UNIVERSITY OF GHANA, LEGON

INFORMATION COMMUNICATION TECHNOLOGY USAGE PATTERNS IN SECOND CYCLE SCHOOLS: A STUDY OF TWO SELECTED SENIOR HIGH SCHOOLS IN GHANA

BY

JOSEPH EDMUND FLEISCHER

(10232161)

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DECLARATION

I do hereby declare that except for other people's work cited which have been duly acknowledged, this thesis is the result of my own original research, and that this thesis, either in whole or in part, has not been presented elsewhere for another degree.

I bear sole responsibility for any shortcomings.

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JOSEPH EDMUND FLEISCHER

(STUDENT)

DATE …….

……..

PROF. STEVE TONAH

(SUPERVISOR)

DATE ……..

……

PROF. CHRIS ABOTCHIE

(CO-SUPERVISOR)

DATE …….

ABSTRACT

Information communication technology (ICT) usage is a global phenomenon and has caught up with users in the African continent. In view of this, Ghana as a country in realizing the importance of ICT in the lives of its citizens as a potential in enhancing development rolled out a policy for the use of ICT. This policy has seen the study of ICT as a subject in both the basic and second cycle levels of the educational institution. One major barrier arising in terms of ICT usage is what social scientists have described as the 'digital divide' phenomenon. This is a term that distinguishes users of ICT in different ways, some of which refers to those who possess the facility and those who do not as well as those who have the skills in using the facilities and those who cannot. The social capital theory was used in the study to ascertain the comparative usage of ICT in an urban and rural school. Based on a sample of 240 respondents drawn from two schools the study found that both teachers and students in the schools do not know much about ICT although ICT devices are a common resource in the country; ICT facilities were not equitably distributed in the two schools as the number of these facilities in the rural school compared to those in the urban school were inadequate for both students and teachers; and also there was a gender disparity among students in the use of ICT. Some recommendations made by the study include the need for the Ghana Education Service (GES) to make the study of ICT an examinable subject in the SHS syllabus to persuade the use of ICT among teachers and students at the second cycle school level; the provision of training programs for teachers especially the older ones in the use of ICT; the provision of ICT devices like laptops for the teachers (on hire-purchase basis) to enable them own as well as use these devices and government providing 'state of the art' ICT laboratories in second cycle schools to encourage both teachers and students to adopt the use of ICT. These are important for the transformation of education in Ghanaian second cycle schools.

DEDICATION

This work is dedicated to the next generation of future leaders who are striving hard with hope to see this country (Ghana) and the world at large become a better place to live in. Many of such people have great ideas but are unable to see these ideas become a reality due to the lack of resources or unequal opportunities in the environment they find themselves in. The future however is bright and with the effective use of ICT this generation of future leaders can see their dreams come true.

"Where there is no vision, the people perish: but he that keepeth the law, happy is he."

Proverbs 29: 18 (KJV)

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LIST OF ABBREVIATIONS

ACT21S	Assessment and Teaching of 21st Century Skills
BECE	Basic Education Certificate Examination
CEO	Chief Executive Officer
CLIT	Centre for Innovative Learning Technologies
GES	Ghana Education Service
GPRS	Ghana Poverty Reduction Strategy
ICT	Information Communication Technology
ICT4AD	Information Communication Technology for Accelerated Development
IRB	Institutional Review Board
IT	Information Technology
ITP	International Telementor Program
ITU	International Telecommunication Union
KNUST	Kwame Nkrumah University of Science and Technology
Lab	Laboratory
MD	Managing Director
MDG	Millennium Development Goals
MoE	Ministry of Education
NGO	Non-governmental organization
ODL	Open and Distance Learning
PTA	Parent-Teacher Association
PWC	Price Waterhouse Coopers
SHS	Senior High School

SPSS	Statistical Package for Social Sciences
UCC	University of Cape Coast
UEW	University of Education, Winneba
UG	University of Ghana
UK	United Kingdom
UNESCO	United Nations Educational Scientific and Cultural Organization
UPS	Uninterruptible Power Supply
TV	Television
USA	United States of America
VC	Video Conferencing
WASSCE	West Africa Senior Secondary Certificate Examinations
Y2K	Year 2000

CHAPTER ONE

BACKGROUND TO THE STUDY

1.1 Introduction

The world today is a 'global village'. To speak of a 'global village' is to view the whole world as a single community served by electronic media and information technology (Encarta dictionaries, 2009). Society has become more complex by the presence and use of Information Communication Technology (ICT). It is the possession and effective use of ICT the world over that has characterized the level of development of countries.

Today, countries which own and effectively use ICT have risen to top positions in the world. Typical examples of these countries are found in Asia and are popularly referred to as the "Asian Tigers". These countries include South Korea, Hong Kong, Singapore and Taiwan who were all at one point regarded as developing or 'Third World' countries. The reason for the development of these countries is partly because of the use of ICT in the lives of the people in these countries which produces numerous inventions that are undeniably a breakthrough or intervention in solving some of the problems in society.

It is upon realizing the importance of ICT in the development agenda of any country that Ghana rolled out a policy known as the ICT for Accelerated Development (ICT4AD) policy in March 2003 (The Ghana ICT for Accelerated Development Policy, 2003). This policy was birthed to represent the vision for Ghana in the information age.

Ghana like any country with the aim of making strides in the use of ICT, would find a study like this useful. This study would therefore enable the country create awareness of

ICT use for the general public and also contribute to already existing literature which can possibly be used for further consideration in policy review.

