UNIVERSITY OF CAPE COAST

THE INTEGRATION OF INFORMATION COMMUNICATION TECHNOLOGY IN RURAL SCHOOLS IN THE SAVELUGU NANTON DISTRICT

BY

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DECLARATION

Candidate's Declaration

I hereby declare that this project work 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: Emelia Karbo

Supervisor's Declaration

I hereby declare that the preparation and presentation of the project work were supervised in accordance with the guidelines on supervision of dissertation laid down by the University of Cape Coast.

Supervisor's Signature:……..…… Date:…….

Name: Dr. Jonathan A. Fletcher

ABSTRACT

This study looks at efforts being made by the Ministry of Education and other education stakeholders to address the ICT situation in some schools based in Savelugu Nanton in the Northern Region of Ghana. The study highlights the plight of schools in rural areas where the lack of basic amenities such as adequate accommodation, furniture, water, etc. is the order of the day.

The target population for the study was teachers and students in Senior and Junior high school within the Savelugu Nanton District . Two schools from both Senior and Junior high school were selected using random sampling technique. The research design employed was a descriptive survey. The data was collected through the means of a questionnaire, analyzed by the use of frequency tables as well as percentages.

The study concludes that a number of challenges are impeding integration. These include: lack of resources, lack of training in ICT and inadequate support from the Ministry of Education for the implementation of any e-Education policy.

The main recommendation of the study is that since all schools have not attained the same level of ICT integration, there should be a clearly defined audit to determine what is needed and how it should be provided

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DEDICATION

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ACRONYMS

CAT	Computer Assisted Teaching
SHS	Senior High School
ICT	Information and communication Technology
SPSS	Statistical Package for Social Sciences
SAMS	School Administration Management Systems
NINS	Northern Information Network for Schools
PALM	Pupil Anatomy in Learning with Micro Computers
SAIDE	South Africa Institute for Distance Education
FCUBE	Free Compulsory Universal Basic Education
MOESS	Ministry of Education Science and Sports
PNDC	Provisional National Defense Council

CHAPTER ONE

INTRODUCTION

The introduction of Information Communication Technology (ICTs) in schools is fairly a recent activity. Schools have introduced ICT to provide teachers and students access to computers to improve on teaching and learning in both rural and urban schools in Ghana. This study is mainly concerned with the integration of ICTs in schools in Savelugu Nanton district in the Northern Region of Ghana.

This chapter focuses on the background to the study, statement of the problem, objectives of the study and research questions. It also spells out in detail the significance of the study, limitation of the study and organization of the study.

Background to the Study

Recent changes in information communication technologies (ICTs) are transforming industrial organizations, management practices, and the structure of national and global economies. A new divide is being created between the information-rich economies and slow moving information-poor economies. A new type of global inequality is also rapidly emerging between those countries that are "plugged" into the global networks and those that are not. Unfortunately, Africa lags behind the rest of the world in every dimension of this technological

revolution. According to the World Bank, Africa needs to make enormous and immediate progress through various ICT initiatives (Sharan, 1991).

It is an undeniable fact that ICTs play a very important role in the development of every nation. This is because growth is induced by the flow of information and this realization has led most economies into knowledge based ones.

Developing countries have realized this and are vigorously pursuing the use of ICTs as a platform for socio-economic development. But are these countries getting it right? May be, may be not. It is also true that the critical work forces of these developing countries is the youth graduating from the polytechnics, the universities and the professional training institutions but are these graduates trained adequately to handle critical information in a knowledge base world?

The Wikipedia suggests that at least three interlocking driving forces are changing the rules of business and the national competitiveness: globalization where markets and products are more global; information/knowledge intensity – efficient production relies on information; and technological know-how. Indeed, over 70 per cent of workers in developed economies are information workers; many factory workers use their heads more than their hands and computer networking and connectivity developments such as the internet is bringing the "global village" ever nearer . As a result, goods and services can be developed, bought, sold, and in many cases even delivered over electronic networks. The application of any new technology depends on how it meets economic demand. It can stay dormant or get a commercial breakthrough. Human capital-competences

are a key component of value in a knowledge-base company, yet few companies report competency levels in annual reports (Herselman, 2003).

Apparently, as educational investments in ICTs increase in Africa, so too are efforts being made to build and strengthen training capacity and support in the effective use of these technologies. The dramatic increase in the number of technology-based models for developing and delivering educational programmes requires increased emphasis on identifying and understanding the challenges for curriculum integration and proposing effective solutions that are implementable in the African educational milieu at all levels.

The global onslaught of ICTs has engendered the need for the integration of ICTs into all spheres of life, be it at work, at home, in schools or in the field of entertainment (Herselman, 2003). Against this background, educational institutions are making efforts to incorporate basic computer literacy in most of their courses. ICTs are now acknowledged as integral component of primary, secondary and tertiary education. The MOESS has included ICT in the educational system following the review of the current education system (Anamuah Mensah committee report 2008). Moreover, the Information Communication Policy of Ghana clearly states that ICT is creating new ways of learning and it has the potential to enhance the management and administrative capacity of schools. The potential of ICTs to drive the education system cannot be overemphasized. Some benefits to be derived from integration of ICTs in education are:

1. Making learning more interactive.
2. Enhancing the enjoyment of learning.
3. Customizing curricula to meet learner need and development.
4. Capturing data for storage to support decision making.
5. Enhancing the avenues for collaboration and family members and the School community
6. Improving ways of accountability and reporting.
7. Making education learner centered instead of educator centered.
8. Improving teaching and learning in content areas
9. Developing the students' learning skills considered essential in the modern working environment
10. Increasing motivation for teaching and learning
11. Promoting student-centered learning; and
12. Stimulating creativity and collaboration.

It is common knowledge in Ghana that whilst some of the urban schools are relatively well resourced and well staffed, the same cannot be said of schools in the rural areas of the Northern Region. The latter is confronted with overcrowded classes, lack of classrooms, lack of textbooks, inadequate furniture and other basic resources. In support of this assertion, Herselman (2003) cites Furlonger in her work to make the point that urban schools have advantage of information centres, Internet access to information and experienced educators. The question that arises is how can rural schools, which cannot obtain basic ICT facilities, manage to successfully integrate ICTs into their curriculum?

Students are considered to be more productive when using ICT because they feel their needs are being met. Some argue that ICT allow students to access information through their preferred learning styles. This makes the integration of ICT into classroom a very important subject. ICT would make it possible to create a system in which students could receive one-to-one attention, learn by failure, and develop that knowledge that they want. ICT systems have developed to the point that they can be integrated into classrooms to make them efficient tools for teaching and learning (Hood & Hutchins, 1996). In a way, ICT are the 'books' of this century. This potential exists for the revolutionization of education and to create a society which is better educated than earlier generations. The difficulty is that the effective use of ICTs requires a retooling of modern teaching methods. Current student to teacher ratios do not provide those being educated with the attention that is necessary for knowledge acquisition. ICT integration could greatly decrease the effect of lack of teachers by allowing each student to have one on one interaction through their own computer terminal. Students would be able to pursue any questions that they might have using the resources found on the internet and on software programs. In theory students would find the answers on their own and get more detailed answers to their specific questions. This process requires teachers to take up a new role. No longer would they be instructors, they would guide. The teacher would take on a more parental role and guide the student through problems and hopefully show the individual where he or she is wrong.

ICT would create a format for students to pursue their interests and explore what they want to learn. This is possible because ICTs provide the student with resources that are not currently found in the classroom. In the words of John Sculley, former Chief Executive Officer of Apple Computers, students would be provided with "a classroom with a window on the entire world's knowledge" (Gayeski, 1987, p: 122). Information could be provided in a way that was previously impossible. Instead of having to get on a plane or imagine what something is like, students could be provided with the opportunity to see and experience things outside of their environment without leaving the classroom (Gayeski, 1987). The availability of this breath of information creates an atmosphere in which a student can experience that which interests him or her. In finding the answers to specific questions about what interest them, students also learn through failure; a process which encourages the acquiring of knowledge. If used properly it is possible that ICTs would provide students with examples of real life experiences from which they can learn.

Some opponents of ICTs integration argue that with increased interaction with the monitor, students will lose their ability to communicate with others. This can be overcome with proper use of the computer. If students have to complete projects such as presenting the information that they have acquired to the class in oral presentation or if they have to compose e-mail letters to experts on the subject which interest them, they will not lose communication skills. This process would prevent students from losing their ability to write while permitting them to explore what interest them. There are other difficulties that need to be addressed

or overcome before ICT can be integrated into schools. These problems, which include financing, computer turnover, effectiveness of current software, and educating teachers, are the main reasons why ICT has not been effectively integrated into schools. Not all of these difficulties can be overcome by those in the field of education.

Those responsible for schools and districts must consider the cost of successful integration and plan accordingly. In order to finance the integration of ICT and plan accordingly, those in decision making positions must be prepared to make difficult decisions regarding the way money is allocated. A full commitment to ICT integration involves the cost of teacher education, updating computer systems, buying software, and connecting classrooms to the internet. The long term budgets of the education system will be affected if classrooms are to become fully integrated (Knapp & Glenn, 1996).

Without the support of the people in charge of the distribution of finances computer integration will never reach its full potential (Gayeski, 1987).

ICT integration requires a commitment to changing the way schools operate. The obstacles that must be overcome lie in many different areas and involve a variety of individuals. It is hoped that through an increased awareness of the subject matter, these individuals will be convinced that the integration of ICT in schools will benefit students and provide them with superior education. Educational policy makers, non-governmental organization (NGOs), bilateral and multilateral donor organizations and school administrators are making the collective effort to promote ICT integration in Ghanaian schools. Because of the efforts of NGOs and

donor organizations in particular, ICT facilities have extended to some schools, mostly in urban communities. Dankwa (1997) and Parthemore (2003) point out that many secondary schools in Ghana can now boast of computer labs through which students are gaining basic computer literacy. A number of these schools have internet capabilities enabling students to deepen their connection to the outside world.

Although this is encouraging information, extensive review of documents of NGOs that are spearheading ICT integration in Ghanaian schools reveals that most secondary schools now benefiting from ICT are either located in urban areas or are classified as premier secondary schools (Dankwa, 1997; Hawkins, 2002; Parthemore, 2003). According to Parthemore (2003), computer literacy education in Ghana has been concentrated in major urban areas. A few better schools in outlying areas have attempted to "catch up" with their urban counterparts by contracting with private companies to provide computer education. The costs for private computer training are prohibitive and it's rarely if ever the case that all students have access. Other schools have taken part in the Ghana Education Service sponsored scheme where for every hundred text books they purchase from a private firm, they receive one computer system.

Recently School Net, a foundation based in Switzerland, chose fourteen schools in Ghana in which to implement ICT integration in schools. Of these schools, five are located in Accra, three in Kumasi, Four in Cape Coast, one in Tema, and one in Aburi. Of these fourteen schools, eleven belong to those schools

categorized as premier schools. Apart from Aburi, the rest of the locations are all cities.

In recent times, the government reiterated its commitment to extend ICT to all schools in the country in the media. The government also emphasized its commitment to promote equitable integration of ICTs in the school system so that all students will equally benefit from them regardless of their geographical location. The successful implementation of such policy would be a great achievement in the educational system. However, existing inequality, poor infrastructure and the nation's present economic situation is likely to pose a challenge to integrating ICT into the school system. Education policymakers in Ghana have hailed the integration of ICT in Ghanaian secondary schools as a remarkable step that will contribute to knowledge production, communication and information sharing among students and teachers in the school system. This perception stems from assertions in the literature about the benefits that come with the integration of ICT in schools (Mucherah, 2003; Education Testing Service, 2001; Hakkarainen, K., Iiomaki, L., Lipponen, L., Muukkonen, H, & Rahikainen, M. 2000). Furthermore, Hakkarainen et al (2000) points out that ICT is a transformative tool and its full integration into the schools system is necessary to prepare students for the information society they will inherit. Contrary to the promising notion of integration of ICT as a means of knowledge production, numerous scholars have highlighted the need to address the numerous problems that the integration of ICT will bring.

These issues include: a lack of adequate time to plan to use ICT (Mooij & Smeets, 2001); inadequate teacher training (Webb, 2003); lack of relevant content and software application (Snyder & Angus, 2003); lack of access to hardware, lack of technical support and lack of administrative support (Brickner, 1995). For instance, there is a need for appropriate telecommunication infrastructure and well-trained ICT professionals (i.e. personnel who are capable of utilizing ICT resources in school work, technicians to install and maintain the equipment and others that produce learning content) who will be prepared to work in the rural areas.

In spite of the drawbacks faced by rural schools, some schools have managed to introduce IT into their curriculum as directed by the new educational reforms. It is reasonable to suggest that some factors will facilitate and others will impede the integration of ICT in rural schools in Ghana and consequently affect the provision of equal and quality education for all as well as the global benefits derived from the use of ICTs.

Statement of the Problem

It has become obvious that there are disparities between urban and rural schools in terms of human resources and ICT facilities. The human resources include qualified ICT teachers, coordinators and technicians whilst the ICT facilities include infrastructure (computer laboratories, class rooms, tables and chairs), computers and internet among others.

The lack of human resources and ICT facilities appears to hinder integration of ICT in schools in Savelugu Nanton District. This condition depriving students and

other ICT users of becoming part of the knowledge based economy of Ghana and the entire global world. The lack of knowledge about the extent to which the lacks of resources affect integration is a problem as the latter and needs to be investigated.

Objectives of the Study

The general objective of the study is to determine level of integration of ICT in rural schools of the Savelugu Nanton District.

