between 20 to 30 computers in the laboratory. Nine (10.8%) teachers and 52 (21.2%) students also indicated that the schools had between 31 to 40 computers in laboratories. Five (6.0%) teachers and 4 (1.6%) students also indicated that the schools have 50 and above computers in a laboratory.

Table 12

Number of Computers in a Laboratory

Number of computers	Teacher Frequency	%	Student Frequency	%
20-30	63	75.9	174	71.1
31-40	9	10.8	52	21.2
41-50	6	7.2	15	6.1
51 -60	5	6.0	4	1.6
Total	83	100	245	100
	Mean = 31		Mean = 29	
	SD = 3.2		SD = 2.0	

In the opinion of the teachers, on the average, there were 31 computers with a standard deviation of 3 computers. In other words, each school in the Sekondi-Takoradi Metropolis sampled had 31 computers, give or take 3 computers in a laboratory, suggesting a minimum of 28 computers and a maximum of 34 Computers in a laboratory on the average. On the other hand

students sampled felt that on the average, the sampled schools had 29 computers give or take 2 computers, suggesting that a minimum of 27 computers and a maximum of 31 computers. Table 13 shows the internet connectivity of the schools.

Table 13

Respondent's Views on Internet Connectivity

Status	Yes	No
Teachers	31	52
Students	85	160
Total	116	212

χ^2=0.176 df=1, p>.05

Table 13 indicated that both teachers and students responded that most of their computers are not hooked to the internet. In other words 52 teachers responded that the computer laboratories were not accessible to the internet. Similarly 160 of the students indicated the same.

On the contrary 31 of the teachers indicated that the computer laboratories were accessible to the internet. Again, 85 of the students also responded that the computer laboratories were accessible to the internet.

The analysis shows that most of the Senior High Schools in the Sekondi Takoradi Metropolis did not have access to the internet. This may be as a result of cost related issues. On this (William, 2000) asserted that the use of internet technologies for education in particular requires explicit tariff structures and long term infrastructure investment commitments that are not forthcoming in most countries. Murphy, Coover and Owen (2002) also point out that the issue of most schools not having access to the internet could be

resolved through government regulations requiring service providers, public or private, to subsidise cost or reduce tariffs for educational institutions.

Status Differences in Opinions about Internet Connectivity

The following hypothesis regarding status differences in opinions about Internet connectivity in schools was tested.

H_0 The opinions of respondents are independent of status as a teacher or a student.

H_1 The opinions of respondents are dependent on status as a teacher or a student.

The opinion regarding Internet connectivity was independent of status, χ^2 (1, N=328) = 0.176, p>.05 therefore the null hypothesis that the opinions are independent of status could not be rejected.

Table 14

Respondents' Views on Access to ICT Facilities

Status	Yes	No
Teachers	70	13
Students	204	41
Total	274	54

$\chi^2 = 9.51$ df =1 p>.05

When the respondents were asked if they had access to the ICT facilities in the schools, Table 14 indicated that 70 of the teachers and 204 of the students responded yes. This shows that the majority of the teachers and students had access to ICT facilities. A small number of respondents that is 13

of the teachers said they had no access to ICT facilities and 41 of students also responded similarly that they did not have access to ICT facilities.

This Analysis is in support of Butcher (2003), who portray that many early development projects in the area of ICT set out to ensure that as many people as possible had a computer within walking distance, often using tele-centers or other means of shared community access for delivery. With this in mind, it could be seen that although the computers are few in the laboratory, many students as well as teachers still have access to them. The study was interested to find out about the number of times in a week that respondents used computer. Table 15 shows the analysis.

Status Differences in Opinions about Access to ICT Facilities

The following is hypothesis regarding status differences in opinions about access to ICT facilities in schools was tested.

$H_{0;}$ The opinion of respondents are independent of status as a teacher or a student.

H_1 The opinions of respondents are dependent on status as a teacher or a student.

The opinion regarding access to ICT facilities was independent of status, χ^2 (1, N=328) =9.51, p>.05 therefore the null hypothesis that the opinions are independent of status is rejected. Table 15 shows the Number of times in a Week that respondents Use the Computer.

Table 15

Number of Times in a Week that Respondents Use Computer

Number of times	Teachers Frequency	%	Students Frequency	%
1	22	26.5	179	73.1
2	20	24.1	21	8.6
3	9	10.8	3	1.2
4	24	28.9	2	.8
Total	75	90.3	205	83.7
	Mode =4times/week		Mode=1, once/week	

Table 15 revealed that 24 (28.9%) of the teachers had access to the computers four times in a week. On the other hand, only two (.8%) of the students had access to the computers four times in a week. Whereas about 22 (26.5%) have access to the computers once a week, the chunk of the students of 179 (73.1%) also had access to the computers once a week. Twenty (24.1%) and 21 (8.6%) of teachers and students respectively indicated that they use the computers twice in a week.

Eight (9.7%) of the teacher respondents did not respond. On the part of students 40, (16.3%) did not answer that question. The modal time of 4 times / week for teachers and once per week for students show that, on the average, about 29% teachers use the computers up to 4 times a week while 73% students use the computers once a week.

It could be noted that though the majority of the students as well as teachers responded in Table 16 that they had access to ICT facilities, the number of time within a week that they used the computer was minimal on the part of the students. The computer laboratories may be opened to the teachers all the time but may be restricted to the students at other times. As Cuban and Kirkpatric (2002) pointed out, simply providing ICT equipment to schools or

teachers and putting ICT on the curriculum will not necessarily make a difference in teaching and learning but what will make the difference is the way in which these equipment and other resources are used. As the saying goes "practice makes man perfect", if these students are not given enough time to practice with the computers and giving them enough time to use them, there will not be any important impact on them. Table 16 summaries the number of hours in a day that respondents use the computer.

In Table 16, 37 (44.6%) constituting the majority of the teachers indicated that they use the computer one hour in a day. On the part of the students, 158 (64.5%) also constituting the majority of the respondents use the computer one hour in a day. Seven (8.4%) of teachers and 39 (15.9%) of students use 3 hours in a day. While 18 (21.7%) teachers indicated that they use the computer 4 hours none of the students respondents said they use the computer 4 hours in a day. This again goes to buttress the point that the teachers have more access to the computer than the students.

Table 16

Number of Hours of Computer Usage in a Day

Number of hours	Teachers Frequency	%	Students Frequency	%
1 hour	37	44.6	158	64.5
2 hours	21	25.3	48	19.6
3 hours	7	8.4	39	15.9
4 hours	18	21.7	0	0
Total	83	100	245	100
	Mean =2.0hrs Mode = 1hr	SD = 1.20hrs	Mean =1.2hrs Mode = 1hr	SD = .423hrs

Research Question 2: For what purpose are computers used in the Senior High Schools in the Sekondi Takoradi Metropolitan Assembly?

The import of the question was to find out the exact use of computers in the Senior High Schools in Sekondi Takoradi. To answer the research question, ten items were designed for respondents to bring out their views on how computers were used for in the schools. The items covered on issues such as the computers being used for recording information, teaching, learning, maintaining students' records, financial management, assisting communication, supporting school library, rationalising students daily feeding menu, to make information easy to access and for jobs efficiency Table 17 summaries the relevant information.

As observed from Table 17, 9 (10.8%) of the teacher respondents totally disagreed that the computer is used for recording information in the Senior High Schools in the catchment area. On the same issue however, 37 (15.1%) of the student respondents admitted they totally disagreed. Moreover, while 6 (7.2%) of the teachers were not sure whether the computers in the school were used for the purpose of recording information, 25 (10.2%) of the students were also not sure.

Table 17

Respondents' View on the Purpose of the Use of Computers

Purpose of the use of computer	Levels of agreement/disagreement									
	Totally disagree		Somehow disagree		Not sure		Somehow agree		Totally agree	
	Trs %	Stds %	Trs %	Stds %	Trs %	Stds %	Trs %	Stds %	Trs %	Stds %
Recording information	10.8	15.1	3.6	3.3	7.2	10.2	27.7	23.7	50.6	47.8
Teaching	9.6	4.5	12.0	4.1	7.2	4.9	28.9	23.3	42.2	62.9
Learning	7.2	3.7	6.0	5.7	6.0	2.9	22.9	18.8	57.8	69.0
Maintaining records	6.0	4.5	2.4	2.9	8.4	15.5	24.1	14.7	59.0	62.4
Financial management	8.4	17.6	8.4	6.9	13.3	18.4	25.3	15.1	44.6	42.0
Assisting communication	7.2	22.9	2.4	4.9	26.5	20.4	27.7	18.8	36.1	33.1
Supporting school library	14.5	26.1	8.4	12.7	20.5	19.6	27.7	18.8	28.9	22.9
Rationalizing menu	41.0	40.0	9.6	9.0	28.9	25.7	9.8	13.1	10.8	12.2
Information easy access	4.8	12.7	7.2	6.9	10.8	9.8	32.5	21.6	44.6	49.0
Job efficiency	2.0	17.1	7.2	11.4	16.9	19.2	33.7	8.8	30.1	33.1

n_1=83 n_2=245

Where N_1 is the sample of teachers and N_2 is the sample of students

While 42 (50.6%) teacher respondents totally agreed to this issue, 117 (47.8%) students also totally agreed. This means that out of the 83 teacher respondents, 78.3% agreed that the computer is used for recording information 71.5% of the 245 students respondents also agreed. This agreement goes to butters what Newhouse (2002) claim that; database are maintained to include a large amount of information about each students in the school which could be retrieved and analyzed when the need arises. The computer enables school administrator to access and manage information.