ICT today is a breakthrough for development in the world. The idea which once was the preserve of only the military has broken out of this comfort zone (Cavanagh, 2007). Like a cancer which cannot be controlled if not detected early, so has the growth of ICT in society become today. The world today is dominated by ICT usage and Africa which is regarded as a 'Third World' continent based on its level of development has not been left out of this domination. The influence of social media, software programs or operating systems and search engines like Facebook, Google, Macintosh, Android, Microsoft, among others which are mostly USA based companies have found their way to the African continent. Many of the founders of these companies are billionaires today who have channelled millions of dollars ($) of their wealth into charity projects which mostly go to 'Third World' countries especially those in Africa. The influence of these founders through their charitable projects as well as the impact from the use of their products all over the world makes one wonder the degree of power or influence these companies have in the world today. Bill Gates, the founder of Microsoft for instance is listed as the second richest man in the world according to the Forbes' list of the world's richest men and women with a net worth of about $56 billion (www.forbes.com/forbes, 2013).

Ghana as a country has also had its share of ICT dominance in the society. The question that one may ask is how are users of these ICT tools or devices using them? Over the years, it has been realized by world leaders as well as policy makers that the effective use of ICT determines to a large extent the level of development of any country. This ideology has been proved through the success stories of countries referred to as

"Asian Tigers". It is in view of this that it is important to find out how Ghana as a country is making use of this powerful tool called ICT; whether good or bad in order to effectively invest the necessary resources needed to train its people to effectively use it for the good of the country and also adopt measures to curb the bad usages.

1.2 Problem Statement

Ghana as a country has in recent times recorded cases involving some youth engaged in cyber-fraud. The cyber-fraud problem has occurred at different levels in the country. Studies done by Kornblum et al (2009) reveal how cyber-fraud has been perpetuated in some developed countries by young men popularly referred to as hackers. These men use their ICT skills to either defraud people of their money or break into bank accounts and government security information systems.

In Africa also, many young men[1] have been involved in cyber fraud activities which is quite different from recorded cases in developed countries. In Ghana[2] for instance, the desire for ostentatious living by the youth as well as pressure from their female peers to enjoy life has pushed many young boys into dropping out of school in search of this quick path to prosperity.

It has become a common scene in Ghana today to see a number of youth (mostly boys) converging at internet cafes, making these places their habitation from morning to

[1] There is insufficient research to prove which gender is highly engaged in cyber fraud or cyber-crime (as it is internationally recognized) especially in Ghana. However, reports made on the subject have always identified boys and young men as the patrons of this illegal activity.

[2] Ghana was named the 10th country in the list of top 10 countries with cyber-crime activities in the world. (www.techbaron.com/top-cyber-crime countries)

late into the night to engage in cyber fraud[3]. This process involves them engaging in dealings with some foreigners in developed countries defrauding them of their money. (www.vibeghana.com, 2014). There have also been reports of some groups of people who consult spiritualists to enable them gain wealth over-night, a phenomenon popularly referred to as '*sakawa*'[4] in Ghana. Some newspaper stories have reported stories of some 'sakawa' boys attending churches in search of help from pastors to deliver them from the spiritual attacks that worry them in the night as a result of the covenants made for them by these spiritualists. One newspaper in 2010 reported a story involving Sakawa boys under the headline "*Prophet Agya Dan Delivers Sakawa Boy*" (www.todaygh.com, 2010). Many youth (mostly boys) today are found in internet cafes engaging in some cyber-crimes as well as spending time on websites that are unproductive to them. Some of these websites include pornographic websites and social media websites like Facebook, Twitter, Instagram etc. The use of these social media websites have sometimes been attributed to as the cause of poor academic performances of some students. Some education experts have asserted that the use of social media language has hampered the English grammar of many students causing them to fail in their exams. The prevalence of young boys engaged in the 'sakawa' trade has become a major problem for security agencies like the police to control (www.vibeghana.com, 2014).

[3] Cyber fraud is the crime of using computers and internet to obtain money from people living abroad (mostly in Europe and the USA) by deceiving them. Today, the leading African countries engaged in these activities are Nigeria and Ghana. Nigeria for instance, is currently ranked number 3 in the world. (www.balancingact-africa.com/news/en/list)

[4] 'Sakawa' is a term used in the Ghanaian parlance to describe the mysterious acquisition of wealth by young men (mostly teenagers) through cyber fraud or ritual sacrifices.

In October 2014, newspaper reportage carried stories in the northern region involving school children as young as 14 years abandoning school to engage in cyber fraud. The problem has been a major concern to residents living in the Tamale metropolis who see these young boys on a daily basis driving flashy cars and have been found to have built palatial houses in the area. It was also reported that some people in the working class group were also involved in the practice. The 'sakawa' boys who are popularly referred to as 'game boys' in the region have caused a public spectacle because of their affluent lifestyle which called for the intervention of the police by leaders and residents in the area to investigate the matter and possibly arrest these boys (www.vibeghana.com, 2014).

Teachers have also been worried about the harmful effects of social media language to the English grammar expressions of their students. Many students today find difficulty in spelling and have recently adopted social media language in their write-ups in school. There is therefore the need for the government of Ghana to ensure that the right use of ICT is encouraged especially by the youth who constitute a larger proportion of the country's population. This can be achieved through the inclusion of ICT in the school curriculum. Although this already exists, a lot more needs to be done to achieve this goal.

ICT today provides learning equipment like computers, e-toys, computer software among others which have programs that make learning fun for young children of school-going age. Ghana as a country has adopted a revision of the school syllabus especially at the basic school level to include the study and examination of ICT as a compulsory

subject in the Basic Education Certificate Examination (BECE)[5]. This has however been considered by some experts as insufficient since many students still grapple with the understanding of ICT as well as its usage.