The specific objectives of the study are to:

1. Determine the state of ICT in rural schools in the Savelugu Nanton District.
2. Identify teachers and students' perceptions of using ICT in education and factors that impede the integration of ICT in rural schools in Savelugu Nanton District.
3. Make recommendations for effective integration of ICT in rural schools and for policy formulation and implementation based on the findings regarding (1), (2) and (3) above.

Research Questions

The following research questions have been formulated to guide the study.

1. What is the state of ICTs in the rural schools in the Savelugu Nanton District?

The question sought to find out:

a) whether students and teachers have knowledge in the use of computers;

b) about students and teachers' levels of expertise in computer programmes;

c) the ICT resources that can be found in the school;

d) whether students have access to those ICT resources;

e) About the availability and level of usage of computers in the school.

2. What are teachers and students' perception of the use of ICT in education?

3. What factors impede the diffusion of ICT in rural schools in the Savelugu Nanton District?

4. What are the benefits of ICT and its impact on students and teachers?

Significance of the study

The findings would benefit curriculum planners as well as the Government. It would encourage curriculum planners to integrate information communication technology in such a way that it will suit the changing development and demands of the global world. The findings would enable Government and stakeholders to be more informed and therefore invest in providing computers to rural schools, especially in Savelugu Nanton. Findings would also contribute to literature on the integration of information communication technology in the rural schools in Ghana.

Delimitations of the study

The study was limited to Educators, Students of Senior and Junior High Schools in the Savelugu Nanton District because the integration of ICTs into teaching and learning is possible in schools with computers.

Limitation of the Study

Limitations are natural conditions that restrict the scope of a study and may affect its outcomes. The limitations of this study could be varied and may be viewed from different perspectives. Some of the limitations that could be associated with the study are; some schools may not permit the researcher to conduct the study there. The study may be constrained by time and resources to cover as many schools as possible in Savelugu Nanton district.

Organization of the Study

The report on the study has been organized into five chapters. The first chapter deals with the background to the study, statement of the problem and the objectives of the study, as well as research questions and organization of the study. The second chapter comprises relevant literature with various themes addressing the subject matter of the study. The third chapter constituted the methodology of the study and considers methodological procedures such as the study design, study area, sources of data, target population, sample size and sampling procedure and instruments for data collection. Additional aspects of the methodology include pre-test of the instruments, main study as well as data collection, processing and analysis. The fourth chapter deals with issues such as analyses and discussions of findings of the study. The final chapter is devoted to the summary, conclusions and recommendations of the study as well as areas for further research.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

Introduction

The study will generally review relevant literature on issues relating to information, communication, technology and education. This chapter sets out to identify the factors that facilitate and impede the integration of ICTs into teaching and learning. The benefits of integration, as proposed by educators worldwide will also be examined as well as the changes that schools and teachers are required to make to achieve successful integration of ICT. The experiences of teachers and researchers will be included in this review.

The chapter is organized under the following thematic areas:

1. The educational system in Ghana
2. What is ICT?
3. The need for ICT in education
4. The value of integration of ICT into the curriculum
5. Barriers or obstacles to ICT integration
6. ICT and education in Savelugu Nanton

Educational system in Ghana

The philosophy of the educational system of Ghana lays emphasis on education that results in the formation of well-balanced individuals with the

requisite knowledge, skills, values, aptitudes and attitudes to become functional and productive citizens.

Ghana has since independence made significant strides in its education system. The education landscape in Ghana today is the result of major policy initiatives adopted by past governments as well as the present one.

Some of the laws, policy documents and reports, which have helped in meeting the educational needs and aspirations of the people include:

1. The Education Act of 1961
2. The Dzobo Report of 1973 (Recommended the JSS Concept)
3. The New Structure and Content of Education of 1974
4. The Education Commission Report on Basic and Secondary Education 1987/88
5. The Education Reforms Programme 1987/88
6. The University Rationalization Committee Report 1988
7. The Free Compulsory Universal Basic Education Programme, 1996
8. The FCUBE policy Document and Programme of operations,1996
9. The Ghana Education Trust Fund –GET Fund Act 2000.(Act 581) and now
10. The New Educational Reform, 2007

Indeed these initiatives have not only helped in structurally transforming the education system but also improved access, quality teaching and learning, infrastructure delivery as well as management efficiency. Despite the successes these reforms have had on the educational landscape of Ghana, they have not done much to address the need of the nation in terms of producing a human

capacity with all the requisite training in ICTs. Realizing this, governments started introducing computers into Senior High Schools (SHS) in the late 1990s. This necessitated a statement from the Government of Ghana which claims that ICT revolution is having tremendous impact on the rapid development of world economies and making national economies more interdependent than they were some years ago. The statement claimed further that the Ministry of education science and sports is therefore committed to making Ghana a key player in today's digital age. To this end, the Ministry has embarked upon a programme to streamline computer studies in Senior High School. A curriculum has now been developed for ICT training and examination at the West Africa Senior Secondary School Certificate Examination Level. Countries all over the world have undertaken education reforms at one time or the other to improve upon the content and delivery of quality education. Ghana has had its fair share of educational initiatives and reforms spanning across five decades as mentioned above. Key among the latest (2007) reforms is a continuous 11-year basic education which is universal and compulsory. The 11-year period is made up of 2-years of Kindergarten, 6 years of primary and 3 years of Junior High School. The post-junior high school education is followed by a 4-year senior high school education which embraces four courses: General education, Vocational education, Technical education and Agricultural education.

The reforms also give room for students who cannot continue to the senior high school to engage in apprenticeship/skill training. The reforms prescribe a four –year programme for students and mandate them to study five core subjects,

namely: English, Mathematics, integrated Science, Social Studies and Information and Communication Technology (ICT).

What is ICT?

ICT has been described in the new educational reforms of the Ministry of Education Science and Sports as the convergence of "information technology and communication technology" (Ministry of Education Science and Sports, 2004). The White Paper goes on to state that "ICTs are the combination of networks, hardware and software as well as the means of communication, collaboration and engagement that enable the processing, management and exchange of data, information and knowledge" (Department of Education, (2004). Similarly, Isaacs, Broekman and Mogale (2004:39) define ICT as the use of "technology to create, store, process and use information in various forms (data, voice, image, multimedia presentations and other forms including those not yet conceived". SAIDE: (2005, P. 120) also define ICT as "the technologies which together support people's ability to manage to communicate information electronically". Examples of such technologies are digital cameras, video recorders, television and radio. In this study ICT will be used to refer to the set of activities and tools that facilitate the capture, storage, processing, transmission and display of information by electronic means to enhance teaching and learning.

The role of ICT in Education

An examination of the use of ICT in education, worldwide, reveals a high degree of unanimity on the part of researchers who have been involved in assessing its role, in their enthusiasm for the adoption of information and

communications technology in all spheres of life. Technology can be regarded as simply a tool that can be used to solve a problem efficiently and easily or it can determine educational change (Noss, 1991). The technology alone will not effect this change; investment in teacher training, in both technical and pedagogical skills, and in infrastructure is necessary to achieve the objectives of the various technology-integration projects (Tapscott, 1999, Bennet, 1997).

After twenty years and spending millions of Ghanaian cedis since the first personal computers were plugged into the nation's schools, policymakers and the public are finally starting to demand evidence that their investments in technology have been worthwhile. One difficulty in determining the effectiveness of education technology is that there is so little consensus about its purpose. (Trotter, 1998). A report presented to the Ministry of Education Science and Sports by the Teaching, Learning and Education Technology Advisory Committee found problems with the implementation plans of ICT (Addo & Mensah, 1999). These plans, it was found, concentrated on hardware and infrastructure objectives but had set no educational goals that could form a basis for research into the impact of technology in schools. The precise role of ICT in education had not been defined.

Writing in the Educational Technology Journal on how schools should prepare for ICT integration, McKenzie (1998), concluded that school technology plans, in general, tended to include lofty goals that translated poorly into daily classroom realities. Other researchers found that computers were being used in schools to supplement traditional pedagogy, if used at all, and no attempt was

being made to integrate them into the curriculum (Geisert &Futrell, 1995; Bennet, 1997; Ginsberg &McCormack, 1998). If the technology in the schools was used differently, they concluded, it could bring advances that would improve education greatly.

It seems that the importance of the role of technology in education will depend on the context in which it is deployed. Similar views were expressed in a recent Irish publication, Irish Education for the 21st Century. Indeed, it is the teachers, the curriculum and the school ethos, much more than equipment that determine whether students are motivated to express themselves in an imaginative manner (Trench, 1998). Despite the expense involved, technology is very appealing in its role in schools and education (Cuban, 1993).

The need for ICT in Education

To be productive and competitive in the knowledge economy, governments must focus on strategies to provide quality education. A quality education is one which can impart skills that will serve as a tool for productivity. In an article on the 'Net Generation', Tapsccot (1999) wrote that the infiltration of technology into the lives of students, in the home and society at large, has considerable implications for the content of the curriculum in schools and for the teaching methodologies employed by teachers. The students themselves have become the most potent force for change (Tapscot, 1999).

This skill can be gained by providing ICT resources to all including those who have no access. The need to adopt ICTs in schools is summarized into three rationales:

1. Economic rationale - to meet the requirements for employability as the 21st century unfold.
2. Social rationale - to fulfill the requisite for participation in society and the work place, and
3. Pedagogical rationale - to concentrate on the role of teaching and learning (OECD, 2001).

From the afore-mentioned, it might be safe to conclude that the value that ICTs will add to education is really exciting and it is worth giving a try. OECD (2001) and Rao (2004) make the point that the ubiquitousness and utility of ICTs is changing the way people live, learn, work and relate to each other. The explosion and free flow of information and ideas have brought knowledge and its applications to millions of people, creating new choices and opportunities in some of the vital realms of human endeavour. These developments have created what scholars refer to as the knowledge society or learning society or information society. From this standpoint, we can note that the global economy is now based on the exploitation of knowledge in addition to labour and natural resources. A knowledge-based economy is one in which growth, development and innovations are driven by the optimal use of information and information products (SchoolNet Toolkit Guidebook1). That is, the ability to transmit data over information and communication infrastructure. According to the Ministry of Education Science and Sports, the global explosion of information has not reached many people. Thus we are experiencing what is referred to as the 'digital divide. The term "digital divide" refers to a situation where some populations

have access to ICTs and others have very little or no access at all (School Net Toolkit Guidebook1) The use of ICTs in education, it is hoped, will expand education to remote places and consequently help bridge the digital divide.

To be productive and competitive in the knowledge economy, governments must focus on strategies to provide quality education. Quality education is one which can impart skills that will serve as a tool for productivity. Hawkins (2002,p.38) writes of this skill as "information reasoning" which he posits as "a process in which reliable resources of information are identified, effectively accessed, understood, contextualized and communicated to colleagues". He further points out that employers require workers who possess skills necessary to collaborate, engage in teamwork, and be able to share information across global networks. These workers must also have the ability to learn quickly in a rapidly changing environment.

This skill can be gained by providing ICT resources to all including those who have no access. This view was endorsed by the former President of South Africa, Nelson Mandela who is quoted by Stern (1999,p.4) as stating that universal access to information is a means to "promote economic growth and development, consolidate democracy and human rights, and increase the capacity of ordinary people to participate in governance". Therefore, it is imperative for society to reconsider the way skills are developed so that society can benefit from the use and harnessing of ICT and ICT resources. OECD (2001, p.9) notes "all countries wishing to enhance the quality and effectiveness of the learning process in schools and are looking to ICT as the means whereby this may be achieved".

UNESCO (2002) also points out that all governments aim to provide the most comprehensive education possible for their citizens within the constraints of available finance. Because of the pivotal position of ICT in modern societies, its introduction into education will be high on any political agenda. To this end, many people have acknowledged that acquiring information through the use of ICTs in education is of crucial importance (Baartman, 2003, p.52). The belief is that ICTs will create a citizenry of lifelong learners who can adapt to the global economy.

Capper (2003) notes that the use of ICTs enhances learners' performance, better prepares learners for most careers and vocation and shifts the traditional teaching method to a learner-oriented method. Cawthera (2001, p.11) notes that "If a country is to be internationally competitive it is essential that its labour force is able to utilize and harness the advantages of ICTs. If the education system fails to enable people to do this it also fails to meet the needs of the country and its economy". Isaacs, Broekman and Mogale (2004) have also pointed out that introducing ICTs into education will provide opportunities for the youth to function in the information age. That is, ICTs in education will promote cultural exchange, develop communication skills among learners and assist them with studies. For instance, learners can learn other peoples' culture over the Internet and even exchange ideas about different cultural practices. ICTs thus will enable the Ministry of Education Science and Sports to attain its goal of providing a unified national education system based on the democratic principles of equity, transparency and participation (Ghana Education Service, 2001).

Kante and Savani (2003) have stated that the use of e-learning can reduce the cost of face to face training, time of training, expand educational opportunities and develop knowledge-economy skills which is increasingly demanded in the labour market. A case study in Maliis cited by these two authors to show the cost effectiveness of adopting ICTs in education. Fletcher (2003, pp.10-14) also notes that "technology-based instruction can reduce time and cost needed for learning". Haddad (2003,p.6) supports the cost effectiveness of ICT in education by pointing out that "ICTs, although expensive, may end up to be the best investment to make acceptable levels of learning affordable for all students, anywhere, within reasonable time and resources". From the points made by the aforementioned authors, it is evident that the use of ICTs in education has the potential promise for cost reduction and for an improvement of training and quality of service.