When it came to the computer used for teaching in the catchment area, 8 (9.6%) of the teachers as against 11 (4.5%0 students said they totally disagreed to this issue. While 6 (7.2%) of the teacher respondents admitted they were not sure if the computer is used for teaching, 12 (4.9%) of the students also said they were not sure. 35 (42.2%) teachers as against 154 (62.9%) students totally agreed that the computer is used for teaching. From the analysis it could be seen that, the majority of both the teachers and students share the view that the computer is used for the purpose of teaching. This view was emphasized by Loveless (2003) who stated that the notion of teaching ICT capabilities is a challenging one as it requires teachers to not simply teach how to perform tasks using ICT but also to allow students to learn and explore why, when and where to use ICT.

On the issue of the computer being used for learning,6 (7.2%) teachers as against 9 (3.7%) students said they totally disagreed that the computer is used for learning in the catchment area While 5 (6.0%) teachers were not sure whether the computer is used for learning,7 (2.9%) of the students were also not sure.

Table 17 shows that 48 (57.8%) teachers as against 169 (69.0%) students totally agreed that the computer is used for learning in the catchment area. the majority of the respondents (both teachers and students) agreeing to the fact that computers are used for the purpose of learning, support Cradler and Brieghforth (2002) view that the computer induce learner independence. These show that even without the teacher, the students can learn on their own using computers. Also supported is Gregorie et al (1996) who asserted that students learn more in less time and produce more when they use the computer properly. Moreover, it supports Riel (1998) who agreed that the use of ICT in learning is extrapolated to the support of a learning community. This proves that using ICT to learn is a good thing. What one should not forget is that harnessing the power of modern technologies for learning purpose require that appropriate learning strategies to develop that harmonies effectiveness in learning with the technology role (Kearns & Papadopoulos, 2000).

As to whether the computer was used for maintaining students records in the catchment area, 5 (6.0%) teachers said they totally disagreed while 11 (4.5%) students also totally disagreed on the same issue. Also 7 (8.4%) teachers were not sure, 38 (15.5%) students were also not sure whether the computer is used for maintaining student's records in the catchment area Forty nine teachers representing (59.0%) as against the majority of the students, that is 153 (62.4%) totally agreed that the computer was used for maintaining students records in the catchment area.

As regards the use of the computer for financial management in the catchment area, 7 (8.4%) teachers as against 43 (17.6%) said they totally disagree.

While11 (13.3%) of the teachers were not sure, 45 (18.4%) of the students were also not sure whether the computer is used for financial management. Furthermore, 37 (44.6%) teachers as against 103 (42.0%) students totally agreed on the issue that the computer is used for financial management in the catchment area.

On the issue of the computer being used for assisting communication in the catchment area, 6 (7.2%) teacher respondents and 56 (22.9%) students respondents totally disagreed that the computer is used for communication in the various schools. While 22 (26.5%) teachers were not sure, 50(20.4%) were also not sure whether the computer was used for communication in the catchment area.

Furthermore, 30 (36.1%) teachers as against 18 (33.1%) totally agreed that the computer is used for communication in their various schools. It can be seen that most of the respondent agreed that the computers were used in the schools for communication but the computers were not hooked to the internet. As a result of this, no meaningful impact would be made here. For, as Loveless (2003) pointed out, internet access has enabled students to use technology to communicate with others both within the school and in the wider world. Loveless (2003) again stated that the capacity to deliver information or to communicate with a mass of students in quite individual ways opens up the possibility of tailoring pedagogy to the needs of a student in time and place without the limitation imposed by peer group.

On the issue of the computer being used to support school library, 12 (14.5%) teachers totally disagreed that the computer is used for supporting the school library. 64 (26.1%) students were also of the same view. While 17

(20.5%) teachers were not sure, 48 (19.6%) students were also not sure whether the computer is used for supporting the school library. Furthermore, while 24 (28.9%) teachers totally agreed that the computer is used for supporting library in the catchment area, 56 (22.9%) shared the same view.

Regarding the computer being used for rationalizing student's feeding menu, 34 (41.0%) teachers totally agreed as against 98 (40.0%) students who were of the same view. Also, 24 (28.9%) teachers as against 63 (25.7%) students were not sure if the computer was used for rationalising students' menu.9 (10.8%) teachers as against 30 (12.2%) students totally agreed that the computer is used for rationalising students' menu in the catchment area. There is a turn of opinions here. The majority of the students and teacher did not agree that the computers were used to rationalised student feeding menu.

Again, 4 (4.8%) teachers as against 31 (12.7%) students totally disagreed that the computer is used for making information access easy. While 9 (10.8%) teachers were not sure if the computer is used to make information easy to access in the catchment area, 24 (9.8%) students were of the same view. Furthermore, only 37 (44.6%) teachers as against 120 (49.0%) students totally agreed that the computer is used to make information easy to access.

The data suggest that the majority of both teacher respondents and student respondents agreed that the computer makes the access of information easy for them. On this issue, the Delores Report (1996) pointed out that individual's ability to access and process information is set to become the determining factor in ICT integration not in the education set ups, but in working environment. But Mckenzie (1997) argued out that it is important to question the kind of

information being accessed, how the information is presented, what is being done with it and when it becomes too much. The researcher thinks that what Mckenzie (1997) view is aimed at enabling the students as well as teachers to sieve the information they access and make use of the good ones and abandon the bad ones.

As regards job efficiency, 10 (12.0%) teachers as against 42 (17.1%) students totally disagreed that the computer is used for the purpose of job efficiency in the catchment area. Also, 25 (30.1%) teachers as against 18 (33.1%) students totally agreed that the computer is used for the purpose of job efficiency in the catchment area.

There was the agreement that job efficiency is ensured when computers are used. This means that most of the tasks in the senior high schools in the Sekondi Takoradi Metropolis were done with computers. This finding is in line with the view of Means and Olson (1994) who pointed out that since the computer is seen as a real life tool applicable to future employment, its use lends authenticity to the students work and promote attitudes important to life long learning. From this one can say that when ICT is used properly, it will boost the efficiency of the students even when they enter the field of work.

Research Question 3: How proficient are teacher and students in Sekondi Takoradi Metropolitan Assembly in the use of computer, accessories and software?

This question was to find out whether the teachers and students in the Sekondi Takoradi know how to use the computer and accessories. It was also to find out the types of software that they use. To answer this research question, six

questions were raised. These were questions looking into issues such as the ICT application software taught in schools, the application software that teachers and students know how to use, where they learnt that application, their knowledge on some identified application and computer accessories and their knowledge on the use of the internet. Table 18 summarises the relevant information on ICT application software taught in schools.

Table 18 depicts ICT application software taught in schools. On this issue, 4 (6.0%) male teacher respondents indicated that all the application software were taught in schools as against none of their female counterparts. Again, five (4.0%) male student respondents also said that all the application software are taught in schools whereas 32 (27.1%) of their female counterparts agreed on the same issue. On the issue of whether software like Word, Excel, PowerPoint, E-mail, Internet were taught in schools, 51 (77.3%) of the male teacher respondents agreed as against 13 (76.5%) of their female counterparts. In addition, 90 (70.9%) of the male student respondents as against 72 (61.1%) of their female counterparts indicated that word, excel, Power Point, e-mail, internet were also application software taught in schools.

In all, a total of 66 (100%) of the male teacher respondents and 17 (100%) of their female counterparts intimated that the above mentioned application software were taught in their schools. Also, a total of 127 (100%) male student respondents and 118 (100%) of their female colleague respondents shared the same view on the issue.

Table 18

ICT Application Software Taught in School

Application software	Teachers						Students					
	Male	%	Female	%	Total	%	Male	%	Female	%	Total	%
All application software	4	6.0	0	.0	4	4.8	5	4.0	32	27.1	37	15.1
Word, excel, PowerPoint, internet	51	77.3	13	76.5	64	77.1	90	70.9	72	61.1	162	66.2
Word, excel	11	16.7	4	23.5	15	18.1	32	25.1	14	11.8	46	18.7
Total	66	100	17	100	83	100	127	100	118	100	245	100

From the analysis, it can be seen that software such as Word, Excel, and PowerPoint and how to use the internet are taught in the schools. Means and Olson (2002) pointed out that the use of the word processing capacity of the computer eliminate some of the frustrations of writing and it enable students to better express their ideas in writing. Again, Jonassen (1996) brought out that, when tools such as database, spreadsheets, multimedia, e-mail and network search engines are utilized to complete projects requiring students to use information to solve problem, there is greater potential to promote cognitive development. It can therefore be said that it is encouraging that such software are taught in the senior high schools.