According to Wadhwa (2013 as cited in the Washington post), the provision of computers and laptops for students' use is as needful as their text books hence the need to provide students and pupils with these facilities. India for instance which is an emerging giant in the world by way of development, invented its own computer tablet called 'Aakash'. In view of the government of India's awareness of the importance of ICT's role in education, it was estimated that a number of tablets were supplied by the government to pupils in basic schools before commercial sale commenced for the same product (www.bbc.co.uk). One reason for the invention of this product by the Indian government was to help bridge the 'digital divide' gap between developed countries and developing countries (www.bbc.co.uk/aakash). The Indian government upon realizing that the technology industry had no motivation of catering for the needs of the poor sought for investors to manufacture a proto-type tablet they had unveiled in July 2010. The government therefore made a commitment to purchase 100,000 units of these tablets from any investor who was ready to produce these gadgets at a price of $35. This led them to seek for investors and experts who could enable them manufacture the device locally and at a cheaper cost that would make the device affordable to a number of people

[5] Basic Education Certificate Examination (BECE) is the final examination taken by pupils at the basic school level to determine their preparedness and qualification to the second cycle level. In Ghana, the examination is organized and coordinated by the West African Examinations Council (WAEC) which is the body in charge of organizing examinations as well as other external examinations for educational institutions in West Africa.

mostly school children so that even the poorest family could own it. (Wadhwa, 2013 as cited in the Washington post).

The invention of ICT has created competition among information technology (IT) producing companies which has made ICT devices a common product on the market (yet not many people own it). Some people are also ignorant and in some cases clueless about its use. It is in view of this awareness, that the prospects of ICT for Ghana is being sought to ensure that efforts are made to help raise the standard of education in Ghana with the use of ICT. This can only be achieved by ensuring that ICT usage is encouraged in Ghanaian public schools by equipping them with the facilities to enable students in these schools acquire the skills that would enable them compete with their counterparts in other parts of the world just as is being done in most private schools in the country. To make this dream a reality in Ghana is the reason why a study like this is being carried out to find out the extent of ICT use in second cycle schools[6] in Ghana in order to make some adjustments and also propose some new ways of effectively doing so.

This study focuses on the usage patterns of ICT in second cycle schools making it a relevant piece of material because there are not many studies done on this subject especially in relation to its usage in second cycle schools in Ghana hence the relevance of this study. To carry out this study, a number of research questions have been asked to enable the researcher investigate this important but neglected subject. This therefore leads

[6] Second cycle schools are schools at the secondary education level. In Ghana, these were formerly referred to as senior secondary schools (which ran for a 3 year duration) but was later changed to senior high schools due to changes in the country's educational curriculum of having a four-year duration for students at this level. Today, the educational duration is three years but the senior high school name has still been maintained due to a change in government (between the 2008-2012 period).

to the next topic of discussion which is the research questions of the study which have been captured below.

1.3 Research Questions

1. How has the ICT policy in Ghana facilitated the equipment of senior high schools with ICT facilities?
2. How do students and teachers in the rural and urban schools use the ICT tools that are available to them?
3. Is there a gender disparity in ICT use among students in the second cycle schools?
4. To what extent does ICT usage have an influence on the academic work of students?
5. Is there a 'digital divide' in ICT use among rural and urban senior high schools in Ghana?

To find answers to the research questions asked, the researcher was guided by the objectives proposed by his study. These objectives have been outlined as follows:

1.4 Research Objectives

1.4.1 General Objective

The general objective of this study is to find out the usage patterns of ICT in second cycle schools. The name senior high school has however been mentioned occasionally in this study because of its reference to second cycle schools in Ghana. The study is guided by a number of specific objectives as follows:

1. To examine the type of ICT tools available in the senior high schools studied and also find out if these were influenced by the country's policy on ICT.

2. To examine how students and teachers in the rural and urban schools use the ICT tools available to them.
3. To investigate if a gender disparity exists among students in terms of ICT usage.
4. To investigate how ICT use by students in the schools (urban and rural) has had an influence on the academic work of these students in their core subjects (if any).
5. To describe the nature of the "digital divide" (if any) and its impact on teaching and learning.

To ascertain the validity of the objectives proposed, the researcher sought to test some hypotheses that would make his findings from the research field valid and concrete. These have been stated below as follows:

1.5 Statement of Hypotheses

1. The higher the access of ICT facilities in a school, the more its use by students to enhance their academic performance.
2. Male students are more skilled in the use of ICT than female students.
3. Schools in the urban areas are better skilled in the use of ICT than schools in the rural areas.

1.6 Definition of Concepts

For the purpose of this study, the following concepts would be used by the researcher:

1. **Information Communication Technology (ICT):** This involves all forms of electronic technological tools used to provide information to users or enable them communicate with one another.

2. **Youth:** For the purpose of this study, a youth is any individual between the ages of 15-20 years.

This is because the respondents being selected for the study are likely to fall within this age bracket and also because this is the age bracket required for a student enrolment in senior high schools in Ghana.

3. **Senior High School:** A second cycle educational institution which educates individuals who have passed through basic school education in Ghana.

4. **Digital divide:** This refers to the gap that exists between groups of people with regards to their access and use of ICT and ICT devices. This varies differently among societies.

1.7 Significance/ Rationale for the Study

This study is expected to broaden the knowledge about ICT usage in Ghana and also add to already existing literature. This would also create the awareness of the issues that prevail in the schools and possibly serve as a useful document for policies being made on youth education. The study was carried out for a number of reasons. Some of these reasons are: the lack of studies done on the subject of ICT use in second cycle schools in Ghana, the presentation of ICT devices provided in SHS in Ghana. The study also looks at the gender disparity that exists among students in their use of ICT and also finds how much students as well as teachers know about ICT in order to use the facility. These reasons provide the basis for which this study was conducted making it a useful document worth reading.

1.8 Scope and Limitations of the Study

The study in totality looks at a number of issues ranging from the introduction of ICT into the country, the adoption of ICT as a useful tool for development in Ghana

because of the policy on ICT, the introduction of ICT in schools which includes SHS (which is the focus of this study), the ICT devices that are available in the two schools studied, the use of ICT facilities by teachers and students in the two schools studied, the gender disparity that exists among students in their use of ICT, and the disparity that exists among the two schools in their adoption and use of ICT facilities (digital divide phenomenon).