ICT-based education can provide gender equity in many ways. Some academics have stated that the education of women will promote social and economic development. For instance, Hawkins (2002, p.42) quotes a UNICEF document which reports on a research that states, "an extra year of schooling will increase a woman's future earnings by about 15 percent, compared to 11 percent for a man". This perhaps supports the popular saying that "if you educate a woman, you educate a nation". However in most societies, the observation is that women play second fiddle to men because education is a time-and-place venture and women may for various reasons are not able to fulfill this requirement. Again in some religions, women are not accorded equal status as men. For example, in

some Christian churches, women are not accepted as priests or cannot hold some leadership positions. However, in recent times calls are being made for gender equality. For instance in Ghana, the Ghanaian constitution makes provision for gender equity. This move to empower women can be enhanced by providing ICTs in education. For example, the Internet which has numerous sources of information is not exclusively for men. Women can also have access to it. So women can obtain information from the Internet, which they can use to assert their positions in society. Hawkins (2002,p.42) provides examples in Mauritania and Ghana where girls have indicated that the Internet has given them the impetus to assert their freedom and rub shoulders with boys as it affords them the opportunity to access information beyond the controlled information provided to them.

In many societies, especially the developing ones, providing proper education to learners with special needs pose real challenges. OECD (2001) makes the point that significant benefits have been derived from the use of ICTs by learners with special needs. The use of ICTs in schools will afford children with visual and muscular difficulties the opportunity to read, write and express themselves. Integrating ICTs in schools will enable children with special needs to attend ordinary schools. UNESCO (2002) states that ICT permeates the business environment; it has underpinned the success of corporations and provided governments with an efficient infrastructure. It adds further that ICTs have added value to the process of learning, and in the organization and the management of learning institutions. Kante and Savani (2003, p.15) also support this view by

stating that since ICTs have proved successful in business, there is no harm in trying it in education.

Technology will serve as points of mediation for teachers who are not well qualified. Educational materials can be prepared and distributed to all schools either through the Internet or the broadcast media. In Namibia, the government has noted that the value of ICTs in the classroom goes beyond that of a practical teaching aid Haddad (2003, p. 6) It further points out that "the need to use new technologies to raise the quality and efficiency of education cannot be overemphasized". To improve the quality of education and technical proficiency of its human resource, the Namibian government feels that it is imperative to expose its children, parents and teachers to ICTs. This measure aims to increase productivity and accelerate development. In Zambia, ICTs in education is regarded as important as basic reading and writing skills (SchoolNet Zambia). In Uganda, the government has indicated its commitment to integrating ICTs into formal and informal education. Kawooya (2004) cites how SchoolNet in collaboration with the Ugandan government has introduced School-Based Telecentres to provide schools and communities with ICT facilities.

Details to similar claims to the usefulness of ICTs in education in African countries can be accessed through (SchoolNet Toolkit Guidebook2).

It must however be pointed out that the use of ICTs in education has some drawbacks and some of the cited drawbacks are:

1. Lost of personal contact between educators and learners.

2. Lack of commitment on the part of both educators and learners to utilize ICT resources.
3. High cost of installation.
4. Lack of competent personnel to use ICT resources.
5. Accessibility to hardware and software.
6. Reliability and quality of computers.
7. Professional training for ICT users.

Moreover, Cawthera (2001,p.10) has argued that there is no research to prove that the application of ICTs in education will be more successful than other resources such as "textbooks, teacher training or nutritional supplements". A similar assertion has been made by Fletcher (2003, p.14) who points out that "the arguments in favour of technology-based instruction are incomplete. In spite of these apprehensions, education cannot ignore the changes wrought in society by the proliferation of ICTs. The researcher therefore contends that the ultimate introduction of ICTs in schools will prove more rewarding than sticking to the traditional method of teaching and learning. This does not rule out the need for good planning for harnessing the potential of ICTs in teaching and learning.

The value of integration of ICT into the curriculum

If educators are to make major changes in any system they must be convinced that the changes are necessary and will benefit the education system and all its components. There is general agreement among researchers that ICT integration is worthwhile, provided proper planning and training are provided. In a report to the Ministry of Education Science and Sports in 1999, the authors

concluded that, a nation cannot prepare its student for the future by ignoring the technology that is already part of their lives today. Failure to equip students to function fully and effectively in this environment will result not only in restricting their employment prospects but in impeding their ability to contribute fully to the development of their society.

The committee also concluded that the integration of technology in education should involve:

1. Enhancing literacy in its broadest sense.
2. Expanding sources of information.
3. Improving communications.
4. Developing critical thinking (Addo & Mensah, 1999).

Specific groups have been identified as those which benefit greatly from ICT. These include students who are low achievers, such as students with learning disabilities or those at risk of academic failure. These groups are especially likely to show improvement in academic achievement when ICTs are used in teaching and learning (OTA, 1988; Software Publishers Association, 1993; Weiss, 1994).

Added to this, educators can expect significant improvement in student behaviour and absenteeism (Dwyer, 1994), dropout rates (Braun, 1993), classroom interaction, independent learning and collaboration (Software Publishers Association, 1993). The IT 2000 document outlines the following four compelling reasons (from Hawkridge, 1990), for integration:

1. There are social benefits. All young people, regardless of social or economic background, would have equal access to new technologies.
2. There are vocational and economic reasons. There is an increasing demand for technologically literate workers in Ireland and abroad. Knowledge and familiarity with the new technologies will be an employability factor. Nations that successfully embrace the information age will have an economic advantage over their competitors
3. There are pedagogic reasons. ICT can improve the quality of the educational experience. Educational research has shown that high motivation is a factor with students using ICTs for learning.
4. There are broader catalytic reasons. The use of computers can encourage the ability to access and handle information and encourage deeper thinking due to less emphasis on memorizing facts. Schools can become more collaborative environments the primary rationale for ICT adoption is that it should be seen to complement the achievement of broader educational aims which affirm the professional skills of teachers and the personal growth of students. (IT 2000 document).

Hawkridge (1990, p.124) adds the qualifier that the catalytic rational requires organizational change to succeed. "Computers follow the law, rather than the law following computers. They are seldom catalytic in the broad sense, although they change working practice". There is broad agreement with this point throughout the literature.

Social Benefits

Many studies have outlined the social benefits that can accrue from the use of technology in the classroom (Schrum & Berenfeld, 1996):

1. Students and teachers have access to widely distributed electronic resources.
2. Resources are shared. Students and teachers can collaborate.
3. Collegial, social and professional development activities can be supported among educators.
4. Students in deprived areas have the same access to information as those in affluent areas.
5. Physically challenged people can participate.
6. The educational process is available to all.

Vocational and economic benefits

The world operates as an information society. Over the last thirty years, electronic technology has dramatically become part of every area of society and every aspect of our lives. The very nature of work has changed with an increasing demand for workers who could master the new technologies and use them to conduct business that formerly did not require computers at all (Strommen, 1992). It is clear that in the future effective leaders and citizens will be expected to understand and use computers and communications technology. Obviously, a school's policy in relation to computer technology will play a major role in the preparation of these future leaders and citizens.

Teachers and ICT

Teachers may wonder if the introduction of ICT in schools has changed what students need to learn or the type of learning they should achieve. It can become difficult to balance learning the subject content and learning the technology. Researchers agree that this is a problem initially but, with practice, it can be overcome. Researchers have found that there is a shift towards a less didactic and more open style of teaching when computers are used. Somekh (1989,p.67), as a result the PALM (Pupil Autonomy in Learning with Microcomputers) Project, comments that "the shift of control over learning away from the teacher towards the pupil, and the crucial role teachers play in this process, are fundamental to our understanding of autonomy in learning." Teachers often complain about students who will not take responsibility for their learning; perhaps greater responsibility will come with the increase in control that the student will have in a computer environment.

Schools must change the emphasis from learning about computers to learning with computers (Jonassen, 1996). This point is made very clearly in the report to the ministry

of education science and sports where the authors point out that the present technology-driven agenda, which has created public expectations about computers and education, must be changed to a curriculum-driven one, where teaching and learning are supported through the integration of ICT with the curriculum (Quaye & Kumasa, 1999). This same report also makes the point that a significant portion of the funding must go towards teacher support in their role of teaching using

technology. This support should include in-service, both to become comfortable using computers as tools that assist in the many tasks involved in administering a classroom, and in integrating the use of computers into the curriculum.

It should also mean access to technical support on a timely basis. Indeed, teachers should not be expected to be network specialists. (Quaye & Kumasa, 1999).

An understanding of the teaching and learning processes is essential to understanding how the computer fits into teaching (Van Deusen & Donham, 1987). The teacher's role is to teach; the computer and the software make the jobs of teaching and learning easier to achieve. According to Ryba and Anderson (1989), the main components of the teacher's role would be:

i. Planner: select and evaluate software, plan access to computers for students, allow cooperative groups where possible.
ii. Manager: effect smooth progress of learning and facilitate equal access for all.
iii. Facilitator: ensure students make appropriate use of software, help students set goals, encourage and reinforce positive behavior.
iv. Guide: suggest direction, provide cues, and set a variety of tasks.
v. Participant: collaborate with students, allow time for discussion, listen to students, and involve them in their learning.

Flexibility is the most important feature of the new role which the teacher will have to play (Strommen, 1992). The new computer environment may prove to be rather complex for the teacher, especially in the beginning. The transition from the familiar to the unknown is daunting and uncomfortable. A lot of time is

required to learn both the technical aspects of the environment and the new style of teaching which will be required. The changes that are required, researchers agree, will not happen unless the teacher is supported and encouraged (Strommen, 1992; Ryba and Anderson, 1989; Beasley and Sutton, 1993). The changes are desirable according to Papert (1996) who concluded that the new style of learning provided the flexibility that could allow every individual to find personal paths to learning. Individuals do not learn new skills simply by exposure to them. Authentic and mandatory activities increase the likelihood that participants will internalize the use of ICTs (Schrum, 1995). In other words, teachers and curriculum planners must prescribe activities within every subject where the student uses ICT as a matter of course. Other research has suggested that part of the difficulty in adopting innovation or reform relates to teachers themselves (Floden, Goertz & O'Day, 1995).

Tapscott (1999), president of New Paradigm Learning Corporation in Toronto, has identified eight shifts by educators and students to new ways of thinking about teaching and learning:

i. From linear to hypermedia learning- access to information is more interactive and non-sequential.
ii. From instruction to construction and discovery.
iii. From teacher-centered to learner-centered.
iv. From absorbing material to learning how to navigate.
v. From school to lifelong learning.
vi. From 'one-size-fits-all' to customized learning.

vii. From learning as torture to learning as fun.

viii. From the teacher as transmitter to the teacher as facilitator.

Studies on technology integration conducted by Macro International suggest that one of the most important factors related to the successful integration of technology is effective leadership (Livesay & Murray, 1992).

Many other studies of ICT integration in schools have concluded that where there is no collaboration among leaders, there may be pockets of successful programs or initiatives, but these are usually dependent on individuals, and when the individuals leave, the programs disappear (Council of Chief State School Officers, 1990).

Technology is the driving force behind fundamental changes in our schools. It allows us to teach children in a way that corresponds more closely to the way they learn naturally. The emphasis changes from "being taught" to "learning". (Jonassen, 1996). Research has shown that a number of key factors must be in place before successful integration of ICTs can take place. (Byrom, 1998)

i. The school must have energetic and committed leadership.

ii. There must be a comprehensive plan, setting out the mission, vision and goals. It must reflect the ideas of the entire school community.

iii. There must be the realization that the process will be slow and will require substantial levels of support and encouragement for educators and that some teachers will be unwilling to become involved for a variety of

iv. Comprehensive in-service must be provided by experts on an ongoing basis.

v. The acceptance that the teacher's role will change.

vi. The school needs access to professionals with expertise in technology and pedagogy.

Coley, Cradler and Engel (1997) found that technology has the potential to decrease the opportunity gaps by allowing students from different backgrounds equal access to the wealth of information available on the Internet.

It would appear to be a mistake to invest solely in hardware and software and concentrate on reducing the ratio of students to computers, as the presence of the technology is no guarantee of effective use. Teachers must be aware of the pedagogic principles underlying teaching with, and learning with, computers. It would seem that there are possibilities for community involvement, especially local industry, in the school's technology developments, allowing more people to share in the Information Society.

Schools must take note of the educational research that indicates that real learning requires a move away from the behaviourist theory to the constructivist theory of learning. Students should be helped to acquire personal skills necessary for everyday life. In Ghana the Committee to Review the Curriculum for Schools (1996) identified these skills as:

a. Thinking: acquire knowledge, reflect and evaluate, analyze, problem-solve.

b. Expressing: create and express ideas in a variety of ways.

c. Relating to others: recognize and appreciate diversity.

d. Applying skills and ideas to solve practical problems.

These skills cannot be taught in isolation. The computer can have a major role here. Computers provide the tools and structures for such learning. Thinking skills can be taught using simple programming languages such as Logo or adventure games and simulations. Social skills can be enhanced using Word-processing and applications that encourage collaboration. Communication skills can be developed by simple screen-to-screen interaction in the school, emailing to others anywhere in the world, teleconferencing and chat-rooms.

In summary, it appears that Implementing ICTs in schools requires considerable reform and change in:

i. Syllabus content.

ii. Pedagogy.

iii. Teaching styles and methodologies.

iv. Evaluation - what is being measured and the means of evaluation.

Barriers or Obstacles to ICT integration

The barriers to integration, according to the literature reviewed, relate to:

a. The teacher- skill level, attitude, motivation, vision and pedagogic beliefs.

b. The school culture – leadership , planning, vision and staff development

c. Resources –finance, hardware and software, time and access to training

d. Although it is accepted that ICT integration has a significant role in education, there are barriers to be overcome in implementing it in the classroom. Most

education leaders, according to studies conducted by the Office of Technology Assessment in the U.S., believe the under-utilization of computer technology in the classroom is a result of at least four factors:

1. Inadequate teacher training.
2. A lack of vision of technology's potential for improving teaching and learning.
3. A lack of time to experiment.
4. Inadequate technical support (OTA, 1995).