Gender Differences in Opinions about ICT Software Taught in Schools

The following hypothesis regarding gender differences in opinions about computer application software taught in schools was tested.

H_0: There is no significant difference between the views expressed by male respondents on ICT application software taught in schools and that of their female counterparts.

H_1: There is a significant difference between the views expressed by male respondents on ICT application software taught in schools and that of their female counterparts. Table 19 shows the summary statistic of software taught in schools.

Table 19

Summary Statistic of Software Taught in Schools

	Pearson χ^2 value	Asymptotic significance
Teachers	1.384	.501
Student	36.747	.000

The Pearson chi-square value for the teacher respondents on the software taught in the senior high schools in Sekondi-Takoradi was 1.384 and the asymptotic significance was .501. Using .05 level of confidence, it means that there was no significant difference in the views expressed by the teachers (in terms of gender). Therefore, the null hypothesis could not be rejected. On the part of the students the Pearson chi-square value was 36.747 and the asymptotic significance was .000 meaning that there was a significant difference in the views of the students (in terms of gender).Therefore, the null hypothesis was rejected in favour of the alternative hypothesis. Thus it was concluded that opinions about computer application software taught in schools for students were associated with gender.

Table 20

ICT application Software that Teachers and Students can Use

Application software	Teachers						Students					
	Male	%	Female	%	Total	%	Male	%	Female	%	Total	%
All applications	16	24.2	1	5.9	17	20.5	1	.8	0	.0	1	.4
Word, excel	10	15.2	0	.0	10	12.0	49	38.6	52	44.0	101	41.2
Word, excel, e-mail, PowerPoint, internet	28	42.2	11	64.7	39	47.0	37	29.2	48	40.7	85	34.7
Word, excel, internet	12	18.1	3	17.6	13	18.1	35	27.6	17	14.4	52	21.2
None	0	.0	2	11.8	2	2.4	5	3.9	1	.8	6	2.4
Total	66	100	17	100	83	100	127	100	118	100	245	100

Table 20 shows respondents' views on the ICT application software that teachers and students can use. On this item, 16 (24.2%) of the male teacher respondents as against 1 (5.9%), of their female colleagues were of the view that all application software can be used by teachers and students. However, only 1 (0.8%) of the male student respondents shared the same view though none of their female colleagues shared this view point.

Again, on whether teachers and students can use word, excel, PowerPoint, e-mail and internet, there were diverse views expressed. For instance, 28 (42.2%) of the male teacher respondents and 11 (64.7%) of their female colleagues were of the opinion that the above-mentioned application software can be used by both teachers and students. Here again, 37 (29.2%) of the male students respondents and 48 (40.7%) of their female colleagues could not agree more with their teachers.

On whether Word, Excel and Internet could be used by teachers and students, respondents had these to say. For instance as Table 20 shows, 12 (18.1%) of the male teacher respondents and only 3 (17.6%) of their female counterparts indicated that word, excel and internet can be used by both teachers and students. However, majority of the male student respondents of 35 (27.6%) and 17 (14.4%) of their female counterparts had the same opinion.

Interestingly, none of the male teacher respondents felt that no ICT application software can be used by both teachers and students even though two (11.8%) of the female teachers indicated that none of the application software programmes can be used by teachers and students. Yet, five (3.9%) of the male

student respondents and only one (0.8%) of their female colleagues indicated that none of the application software mentioned above could be used by teachers and students.

Table 20 also shows that the majority of the teachers as well as students can use the software taught in the senior high schools. This is a good sign because according to Rose and Ferlund (1997), these software have the power to stimulate the development of intellectual skills such as inquiry, reasoning, problem solving and decision making abilities. These mentioned qualities are qualities that students are expected to develop. The question now is: Do the teachers and students in the senior high schools in Sekondi-Takoradi really use these skills in the actual teaching and learning?

Gender Differences in Opinions about ICT Use

The following hypothesis regarding gender differences in opinions about computer application software that teachers and students can use was tested:

H_0: There is no significant difference between the views expressed by male respondents and their female counterparts on ICT application software and their gender.

H_1: There is a significant difference between the views expressed by male respondents and their female counterparts on ICT application software and their use. Table 21 shows the summary statistic of software teacher and students can use.

Table 21

Summary Statistic of Software Teachers and Students can Use

	Pearson χ^2 value	Asymptotic significance
Teachers	14.917	.021
Students	24.264	.004

Pearson chi-square value for teachers was 14.917 and the asymptotic significance was .021. Using .05 level of significance, the data suggest that the views expressed were associated with gender, χ^2 (N=83) =14.917, p =.021. The null hypothesis was, therefore, rejected. Similarly in the case of the students, views expressed were associated with gender, χ^2 (N=245) =24.264, p =.004. Therefore the null hypothesis was rejected. Table 22 provides information about respondents' knowledge and skills in using computers.

Table 22 indicates that 57 (68.7%) of the teachers know how to switch on and start up computer. On the same issue, 186 (75.95%) of the students also said they had knowledge about switching on and starting up a computer. Only one (1.2%) of the teachers and 13 (5.3%) of the students said they did have little knowledge on the switching on and starting up a computer. Then 14 (4.8%) of the teachers and only 1 (0.4%) of the students indicated that they had no knowledge on the issue.

Table 22

Respondents' Knowledge of the use of Computer

Knowledge of use of computer and accessories	Much knowledge		Enough knowledge		Little knowledge		No knowledge	
	Tr %	Stds %	Tr %	Stds %	Tr %	Stds %	Tr %	Stds %
To switch on and start up the computer	68.7	75.9	25.3	18.4	1.2	5.3	4.8	.4
To use the start button to launch a programme	55.4	13.5	32.5	28.2	4.8	14.7	7.2	3.7
Move a window by dragging on the title bar	50.6	39.6	3.3	25.7	12.0	26.5	6.0	8.2
To close, minimize and restore a window from task bar	61.4	54.3	20.5	20.0	12.0	15.5	6.0	10.2
To name and save work on hard drive	42.2	42.9	41.0	24.9	10.8	16.3	6.0	15.5
To save work in appropriate named files	43.4	45.7	33.7	30.2	15.7	14.3	7.2	9.8
To print using the print button on the software toolbar	41.0	14.3	27.7	25.3	22.9	21.6	8.4	38.6
n_1=83						n_2=245		

Where n_1 is the sample of teachers and n_2 is the sample of students

On the issue of using the start button to launch a programme, 46 (55.4%) of the teachers and 131 (53.5%) of the student indicated that they have much knowledge about it. Yet, 6 (7.2%) of the teachers and 9 (3.7%) of their students disclosed that they had no knowledge on using a start button to launch a programme.

On another item, 42 (50.6%) of the teachers together with 97 (39.6%) students said they had much knowledge on moving a window by dragging the title bar. On the same issue, 10 (12.0%) of the teachers and 65 (26.5%) of the students said they had a little knowledge on moving a window by dragging on the title bar. Only 5 (6.0%) of the teachers and 29 (8.2%) of the students intimated they had no knowledge about the issue.

On the next issue, 51 (61.4%) of the teachers and 133 (54.3%) of the students agreed that they have much knowledge about closing, minimizing and restoring a window from the task bar. In addition, 5 (6.0%) of the teachers and 25 (10.2%) students intimated that to close, minimize and restore a window from a task bar, they had no knowledge at all on it.

On whether they could name and save work on a hard drive, 35 (42.2%) of the teachers and 102 (42.9%) of the students admitted having much knowledge on the subject. Then 9 (10.8%) of the teachers together with 40 (16.3%) of the students admitted having little knowledge about the item. Finally, only 5 (6.0%) of the teachers and 38 (15.5%) of the students admitted having no knowledge about naming and saving work on hard drive of a computer.

As to whether they could save work in appropriate named files, 36 (43.4%) of the teachers and as many as 112 (45.7%) of the students said they had much knowledge on the subject. Again, 13 (15.7%) of the teachers and 35 (14.3%) of students said they had little knowledge on the matter. Finally, on this issue, 6 (7.2%) of the teachers and 24 (9.8%) of the students however indicated no knowledge about saving work in an appropriate named file with the computer.

On the final issue, that is the ability to print using the print button on the software bar, a different picture was painted. 34 (41.0%) teachers and only 35 (14.3%) of the students said they had much knowledge. Again, 23 (27.7%) of the teachers and 62 (25.3%) of the students disclosed that they had enough knowledge about the subject. 7 (8.4%) of the teachers and 95 (38.6%) student admitted having no knowledge about print using the print button on the software tool-bar of a computer.

The data suggest that, the majority of the teachers as well as the students had knowledge on the use of computers. This was reassuring. For as Loveless (2003) pointed out, some knowledge regarding the use and functions of the computer system needs to be acquired in the schools when the computers are to be used in the societies especially in the field of work. Table 23 summarises the information on respondents' knowledge of the use of computer accessories.