The study conducted encountered a number of challenges on the field. These challenges included difficulties in getting access to important documents that could support the research, difficulties with some of the respondents whilst filling the questionnaires distributed, financial challenges involving travels to the study sites as well as expenses on research materials and difficulties in getting teachers for the interviews. Among these challenges the major challenge for the study was in getting students to participate in the research. This therefore limited the researcher in making use of a sample size of 120 respondents which may be considered as insufficient for the study to generalize its findings. This sample in view of the population of students in the school was considered sufficient by the researcher to gain an understanding of the problems existent in Ghanaian second cycle schools.

The study which tried to cover a number of subjects was limited in a few ways. The main limitation of this study was in its focus on the usage patterns of ICT among teachers and students in the second cycle schools studied. The study was unable to fully study the digital divide phenomenon the existed among schools in Ghana. This is a subject which can be considered for further studies because it forms the basis of not only ICT is use in

the country but the extent to which the ICT idea can be fully implemented and utilized in the country.

1.9 Chapter Disposition

This work is divided into six chapters. The first chapter deals with an overview of the study by giving an introduction to the study, problem statement, research questions, objectives, statement of hypotheses, definition of concepts and significance of the study.

The second chapter deals with the literature review of the study. The topics discussed here include the introduction, a general view of ICT and its usage, ICT usage in Ghanaian second cycle schools, studies done on ICT usage in developed countries, government policies on ICT in Ghana, the digital divide phenomenon and the theoretical framework for the study.

Chapter three deals with a brief history of ICT use in Ghana and the topics discussed here are the introduction, the development of the telecommunication industry before independence, the development of the telecommunication industry in the post-independence period, the telecommunication industry in modern Ghana, the emergence of ICT in Ghana and the usage of ICT in the education sector of Ghana.

Chapter four deals with the research methods used in the study. These include the introduction, the research design, research approach, study sites, target population, the data collection approaches, sampling procedure, research tools, data analysis, ethical consideration and the limitation of the study.

Chapter five deals with the data analysis, presentation and discussion of the data collected from the field. This discusses the responses given by teachers and students who

participated in the study. Topics captured in this chapter are the introduction and discussions to the quantitative and qualitative data collected from the research field.

The final chapter deals with the summary, conclusions and policy implications of the study. This was based on the findings from the study with reference to the literature reviewed. This enabled the researcher to make final remarks on the research topic which was the usage patterns of ICT by teachers and students in senior high schools as well as what can be practically done to improve or enhance the state of Ghanaian senior high schools.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter reviews literature on studies already done on the role of ICT in the lives of people (especially those in school) and how this is used by the people who acquire or possess it. Literature reviewed include a general view of ICT and its usage, ICT usage in Ghanaian second cycle schools, studies done on ICT usage in developed countries, government policies on ICT in Ghana, the digital divide phenomenon and the theoretical framework for the study. These topics are discussed below and begin with a global understanding of ICT and its use.

2.2 A General View of ICT and its usage

The Assessment and Teaching of 21st Century Skills (ACT21S) internationally categorizes 21st century skills into four broad areas namely: ways of thinking; ways of working; tools for working and skills for living in the world (www.act21s.org). The global impact of ICT usage has therefore put pressure on the government of Ghana to formulate a policy for ICT upon realizing the importance of ICT to development. This policy, named the ICT for Accelerated Development (ICT4AD) was formulated in March 2003.

ICT involves among many things the study of computer devices and accessories, the operation of these devices and applications of programs that run these devices. It can also be defined as the medium that utilizes both telecommunication and computer technologies to transmit information (Garrison and Anderson, 2003).

. This consists of hardware, software, networks and media for collection, storage, processing, transmission, presentation of information (voice, data, text, and images) and the hand held devices like mobile phones (Garrison and Anderson, 2003).

ICT has become so important in the world today that it has gradually controlled the way of life and influenced human behaviour in many ways. The influence of ICT in society is what has drawn the attention of sociologists and some social scientists to take keen interest in studying this dominant phenomenon. Alzouma (2006) examined the specific appropriation and adoption process of cell phones and computers in the African context. Although the study reveals attempts made by the Senegalese government to expand telecommunication channels in the country which also introduced internet connection, the study fails to present the extent of usage as well as the activities users of these interventions were engaged in. It is this gap in the literature that this study seeks to fill considering that ICT has come to stay especially in the educational institution.

Another study conducted by the International Telecommunication Union (ITU) in 2004 revealed that Africa is now "the world's fastest growing mobile market" (ITU, 2004). According to the ITU (2004), between 1998 and 2003, the increase of subscriptions to cell phones outpaced one thousand percent (1000%) those of fixed lines. The study further revealed that more than 51.8 million people in Africa have cell phones while only 25.1 million of them owned fixed lines. The study does not explicitly tell us what these cell phones are used for which is the gap this study attempts to fill. Also, although the study presents a continuous increase in the acquisition of cell phones, it does not inform readers on the uses of these devices as well as the mediums through which users are introduced to these devices. According to Alzouma (2006), the reasons why cell

phones were rapidly spreading all over Africa was due to the fact that they fit better in the African domestic environment than computers do. The second reason was that they were aligned with the mental dispositions of illiterate people, who in order to use computers, need to know not only how to read but also how to arrange a text and possibly how to understand or construct tables and diagrams in addition to mastering a foreign language. Thus cell phones gave users an opportunity to express themselves in their own language as well as their emotions without any hindrance in doing so. The easy use of cell phones compared to other ICT devices has resulted in a persistent increase in the manufacture and sale of the device.

ICT therefore offers many uses among which include information sharing, communication, information storage, and processing. The rise of ICT use in Africa of which Ghana has not been left out is what makes the consideration of it within the Ghanaian context worthwhile. ICT dominance in the country has gradually induced pressure on the institutions that exist to adopt its use as a way of revamping their capacity to function efficiently. One of such institutions that have been faced with this pressure is the educational institution. It is the changes in the educational system due to globalization that has merited the need to adopt ICT use to enhance and change the face of education in Africa. Education in Ghana has recently encountered falling standards which some stakeholders have attributed to the existing course contents. These course contents have been regarded as outmoded and efforts have been made to advocate for a revision in the syllabus to meet modern trends. The need for revision has necessitated the introduction of ICT in schools especially at the second cycle level. It is in view of the introduction of

ICT in second cycle schools in Ghana that the next area of discussion of this study turns to the use of ICT in second cycle schools.