The CEO Forum on Education and Technology (1997) states that less than 3 percent of America's schools are at the leading edge of effectively integrating technology into classroom practices. In 1991, Pelgrum and Plomp conducted a worldwide study of computers in education in which they identified over 20 conditions that impeded the use of IT in education. Further studies reported by the Congressional Office of Technology (1995) and Ginsberg and McCormack (1998) found many of the same factors to be present. A year later a survey of school principals in British Columbia, (Social Science Statistics Research Methodology 1996) identified almost identical factors.

The factors common to these studies that are perceived as impediments are:

1. Access to computers and scheduling computer time.
2. Availability of appropriate software.
3. Time required planning, preparing and providing assistance.
4. Skill and confidence required to implement computers in teaching.
5. Skill required troubleshooting faults.

6. Lack of incentives and self-motivation.
7. Negative (or lack of positive reinforcement) attitudes of administrators.
8. Inadequate teacher education and training.
9. Shortening of learning time for student's teaching becomes more challenging.

It would appear from these studies that access to computers, time to learn the technology and a perception that adoption of ICT would present major challenges are obstacles which administrators must deal with if ICT integration is to become a reality.

ICT and education in Savelugu Nanton

In the light of the developments stated above, OECD (2001:9) states that "all countries wishing to enhance the quality and effectiveness of the learning process in schools, and are looking at ICT as the means whereby this may be achieved". From this standpoint, the Ministry of Education Science and Sports has realized that the provision of the relevant education with the application of ICTs can no longer be ignored.

It has become crucial that access to ICTs in education is provided by all concerned. Certain areas in the Northern Region especially the Savelugu Nanton District have not had their fair share of the ICT cake. Apart from the Northern Information network for schools (NINS) computer –training center which has only four (4) computers, there is no other computer training center and there is no other organization in the district that is into the promotion of ICT. In this regard, the Ministry of Education Science and Sports has introduced ICT with the

inception of the new educational reform to ensure the integration of ICTs into the school system in the Savelugu Nanton District and other district in the country.

The Ministry of Education Science and Sports also sees the integration of ICTs into the school system as a way of providing quality education to all and to redress the past inequalities in education. This view is emphasized by the Minister of Education, in a foreword to the "White Paper on e-Education" (Ghana Education Service, 2004). Consequently, the Department of Education has introduced Information Technology (IT) into its new school curriculum. A White Paper was released (Ghana Education Service, 2004), to guide the department in the introduction of e-Education into the Ghanaian school system.

The White paper stated that e-Education revolves around the use of ICTs to accelerate the achievement of national goals. The paper stated further that e-Education will ensure the provision of the connectivity to enhance teaching and learning, provide the relevant support services such as pedagogical, curricular, assessment, managerial and administrative (Ghana Education Service, 2004). This implies that, if successfully implemented, the country's education system will be transformed to produce quality education with equal access to all and a breed of lifelong learners.

As mentioned elsewhere in this dissertation, individual schools are doing their lot to get ICTs introduced into their schools, despite the fact that there is no guidance from the education department. On the whole, urban schools are edging out rural schools in integrating ICTs in their schools. Rural schools are beset with mainly the problem of basic infrastructure. However, with the appropriate

planning, ongoing professional development programme with its built-in evaluation and sustained by financial support and essential technical staff, rural schools (such as those in Savelugu Nanton) can also benefit from the use of ICTs.

The next chapter looks at methodology of the study including the sampling procedures and hoe data was collected for the study.

Summary

The chapter looked at the need for integration of ICTs into education and noted that there is ample evidence that ICTs will transform education to produce people who will be adequately equipped to compete in the Knowledge society.

The Department of Education has taken up the challenge to ensure that the curriculum offers the right programme which will see learners leaving schools with the necessary ICT skills with the capacity to be lifelong achievers. The department has introduced IT into the school curriculum and produced a white paper to guide it in the provision of e-Education to schools in Ghana.

Individual schools are doing their lot to get ICTs introduced into their schools, despite the fact that there are numerous problems encountered by the schools in the Savelugu Nanton District. On the whole, urban schools are edging out rural schools in integrating ICTs in their schools. Rural schools are beset with mainly the problem of basic infrastructure. However, with the appropriate planning, ongoing professional development programme with its built-in evaluation and sustained by financial support and essential technical staff, rural schools can also benefit from the use of ICTs.

CHAPTER THREE

METHODOLOGY

Overview

This chapter provides an outline of the design of the study, the population, sample and sampling procedure. In light of this, the research methodology is explained with specific reference to data collection. It further discusses the research instruments used in the data collection, the relevant data processing techniques and method that were used to analyse and interpret the data collected.

Study Area

Savelugu Nanton district is one of the eighteen (18) administrative districts of the Northern Region. It was established by PNDC Law 207 under the legislative instrument of 1988. It was carved out of the then western Dagomba District Council which includes Tolon/Kumbungu and Tamale Metropolitan Assembly. The district is located in the Northern Region of Ghana. It shares boundaries with West Manprusi in the West and Tamale Metropolitan Assembly to the south. The district has 54 preschools, 81 primary schools, 18 junior high schools and 2 senior high schools.

Research Design

The research design stems from the research problem stated in chapter one. Thyers, as cited by De Vos (1998:123), states that a research design is "a blue-print" or detailed plan for how a research study is to be conducted." Similarly, Merriam (1991:6) notes that: A research design is similar to an architectural blueprint. It is a plan for assembling, organizing and integrating information (data), and it results in a specific end product (Sarantakos 1998). The selection of a design is determined by how the problem is shaped, by the questions it raises, and by the type of end product desired.

To this end, it is vital for the researcher to have a thorough knowledge of the methodological and analytical tools available, as well as awareness of their uses and their shortcomings. The research design applied in this study can be described as qualitative (because it will provide description of stakeholders' views and experiences), quantitative (as some data will be statistically analyzed) and exploratory (because it will explore some educational territories that have not been sufficiently documented).

The research will also be interpretive as it seeks to provide insights into the behaviour expressed and the meanings of interpretations that subjects give to their world. The result of the research will be contextual reflecting the reality of stakeholders in schools in Savelugu Nanton highlighting their views and experiences regarding the issue of integrating ICTs into the school curriculum.

Qualitative Research Methodology

Qualitative study according to Creswell (1994, p.2) is an "inquiry process of understanding a social or human problem, based on building a complex, holistic picture, formed with words, reporting detailed views of informants, and conducted in a natural setting". It can thus be said that "qualitative research uses unobstructed logic to get at what is really real- the quality, meaning, context, or images of reality in what people actually do, not what they say they do (as in questionnaires)" With this study, the social world of both educators and learners in the district which is located in their access to the use of ICT resources in schools is examined. That is, the means by which they try to acquire ICT resources in rural schools in the district as well as the obstacles they have to overcome to ensure that they can also join the ICT bandwagon will be investigated.

Qualitative research according to Leedy (1997,p. 156) "has grown out of diverse disciplines (anthropology, sociology, psychology) that are marked by distinctive interests, theories, issues and research methods". However, Vockell and Asher (1995,p.193) point out that qualitative research is relatively new, as educational research followed the dictates in psychology, which remained experimental and based on surveys that convert data to statistics and working with predetermined groupings of participants' responses. Qualitative research therefore appears to be constructivist and interpretive in its epistemology, although positivist research with qualitative data is not unusual (Henning, 1995).

The task of the qualitative researcher is to try and capture data on the perceptions of local actors 'from the inside', through a process of deep attentiveness of emphatic understanding and of suspending or 'bracketing' preconceptions about the topics under discussion as much as possible (Miles & Huberman, 1994,p. 6). This view of immersing in the everyday life of the setting chosen for study is held by Marshall and Rossman (1989, p.11) and Silverman (1993, p.25). To achieve this, the researcher will make use of a range of sources of data collection to gather data on any number of aspects related to the unit of analysis, including the physical setting of the study, in order to put together a complete picture of the social dynamics and other information of a particular situation, programme, phenomenon or activity. Qualitative research can therefore "provide a broader version of theory than simply a relationship between variables" (Silverman, 1993, p.27). While this study has a specific focus, the strategies employed by the inquirer will allow for the management of unplanned themes. By developing a focus for data collection, the research will not be approached with narrow questions or hypotheses.

Sadler in Vockell and Asher (1995) cite some areas of pitfalls in the use of hypotheses in qualitative studies and cautions those attempting to observe and make generalizations and inferences in qualitative research. Bearing this in mind, this study is asserted to be unambiguously interpretive and pragmatic, with no claim to externalize or generalize the findings beyond the research position.

Quantitative research methodology

The quantitative researcher collects facts and studies the relationships of one set of facts to another. The researcher measures, using scientific techniques that are likely to produce quantified and if possible generalized conclusions. Quantitative research uses questionnaires, or observational techniques to collect information about the characteristics of a person, group, program or other educational entity. In this study, questionnaires were used to seek to explain the stakeholders' views on the integration of ICTs into the school curriculum. The findings have been statistically presented in a formal scientific style using passive and impersonal language in chapter four. The quantitative researcher according to De Vos (1998, p.242) "sees himself as detached from, not as part of, the object that he studies". The researcher therefore conducted an objective inquiry. Reid and Smith (1981, pp.87-89) also point out that the role of the quantitative researcher is to be an objective observer, whose inquiry is focused on specific questions or hypotheses that ideally remain constant throughout the investigation. The data collection procedures and types of measurements is constructed in advance of the study and applied in a standardized manner. The interviewer or observer is not expected to add his/her own impression or interpretations. Measurements are focused on specific variables that are quantified through rating scales, frequency counts and other means. Results of data analysis are presented by obtaining statistical breakdowns of the distribution of the variables and by using statistical methods to determine associations between variables. The study made use of quantitative data in the way it has been described above.

Descriptive research methodology

As indicated elsewhere, the aim of this study is to present an accurate, carefully and systematic description of the views, expressions, characteristics and activities of how schools in Savelugu Nanton are trying to integrate ICTs into the school curriculum. The aim of descriptive research is to examine an event or phenomenon and characterize it as it is in a specific context (Le Compte & Preissle, 1993). There is no manipulation of treatments or subjects; the researcher takes things as they are. Merriam (1991p.11) states that descriptive research implies that the end product is rich 'thick description' of the phenomenon under study. By 'thick description', research attempts to capture the meaning in an interactional experience. In this study, certain phenomena were described in addition to measuring and analyzing them.

Study population

Powers, Meenaghan and Toomey cited by DeVos (1998, p.190) define a population "as a set of entities for which all the measurements of interest to the practitioner or researcher are represented". A population is therefore, the totality of persons, events, organization units, case records or other sampling units with which the research problem is concerned. The target population for the study comprised students, teachers, ICT coordinators in schools, and the District Director of Education in the Savelugu Nanton district.

Sample and Sampling Technique

The term sampling according to Kerlinger as cited in De Vos (1998, p.190), "means taking any portion of a population or universe as representative of

that population or universe". Vockell and Asher (1995:170) also state that "the term sampling refers to strategies that enable us to pick a subgroup from a larger group and then use this subgroup as a basis for making inferences about the larger group - the researcher's goal is always to generalize about the population based on observation of the sample". Often it is impossible to identify all the subjects of a population of interest. So samples are chosen for a study. Reid and Smith (1981, p.70) concur with this by stating that "the major reason for sampling is feasibility". They go on to explain that even if it were theoretically possible to identify, contact and study the entire relevant population, time and cost considerations would often render this a prohibitive undertaking.

Thus with sampling, time, money and effort can be channeled into producing better and quality research. Arkava and Lane as cited (in De Vos 1998:191) maintain that "the observation or study of a phenomenon in its entirety would be tedious and time consuming and would produce a massive amount of data, which by implication would be difficult to process, analyze and interpret". To this end, the researcher aligns with Kerlinger (in De Vos, 1998) who posits that representativeness must be considered when sampling. In other words, a sample must reflect the characteristics of the population relevant to the study. For the purposes of this study, the researcher used purposive sampling. Purposive sampling is based on the assumption that "one wants to discover, understand, and gain insight, therefore one needs to select a sample from which one can learn the most" (Merriam1991,p.48).

Patton (in Leedy 1997, p.162) also posits that: purposeful sampling is done to increase the utility of information obtained from small samples. Participants for the study were chosen because they were knowledgeable and informative about the phenomenon the researcher is studying. In the study, the researcher focused on junior and high schools in the Savelugu Nanton area of the Northern Region and drew samples from three of the five education circuits in the area. The researcher feels high schools have relatively bigger budgets than primary schools and should thus be in a better position to acquire ICT resources. The demand for ICT literate high school graduates is higher than that of primary schools. So they are more likely to be more knowledgeable on ICTs. The sample in this study will consist of four schools. One of the schools was offering Information Technology (IT) as an examinable subject at the end of the term and their IT resources were donated by Vodafon and MTN. The other two had also bought a few computers from their school funds and used the computers for administrative purposes. The researcher also visited a school with well-resourced computer labs in Tamale. The purpose of the visit was to ascertain what ICT resources an urban school has, the feasibility and sustainability of integrating ICTs in schools curricula and then to compare it with what pertains in rural schools. For the purpose of the study, four schools were chosen purposively from rural communities. The respondents comprised one hundred and sixty (160) students and ten (10) teachers from two (2) Senior High School And two (2) Junior High Schools in the Savelugu Nanton District.