Table 23 reveals that 28 (33.7%) and 69 (28.2%) of teachers and students respectively intimated that they had much knowledge on the use of all the keys on the key board of the computer. Again, 41 (49.4%) of the teacher and 89 (36.3%) of the student admitted having enough knowledge on the issue. Then, 12 (14.5%)

of the teachers and 75 (30.6%) of the students said they had little knowledge about the use of all the keys on the key board. Two (2.4%) of the teachers and 12 (4.9%) of the students agreed on having no knowledge at all about the subject.

On the issue of using the mouse to select icons, open and close windows, 55 (66.3%) teacher and 169 (69.0%) student said they had much knowledge about that. Again, 21 (25.3%) teachers and 52 (21.2%) students indicated that they had enough knowledge which will propel them to use the mouse to select icons, open and close windows. On the same item, only 5 (6.0%) teachers and 21 (8.6%) students admitted that they had little knowledge on the item. Finally, only 2 (2.4%) teachers and 3 1.2%0 students said they had no knowledge at all on using the mouse to select icons, open and close windows.

On whether they had knowledge or otherwise in single clicking and double clicking a mouse, the responses were varied. On this 54(65.1%) of the teacher respondents and 176 (71.8%) of the students that is a majority, indicated that they had much knowledge on the subject. However, 24 (28.9%) and 49 (20.0%) of the teachers and students respectively indicated that they had enough knowledge on the item. Then, only 3 (3.6%) of the teachers and 18 (7.3%) of the students intimated that they had little knowledge of the above activity. Finally, 2 (2.4%) of the teachers and 2 (0.8%) of the students indicated that they had no knowledge at all when it comes to single clicking and double clicking a mouse on the computer.

Table 23

Respondents' Knowledge of the Use of Computer Accessories

Knowledge of use of computer and accessories	Much knowledge		Enough knowledge		Little knowledge		No knowledge	
	Tr %	Stds %	Tr %	Stds %	Tr %	Stds %	Tr %	Stds %
To use all the keys on the key board	33.7	28.2	49.4	36.3	14.5	30.6	2.4	4.9
To use the mouse to select icons, open and close windows	66.3	69.0	25.3	21.2	6.0	8.6	2.4	1.2
To single click and double click a mouse	65.1	71.8	28.9	20.0	3.6	7.3	2.4	.8
To save and load work to and from floppy disc	45.8	21.6	30.1	26.9	13.3	31.4	7.2	20.0
n_1=83				n_2=245				

Where n_1 is the sample of teachers and n_2 is the sample of students.

When asked whether they could save and load work to and from a floppy disc, respondents made varied responses. 38 (45.8%) of the teachers and 53 (21.6%) of the students said they had much knowledge on the issue. Then 25 (30.1%) of the teachers and 66 (26.9%) of the students were of the opinion that, they had enough knowledge on it. Again on that same issue, 14 (13.3%) of the teacher and 77 (31.4%) of the students said they had little knowledge about it. Finally, only 6 (7.2%) of the teachers and 49 (20.0%) of the students indicated that they had no knowledge at all in saving and loading work to and from a floppy disc. Again the picture is painted that most of the teachers and students can use ICT accessories.

The next issue of interest to the study was whether the respondents had knowledge of the use of the internet. Table 24 summaries what the respondents stated.

Table 24 portrays respondent's response regarding their knowledge about the use of the Internet On the issue of sending an E-mail and receiving a reply, 40(48.2%) teachers and 66 (26.9%) of the students indicated that they had much knowledge on it. Then 28 (33.7%0 of the teachers and 41 (61.7%) of the students said they had enough knowledge in sending an E-mail and receiving a reply. On the same issue, 11 (13.3%) of the teachers and 49 (20.0%) of the students claimed to have little knowledge on the subject. Finally only 4 (4.8%) of the teachers and 89 (36.3%) of the students revealed that they had no knowledge at all on the item.

Table 24

Respondents' Knowledge of the Use of the Internet

Knowledge of use of computer and accessories	Much knowledge		Enough knowledge		Little knowledge		No knowledge	
	Tr %	Stds %	Tr %	Stds %	Tr %	Stds %	Tr %	Stds %
To send an e-mail and receive a reply	48.2	26.9	33.7	61.7	13.3	20.0	4.8	36.3
To use the internet to access information on the various search engines	39.8	26.6	34.9	18.8	19.3	21.6	6.0	31.0
N_1=83							N_2=245	

Where n_1 is the sample of teachers and n_2 is the sample of students.

On the question of how to use the Internet to access information on the various search engines 33 (39.8%) of the teachers and 70 (26.6%) of the students said they had much knowledge on the issue. Furthermore, 29 (34.9%) of the teachers and 46 (18.8%) of the students said that they had enough knowledge on it. In addition, 16 (19.3%) of the teachers together with 53 (21.6%) of the students were of the view that they had little knowledge on the matter. In the end, 5 (6.0%) of the teachers and 76 (31.0%) of the students also said they had no knowledge at all when it comes to the use of the internet to access information on the various search engines.

The data suggest that both teachers and students needed more knowledge on the use of the internet. As Leu (2000) pointed out, the Internet is entering the classroom at a rate faster than books, newspaper, magazines, movies, overhead projectors and television and students need it (internet) to access information. There is, therefore, the need for educators to continue to think of ways to help learners to take the best advantage of this tool (Internet) in order to maximize the benefit of ICT in education.

Research Question 4: To what extent is ICT used to enhance teaching and learning in the SHS in Sekondi Takoradi Metropolitan Assembly

The import of this question was to find out if ICT is used in the teaching and learning process such as presenting lesson and giving and receiving assignment. To answer this question, four questions were posed. These questions were concerned with issues such as using ICT to enhance teaching and learning

and the attitude of teachers and students toward the use of ICT in teaching and learning. The next issue of interest to the study was about the responses of teacher respondents on the use of ICT to enhance teaching. Table 25 summarises what the respondents stated.

Table 25 below reports teacher responses on the use of ICT to enhance teaching. The respondents in this light exposed very interesting opinions. On the issue of using ICT to develop teaching and learning materials, only 17 (25.5%) teachers indicated very often. In other words, they admitted that very often ICT is used to develop teaching and learning materials. Of the total teacher respondents, 11(13.3%) teachers also said often, ICT is used to develop teaching and learning materials. Then, 24 (28%) teachers said that quite often, ICT is used to develop teaching and learning materials. Finally, 31 (37.3 %) teachers indicated not at all meaning they do not use ICT to develop teaching and learning materials.

On the issue of using ICT to help present lessons, 9 (10.8%) teachers said that very often, they used ICT to present lessons. Of the total number of 83 teacher respondents, a chunk of 54 (65.1%) teachers said not at all. This means that the teachers in this category were of the view that ICT was not used in presenting lesson.

Table 25

Teachers' Responses on the use of ICT to Enhance Teaching

ICT to enhance teaching	Very often	%	Often	%	Quite often	%	Not at all	%
ICT to develop teaching and learning materials	17	20.5	11	13.3	24	28.0	31	37.3
ICT to present lessons	9	10.8	7	8.4	13	15.7	54	65.1
ICT to give and receive assignment	9	10.8	5	6.0	12	14.5	57	68.7
ICT to provide basic computer skills	18	21.7	9	10.8	14	16.9	42	50.6

On the use of ICT to provide basic computer skills, 18 (21.7%) teachers said very often, ICT helped to provide basic skills. Again on the issue, 14 (16.9%) teachers said ICT helped to provide basic computer skills quite often. Finally, 42 (50.6%) teachers indicated not at all. In effect, these teachers (that is the 42 teachers) meant that ICT was not used to help to provide basic computer skills.

A critical look at Table 25 reveals that a majority of the teacher respondents disagreed on almost all the issues raised under it. Most of them therefore think that ICT is not used to enhance teaching. This perhaps explains why the majority indicated 'not at all' for almost all the issues here. This gives a clear picture that in the teaching of the subject areas themselves ICT is not used. But Newhouse (2002) argued that the computer has the potential of improving the efficiency of many task done in the school and it could be used as a tool by the teacher for the preparation of lessons and management of teaching resources. The computer can therefore be of help to the teachers when they (teachers) are encouraged to use them. That is why Mauze (2002) opined that a programme designed to help teachers to integrate ICT into their classroom should be introduced and demonstrated.

When the student respondents were asked in an open-ended question form to tell how they got information for their assignment before ICT was introduced to them, 155(66.3%) of them indicated that they got information for their assignment from library books. Again, 12 (4.9%) also indicated they got information from siblings whilst 16 (6.5%) said they got information from friends. On the same issue, 25 (10.2%) indicated they got information from

pamphlets and 36 (14.75%) said they got information from their own private studies. One (0.4%) did not give any answer to this question.

From the responses, it could be seen that out of the 245 respondents, the majority of them used the library for getting information for their assignments. The use of the libraries should not be abandoned because of ICT. This supports the assertion by Collis (1989) that many elements of the traditional school organization would and should remain regardless of information technologies' potential. As some of the respondents said, they got information from their siblings, Collis (1989) again suggested that there is also the need for human to human interaction and motivation in the learning process of the learners (students).