2.3 ICT usage in Ghanaian second cycle schools.

There have been many studies conducted on the role of ICT in society or its influence but very little has been done regarding its usage in schools within the Ghanaian society. In Ghana, a study was done by Amenyedzi et al (2011) on the use of computers and the internet as a supplementary source of educational material in three senior high schools in the Tema Metropolis in Ghana. Although the study examines a number of issues related to ICT use in senior high schools, it leaves out the concept of the digital divide in ICT use that exists among the schools studied. It is the digital divide gap in literature that this study seeks to fill because of the disparity it creates among many schools in the country. Another study conducted in Ghana by Ablimi and Adu-Manu (2013) suggested that the focus of teacher training institutes should not be limited to training teachers on how to use ICT but rather should provide teachers with the skills and expertise required to use ICT to teach a curriculum which is better suited to prepare students for the 21st century. Although their study informs this study on the importance of teachers' knowledge and skills in using ICT, it also fails to examine the digital divide gap that exist among teachers in their ICT uses. Agyei and Voogt (2010) also focused on teachers' use of ICT in teaching mathematics in senior high schools. The study focused on the use of ICT by mathematics teachers to improve teaching the subject for students to develop the interest in the subject as well as acquire skills, creativity, and the arts of enquiry and problem solving. The study however focused more on the teachers' role in the education process and neglecting the role students played in this institution. The study also looks at the

differences that exists among teachers in their ICT skills but does not look at the digital divide gap that exits among senior high schools in the ICT facilities available in the schools. It also does not look at the use of ICT by students in the school which are some of the gaps in the study done by Agyei and Voogt (2010) that this study seeks to fill.

In spite of the importance of ICT in education, there have been some criticisms made by scholars about its effectiveness in education especially in relation to it enhancing students' academic performance. Some of these critics have argued that the presence of social media has badly affected students' academic performance because of the length of time spent by students in chatting with friends on these platforms. A survey conducted by Adu-Boafo (2012 as cited in the globe newspaper) on the academic performance of Facebook (a social media website) fans revealed that the website had damaging effects on the fans or users of the social media website. According to Adu-Boafo (2012), 65% of respondents attested to using Facebook daily in checking their accounts and sending messages to friends but did not believe that the website had any effect on their academic performance. Although the study by Adu-Boafo (2012) informs this study on some of the uses of social media by students it does not discuss the disparity that exists in the ICT uses among students. It also does not talk about the channels through which the social media platforms are used by students. Also, because Adu-Boafo (2012) looks at the study in a tertiary institution which is mostly equipped with ICT facilities it makes it imperative to investigate the usage of ICT in second cycle schools since some students either drop out of school at this stage or are unable to progress to the tertiary level. It is in view of these gaps in Adu-Boafo (2012)'s study that this study seeks to investigate the use of ICT in second cycle schools hence the choice of this area

of research to find out how the facilities are being used and how these are influencing the educational system. The next topic of this chapter deals with studies done on ICT use in the educational sector in developed countries.

2.4 Studies done on ICT usage in developed countries

A number of studies have been done on ICT use in schools the world over, hence the need to embrace similar studies in Ghana. According to a report by Price Water House Coopers (PWC, 2010), teachers particularly have a very important role to play in the many stakeholders involved in ensuring effective integration of ICT in the education system. Carlson and Gadio (2002) also assert that teachers are the key to whether technology is used appropriately and effectively. Scholars like Aktaruzzaman et al (2011), have also asserted that the appropriate use of ICT can catalyze the paradigm shift from a teacher-centred pedagogy to a more effective learner-centred pedagogy. The ideas provided by the scholars previously mentioned are quite laudable provided that the requisite facilities are made available in schools. In many developed countries schools are more resourced, education is of high quality and teachers are able to carry out their duties with little difficulty. It is therefore imperative for developing countries especially in Africa to realize that teachers form the focal point through which quality education is provided.

Education in developed countries has gone beyond the dependency of students on their teachers for the acquisition of knowledge and also in learning. This has therefore created the need for the inclusion of ICT for students' use to enable them study on their own with the aid of the teacher as a guide. Some scholars have even advocated for the use of ICT in the classroom as a way of enhancing teaching in students' assessment. For

instance, researchers in the Centre for Innovative Learning Technologies (CLIT) have been developing studies around the use of technology to identify under what conditions – who, what, where, when, and how- technologies can be used to support learning (Ravitz, 2002). The key purpose of the CLIT has been to define a trajectory for the evolution of technology and its application in classrooms (Roschelle and Pea, 1999). According to Ravitz (2002), one way technology can be a substantial help to teachers and learners is by improving the ability to offer formative assessments of a learner's knowledge and skills, assessments that can support teachers and learners in the classroom. The challenge for Ravitz (2002) is how to communicate ideas from these assessments to administrators, the public, and journalists, and to encourage the use of test scores to better inform instructional practices.

Assessment in education is a very important aspect of educational innovation or reform and is considered in developed countries as a way of improving the facilities of the educational institutions in those countries. The reason for assessment is to help guide the teaching and learning process, shaping student self-monitoring and opportunities for learning (Ravitz, 2002). Black and William (1998) also show that formative assessments can help low performers most, while benefiting all students. However, in contrast, high stakes assessments provide little direct performance support for individual learners or their teachers (Black and William, 1998). The views shared by the earlier scholars are important keys that can transform the educational sector in Ghana if these are adopted in our second cycle schools. Most of these points have been adopted by private schools in Ghana but many public schools are yet to adopt some of these trends.