Research Instruments

Questionnaire (Appendix A) and interview schedules were constructed for the study. The questionnaire is used as a follow-up interview to get more clarifications on the phenomenon being studied and to obtain written artifacts from the participant's whiles the interview guide is to elicit factual and in-depth data/information on integration of ICT in schools. The choice of interview as a technique for data collection was informed by its strength in motivating the respondent to give more accurate and complete information. The semi- structured type was used in this study. This type of interview probes the views of small elite individuals. These individuals have particular experiences or knowledge about the phenomenon being studied

The two instruments were designed to help the researcher to collect data for the study. The aim of the questionnaire and the interview schedule was to ascertain the following:

1. Computer literacy of both educators and learners.
2. Accessibility of ICT resources.
3. What the ICT resources are used for.
4. The importance of ICT resources in education.
5. Professional Development for educators

Pilot testing of Research Instruments

The interview schedule and questionnaire were pre-tested on students, teachers and the other relevant respondents selected from Kumbungu an area with similar characteristics as Savelugu Nanton. The respondents comprised ten (10) students

and five (5) teachers from two (2) Senior High School And two (2) Junior High Schools. The pilot test gave the researcher the opportunity to ascertain the validity and reliability of the instruments based on the understanding of the piloted respondents. The final instrument was revised based on the outcome of the pilot test. A series of technical questions on 'ability to change directories' or 'query a database' etc. were removed as they were very confusing for novices. These were replaced by a self assessment test where respondents were asked to rate their competence in common programmes and computer applications, by ticking options ranging from very good to none. There were no substantial alterations to the interview schedules for the ICT coordinators as a result of the pilot study.

Data Gathering Process

The pattern and format of the study determined the nature of the data collection methods and how this was implemented. Qualitative data collection is eclectic in nature, and therefore utilizes rich and diverse data to answer questions about the complexity and variability of human life (Le Compte & Preissle, 1993). Patton (in Merriam, 1991:p.67-68) describes qualitative data as consisting of detailed descriptions of situations, events, people, interactions, and observed behaviours, direct quotations from people about their experiences, attitudes, beliefs and thoughts, and excerpts or entire passages from documents, correspondence, records and case histories. As stated earlier in chapter one, data for this study were drawn from different sources using three modes of capturing the participants' views and experiences: questionnaires, and interviews. The use of

multiple methods of collecting data is what Denzin (1988) refers to as triangulation, a research mechanism that serves to enhance the validity of the inquiry by using different data sources, different collection methods and often also different analysis methods, all focusing on the research problem at hand.

The questionnaire was distributed to educators, learners and administrative staff to complete. Bell (1993), states that questionnaires are a good way of collecting certain types of information quickly and relatively cost-effectively. The questionnaires were delivered personally to all the participating schools. The interview schedule was administered to educators responsible for ICT in all the schools. Two of the educators were principals of their respective schools. Overall, 160 completed questionnaires were received from students out of the 180 questionnaires distributed. Thus 89% of the questionnaires distributed were received; in addition ten (10) completed questionnaires were also received from teachers .The high rate of return may be due to the fact that the person responsible for collection was up to the task. Alternatively the students may not have been comfortable answering the questions and thus did not bother to return them.

Sources of data

The sources of data for the study include both primary and secondary. The primary source of data comprised basically the responses to the questionnaire items made by the students, teachers, and ICT coordinators as well as the interview data. The secondary sources of data were reports, company brochures, journals, newsletters, bullets, books, internet and other relevant existing empirical

literature of scholars in the area of education, information, communication, technology and education.

Methods of data Processing and Analysis

Data analysis implies examining, categorizing, tabulating or recombining the collected data (Yin, 2003). In this regard, the raw data collected from the completed research instruments were examined and taken through quality control measures such as sorting, editing, and coding to identify and eliminate errors, omissions, incompleteness and general gaps in the collected data. The refined data was then be imputed into a computer Software Statistical Package for Service Solutions (SPSS) and excel to facilitate data description and analysis.

Descriptive statistics such as cross tabulation and frequencies were employed to summarize and present the quantitative aspect of the data in the form of tables, to facilitate interpretation and analysis using frequencies and percentages. The qualitative aspect of the data was summarized in the form of text, quotes and extracts for easy description and analysis. Thus, both quantitative and qualitative methods were employed to summarize, describe, analyze and interpret the data collected. The next chapter covers the analysis of the data collected in the study.

CHAPTER FOUR

RESULTS AND DISCUSSION

This chapter deals with the analysis and interpretation of the data collected. Descriptive statistics was used in analyzing the data; percentages were employed to explain certain points when necessary. For a clearer understanding data interpretation was organized in two parts: the first part for students and the second part for educators or teachers. The data were analyzed and discussed to find answers to the following research questions:

1. What is the state of ICTs in the rural schools in the Savelugu Nanton District?
2. What factors facilitate or impede the diffusion of ICT in rural schools in the Savelugu Nanton District.
3. What are teachers and students' perception of the use of ICT in education?
4. What factors impede the diffusion of ICT in rural schools in the Savelugu Nanton District?
5. What are the benefits of ICT and its impact on students and teachers?

Characteristics of respondents

In this section, the background information of the respondents is discussed. This part of the analysis sought to find out whether students and teachers have different backgrounds in terms of characteristics and experiences they have been exposed to in their computer laboratory learning environment. It is important to know the

background characteristics and experiences of respondents in order to make informed decisions about how they see their computer laboratory learning environment. For the purpose of the study, four schools were chosen purposively from rural communities. The respondents comprised one hundred and sixty (160) students and ten (10) teachers from two (2) Senior High School And two (2) Junior High Schools in the Savelugu Nanton District.

Table 1: Gender of Respondents

Gender	Frequency	Percent (%)
Male	92	57.5
Female	68	42.5
Total	**160**	**100**

From Table 1, it can be seen that the sample consisted of 92 males (57.5%) and 68 females (42.5%).This is so because the enrollment rate for females in the area is low as compared to that of males. This was as a result of a high rate of female drop outs, teenage pregnancies and early marriages. (A World Food Program Report On Female Enrollment in Northern Region 2002)

Table 2: Level of Education

Level	Frequency	Percent (%)
JHS	44	27.5
SHS	116	72.5
Total	**160**	**100.0**

Table 2 shows the distribution of the level of education of the respondents. It can be seen that majority of the respondents at the time of survey were the

Senior High School students making (72.5%) and (27.5%) for those in the Junior High School respectively. The reason for the low proportion from the Junior High School level reflects the level of computer usage as well as the number of computer related resources in the JHS level generally.

Research Question 1

The first research question for the study was: "What is the state of ICTs in the rural schools in the Savelugu Nanton District?" This research question sought to find out the following: whether students and teachers have knowledge in the use of computers, their level of expertise in computer programmes, what ICT resources can be found in the school, whether students have access to those ICT resources and the availability and level of usage of computers in the school.

Table 3: Knowledge in the use of the computer

Response	Frequency	Percent (%)
Yes	110	68.8
No	50	31.2
Total	**160**	**100.0**

On whether students have knowledge in the use of the computer, the table 3 shows that out of 160 respondents for both SHS and JHS it was realized that (68.8%) had knowledge in basic computer literacy skills such as Microsoft word, Excel and PowerPoint software packages whiles the remaining (31.2%) had no knowledge about the use of the computer.

Table 4: Level of expertise or competence in the use of computer software Programme

Programme	Level of Expertise (% of Respondents)				
	Very Good	Good	Fair	Poor	None
MS Word	25	29.4	15.6	7.5	22.5
Spreadsheet	6.2	11.9	20.6	20.6	40.6
Database	8.8	17.5	16.9	13.8	43.1
MS PowerPoint	18.1	16.2	16.2	13.8	35.6
MS Publisher	16.9	8.1	16.2	20	38.8
Internet Explorer or Netscape	11.2	15	16.9	17.5	39.4
Web Development	11.2	13.8	12.5	21.9	40.6
Programming Language	13.8	10	12.5	20.6	43.1
Typing Tutor	15.6	15.6	11.9	16.9	40
Email (Outlook)	11.9	11.9	10.1	20.8	45.3

From Table 4, it can be seen that (29.4%) of the students had good knowledge on the use of Ms Word with (22.5%) representing the number with no knowledge on this basic computer programmes. The researcher went further to find out their level of expertise of computer programmes like spreadsheets, database, Ms PowerPoint, Ms Publisher, Internet Explorer or Netscape, Web Development (Front-Page), Programming Language, Typing Tutor, Email (Outlook).It could be inferred from Table 4 that (35.6%) of the students had no knowledge in Ms PowerPoint and (45.3%) had no knowledge of the use of email.

Those who had little knowledge in computer literacy skills were utilized for typing, creating folders and saving on file, drawing and PowerPoint presentation, play music watch movies and internet searches. The learners were prepared to learn the skills if ICT resources were made available.

Table 5: Availability of ICT resources in schools

Response	Frequency	Percent (%)
Yes	66	41.2
No	94	58.8
Total	**160**	**100.0**

It can be inferred from Table 5 that (41.2%) of the respondents indicated that they had ICT resources in their school while the remaining (58.8%) had no ICT resources in their schools. This seems to suggest that majority of respondents did not have ICT resources which they think was due to the unavailability of ICT laboratory and its facilities.

Table 6: Access to ICT resources by students

Response	Frequency	Percent (%)
Yes	56	35
No	104	65
Total	**160**	**100**

From Table 6 it shows that only (35%) of the respondents indicated that they had access to ICT resources in their school during school periods whereas (65%) had no access to those ICT resources. This could be as a result of lack of

access either at school or at home and the lack of money to pay for computer training .The resources respondents had access to at school include monitor, keyboard, central processing unit, mouse, floppy disk, scanner and printer. In order to validate the responses the participants gave regarding availability and access to ICT (in Tables 5 and 6) , the respondents were asked to indicate their access to computers (Table 7) and their level of usage (Table 8) in their respective schools by stating the extent to which they agreed or disagreed to statement regarding access and usage respectively.

Tables 7 and 8 show the responses that were received from the participants.

Table 7: Availability and access to computers

Statement	Percentage (%) Response				
	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
My school has adequate computer and accessories for the use of students	11.9	8.8	2.5	37.5	39.4
Students have access to computers in carrying out their studies in my school	15.6	17.5	1.9	24.4	40.6
I have access to and use of computer at most times in the school environment	5.6	16.2	2.5	28.8	46.9

Table 7 continued

I have access to internet services in my school	6.2	6.9	5.6	27.5	53.8
I have access to internet services in the district	6.9	8.1	3.8	33.1	48.1

With regards to adequate computers and accessories for students in school, 39.4% and 37.5% of the respondents disagreed and strongly disagreed while 11.9% and 8.8% strongly agreed and agree respectively. A little over two percent (2.2%) were undecided. Over forty per cent (40.6%) of the respondents did not have access to computers in carrying out their studies in school. Only 15.6% of the respondents had access to computers for their studies. Those who had access to computers were not only limited to the school. (35.6%) of the respondents indicated that they get access to and use of the computer outside the school environment. A little over forty-eight per cent (48.1%) of the respondents strongly disagreed they had access to the use of internet services in the district generally.

Table 8: Level of Usage of ICT resources in school

Statement	Percentage (%) Response				
	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
I use ICT resources to help me to learn	58.8	33.1	-	5	3.1
I use ICT resources to store vital data or info	63.1	26.2	0.6	6.9	3.1
I use ICT as a source of information reference in most subject areas.	57.5	30.6	2.5	4.4	5
The use of ICT makes learning more interesting, attractive and understanding	68.6	29.6	0.6	-	1.3
I use ICT as a means of exchanging information	55	30.6	5.6	5.6	3.1
The use of ICTs in my school will afford me with visual and muscular differences to read, write and express myself	17.7	26.6	5.1	19.6	31

Table 8 continued

ICTs have added value to the process of learning in my school	59.4	34.4	3.8	0.6	1.9
Educational material can be prepared and distributed through the use of ICT resources	61.6	31.4	1.9	3.1	1.9

From Table 8, respondents indicated that they really knew the benefit of ICT resources. For instance 58.8% of the respondents indicated that ICT resources can facilitate their learning process. Sixty-three per cent (63%) of the respondents strongly agreed that ICT resources could be used in storing data and information. Sixth-eight per cent (68.6%) of the respondents strongly agreed that ICT resource could make learning interesting attractive, and understanding. Only (31%) of the respondents strongly disagreed that ICT resource could afford them with visual and muscular differences to read write and express themselves. However (61.6%) of respondents strongly agreed that ICT resource could be used to prepare and distribute educational materials.

Research question 2

The second research question was: "What are teachers and students' perceptions of using ICT in education? And the (perceived) educational benefits of the use of ICT in schools in the district.

Table 9: Perceived educational benefits of the use of ICT

Benefit	Frequency	Percentage
Makes learning more interactive and enjoyable	144	26.3
Captures data for storage to support decision making	132	24.1
Improves ways of accountability and reporting	60	11
Improves teaching and learning in content areas	50	9.1
Develops the students' learning skills considered essential in the modern working environment	79	14.5
Stimulates creativity, increase motivation and collaboration for teaching and learning	62	11.3
Promotes student-centered learning	20	3.7
Total	**547**	**100**

Table 9 shows the respondents' perceived benefits of computer usage. Given the right level of resources, these benefits can arguably facilitate the integration of computers into educational programmes. Indeed, the impediments described by the respondents were so described because of their potential to prevent the respondents from reaping the benefits that have been stated in Table 10. The benefits are discussed in detail below.

Making learning more interactive and enjoyable

Technology can be regarded as simply a tool that can be used to solve a problem efficiently and easily or it can determine educational change (Noss, 1991). From the responses, learners indicated their preparedness to learn and utilize computers if made available to them.