On the issue of how the introduction of ICT helped teachers' teaching and learners' learning, 36 (43.4%) responded that ICT has helped them in their research on the subjects that they teach. Again, seven (30.1%) and 25 (3.6%) said they use ICT in teaching and in typing their lesson notes respectively. On the contrary, to those teacher respondents who indicated that the introduction of ICT has helped in one way or the other in the teaching process, 12 (14.5%) said that ICT has not helped them in any way in their teaching process.

On the part of the students, the majority, that is, 102 representing 41.6% indicated that ICT has helped them to do their research when they are given assignments. This was followed by 90(36.7%) responding that ICT has broadened their knowledge. Again, 32 (13.1%) indicated that ICT has helped in their learning and eight of them representing 3.3% said ICT has helped improve their communication. However, 13 students representing 5.3% also contrary indicated that ICT has not helped them in any way.

Comparing the responses of the teachers and students, it can be seen that ICT has helped them in their teaching and learning. Gregorie et al (1996) are of the view that students can use ICT as a tool to investigate deeply the real world, access information even outside their own classrooms, analyze and interpret the information that they get. This view is supported by the responses of the student respondents that ICT has helped in the researching for information to do their assignments. Also, as Moore (2000) pointed out, the computer is a support to the learning environment and so its effects on teaching and learning cannot be isolated. Becta (2002) shared that of all the comparison made between pupils' expected scores and actual scores, the difference in attainment associated with the greater use of ICT was vividly present. This is supported by the students' claim that ICT had helped in their learning.

Concerning the general attitude of teachers in the senior high schools in Sekondi Takoradi towards the use of ICT in the teaching and learning process, the majority of 46 (55.4%) of the teacher respondents said that teachers had positive attitude towards the use of ICT. On the contrary, 13 representing 15.7% of the teacher respondents said that teachers had negative attitude whilst 24 teachers constituting 28.9% indicated that teachers have lukewarm attitude towards the use of ICT in the teaching and learning process.

On the part of the students, 189 (77.1%) of the student respondents said teachers had enthusiastic and supportive attitude towards the use of ICT in the teaching and learning process. Thirty-one of them also indicated that the teachers teach so much theory and do not allow them to use the computers whilst 12 (4.9%) said the teachers were restrictive. Again, six of the

respondents indicated that the teachers were impatient and discriminatory. Moreover, seven (2.9%) of the respondents said that some of the teachers did not teach at all.

Comparing the responses of the teachers to that of students, it could be seen that in all the two cases, the majority indicated that teachers have positive attitude towards the use of ICT. Although in the majority, quite a number of the respondents also had views that the attitudes of the teachers were negative towards ICT use. This supports the views of Brummelhuis (2000) that the beliefs and attitudes of teachers towards their teaching have not changed and basically in the secondary schools the teaching and learning process have not changed. Means and Olson (1994) also argued that the main reason why computers have not altered the curriculum is the way it is predicted by influence of traditional teaching methods and routines of practicing teachers. This may well be the reason why some teachers in the Sekondi Takoradi senior high schools are still reluctant to use ICT in the teaching and learning process although the majority has changed their attitude positively in the use of ICT.

Describing the general attitude of students in the senior high schools in Sekondi Takoradi Metropolis, 80 (96.4%) of the teacher respondents were of the view that the students were ready and eager to learn ICT and to learn with ICT. In the same vein, 173 (70.6%) of the student respondents shared the same view though 37 (15.1%) and 21 (8.6%) were also of the view that the attitudes of students were good and very good respectively towards the use of ICT in the teaching and learning process. On the contrary, three representing 3.6% of the teacher respondents said the attitudes of students in the senior high schools

in Sekondi Takoradi were not encouraging and 4 (5.7%) of the student respondents were also of the view that the attitude of the students were poor. The data suggest that a majority of both teacher and students respondents shared the view that students in the senior high schools in the catchment area had positive attitudes towards the use of ICT.

The findings suggest that students in general would developed a positive attitude towards the use of ICT in the teaching and learning process when they were given the necessary motivation supports some prior studies (for example, Crawford & Vashey, 2002; Loader & Neville, 1991).

Research Question 5: What are the barriers to the use of ICT in SHSs in the Sekondi Takoradi Metropolitan Assembly?

The research question was to find out the challenges that teachers and students in the senior high schools in the Sekondi Takoradi Metropolis face in their use of ICT in the teaching and learning process. Four issues were raised to find out what hinders the integration of ICT in education. Among the issues were, integration of ICT associated with uncertainty, the integration of ICT being hindered by force of habit, the integration of ICT being hindered by support network and the integration of ICT being hindered by inadequate follow up support. Table 26 shows the analysis of teacher respondents on the barriers to the integration of ICT into education.

Table 26 shows respondents view on the barriers to the use of ICT in the concerned schools. Here again, varied responses were received from the teacher respondents. Ten (15.2%) of the male teachers and only 1 (5.9%) of their female colleagues strongly agreed that integration of ICT is associated with uncertainty. Nine (13.6%) of the male teachers indicated a strong

disagreement to the statement that integration of ICT is associated with uncertainty. A mean rating of 2.36 was obtained. This implies that the teachers tended towards disagreeing with the statement.

On the issue of whether the integration of ICT in teaching is hindered by force of habit, 16 (24.2%) of the male teachers respondents and seven (41.2%) of their female colleagues expressed strong agreement to the assertion. However, 21 (31.8%) of the male teachers and 7 (41.2%) of the female teachers disagreed with the statement. In the end, only six (9.1%) of the male teachers strongly disagreed with the statement that integration of ICT in teaching is hindered by force of habit. Again a mean rating of 2.20 was obtained which also implies that the teacher respondents, both male and female, agree with the statement more than they did with the previous statement.

On the issue of inadequacy of support as a barrier to the use of ICT in the senior high schools, 29 (43.9%) of the male teachers and eight (47.1%) of their female colleagues strongly agreed that inadequacy of support is a barrier in the use of ICT. Then, six (9.1%) of the male teachers and one (5.1%) of the female teachers disagreed. Finally, only two (3.0%) of the male teacher respondents strongly disagreed with the assertion that inadequacy of support is a barrier to the use of ICT in the senior high schools. A mean rating of 1.68 was obtained. This implies that the majority the teachers agreed that inadequacy of support network hinders the use of ICT in the senior high schools.

Table 26

Teacher Respondents' View on the Barriers to the Use of ICT

Barriers to the use of ICT	Strongly Agree		Agree		Disagree		Strongly Disagree		Mean
	Male (%)	Female (%)	Male (%)	Female (%)	Male (%)	Female (%)	Male (%)	Female (%)	
ICT integration is associated with uncertainty	10 (15.2)	1 (5.9)	27 (40.9)	13 (76.5)	20 (30.6)	0 (.0)	9 (13.6)	0 (.0)	2.36
ICT integration is hindered by force of habit	16 (24.2)	7 (41.2)	23 (34.8)	3 (17.6)	21 (31.8)	7 (41.2)	6 (9.1)	0 (.0)	2.20
Inadequacy support network is a barrier to ICT integration	29 (43.9)	8 (47.1)	29 (43.9)	8 (47.1)	6 (9.1)	1 (5.1)	2 (3.0)	0 (.0)	1.68
Inadequate follow up support hinders integration	21 (31.8)	6 (35.3)	34 (52.5)	9 (52.9)	2 (13.6)	2 (11.8)	2 (3.0)	0 (.6)	1.85

On the issue of whether, inadequate follow up support hinders the teaching and learning of ICT, varied responses were recorded. On this issue, 21 (31.8%) of the male teachers and six (35.3%) of their female colleagues strongly agreed that inadequate follow up support hinders the use of ICT. Again on the issue, 34 (51.5%) and nine (52.9%) of the male and female teacher respondents respectively agreed. Finally, only two (3.0%) of the male teachers strongly disagreed with the said assertion. Finally from the table 26, the issue of inadequate follow up support hinders the teaching and learning of ICT also attracted of mean rating of 1.85. What this means is that again, the majority of the respondents agreed that inadequate support hinders the integration of ICT in the teaching and learning process. The table 27 shows the analysis of students respondents on the barriers to the integration of ICT into education.

On the issue of whether integration of ICT in teaching and learning is associated with uncertainty, 22 (17.3%) male students and 16 (13.6%) of their female friends strongly agreed. Again, 50 (39.4%) of the male and 50 (42.4%) of the female ones agreed with the statement. Then 40 (31.5%) of the male students and 35 (39.7%) of their female colleagues however disagreed on the same issue. Finally 15 (11.8%) of the male students and 17 (14.4%) of their female counterparts strongly disagreed that the integration of ICT in teaching and learning is associated with uncertainty. On this issue, a mean rating of 2.41 was obtained from the data. This implies that quite a chunk of the student respondents agreed with the assertion that the use of ICT in teaching and learning is associated with uncertainty. This is

in line with what the teachers agree that teaching and learning is associated with uncertainty.