Some studies have also shown that a person acquires only 15-20% of information through the auditory sense and 60-80% through visual sense as leaners visualize computer graphic images displayed with animation in video teleconferencing making illustrations look real in actual life situation and that enhances retention (Tinio, 2002; Omwenga, 2003; as cited in Redempta, 2012). Based on these findings, developed countries have implemented the use of ICT in their educational systems which have led to the introduction of ICT use in the curriculum of students.

Ghana can learn from some of these methods of teaching to improve education in the country. The introduction of ICT in second cycle schools would enable teachers provide more audio-visual presentations of their subject to enable students develop interest in their subjects and also make learning fun for them. Redempta (2012) gives an account of Kenya's effort to implement ICT use in second cycle schools and the potential role ICT can play in education. Omwenga (2004) also discusses e-learning which was identified as an example of the use of these ICT-supported teaching and learning methods whose use in educational institutions is gaining momentum with the passage of time. According to Allen (2003), Garrison and Anderson (2003), e-learning is the purposeful use of electronic systems in support of the learning process. This is supported by electronic hardware and software either online (synchronous) or offline (asynchronous). E-learning is a platform that can be delivered as a self-paced or instructor-led, either individually or on a small or large group basis and can be used as a hybrid to the face-to-face format, or exclusively in the open and distance learning (ODL), offered through electronic media such as CD-ROMs, mobile phones, Television, Video Conferencing (VC), e-mail, interactive TV and satellite among others (Redempta, 2012). There is no doubt that the

use of ICT has been successful to a large extent in developed countries. Redempta (2012) asserts that the use of technology instruction changes the structure of the classroom where teachers function as coaches, mentors, advocates, and managers of information and serves as facilitators of instruction. He further asserts that ICT facilitates access to resource persons such as mentors, experts, researchers, professionals and peers worldwide. The International Telementor Program (ITP) in Canada for instance, links students with mentor-experts through e-mail and discussion forums and also provides project-based online mentoring support to university students. Teachers in these schools are offered the opportunity with the aid of technology to a record of their students' academic history and teachers have the data and information needed to individualize instruction and assessment. ICT is therefore presenting a new model of education with a view to preparing students for 'lifelong learning'. This 'lifelong learning' according to Redempta (2012) is a continuous learning process throughout one's entire life, from childhood to retirement.

A report by the World Bank (2002) categorizes e-readiness criteria into four components: Connectivity (the quality and extent of Internet infrastructure), Capability (a country's ability to deliver and consume e-learning), Content (the quality and pervasiveness of online learning materials) and Human capacity Policy and Cultural environment whereby the legal and regulatory environment affecting the ICT sector is considered, and finally the size of the ICT sector. In reference to e-readiness, one important resource to make it successful is the internet without which the process cannot be made possible. This is a major challenge for African countries hence the inability to successfully implement the ICT program in schools. In some developed countries like

Estonia, Finland and France, access to the internet is a fundamental human right and access to technology and broadband is regarded as a basic infrastructure, in the same way as electricity or roads (ITU, 2010).

According to a report by the ITU on e-readiness, Africa was ranked the lowest in connectivity, with only 50 percent of the rural population within reach of a mobile cellular network. It was also estimated that globally over 852 million people are not covered by mobile cellular signal, out of which 230 million are from rural population in Africa (ITU, 2010). These statistics give a fair idea of the state of ICT usage in the world at large. In the United States, the ratio of students to instructional computers reached five to one (5:1) and 98% of schools were connected to the internet by 2007. Also in the United Kingdom (UK), the ratio of students to computers was 12:1 in primary school and 7:1 in secondary school while access to the internet was virtually universal, as it was in the European Union as a whole (Redempta, 2012).

The Republic of Korea also recorded an average number of students per personal computer as 5.8, and 70.7% of schools which are equipped with 2Mbps Internet lines. The statistics from these countries revealed that the adoption of e-learning was highest in primary schools (88.0%), middle schools (78.0%), high schools (68.7%), junior high schools (47.1%), junior colleges (62.0%), and universities (78.0%), making it an example of 'an e-ready state' (UNESCO, 2010). In accessing the cases of these developed countries and emulating their example there needs to be a change in view of education and what education should entail especially in the 21st century.

Ghana as a country did not adopt the idea of ICT use as a tool for development until 2003. ICT as a tool to improve the educational system is gradually catching up since the inculcation of ICT in the curriculum was instituted. Many public schools in the capital town of Ghana do not have ICT facilities like desktop computers although they are examined on the subject of ICT. Teachers therefore use pictorial images of the devices to illustrate the intended subject to their students. Those who own devices like laptops try to demonstrate some of the topics to their students using the laptops. This has therefore made it difficult to fully implement the use of ICT in schools in the country in order to catch up with the developing world. For Ghana as a country to implement the initiatives adopted in the developed countries and emulate them, there is the need for some re-structuring in the government policies. The assertion of restructuring government policies therefore takes the next discussion of this chapter to government policies or implementation of ICT use in schools.

2.5 Government Policies on ICT in Ghana

Ghana as a country upon realizing the transformation caused in the development of any nation through the use of ICT has formulated a policy on ICT. The policy, named the Ghana ICT for Accelerated Development (ICT4AD) represents the vision for Ghana in the information age. It is based on the policy framework document which states that: *"An Integrated ICT-led Socio-economic Development Policy and Plan Development Framework for Ghana"***.** This policy was released in March 2003 (The Ghana ICT for Accelerated Development Policy, 2003). The Ghana ICT policy fully takes into account the aspirations and the provisions of key socio-economic development framework documents including: the Vision 2020. The policy sets out the road map for the

development of Ghana's information society and economy and provides a basis for facilitating the socio-economic development of the country in the emerging information, knowledge and technological age to be dominated by information and knowledge-based economies. The policy however has been designed to aid Ghana's development process by contributing to addressing the nation's key development challenges (The Ghana ICT for Accelerated Development Policy, 2003). These challenges cut across issues of human development, transforming the agricultural sector the adoption of science and research among others. To solve these challenges, the ICT policy proposes a number of objectives to guide the implementation of the policy. Some of the objectives that apply to this study include:

1. To aid the process of the development of national human resource capacity and the nation's R&D capabilities to meet the changing needs and demands of the economy.
2. To promote an improved educational system within which ICTs are widely deployed to facilitate the delivery of educational services at all levels of the educational system.
3. To accelerate the development of women and eliminate gender inequalities in education employment, decision-making through the deployment and exploitation of ICTs by building capacities and providing opportunities for girls and women.