The respondents indicated that ICT can make learning more interactive and enjoyable. Reasearch conducted by Corley, Cradler and Engel (1997) found that ICT technology has the potential to decrease the opportunity gaps by allowing students from different backgrounds equal access to the wealth of information available on the internet.

Capturing data for storage to support decision making

ICT have contributed tremendously in data capturing for making informed decisions. From the table 9, 24.1% of the respondents indicated that ICTs can contribute to the capturing of data for storage to support decisions making. According to Babbie (1995) for instance, it is necessary for the social scientist to be familiar with the use of most of the popular computer software such as the statistical package for social sciences (SPSS). This insight will help researchers to understand the general knowledge in the use of ICTs in carrying out data analysis, before, during and after field work. It is therefore important to note that the integration of ICTs in to school curriculum will help students make informed decision concerning their studies.

Develop the students' learning skills considered essential in the modern working environment. The use ICT is to create learning environment centers for student as learners believe that they learn more from what they do and think about rather than from what they are told. This support may include a tutor, peer, or a technology such as application of ICT. This has led to the use of ICT to support learning. ICT learning environments are those in which ICT are used to either maintain a learning environment or used to support the student learner in this

vygotskian sense (Decarte, 1990; Mevarech & light, 1992). It can be inferred from Table 9 that 14.5% of the respondents indicated that students can benefit from ICT by developing their learning skills which is essential in this modern working environment. Therefore the technology is used to help create the types of learning environments and the types of support for learning that are known to be ideal.

Summary of Students' responses

From the responses of the learners in the schools which took part in the study, the following themes emerged:

1. Learners have inadequate computer literacy training and thus limited computer literacy skills.
2. Few learners have access to ICTs in the schools.
3. Learners have limited access to ICT resources and therefore have limited ideas of benefits that can be gleaned from the use of ICTs.
4. There is limited knowledge of ICTs and ICT resources.

Research Question 3

What factors impede the integration of ICT in rural schools in Savelugu Nanton District? This research question sought to find out the following: barriers to the successful integration of ICT in schools in the district and what factors impede the integration of ICT in rural schools in Savelugu Nanton District?"

Table 10: Barriers to the successful integration of ICT

Barrier	Frequency	Percent
Lack of electricity	20	4.9
Inadequate telecommunication infrastructure	78	19.2
Lack of qualified and competent personnel	12	3
Unpreparedness of both educators and learners to fully utilize ICTs resources available	6	1.5
High cost of investing in technology	120	29.6
Inadequate storage facilities	83	20.4
Inadequate ICT infrastructure	17	4.2
The ability of the Ministry of Education Science and Sports to avail resource that will sustain the project	70	17.2
Total	**406**	**100**

*some respondents gave more than one impeding factor

From table 10, the major factors this study identified as impediments are:

Inadequate telecommunication infrastructure

It is an undeniable fact that inadequate telecommunications and infrastructure in the Savelugu Nanton district has really affected the successful integration of ICT. Table 10 shows that 19.2% of the respondents stated that inadequate telecommunication and infrastructure has affected the development and successful integration of ICTs in the district. Some of the communication infrastructure the respondents stated as lacking in the district is telephone lines for

broadband and dial up internet connectivity, computers, internet service providers, software packages, and printers.

According to Ginsberg, Mc Cormack and McKenzie (1998) lack of computers and printers hinder the attempt to use ICTs in the classroom. This goes to confirm why the lack of computers and printers in Savelugu Nanton was seen as an impediment to the integration of ICTs in the district.

Indeed, complete absence or even underdevelopment of telecommunication infrastructure does hamper the use of ICTs in rural communities Mandioma et al. (2007); Adomi. (2005); CIPESA. (2005).

High cost of investing in technology

From Table 10, 29.6% of the respondents indicated that high cost in investing in technology has been a barrier in the integration of ICTs in the district. The respondents indicated that the district has no telephone lines for broadband internet connectivity .Also the district education office needs huge capital to set up computer laboratories with all the necessary accessories to facilitate ICT integration. All these need high capital investment which seems to be lacking in the district. The conclusion is that the schools in the district have no standard ICT laboratory and this really affects the integration of ICTs in the district.

Inadequate storage facilities

Table 10 further indicates that 20.4% of the respondents stated that inadequate ICT storage facilities impede the successful integration in the district. In all the schools which the study was carried out, improvised premises like classrooms were used as storage rooms and computer laboratories. This does not

create a sound environment for learning and hence impede the successful integration of ICTs in the district.

This goes to support the assertion by Cawthera (2001, p.11) that those who advocate the integration of ICTs in schools acknowledge that there are problems associated with access and equity. The poorest areas are unlikely to benefit from the provision of ICTs in schools and this situation will create increased inequalities in education.

Herselman (2003), Kante and Savani (2003) and Isaacs, Broekman and Mogale (2004) have all pointed to the barriers that have individually or in concert, frustrated the successful integration of ICTs in rural schools. Some of these barriers are the lack of electricity, telecommunication infrastructure, qualified and competent personnel, preparedness of both educators and learners to fully utilize ICTs resources available, cost of investing in technology, adequate storage facilities and the ability of the Department of Education to avail resources that will sustain the project

In 1991, Pelgrum and Plomp conducted a worldwide study of the use of ICTs in education in which they identified over 20 conditions that impeded the use of ICTs in education. Further studies reported by the congressional office of technology (1995) and Ginsberg and McCormack (1998) found many of the same factors to be present. A year later a survey of school principals in British Colombia, Statistics Canada (1996) identified almost identical factors. These factors are nearly the same as those the researcher identified in the present study which has been described above.

Responses from Educators/Teachers

Table 11: Gender of respondents of teachers

Sex	Frequency	Percentage (%)
Male	6	60
Female	4	40
Total	**10**	**100**

Table 11 shows that the far majority that is (60%) of teachers in the school met at post at the time of the visit were males and the remaining (40%) were females.

Table 12: Level of Education of educators

Level	Frequency	Percent (%)
Teacher Cert A	3	30
Diploma	2	20
First Degree	5	50
Total	**10**	**100**

Efforts were also made in this study to find out the educational background of teachers. Table 12 provides a summary of the findings. From the table it can be inferred that (50%) of the teachers at post in the school were the research was conducted at the time of the survey were graduates - first degree holders whilst 30% were Cert A teachers and the remaining 20% diploma certificate holder

Table 13: Knowledge in the use of the computer

Response	Frequency	Percent (%)
Yes	9	90
No	1	10
Total	**10**	**100**

An important component of this study was to find out the level of knowledge of teachers on the use of the computer. To ascertain the depth of knowledge of respondents, they were asked to indicate whether they had knowledge in the use of the computer programmes such as word, excel etc. Table 13 gives a summary of the findings. Ninety per cent (90%) indicated that they had knowledge whiles the remaining 10% did not have knowledge in the use of the computer.

Table 14: Level of expertise or competence in the use of computer software

Programme	Level of Expertise (% of Respondents)				
	Very Good	Good	Fair	Poor	None
MS Word	50	50	-	-	-
Spreadsheet	40	10	50	-	-
Database	20	20	30	30	-
MS PowerPoint	40	40	10	10	-
MS Publisher	10	30	10	10	-
Internet Explorer or Netscape	20	30	40	10	-
Web Development (Front-Page)	10	30	40	20	-

Table 14 continued

Programming Language	20	10	20	20	-
Typing Tutor	30	50	10	10	-
Email (Outlook)	33.3	44.4	11.1	11.1	-

Teachers were asked to indicate their level of expertise in Microsoft word, spreadsheets, databases etc. The options were 'very good, 'good', 'fair', 'poor', and 'none'. The respondents discussed above indicated that they have basic computer literacy skills in Microsoft Word, Excel, Power point and Email (Outlook). They use these skills in their lessons, test preparations, typing correspondences, preparing class lists, preparing school budget, drawing graphs, preparing tests and examination schedules and to teach learners computer literacy skills. However, only (20%) had no knowledge in programming language and (10%) had poor skills in Ms PowerPoint, Internet Explorer and typing tutor.

Table 15: ICT resources in school

Response	Frequency	Percent (%)
Yes	7	70
No	3	30
Total	**10**	**100**

It can be inferred from Table 15 that (70%) of the respondents indicated that they have ICT resources in their school while the remaining (30%) had no ICT resources in their schools. The resources that are available include computers, scanners, overhead projectors, pendrives and printer.

Table 16: Access to ICT resources by teachers

Response	Frequency	Percent (%)
Yes	6	60
No	4	40
Total	**10**	**100**

Sixty per cent (60%) of the teachers stated that they have access to computers and other accessories in their respective schools (i.e. during normal school sessions). Forty per cent (40%) of the respondents indicated that they do not have access to the ICT resources in their school those resources like computers and printers available were used for administrative purposes.

Table 17: Availability and level of usage of computers by teachers

Availability /usage	Percentage (%) Response				
	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
My school has adequate computer and accessories for the use of teachers.	-	40	-	-	60
Teachers have access to computers in carrying out their duties in my school	20	40	10	30	-

Table 17 continued

My accessibility to computers is not limited to those in my school but I can access computers elsewhere	30	30	10	30	-
I have access to and use of computer at most times in the school environment	10	30	40	20	-
I have access to internet services in my schools.	10	30	20	40	-
I have access to internet services in the district.	30	10	20	40	-

The availability of ICT resources in the school and the manner in which they are deployed are factors that affect the use of ICT within the school. Sixty percent (60%) of the respondents strongly disagreed that most schools in the district have adequate computer and accessories for the use of teachers (i.e. during normal school session). Thirty per cent (30%) of the respondents indicated that accessibility to internet services in the district is most of the time in the school environment. Thus, they have access to the Internet at school. Thirty per cent (30%) also indicated that they have access to the Internet in their respective schools. They use the Internet searches for information concerning their teaching

subjects, job searches, sending e-mails, downloading music and movies, and to read newspapers online.

Hardware available to respondents includes Monitor, Keyboard, Central processing unit Mouse Scanner and Floppy disks, CDs, DVDs and memory stick (for storage) and a Printer. The respondents have access to the following software packages: Microsoft Word Microsoft Excel Microsoft Power point and Encarta Encyclopedia

Table 18: Level of usage of ICT resources in school

Level (extent)	Percentage (%) Response				
	SA	A	U	D	SD
I use ICT resources like computers to facilitate the teaching and learning process.	70	30	-	-	-
I use ICT resources in storing vital data or information	60	40	-	-	-
I use ICT as a source of information reference in most subject areas	50	50	-	-	-
I use ICT to make learning more interesting, attractive and understanding	60	40	-	-	-
I use ICT as a means of exchanging information	90	10	-	-	-

Table 18 continued					
The use of ICTs in my school will afford students with visual and muscular differences to read, write and express themselves	80	20	-	-	-
ICTs have added value to the process of learning, in my school.	60	10	30	-	-
Educational material can be prepared and distributed through the use of ICT resources	80	10	10	-	-

SA=Strongly Agree, A=Agree, U=Undecided, D=Disagree, SD=Strongly Disagree

From Table 18 majority of the educators indicated that they were conversant with the use of ICT resources in their schools. For instance, 80% of the respondents indicated that ICT resources can help in the preparation of educational materials for use in the class during teaching. Ninety per cent (90%) of the respondents strongly agree that ICT resources can be used as a means of exchanging information. Eighty per cent (80%) of the respondents strongly agree that ICT resource in schools will afford students with visual and muscular differences to read, write and express themselves. Only 10% of the respondents were undecided that educational materials can be prepared and distributed through the use of ICT resources. However 30% of respondents were undecided as to

whether ICTs have added value to the process of teaching and learning, and in the organization and management of learning institutions.

Table 19: Perceived Educational Benefits of the Use of ICT

Benefit	Frequency*	Percent
Making learning more interactive and enjoyable	7	9.9
Capturing data for storage to support decision making	9	12.6
Enhance the avenues for collaboration and family members and the School-community	10	14.1
Improve ways of accountability and reporting	10	14.1
Improve teaching and learning in content areas	10	14.1
Develop the students' learning skills considered essential in the modern working environment	9	12.6
Stimulate creativity, increase motivation and collaboration for teaching and learning	8	11.3
Promote student-centered learning	8	11.3
Total	**71**	**100**

*Respondents gave more than one benefit

There is a general agreement among teachers that computers promote learning when used by educators in their teaching. This is a positive finding in relation to IT 2000 initiative document for schools. Below are the main benefits teachers stated were to be derived from the integration of ICT.

Enhance the avenues for collaboration and family members and the School-community

There has been a lot of development in the use of ICTs in tracking administrative problems of higher secondary education in Ghana. In the past payment of tuition, hotel and other fees which were normally paid in cash or bank drafts are largely carried out online. On line payments and registration have now eliminated the nightmare of long queues for payments, loss of uncollected revenue by dubious means , a better fit between published and achieved time table for academic events. Although there is a great scope for improving the modest efficiencies records represent a great achievement.

Also ICTs have made it possible for parents and students to communicate with each other without necessarily moving from one place to the other. From the table above 14.1% educators indicated that ICTs can enhance the avenues for collaboration and family members and the school community.

Improve ways of accountability and reporting

From Table 18, it was realized that 14.1% of educators indicated that ICTs can improve ways of accountability and reporting. Some of the teachers gave instances like the computer selection process of students into the senior high school being adopted by the Ministry of Education as one of the benefits of ICTs. In the past parents had to employ dubious means to get their wards into the best schools and this was not a fair practice. But with the timely intervention of ICTs accountability has been successful.

It was clear from the educators that ICT has made reporting very easy because students grading can easily be inputted into the computer and stored for future reference.