On another issue about whether integration of ICT in teaching and learning is hindered by force of habit, diverse opinions were recorded. On this item, 13 (10.2%) of the male respondents and 10 (8.5%) of their female colleagues strongly agreed with the issue. Twenty one (16.5%) of the male students and 21 (17.8%) of the female ones strongly disagreed that the integration of ICT in teaching and learning is hindered by force of habit. From the responses, a mean rating of 2.61 was obtained.

Another issue which was captured on the table was inadequacy of support network as a barrier to ICT integration. On this issue, 60(947.2%) of the male students and 31 (26.3%) of the female ones strongly agree with the above issue. Then came 46 (36.2%) of the male students and 64 (54.2%) of their female counterparts who all agreed that inadequacy of support network is a barrier to ICT integration. Only seven (.5%) of the male students and 3 (2.5%) of their female colleagues strongly disagreed that inadequacy of support network was a barrier to ICT integration. A mean rating of 1.84 was obtained on the item. What this means is that the majority of the respondents agreed on the issue.

Table 27

Student Respondents' Views on the Barriers to the Use of ICT

Barriers to the use of ICT	Strongly Agree		Agree		Disagree		Strongly Disagree		Mean
	Male %	Female %	Male %	Female %	Male %	Female %	Male %	Female %	
ICT integration is associated with uncertainty	22 (17.3)	16 (13.6)	50 (39.4)	50 (42.4)	40 (31.5)	35 (29.7)	15 (11.8)	17 (14.4)	2.41
ICT integration is hindered by force of habit	13 (10.2)	10 (8.5)	50 (39.4)	40 (33.9)	43 (33.9)	47 (39.8)	21 (16.5)	21 (17.8)	2.61
Inadequacy support network is a barrier to ICT integration	60 (47.2)	31 (26.3)	46 (36.2)	64 (54.2)	14 (11.0)	20 (16.9)	7 (5.5)	3 (2.5)	1.84
Inadequate follow up support hinders integration	52 (40.9)	47 (39.8)	49 (38.6)	49 (41.5)	14 (11.0)	15 (12.7)	12 (9.4)	7 (5.9)	1.86

Whether or not adequate follow up support hinders the teaching and learning of ICT was the next issue on the table. Here, 52 (40.9%) of the male student respondents together with 47 (39.8%) of their female friends were of the view that inadequate follow up support hinders the teaching and learning of ICT in our schools. Then, 14 (11.0%) of the male students and 15 (12.7%) of the female ones disagreed. Finally, 12 (9.4%) of the male student respondents and 7 (5.9%) of their female colleagues strongly disagreed with the assertion that inadequate follow up hinders the teaching and learning of ICT in our schools. On this item, as could be seen from the table, a mean rating of 1.86 was obtained. This suggests that the respondents agreed to the issue.

Since the integration of ICT in the teaching and learning process will require teachers to change from the old method of teaching, they resist the change. Koontz and Weihrich (1990) said that people want to feel secure and have some control over the change and may resist change if they do not know what to expect. Dennis and Wixom (2000) also explained that people do not always adopt an innovation even if adopting it is logical and beneficial. This might be the reason why the uncertainty as to what to expect has become a barrier to ICT integration.

According to Bitner and Bitner (2002) barriers to ICT can be centred on the support networks that are available to the school. Jensen and Sarroco (2002), added that many of those schools that do have computers still do not have access to the internet, which is an important requirement for supporting networking for learners and teachers, as well as for collaborative learning. The internet can

provide a wealth of learning resources, access to which is, at present, very limited for many African education institutions. The findings of the present study support these views.

Mauze (2002) pointed out that, lack of follow-up support is also another barrier to ICT integration because activities often take place from the school site and suggested that in order for ICT integration to be effective, in class assistance, support must be provided and it must be context specific. He again suggested that programme designed to help teachers to integrate ICT into their classrooms should be introduced and demonstrated. Hands-on and discussion of the implication that the demonstrated applications have on teaching and learning should be done. The finding of the present study also points to the same implication.

An observation by the researcher with the help of an observation check list revealed that, the sampled schools have computer laboratories. Ghana Secondary Technical School had three computer laboratories which were hooked on the net. Two were accessible by the students and one was reserved for the teachers. Sekondi College and St. Johns also had two laboratories. The rest of the sampled schools had only one computer laboratory and this is not hooked to the internet. Sekondi College had some computers in the library annex and students went there anytime they were free and wanted to practise using the computers. Unfortunately, their computers were not hooked to the net. The schools in the catchment area had 40 to 50 computers in the laboratories. The students have practical lessons with the computers once a week.

In all the schools, computing was taught in the schools as a subject. None of the teachers used the computer in the classroom to present lessons. It was observed that the projectors were in the computer laboratories. Again, most of the teachers and students knew how to use the computer software especially Word, Excel and PowerPoint. They also knew how to use the computer accessories. Most of the teachers in all the sampled schools used the internet to source for information. Ghana Secondary Technical School, for instance, had the internet in the staff common room and all the teachers used it to access information.

Teachers also typed their examination questions using the computers in the laboratories. Some students also did their homework using computers in the homes. Though it was not possible to observe how the assignments were done, it was easy to peruse assignments submitted and all those that were available were hand written in exercise books, casting some doubt on the students' claim to have been using computers to do their home work, unless what was meant had to do with using search engines to get information which they then wrote by hand, into their exercise books.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This chapter presents a summary of the study, conclusions from the study and recommendations for possible application. In addition, the chapter ends with suggestion on areas worthy of further study.

Summary

Summary of Research Process

The principal objective of the study was to find out the extent of use of ICT by senior high school students in the Sekondi-Takoradi Metropolis to enhance teaching and learning. The following research questions guided the study:

1. How accessible are ICT facilities to students and teachers of senior high schools in the Sekondi-Takoradi Metropolis?
2. For what purposes are computers used in the Senior High Schools in the Sekondi Takoradi Metropolis?
3. How proficient are teachers and students in senior high schools in the Sekondi Takoradi Metropolis, in the use of computer accessories and software?
4. To what extent is ICT used to enhance teaching and learning in senior high schools in the Sekondi Takoradi Metropolis?

5. What are the barriers to the use of ICT in the senior high schools in the Sekondi Takoradi Metropolis?

The study was a descriptive one. Data were collected from 340 respondents comprising of 90 teachers and 250 students randomly selected from 6 schools which were also randomly selected from the total of 11 schools. Tools used for the data collection were a questionnaire and an observation checklist. The questionnaire was structured for both teachers and students. The questionnaire consisted of both closed and open-ended items and was designed to elicit responses on availability and accessibility ICT resources, the purpose for which computers are used, respondent's proficiency in the use of ICT software, the use of ICT to enhance teaching and learning and the barriers to the use of ICT in the teaching and learning process.

The research instruments were pilot-tested at Mfantsepim School and Oguaa Secondary Technical School both in Cape Coast. The objective of this exercise was to find out the validity and reliability or otherwise of the research instrument. Some items in the questionnaire were modified to eliminate ambiguities. The research instrument was administered personally by the researcher. The researcher personally collected the completed questionnaire as well. Again, with the help of observation checklist, the research made some observations in all the schools.

In all, a total of six senior high schools were involved. Ninety and 250 questionnaires were made for the teachers and students respectively. The retrieval rate was 92% for teachers and 98% for students. The data were analysed using

both descriptive and inferential statistical methods according to the requirement of the specific research question. Details of the analysis are provided in chapter three.

Summary of Findings

The study revealed that most of the respondents (95.2%) had some experience on the use of ICT. This was an indication that both teachers and student in the catchment area had some experience in the use of ICT.

On the issue of the availability, adequacy, location and accessibility of ICT facilities, majority of the teacher respondents 58 (69.9%) and students respondents 206 (84.1%) indicated that the schools had between 1-100 computers and the types of computers were Dell, IBM, HP, Compaq and Toshiba. The computers were installed in laboratories and, in a few cases, the head's office and the general office. Most of the computer laboratories were not connected to the internet. This was confirmed by more than 60% of the respondents. But most schools had the encater programme on the computers which students access for information. Most teachers 70 (84.3%) and students 204 (83.3%) said they had access to ICT facilities but on the average, the computers were used only once a week by students and twice a week by teachers.

Concerning the purpose of the use of computers in the senior high school, teachers and students unanimously indicated that they used the computer for recording information, teaching and learning, maintain records and financial management, assisting in communication and for making information access easy,

suggesting that the senior high schools are making some efforts in their use of ICT for other purposes aside the teaching and learning.

The majority teachers 65 (78.3%) indicated that they used the computers for recording information, teaching and learning as well as for maintaining records and for financial management. Students and teachers also said that computer was used in communication and as a support service in the school library. However, it observed that only one of the sampled schools had computers in the library annex and even so students only went there to practice. The computers were not being used to support school library's operations.