The formulation of the ICT policy in Ghana has brought some changes in the school curriculum. Some of these changes include the inclusion of ICT as a subject of study in the basic and second cycle school levels. ICT is today taught at the basic school level and is also an examinable subject in the BECE. The subject is also taught in the second cycle level (for first and second year students) but not examinable at this level. The ICT policy

has also put pressure on the government to provide the infrastructure that is conducive for the use of ICT in schools. Many public schools in Ghana have benefited from the provision of either an ICT facility or from the provision of either laptop or desktop computers. The government of Ghana in 2014 under its program called "the Better Ghana Agenda" developed a program for training teachers and students in the use of ICT with RLG Communications[7] as the sole distributor of its ICT products. The government under this program distributed 2,331 laptop computers to teachers in the Central region. This is one example of many beneficiary projects done by the government in Ghana to implement the ICT policy in the country. Although a number of ICT infrastructure have been developed for schools in the country, there are many schools in the country that lack ICT facilities. This lack of ICT facilities has therefore created a huge gap in the distribution of ICT access and uses among students in either the basic or second cycle level. These differences in the availability of ICT facilities has created what social scientists refer to as a digital divide phenomenon. The next topic of discussion in this chapter deals with the digital divide phenomenon.

2.6 The Digital Divide Phenomenon

The term 'digital divide' was first used in the mid-1990s by policy leaders and social scientists concerned about the emerging split between those with and those without access to the computer and the internet (Leon-Guerrero, 2009). It has also been referred

[7] RLG Communications Company Limited: A Ghanaian ICT company established in March 2001 with its headquarters in Dubai (United Arab Emirates). The company is accredited in Ghana as the first indigenous African company to assemble laptops, desktops and mobile phones and offer ICT training in the computer and phone repairs. The company is headed by its CEO and chairman Mr. Roland Agambire who started the company as Roagam Links. The company begun as a mobile phone repair outlet and later transformed to become the pioneer indigenous ICT manufacturing, assembling and training firm in Ghana.

Source: http://www.google.com

to as the gap separating individuals who have access to new forms of technology from those who do not (Leon-Guerrero, 2009). Another definition of the digital divide by other researchers explains it as a gap between those who can effectively use new information and communication tools and those who cannot (Gunkel, 2003). This divide is therefore a global phenomenon and in 2007 statistics revealed that less than 10 percent of the world's population uses the internet (Gullien and Suarez, 2005). Although there has been an increasing diffusion of computers and an overall increase in internet use, a deep divide still remains "between those who possess the resources, education and skills to reap the benefits from the technology and those who do not" (Servon, 2002). Scholars like Dijk and Hacker (2003), have argued that issues pertaining to access to information technology or ICT is a multifaceted concept. This in itself makes it an obstacle in the research and discussion of information inequality. For them, the idea is used freely in everyday discussions without an acknowledgement of the fact that there are many divergent meanings in play. According to Van Dijk (1999 as cited in Dijk & Hacker, 2003), there are four kinds of barriers to access and the type of access they restrict which are:

1. Lack of elementary digital experience caused by lack of interest, computer anxiety, and unattractiveness of the new technology (mental access).

2. No possession of computers and network connections (material access).

3. Lack of digital skills caused by insufficient user-friendliness and inadequate education or social support (skill access).

4. Lack of significant usage opportunities (usage access).

These views actually express the different levels through which the digital divide phenomenon is played out in developed countries. This is so because ICT is costly to acquire leaving many people either unskilled or ignorant of its usage due to the maintenance of the gadgets or equipment involved. Some developing countries have managed to acquire ICT and have successfully used it to their advantage to develop their countries which has lifted them out of poverty and rewarded them with a middle income or high-income status as those of the developed countries. Typical examples of these countries are South Korea, Taiwan and Singapore.

The internet which is a product of ICT innovation has been described as both empowering and discriminating enabling residents in some countries to pursue a better life, but others are left behind (Gullien and Suarez, 2005). Taking into consideration the ICT infrastructure in Ghana makes these studies of importance to this study. This is because ICT since its inception in Ghana was seen as the preserve of those who could afford it. Although the telecommunication companies in the country have tried to diversify the use of ICT through mobile technology, the cost of data to operate the internet is very costly making only a few people capable of affording it. The high cost of data for internet use through the introduction of modems gave rise to the springing up of internet cafes in the country that offered the opportunity to those who could not afford running of internet services in their homes. Today, although telecommunication companies have attempted to offer numerous packages that would help reduce the cost of data for using the internet, many people still find it difficult to afford. The ICT policy in Ghana has provided some schools with ICT infrastructure but there are many other schools without these facilities. Schools with the ICT facilities may also not have internet

services in their schools. The lack of ICT facilities and internet services in the second cycle schools constitute digital divide gaps that inform this study to explore them to discover what situations pertain in second cycle schools in the country which is the focus of this study.

According to Leon-Guerrero (2009), users in less developed countries have basic problems: economic (cost of basic necessities versus the cost of internet access), technological (varying ability of local networks), and geographical (limited access outside urban areas; Vartanova, 2002). Warschauer (2003) asserts that it is true that those who are already marginalized in society will have fewer opportunities to access and use computers and the internet.

The digital divide according to Leon-Guerrero (2009) is a symptom of a large social problem in the United States: issues of social inequality based on income, educational attainment, and ethnicity or race are major issues in the country. Data from the National Centre for Education Statistics (NCES)[8] revealed how the computer and internet was divided along demographic and socio-economic lines. These statistics showed that the use of both technologies was higher among white students than among Black and Hispanic students (DeBell and Chapman, 2006).