Improve teaching and learning in content areas

An understanding of the teaching and learning process is essential to understanding how ICT fits into teaching Van Deusen and Donham,(1987) .The teacher's role is to teach and the software makes the job of teaching and learning easier to achieve. It can be seen from the table that 14.1% of the educators indicated that ICTs can improve teaching and learning in content areas. A research conducted by Glinkman and Kuehn (1999) pointed out that expectations about ICT and education must be changed to a curriculum driven one where teaching and learning are supported through the integration of ICT with the curriculum. This restructuring process requires effective integration of ICT in school into existing context in other to provide learners with knowledge of specific subject areas, to promote meaningful learning and to enhance professional productivity. (Tomie, 2000:15)

Table 20: Barriers to the successful integration of ICT in schools

Barrier	Frequency	Percentage
Lack of electricity	4	10.8
Inadequate telecommunication infrastructure	1	2.7
Lack of qualified and competent personnel	7	18.9
Unpreparedness of both educators and learners to fully utilize ICTs resources available	5	13.5

Table 20 continued

High cost of investing in technology	5	13.5
Inadequate storage facilities		
Inability of the Ministry of Education, Science and Sports to avail resources that will sustain the project	8	21.7
Total	**37**	**100**

Table 20 indicates the barriers for successful integration of ICTs in schools in the district. The different barriers and extent of barriers are presented in the table above. The major barriers are discussed below.

Ability of the Ministry of Education, Science and Sports to avail resources that will sustain the project

The government has been through a hurdle for ICT development in schools in Ghana. This is because the government does not give enough priority support to programs that integrate ICTs in schools. This is because they have no understanding of how effective integration of ICTs in schools can help the growth of the economy. The government does not create incentives for innovation and entrepreneurship or factors that are essential for a sustainable ICT needs to be flexible and reflective of local needs and local environments to be effective through innovations scientist and entrepreneurs can find incentives to correct flexible and appropriate ICTs. If incentives are not created by the government, then integration of ICTs cannot meet the needs of schools in the district. From Table 20 it can be inferred that 21.7% of the responses indicated that the inability

of the Ministry of Education, Science and Sports to avail resources that will sustain the project is one of the barriers that impedes the successful integration of ICTs in schools in the district.

Lack of qualified and competent personnel

Recent research studies show that many educational institutions are failing to integrate ICT in school into existing context because of lack of qualified and competent teachers. From the table it can be inferred that 18.9% indicated that lack of qualified and competent personnel can affect the successful integration of ICTs in Savelugu Nanton District. According to Zamit (1992) a major obstacle to successful ICT integration was the lack of teacher confidence and skills when using ICT in teaching. Glenn (1997) stated in his study that one barrier to ICT integration is the difficulty many teachers face in finding and using appropriate software and selection of internet sites for instruction.

High cost of investing in technology

ICTs can only serve as an effective tool for broad base development and opportunity for all people in rural communities (Khali, 2003). From Table 19 a majority of educators (i.e. 7 out of 10) stated that high cost of investing in technology impedes the integration of ICTs in schools. Broadening the reach and affordability of ICTs and services to rural schools remains a complex and difficult challenge. This is because terrestrial telecommunications infrastructure require substantial investment that are often unaffordable to public sector (schools) and do not make economic sense to the private sector (Songan, et al., 2004; chatelaim and Van Wyk, 2007; Fibre for Africa, 2007); Hasson, 2008)

Analysis of Interview Data

Interview with ICT Coordinators in the Northern Regional Education office

The researcher interviewed five (5) ICT Coordinators and four (4) headmasters / head mistresses in the district and made the following observations through the interviews. The researcher gathered from the district ICT coordinator that the government's White paper on e-Education has been sent to all schools in the region. Meanwhile, district ICT coordinators have been trained and they are supposed to be running basic computer literacy programmes for educators in the various schools in the district. In addition to the training, the district coordinators are to embark on advocacy programmes to make stakeholders aware of the e-Education programme. The district coordinators are to utilize computer labs in the various schools that have well resourced computer labs.

The role out of ICTs to the various circuits will be funded mainly by the Department of Education. But the Department will accept donations from any enterprise that offers help. Sponsors the Ministry of Education expects to have on board are MTN, Vodafone and Microsoft. These companies have partnered with the Ministry of Education in providing some schools with ICT resources.

The standard packages that the Ministry of Education offers to schools are computers, printers, overhead projectors, white screens and Microsoft software. As far as donors are concerned, the Ministry of Education does not specify what they give to schools. But the Department recommends that the minimum specification for computers to be used in schools is Pentium II. In the case of software, no special software is desired. So the normal Microsoft software

packages are acceptable. The Education office in the region has also designed a management programme called "Schools Administration Management System (SAMS) and copies are being prepared to be sent to all schools in the Region. The SAMS software is intended to help schools with administrative issues. The Education office plans to organize a workshop for Heads of Schools before copies of the SAMS software are distributed.

The Education office acknowledges that Northern Region is largely rural and illiteracy is rife. So it plans to embark on an awareness programme to showcase the benefits of the use of ICTs. Then the communities will be given basic computer literacy training. Once community members adopt the use of ICTs, the communities will provide the needed support to ICT programmes in schools.

All government schools in the Region are targeted to benefit from the roll-out of ICTs. Basic ICT Training has already started for some educators in government run schools in the region. The Education office feels educators will not like ICT if they do not know its value, so through advocacy programmes, the Regional Education office will highlight the benefits of the use of ICTs to educators. Educators will be trained as ICT champions to handle trouble shooting and minor repairs. ICT resources will be provided mainly by the Ministry of Education. The education office plans to train so many educators so the shortage of ICT educators is not envisaged.

As far as security is concerned, the White Paper on e-Education spells out measures to filter materials which will be available to schools over the Internet.

Free anti-virus software will be provided by the Department to all the government schools in the Regions. However, there is no ICT policy for schools yet. Education office feels it needs first to train all school heads first. Then the office will work with the heads to draw up a policy for the schools. To ensure that schools do not become dumping grounds for disused computers, the Education office has set a minimum standard to be adhered to by all stakeholders. There will be independent research institutions appointed by the Education office to continuously assess the impact and effectiveness of integrating ICTs into government schools in the region. The Education office has no plans yet to study the impact of ICTs on learning outcomes of the learners and motivation of the educators, but it intends to develop one.

From the interviews, the researcher also noted that the Regional Education office is not aware of what goes on in some of the districts let alone the individual schools as far as ICTs in schools is concerned. Furthermore, the researcher knows that there is no ICT training taking place in Savelugu Nanton district as alleged by the ICT personnel in the Department. This is because the researcher is currently teaching in Savelugu. Of the four schools studied only one head had a copy of the White Paper on e-Education. This is a pointer to the fact that documents from the Education offices are not reaching their intended destinations. It is also possible that there is no effective communication link between circuits and schools. There should have been a circular to this effect. There is no explicit plan in place to outline how the roll out of ICTs will be affected. The Education office‘s ICT standards have not been adequately

communicated to schools. If it has been done, then, these standards are not being enforced.

Interview with Headteachers/Headmasters

The responses obtained from Headmasters responsible for ICTs in the various schools have been summarized as follows: Computers available in schools ranged from a minimum of ten to a maximum of forty. Apart from two of the schools which got donations from MTN the other two bought their own ICT resources using school funds. The schools that got their computers as donations have them maintained by the donors and the rest do their own maintenance from the schools' budget. The donors provide technical support for the schools they gave computers as donations and the other schools do not have any technical support. Educators who are responsible for ICTs in the schools do minors trouble shootings and refer major problems to private technicians. Two of the schools have their computers situated in computer labs. Two others have theirs in the various staff rooms. Two of the schools use the computers to teach the learners and in addition, use the computers for administrative purposes. The other two use the computers for administrative purposes only. Schools which use the computers to teach, teach their learners Computer Assisted Teaching (CAT). One school also uses software from Microsoft and Science subjects.

The ratio of learners offering CAT to a computer is 4:1 in one school, and in the other school the ratio is 6:1. One of the schools has Internet connection but it was disconnected due to the non-payment of bills. All the schools use Microsoft Office software packages. Two schools got their software packages as part of

donations, one headmaster made a copy from his personal computer for the school and the other schools indicated they bought their copies. All the schools have not upgraded any of their software yet. In one school all the teachers are computer literate and in the others less than half of the staffs are computer literate or they are engaged in studies to become computer literate. Only two of the schools have qualified ICT educators and the ratio of learners to ICT educators is about 120:1. Only one Headmaster has trained all his educators to become computer literate. Two of the schools that have their computers donated have basic computer literacy training courses run by their sponsors from time to time with the aim of training all the educators eventually. The rest of the schools have no plans in place yet to train their educators. They hope educators will take their own initiative to become computer literate. The computer literacy programmes in the schools are not recognized. The reason being that recognized computer training programmes are expensive and the schools cannot afford them. The Headmasters maintain that educators who want recognizable and accredited training must do it on their own.

Most Headmasters feel the Ministry of Education must provide incentives to reward educators who use ICTs in their work.

Headmasters feel by involving all stakeholders, there will be progress in the integration of ICTs in the schools.

Summary of interview data

1. The following is a summary of the points from the interviews:
2. All the interviewees were keen to use ICT resources if introduced into their schools.
3. The interviewees lacked adequate information on government's plans to introduce e-Education into Ghanaian schools.
4. There is lack of adequately trained professionals to handle ICTs in schools.
5. Very few learners are offering CAT because there are very few computers available.
6. No school had an ICT policy.
7. Financial constraint is limiting the acquisition and use of ICT resources in schools.
8. There is no ICT support staff in any of the schools studied.
9. ICT resources were too few to meet the requirements of a large population.
10. No attempt has been made to involve the community in any way.
11. No significant or reliable support from the Ghana Education Service.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

The chapter comprises a summary of the findings of the study and conclusions drawn from them based on the results, some recommendations have been made for action, both in the short and long terms.

Summary

The study which was conducted in four schools in the Savelugu Nanton district in the Northern Region of Ghana was generally aimed at finding out the state of ICT in rural schools in the Savelugu Nanton District and also to identify the factors that facilitate and impede the integration of ICT in rural schools in the District. The qualitative, quantitative and descriptive design was used in this study. The data for the analyses were collected from Four (4) secondary schools in the district: Savelugu Senior High School, Pong Tamale Senior High School, L .A Junior High School and E.P Junior High School. The sample comprised one hundred and sixty (160) students and ten (10) teachers from Two (2) Senior High school and Two (2) junior high schools in the Savelugu Nanton District. The structured questionnaires (made up of 40 items) and interviews were the main instruments used to collect primary data for the study. The data collected was organized with SPSS for analyses.

Research Questions

The study was guided by the following research questions.

1. What is the state of ICTs in the rural schools in the Savelugu Nanton District?

The question sought to find out:

a. whether students and teachers have knowledge in the use of computers;

b. about students and teachers' levels of expertise in computer programmes;

c. the ICT resources that can be found in the school;

d. whether students have access to those ICT resources;

e. About the availability and level of usage of computers in the school.

2. What are teachers and students' perception of the use of ICT in education?
3. What factors impede the diffusion of ICT in rural schools in the Savelugu Nanton District?
4. What are the benefits of ICT and its impact on students and teachers?

Key Findings

1. Majority of the educators have basic training in the use of computers and therefore are capable of integrating ICTs in their teaching.
2. Educators in the schools where the study was conducted use the computer for activities such as accessing information on the internet more than the students. They also use it to send e-mails, and for typing letters.
3. It was discovered that the use of computer by students for instructional purposes is not practiced in the schools. Two (2) schools have internet access but majority of the students do not use it to access information.

4. Relevant software for teaching is not available in all schools and the few available have so many difficulties with it use. Again, the software available is curriculum free software's instead of curriculum specific or educational software's.
5. It was discovered from the results that there was poor alignment between teacher training and student learning outcomes in the ICT area.
6. Student access to computers outside school and their acquisition of ICT skills outside school far outstrips what is done in the classroom.
7. Implementation is more strongly influenced by national policy than local factors.
8. Individual teachers play a strong role in determining the degree to which ICT is adopted in the classroom.
9. Professional development for teachers is limited and is often restricted to software operation or to personal or school sourced skills.
10. On the whole the challenges faced are inadequate storage facilities, telecommunication infrastructure, ability of the Ministry of Education Science and Sports to avail resources that will sustain the project, high cost of investing in technology and finally lack of qualified and competent personnel.

Conclusions

The study concludes, from the above findings, that a number of challenges are impeding integration. These include: lack of resources, lack of training in ICT and inadequate support from the Ministry of Education for the implementation of any e-Education policy. The current situation in the Savelugu Nanton District does

not augur well for a better, all inclusive education as envisaged in the government's e-Education policy. As it stands, there are obvious half measures in its implementation. The required change has not happened as stakeholders are not being encouraged to embrace the change in order to ensure the successful integration of ICTs in education so that the future leaders of the country are globally competitive.

Recommendations

From the findings the following are recommended for improving the integration of ICTs into teaching and learning in schools at the Junior and Secondary level:

1. A strong, clear, articulated and sustained vision for ICT in the school is required of the school management. Proactive leadership and support must accompany this vision.
2. Every school requires a meaningful ICT policy, designed collaboratively by the teachers in the school. This plan needs regular discussion and review by the staff and must be placed at the top of the school's agenda to ensure that every teacher is aware of its objectives.
3. Schools should not build their ICT plans around the 'vision' of an individual as the plan represents the views of one person only and may disappear if the individual leaves the school.
4. ICT facilities (computer lab) should be well planned by the Ministry of Education such that they will be available to all students and educators for effective use.