On the issue of proficiency in computer use, it was observed that word, excel, power point, and internet were the application software taught in the schools. Again it was seen from the analysis that both teachers and students could use the application software mentioned above. It also came to light that teachers as well as students had knowledge on the use of the computer and its accessories. The majority of the teachers (68.7%) and students (75.9%) could switch on and start up the computer, use the start button to launch a programme, close, minimize and restore window from taskbar, name an save work on hard drive, print using the print button, use the key on the key board, use the mouse to select icons, save and load work to and from pen drives, send and receive an e-mail, and use the internet to access information on the various search engines.

One striking finding of the study was on the use of ICT to enhance teaching and learning. The analysis showed that very few teachers used ICT in developing teaching and learning material. Only few, probably the ICT teachers,

used ICT to present lessons, give and receive assignments, and in providing basic computer skills. This means that in the actual teaching, teachers were not using ICT to enhance the process. However, it was also revealed that the general attitude of teachers toward the use of ICT was encouraging. The majority of teachers 46 (55.4%) and students 189 (77.1%) indicated that teachers have positive attitudes towards the use of ICT. Regarding the general attitudes of students towards the use of ICT teachers unanimously said that the students are ready to learn ICT and to learn with ICT. The students also portrayed that they were eager to learn. Careful observation by the researcher also confirmed this.

With regard to the barriers to the use of ICT in the senior high schools in the catchment area, the teachers agreed that the integration of ICT is associated with uncertainty. They did not know how to incorporate ICT into the normal teaching process. This also goes to explain why the teachers do not use ICT in developing their teaching materials, giving and receiving assignment and in lesson presentation. The study also revealed that teacher did not want to change their habit of teaching in the traditional way to the use of ICT as they agreed that force of habit is a hindrance to the interrogation of ICT.

Moreover, the study revealed that inadequate support network is a barrier to the integration of ICT. Furthermore, it was observed that most schools were not connected to the Internet, making the use of ICT difficult. Inadequate follow- up support was also seen to be a hindrance to the integration of ICT in the teaching and learning process. On the part of the students, there was agreement on all the issues raised here as being the barriers to the integration of ICT.

Conclusions

The findings of the study confirm the view of Pelgrum and Law (2003) that many countries are investing heavily in the area of ICT without having clear plans and objectives. Almost all the senior high schools in the Sekondi Takoradi Metropolis had computer laboratories but the number of computers in the laboratories comparing with the school population was far less. This affects the number of hours and the number of days that both teachers and students spend in using the ICT laboratories. Based on this it could be concluded that though ICT is on the time tables of the senior high schools, teachers and students spend very little time on using ICT.

The findings again have revealed that apart from ICT being taught as a subject, teachers did not make use of ICT. It can therefore be concluded that ICT is not being used in the senior high schools in the Sekondi Takoradi to enhance effective classroom teaching and learning. However, as seen from the definition of ICT, it does not only involve the use of computers but other equipment such as telephone, printers, scanners, photo copiers, television and many more. Teachers do not use these things in the teaching and learning process but these are the things that are used in the real world organisations of work and students are to be exposed to them.

Most of the teachers and students had some knowledge and can use the computers and their accessories such as the keyboard, mouse, and load and download work on hard drives. However, most of the senior high schools did not have connectivity to the internet even though the internet can provide a wealth of

learning resources. Therefore it can be concluded that since teachers and students already have some knowledge on the use of ICT, providing them with the internet connectivity will enable them access information on the net on all subject areas. This will enhance the teaching and learning process.

The findings revealed that factors such as uncertainty, inadequate support network and inadequate follow up support hinder the integration of ICT into the teaching and learning process in the senior high schools in Sekondi-Takoradi. However, it is worthy to note that in spite of all these challenges teachers and students have positive attitudes towards the use of ICT. Therefore, it can be concluded that given the necessary support network and follow-up support, teachers and students in the senior high schools may improve their use of ICT to enhance the teaching and learning process.

Recommendations

Based on the findings and conclusions drawn from the study, it can be seen that all is not well with the use of ICT to enhance effective and efficient teaching and learning in the Sekondi-Takoradi Metropolis. Therefore, the following recommendations are made:

1. Based on the population of the schools, the schools should find ways of increasing the number of laboratories as well as the number of computers in the laboratories since one student to a laptop computer policy has not been effected. This would enable the teachers and students to increase the number of days and hours spent using the ICT facilities.

2. School authorities should consult internet providers for connectivity at subsidised rates to enable teachers and students to access information from the various search engines as this will broaden the scope of the sources of information in the learning and teaching process using ICT.
3. Since the computers are not enough, teachers should use the telephones and fax machines to solicit information from colleagues in other schools, since ICT does not mean only computer.
4. Demonstrations that have been videotaped on DVDs and VCDs should be shown in the classrooms to the students using the television and DVD machines in areas where a resource person is needed and is not available.
5. Teachers and students should use ICT in giving and receiving assignments by using the print machines as well as the E-mail (internet).
6. Barriers that have and are still hindering the integration of ICT in the curriculum should be tackled by policy implimenters. In this regard, as teachers are unwilling to change from the traditional methods of teaching to using information and communication technologies, they should be encouraged policy makers and sensitized from time to time to understand the good side of technology.
7. Follow-up support should be provided by the Ghana Education Service in the schools. This must include in-service education and training on the use of ICT for the teachers in the school and discussion of the implications of the use of ICT in teaching and learning.

Suggestions for Further Research

For a more generalized conclusion to be made on the use of ICT by teachers and students to enhance the teaching and learning process in senior high schools, there is the need for further study in other Districts in the Western Region of Ghana. The scope of the study should be extended to unearth the disparities that exist between the urban and rural senior high schools on the use of ICT in the teaching and learning process.

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APPENDICES

APPENDIX A

QUETIONNAIRE FOR TEACHERS

Dear Sir/Madam,

The purpose of this study is to collect information on the extent of use of ICT by students and teachers in the Ahanta East District to facilitate effective and efficient teaching and learning.

I will therefore be happy if you will provide frank answers to the questionnaire items. Please read each question carefully and answer according to your true opinion. You are fully assured of the confidentiality of all information provided on this paper.

SECTION A: Background Information

Instruction: please kindly tick (√) the appropriate responses to each item.

1. Gender
a. Male [ ]
b. Female [ ]
2. Age
a. 25-35 [ ]
b. 36-45 [ ]
c. 46 and above [ ]
3. Name of School…….
4. Status
a. Head of Department [ ]
b. Teacher [ ]
5. Computer Experience
a. Some Experience [ ]
b. No Experiences [ ]
6. How many years have you spent in your present school
a. One to five years [ ]
b. Six to ten years [ ]
c. Ten years and above [ ]

SECTION B: Availability, Adequacy, Location and Accessibility of ICT Facilities.

7. How available are computers to the school. Tick (√) your response
    a. The school has 101-200 computers [ ]
    b. The school has 1-100 computers [ ]
    c. The school has no computer at all [ ]

8. If the school has computers, what are the types.

Type of computer	Tick as many as appropriate
IMB Compaq Hewlett Packard (HP) Dell Toshiba HP Compaq	

9. Indicate by ticking (√) in the spaces provided where ICT resources in the school can be located.

Resource	Location of Resources					
	Classroom	Lab	Library	HOD's Office	Head Teachers Office	Assistance Head Teacher's Office
Computer						
Projector						
Printer						
Scanner						
Photocopier						
Fax machine						
Internet						

Indicate by ticking (√) the appropriate responses to each them on the adequacy of computers.

10. Number of computer laboratories.
    a. 1 [ ]
    b. 2 [ ]
    c. 3 and above [ ]
11. Number of computers in a laboratory.
    a. 20-30 [ ]
    b. 31-40 [ ]
    c. 41-50 [ ]
    d. 51 and above [ ]

12. Is the computer laboratory accessible to the internet?
    a. Yes [ ]
    b. No [ ]
13. How accessible are ICT facilities to you? Tick (√) your responses
    a. Do you have access to the ICT facilities in the school?
    1. [ ] Yes
    2. [ ] No
    b. If your response to (a) is Yes how many times in a week do you use the computer? 1 ☐ 2 ☐ 3 ☐ 4 ☐

14. How many hours in a day do you use the computers?
    1hr [ ] 2hrs [ ] 3hrs [ ] 4hrs and above [ ]

SECTION C: Purpose of the Use of Computer

Please answer the following questions using the scale below, with the answer that best identifies how strongly you agree or disagree with the statement.

Totally disagree - 1 Somehow disagree - 2 Not sure - 3
Somehow agree - 4 Totally agree - 5

Circle one answer for each question.

The computer is used for:

15. a. Recording information 5 4 3 2 1
    b. Teaching 5 4 3 2 1
    c. Learning 5 4 3 2 1
    d. Maintaining students record 5 4 3 2 1
    e. Financial management 5 4 3 2 1
    f. Assisting communication 5 4 3 2 1
    g. Supporting school library 5 4 3 2 1
    h. Rationalizing students daily feeding menu 5 4 3 2 1

i. To make information easy to access 5 4 3 2 1
j. For job's efficiency 5 4 3 2 1

SECTION D: Teachers proficiency in computer use

16. Which of the following ICT application software are taught in the school. Tick as many as appropriate

Type of Application Software	Tick as many as Appropriate
Word processing Spread sheet Date base management system Desktop publishing Presentation software e.g. Power Point E-mail Internet Other (please specify)	

17. Which of the application software indicated in question 15 do you know how to use?

……
…….....