5. The training needs of teachers must be addressed immediately by the Ministry of Education. Training in ICT integration, as well as technical training, is required. This training should be provided in the school, using the facilities that the teachers will be expected to use and should be of a collaborative nature. It should focus on the needs of the school.
6. Specific training courses should be provided by the Ministry of Education for headteachers and ICT co-ordinators as the skills required in these roles are different to those that are required by the classroom teacher.
7. A full-time ICT co-ordinator is required in every school to provide efficient facilitation and allay teachers' fears about experimenting with the technology.
8. It is simply not feasible to expect a teacher with a full teaching timetable to spearhead the ICT initiatives in the school.
9. Every school requires a network with software that can be configured to provide controlled access to students.
10. The syllabus for each subject on the curriculum may have to be re-designed to facilitate the role that ICT has in teaching and learning. This could include explicit statements in the syllabus about how and where ICT can be used or ICT modules could be incorporated in the syllabus. Examinations should also be designed to acknowledge the role of ICT.
11. The Ministry of Education must ensure that the appropriate resources are provided and all the views of the relevant stakeholders are carefully considered to ensure that rural schools can also successfully integrate and utilize ICTs without any hindrances.

12. There is the need for a strong, clear, articulated and sustained vision for ICT in the school is required of the school management.
13. The Ministry of Education can also explore the possibility of establishing ICT information centers in circuit offices. Educators can then be encouraged to access and submit some of their personal.
14. The Ministry can utilize some of the school holidays to offer training to educators on how to use ICTs to search for information and support teaching and learning.
15. The Ministry of Education can institute a reward system for educators and schools that are integrating ICTs in their teaching and learning and school administrative and management systems.
16. The Ministry of Education can consider setting up technical support offices in the Regions, Districts and Circuits. The offices must be manned by well trained technicians who must be on hand to attend to problems when they are called to do so.

Suggestions for Further Research

Finally, there is the need for further research which will look at the integration of ICT into the curriculum in other areas of the Northern Region as a bigger picture can be built with information from all the other districts of the region.

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APPENDIX A

UNIVERSITY OF CAPE COAST

CENTER FOR CONTINUING EDUCATION

QUESTIONNAIRE FOR EDUCATOR/TEACHERS

INTRODUCTION

This is a study being undertaken by a MEd Information Technology student of the Centre for Continuing Education, University of Cape Coast on "the integration of information communication technology in rural schools of the Savelugu Nanton district". The purpose of the study is to assess the integration of ICT in rural schools. This interview guide is basically for academic purpose and respondents are assured of privacy and confidentiality.

Thank you.

Please tick (√) the appropriate box and fill in the blank spaces where appropriate

SECTION A

Background characteristics of respondents

1. Sex 1. Male 2. Female

2. Educational qualification

1. Ordinary level 2. Teachers' Certificate 'A' 3. Advance level

4. Diploma 5. HND 6. First Degree 7. Second Degree

8. Other (specify)……

SECTION B

Computer literacy skills of educators in rural schools

3. Do you have knowledge in the use of computer programmes such as word, excel etc?

1. Yes [ ] 2. No [ ]

Indicate your level of expertise or competence in using the following software:

Statement	Very good	Good	Fair	Poor	None
4. Word processing					
5. Spreadsheet					
6. Database					
7. Presentation software, eg. powerpoint					
8. Desktop publishing, e.g., publisher					
9.Internet-explorer,netscape					
10.Web development, e.g., front-page					
11.Programing language					
12.Typing tutor					
13.Email (e.g. outlook)					

SECTION C

Availability and accessibility to ICT resources

14. Do you have ICT resources in your school? 1. Yes [ ] 2. No [ ]

15a. If yes, list the ICT resources you have in your school

……

……

……

……

……

……

16. Do you have access to these ICT resources? 1. Yes [ ] 2. No [ ]

17a. If yes, state those ICT resources you have access

to……

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18b. If no, please state why this is the case .....

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Indicate whether you agree with the following statement

Statement	SA	A	U	D	SA
19. My school has adequate computers and accessories for the use of teachers.					
20. Teachers have access to computers in carrying out their studies in my schools					
21. My accessibility to computers is not limited to those in school but that can also be access elsewhere					
22. I have access to and use of computers at most times in the school environment					
23. I have access to internet services in most schools in the district					
24. I have access to internet services in the district.					

SA=Strongly Agree, A=Agree, U=Undecided, D=Disagree, SD=Strongly Disagree

SECTION D

Educational benefits derived from the use of ICT resources.

25. which of the following are educational benefits derived from the use of ICT? (Tick as many responses as applicable)

Making learning more interactive and enjoyable [ ]

Capturing data for storage to support decision making [ ]

Enhancing the avenues for collaboration and family members and the School community [ ]

Improving ways of accountability and reporting [ ]

Improve teaching and learning in content areas [ ]

Develop the students' learning skills considered essential in the modern working environment [ ]

Stimulate creativity, increase motivation and collaboration for teaching and learning [ ]

Promote student-centered learning [ ]

Indicate whether you agree/disagree with the following statement

Statement	SA	A	U	D	S D
26. ICT resources like computers are used to facilitate the teaching and learning process.					
27I use ICT resources to store vital data or information.					
28. I use ICT as a source of information reference in most subject areas.					
29. The use of ICT makes and learning more interesting, attractive and understanding					
30. I use ICT as a means of exchanging information.					

31. The use of ICTs in schools will afford me with visual and muscular difficulties to read, write and express myself.					
32. ICTs have added value to the process of learning, in my school.					
33. Educational material can be prepared and distributed through the use of ICT resources					

SA=Strongly Agree, A=Agree, U=Undecided, D=Disagree, SD=Strongly Disagree

SECTION E

Factors that facilitate and impede the integration of ICT in rural schools

32. Which of the following are barriers to the successful integration of ICT in schools in the district?

a) lack of electricity [ ]
b) inadequate telecommunication infrastructure [ ]
c) lack of qualified and competent personnel [ ]
d) unpreparedness of both educators and learners to fully utilize ICTs resources available [ ]
e) high cost of investing in technology [ ]
f) inadequate storage facilities and [ ]
g) inadequate ICT infrastructure [ ]
h) the ability of the Ministry of Education Science and Sports to avail resources that will sustain the project[ ]

Indicate whether you agree/disagree with the following statements

Statement	SA	A	U	D	SA
33. The provision of hardware in a school without the proper training and support will not enhance the integration of ICTs in schools					
34. Subject teachers who have access to ICT do not use it because they do not possess the knowledge					
35. Subject teachers are satisfied with their current teaching methods and the use of technology is too laden with technical difficulties.					
36. Subject teachers do not have the time to spend on the types of lessons best supported by technology.					
37. GES/schools often provide continuous in-service professional development programme for teachers					
38. ICT training is made part of teacher training programmes, so that newly trained educators will possess ICT skills					
39. The cost of acquiring ICT resources is not a one-time investment but a recurrent expense					

SA=Strongly Agree, A=Agree, U=Undecided, D=Disagree, SD=Strongly Disagree

SECTION F

Recommendations

40. What should be done at the following levels to ensure and enhance the successful integration of ICT in rural schools?

1. The school level……

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2. The district level……..

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3. Regional level……..

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4. National level ..……

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APPENDIX B

UNIVERSITY OF CAPE COAST

CENTER FOR CONTINUING EDUCATION

QUESTIONNAIRE FOR STUDENTS/LEARNERS

INTRODUCTION

This is a study being undertaken by a MEd Information Technology student of the Centre for Continuing Education, University of Cape Coast on "the integration of information communication technology in rural schools of the Savelugu Nanton district". The purpose of the study is to assess the integration of ICT in rural schools. This interview guide is basically for academic purpose and respondents are assured of privacy and confidentiality.

Thank you.

Please tick (√) the appropriate box and fill in the black spaces where appropriate

SECTION A

Background characteristics of respondents

1. Sex 1. Male [ ] 2. Female [ ]

2. Educational attainment/qualification

1. JSS [ ] 2. SSS [

SECTION B

Computer literacy skills of students/learner in rural schools

3. Do you have knowledge in the use of computer programmes? 1. Yes [ ] 2. No [ ]

Indicate your level of expertise or competence in using the following software:

Statement	Very good	Good	Fair	Poor	None
4. Word processing					
5. Spreadsheet					

6. Database					
7. Presentation software, eg. powerpoint					
8. Desktop publishing, e.g., publisher					
9.Internet-explorer,netscape					
10.Web development, e.g., front-page					
11.Programing language					
12.Typing tutor					
13.Email (e.g. outlook)					

SECTION C

Availability and accessibility to ICT resources

14. Do you have ICT resources in your school? 1. Yes [ ] 2. No [ ]

15a. If yes, list the ICT resources you have in your school

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16. Do you have access to these ICT resources? 1. Yes [ ] 2. No [ ]

17a. If yes, state those ICT resources you have access to……

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18. If no,

why?.....

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Indicate whether you agree with the following statement

Statement	SA	A	U	D	SD
19. My school has adequate computers and accessories for the use of students					
20. Students have access to computers in carrying out their studies in my schools.					
21.My Accessibility of to computers is not limited to those in my school but can also be accessed elsewhere					
22. I have access to and use of computers at most times in the school environment					
23. I have access to internet services in most schools in my school.					
23. I have access to internet services in the district					

SA=Strongly Agree, A=Agree, U=Undecided, D=Disagree, SD=Strongly Disagree

SECTION D

Educational benefits derived from the use of ICT resources

24. which of the following are educational benefits derived from the use of ICT? (Tick as many responses as applicable)

1. Making learning more interactive and enjoyable [ ]

Capturing data for storage to support decision making [ ]

Enhancing the avenues for collaboration and family members and the School community [ ]

Improving ways of accountability and reporting [ ]

Improve teaching and learning in content areas [ ]

Develop the students' learning skills considered essential in the modern working environment [ ]

Stimulate creativity, increase motivation and collaboration for teaching and learning [ ]

Promote student-centered learning [ ]

Indicate whether you agree/disagree with the following statement

Statement	Strongly agree	Agree	Undecided	Disagree	Strongly Disagree
25. I use ICT resources to help me learn.					
26. I use ICT resources to store vital data or information					
27. The use of ICT as a source of information reference in most subject areas					
28. The use of ICT makes learning more interesting, attractive and understanding					
29. I use ICT as a means of exchanging information					

30. The use of ICTs in my schools will afford me with visual and muscular difficulties to read, write and express my self					
31. ICTs have added value to the process of learning in my school.					
32. Educational material can be prepared and distributed through the use of ICT resources					

SECTION E

Factors that facilitate and impede the integration of ICT in rural schools

33. Which of the following are barriers to the successful integration of ICT in schools in the district?

1. lack of electricity [ ]
2. inadequate telecommunication infrastructure [ ]

lack of qualified and competent personnel [ ]

unpreparedness of both educators and learners to fully utilize ICTs resources available [ ]

high cost of investing in technology [ ]

inadequate storage facilities and [ ]

inadequate ICT infrastructure [ ]

the ability of the Ministry of Education Science and Sports to avail resources that will sustain the project [ ]

Indicate whether you agree/disagree with the following statements

Statement	Strongly agree	Agree	Undecided	Disagree	Strongly Disagree
34. The provision of hardware in a school without the proper training and support will not enhance the integration of ICTs in schools					
35. Teachers who have access to ICT do not use it because they do not possess the knowledge					
36. They are satisfied with their current teaching methods and the use of technology is too laden with technical difficulties					
37. They do not have the time to					

spend on the types of lessons best supported by technology					
38. GES/schools often provide continuous in-service professional development programme for teachers					
39. ICT training is made part of teacher training programmes, so that newly trained educators will possess ICT skills					
40. The cost of acquiring ICT resources is not a one-time investment but a recurrent expense					

SECTION F

Recommendations

41. What should be done at the following levels to ensure and enhance the successful integration of ICT in rural schools?

1. The school level……

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2. The district

level……

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3. Regional level.……

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4. National level..……

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APPENDIX C

UNIVERSITY OF CAPE COAST

CENTER FOR CONTINUING EDUCATION

INTERVIEW SCHEDULE FOR HEADTEACHERES/HEADMASTERS

INTRODUCTION

This is a study being undertaken by a MEd Information Technology student of the Centre for Continuing Education, University of Cape Coast on "the integration of information communication technology in rural schools of the Savelugu Nanton district". The purpose of the study is to assess the integration of ICT in rural school. This interview guide is basically for academic purpose and respondents are assured of privacy and confidentiality.

Thank you.

Please provide appropriate answers to the following questions.

SECTION A

How many computers do you have in your school?

How did you acquire your computers?

Where are the computers located or housed?

What kind of technical support do you have/received for the use of the computer?

Who has access to the computers?

In which areas are the computers employed in the teaching and learning process?

Which computer literacy skills do your teachers have?

Which computer literacy skills do your students possess?

How many teachers are computer literate?

Do you have access to internet connectivity in your school?

What are some of the educational benefits derived from the use of computers and internet facilities?

What software packages do you use and how are they acquired?

How do you upgrade the software facilities?

Are there plans to upgrade the capacity of teachers in computer literacy?

If yes, in which areas do they need to be improved? Is it recognized by the Ghana

Education Service?

Do you have any policy informing the use of ICT in school?

If yes, what does the policy say?

How would you describe the availability and accessibility of ICT resource in your school?

What would you recommend in making the integration of ICT in schools a success in rural schools at following levels?

School level

District level

Regional level

National level

SECTION B

Background characteristics of respondents

1. Sex 1. Male [ ] 2. Female [ ]

2. Educational qualification

1. Ordinary level [ ] 2. Teachers' Certificate 'A' [ ] 3. Advance level[ ] 4. Diploma [ ]

5. HND [ ] 6. First Degree [ ] 7. Second Degree [ ] 8. Other (specify) [ ]

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