18. Tick (√) the statement that best describes your knowledge to the identified application.

Knowledge of use of computer	Much knowledge	Enough Knowledge	Little knowledge	No knowledge
a. To switch on and start up the computer				
b. To use the start button to launch programme				
c. Move a window by dragging on the little bar				
d. To close, minimize and restore a window from task bar				
d. To name and save work on hard drive				
f. Save work in appropriate named files				
g. Print using the print button on the software toolbar				

19. Tick (√) the statement that best describes your knowledge to the identified application.

Knowledge of use of computer accessories	Much knowledge	Enough Knowledge	Little knowledge	No knowledge
a. To use all the keys on the key board				
b. Use the mouse to select icons, open and close windows				
c. To single click and double click a mouse button				
d. Save and load work to and from floppy disc				

20. Tick (√) the statement that best describes your knowledge to the identified application.

Knowledge of use of internet	Much Knowledge	Enough Knowledge	Little knowledge	No knowledge
a. Send an e-mail and receive a reply				
b. To use the internet to access information on the various search engines				

SECTION E: Use of ICT in enhance teaching

21. Tick (√) the appropriate responses with respect to how often the items below are used.

	Very often	Often	Quite often	Not at all
a. ICT in developing your teaching and learning materials				
b. ICT to present lessons				
c. ICT in giving and receiving assignment				
d. ICT to provide basic computer skills				

22. How has the introduction of ICT helped you in your teaching?

……
……
……..

23. How would you describe the general attitude of teachers towards the use of ICT in teaching and learning?

……
……
……..

24. How would you describe in general the attitude of student towards the use ICT in teaching and learning?

……
……
……

SECTION F: Barriers to the Use of ICT

Kindly tick (√) below, the appropriate responses that best reflect the extent to which you agree or disagree with following statement.

25. Key: SA – Strongly Agree A – Agree D – Disagree SD – Strongly Disagree

	Strongly Agree	Agree	Disagree	Strongly Disagree
a. The integration of ICT in teaching and learning is associated with uncertainty				
b. The integration of ICT in teaching and learning is hindered by force of habit				
c. Inadequacy of support network is a barrier to ICT integration				
d. Inadequate follow up support hinders the teaching and learning of ICT				

APPENDIX B

QUESTIONNAIRE FOR STUDENTS

Dear Sir/Madam

The purpose of this study is to collect information on the extent of use of ICT by students and teachers in the Ahanta East District to facilitate effective and efficient teaching and learning.

I will therefore be happy if you will provide frank answers to the questionnaire items. Please read each question carefully and answer according to your true opinion. You are fully assured of the confidentiality of all information provided on this paper.

SECTION A: Background Information

Instruction: please kindly tick (√) the appropriate responses to each item.

1. Gender
   a. Male [ ]
   b. Female [ ]
2. Age
   a. 13-15 [ ]
   b. 16-17 [ ]
   c. 18 and above [ ]
3. Name of School…….
4. Computer Experience
   a. Some Experience [ ]
   b. No Experiences [ ]
5. How many years have you spent in your present school
   a. One to five years [ ]
   b. Six to ten years [ ]
   c. Ten years and above [ ]

SECTION B: Availability, Adequacy, Location and Accessibility of ICT Facilities.

6. How available are computers to the school. Tick (√) your response
   a. The school has 101-200 computers [ ]
   b. The school has 1-100 computers [ ]
   c. The school has no computer at all [ ]

7. If the school has computers, what are the types?

Type of computer	Tick as many as appropriate
IMB Compaq Hewlett Packard (HP) Dell Toshiba HP Compaq	

8. Indicate by ticking (√) in the spaces provided where ICT resources in the school can be located.

Resource	Location of Resources					
	Classroom	Lab	Library	HOD's Office	Head Teacher's Office	Assistance Head Teacher's Office
Computer						
Projector						
Printer						
Scanner						
Photocopier						
Fax machine						
Internet						

Indicate by ticking (√) the appropriate responses to each them on the adequacy of computers.

9. Number of computer laboratories.
   a. 1 [ ]
   b. 2 [ ]
   c. 3 and above [ ]
10. Number of computers in a laboratory.
    a. 20-30 [ ]
    b. 31-40 [ ]
    c. 41-50 [ ]
    d. 51 and above [ ]
11. Is the computer laboratory accessible to the internet?
    a. Yes [ ]
    b. No [ ]
12. How accessible are ICT facilities to you? Tick (√) your responses
    a. Do you have access to the ICT facilities in the school?
    1. [ ] Yes
    2. [ ] No

b. If your response to (a) is Yes how many times in a week do you use the computer? 1 ☐ 2 ☐ 3 ☐ 4 ☐

13. How many hours in a day do you use the computers?
1hr [ ] 2hrs [ ] 3hrs [ ] 4hrs and above [ ]

SECTION C: Purpose of the Use of Computer

Please answer the following questions using the scale below, with the answer that best identifies how strongly you agree or disagree with the statement.

Totally disagree - 1 Somehow disagree - 2 Not sure - 3
Somehow agree - 4 Totally agree - 5

Circle one answer for each question.
The computer is used for:

14. a. Recording information	5 4 3 2 1
b. Teaching	5 4 3 2 1
c. Learning	5 4 3 2 1
d. Maintaining students record	5 4 3 2 1
e. Financial management	5 4 3 2 1
f. Assisting communication	5 4 3 2 1
g. Supporting school library	5 4 3 2 1
h. Rationalizing students daily feeding menu	5 4 3 2 1
i. To make information easy to access	5 4 3 2 1
j. For job's efficiency	5 4 3 2 1

SECTION D: Students' proficiency in computer use

15. Which of the following ICT application software are taught in the school? Tick as many as appropriate

Type of Application Software	Tick as many as Appropriate
Word processing	
Spread sheet	
Date base management system	
Desktop publishing	
Presentation software e.g. Power Point	
E-mail	
Internet	
Other (please specify)	

16. Which of the application software indicated in question 16 do you know how to use?

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……
……

17. Tick (√) the statement that best describes your knowledge to the identified application.

Knowledge of use of computer	Much knowledge	Enough Knowledge	Little knowledge	No knowledge
a. To switch on and start up the computer				
b. To use all the key boards				
c. To use the start button to launch programme				
d. Move a window by dragging on the little bar				
e. To close, minimize and restore a window from task bar				
f. To name and save work on hard drive				
g. Save work in appropriate named files				
h. Print using the print button on the software toolbar				

18. Tick (√) the statement that best describes your knowledge to the identified application.

Knowledge of use of computer accessories	Much Knowledge	Enough Knowledge	Little Knowledge	No Knowledge
a. To use all the keys on the key board				
b. Use the mouse to select icons, open and close windows				
c. To single click and double click a mouse button				
d. Save and load work to and from floppy disc				
e. make copies of important files onto floppy disc				

19. Tick (√) the statement that best describes your knowledge to the identified application.

Knowledge of use of internet	Much Knowledge	Enough Knowledge	Little Knowledge	No Knowledge
a. Send an e-mail and receive a reply				
b. To use the internet to access information on the various search engines				

SECTION E: Use of ICT to enhance Learning

20. How did you get information for your assignment before ICT was introduced to you?

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21. How has the introduction of ICT help you in your learning?

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22. How would you describe in general the attitude of your teachers towards the use ICT in teaching and learning?

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23. How would you describe the general attitude of student towards the use of ICT in teaching and learning?

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SECTION F: Barriers to the use of ICT

Kindly tick (√) below, the appropriate responses that best reflect the extent to which you agree or disagree with following statement.

24. Key: SA – Strongly Agree A – Agree D – Disagree SD – Strongly Disagree

	Strongly Agree	Agree	Disagree	Strongly Disagree
a. Integration and learning is associated with uncertainty				
b. The integration of ICT in teaching and learning is associated with uncertainty				
c. The integration of ICT in teaching and learning is hindered by force of habit				
d. Inadequacy of support network is a barrier to ICT integration				
e. Inadequate follow up support hinders the teaching and learning of ICT				

APPENDIX C

OBSERVATION CHECK LIST

Situation/Activity	Yes	No	Occasionally	Remarks
1. Availability, Adequacy and Accessibility. a. The computers are available to the school. b. Computers are adequate for all learners.				
2. Purpose of the use of computer. a. Computers are used to teach all subject. b. Some subjects.				
3. Proficiency in computer use. a. Students and teachers know how to use the application softwares. b. Teachers and students know how to use computer accessories.				
4. Use of ICT to enhance teaching and learning. a. ICT is used in developing teaching and learning materials. b. ICT is used to presser lesson. c. ICT is used in giving and assignment.				