In recent times, one wonders if there has been much improvement or changes regarding the challenges faced with ICT use especially on the African continent. In a

[8] NCES: National Centre for Education Statistics. It is a primary federal entity located within the U.S. Department of Education and the Institute for Education Sciences. It is responsible for collecting and analyzing data related to education in the United States (U.S.) and other nations.

Source: http://nces.ed.gov/

continent which is plagued with poverty and the deprivation of the basic needs of life, how possible could the use of ICT be adopted and used effectively in schools especially at the second cycle level? Education in Ghana has been faced with many major challenges making the government embark on a number of projects to improve the welfare of schools as well as the educational system in the country. It is therefore interesting to find out how ICT usage can be adopted to further enhance the improvement of education in the country. This is important to note because many public schools especially those in rural areas are deprived of the resources that would enable them achieve high academic standards. Although many studies have been done on ICT use in schools, there are few studies done within the Ghanaian context. This study would therefore try to add knowledge to already existing studies and also bring out the situation on the ground as far as ICT implementation in second cycle schools is concerned.

2.7 Theoretical Framework of the Study

The theory used in studying the use of ICT in second cycle schools is the social capital theory. Social capital theory was propounded by James S. Coleman. The latter emerged as the most important spokesperson in sociology for his coining of the rational choice theory which has become an orientation that has had a major impact in economics and political science. The theory provides two elementary concepts which are the actors and resources (Kivisto, 2013). Social capital according to Coleman (1988) refers to those aspects of social structures that make it easier for people to achieve things. The theory of social capital was used by Coleman in studying both families and schools. Schaefer-McDaniel (2004) identifies two distinct components of the social capital theory which were recognized by Coleman (1988) in the family. These components were seen in

viewing social capital as a relational construct and social capital as providing resources to others through relationships with individuals. According to Schaefer-McDaniel (2004), the family formed the basis of Coleman's (1988, 1990a) definition of social capital. In studying the family Coleman (1988) observed that family systems are made up of a) financial capital (financial resources for household and child rearing expenses); b) human capital (parental education and economic skills); and c) social capital (Schaefer-McDaniel 2004). To define social capital in the family, Coleman (1990) saw it as being defined by its specific function. This according to the latter refers to "an asset that a person or persons can use as a resource. Social capital is any kind of social relationship that is a resource to the person" (Coleman 1990b, p.35 as cited in Schaefer-McDaniel 2004).

The social capital theory used by Coleman (1988, 1990) explains the relationship that exists between individuals within the family taking into consideration that the family is the basic unit of society. This also enables the individual to develop skills of communication that enable him to interact with other individuals in the society. Although the theory used by Coleman (1988) in studying the family does not directly inform this study its use in studying schools is what this study has adopted. Coleman (1990b) noted that the social capital theory was extremely important in school settings. This was revealed in the mentioning of six crucial types of interpersonal relationships in the school setting. These include interpersonal relationships in the school setting which are relationships among students, among teachers, among parents, between teachers and students, between teachers and parents, and between students and parents (Schaefer-McDaniel, 2004). Interpersonal relationships among players in the schools are of

importance to the success of providing quality education. The assertion made by Coleman (1990) is crucial for this study because ICT which is a new tool in the school's curriculum can only be utilized when all parties come together to ensure the efficient utilization of the ICT infrastructure. Also, because of the complex nature of ICT devices which discourages unskilled people in using it, the social capital theory would help in understanding how students as well as teachers learn or develop the skills in using the ICT facilities available to them.

The social capital theory in relation to this study tries to explain how and why ICT usage patterns are determined by their users through the social networks developed among teachers and students in senior high schools. This is because ICT devices like cell phones or tablets for instance are introduced to the students by their friends who make them crave for these devices because of the functions they offer hence their usage by students and also teachers who are aware of these interventions. The theory explains how people benefit from certain opportunities or adopt certain behaviours that are influenced by people in a group because of the group they find themselves. The students in the second cycle schools are mostly found in groups with their peers to either study or live together in dormitories. To understand the way students adopt the use of ICT the theory would explain how these students as well as teachers develop the habits and skills needed in using ICT which is dependent on the groups they find themselves in and how individuals in these groups adopt new behaviours which in this study refers to the use of ICT. The adoption of ICT use is an entirely new habit for many students in the schools hence the need to prepare them. Although a few of them may be conversant with its use, there is the need to allow interaction in the use of ICT tools among students. It is the

interactions that exist among students in their use of ICT that expose some of them to new ICT devices as well as the requisite uses in operating them.

CHAPTER THREE

BRIEF HISTORY OF ICT USE IN GHANA

3.1 Introduction

The history of ICT use in Ghana is not in a readily available document. This is due to many reasons; the first and foremost of which is the Ghanaian culture of not writing down or recording historic events to preserve the rich culture of the people. The preference of telling the historical events orally (oral traditions) is a phenomenon which has been criticized by many scholars and has also marveled many people from the western world (mostly tourists and some academics). Another reason for the scarcity of historical documents on ICT is attributed to the fact that Ghana as a country has not invented any ICT device which the citizenry can take pride in using and adopting in their daily lives. Although efforts have been made in recent years to create the awareness of the importance of ICT use, very little effort has been made to make it a valuable tool in the country. This has therefore made it difficult for the country to realize the goal of bridging the digital divide gap between Africa and the western world. Ghana has formulated a government policy on ICT which sought not only to implement the use of ICT in the country but also provide a document that informs the citizenry of the rudiments of ICT use and the extent to which government expects to realize the potential of ICT use in the country.

The exact date or period within which ICT was introduced into the country is unknown. There is evidence of some ICT facilities such as desktop computers, typewriters, printers among others that have been used in the country in the late 1990s. As a result of the costly nature of these facilities at the time only a few people or

institutions used them. It was not a common sight to find a computer being used by people let alone identifying an ICT device as we have it now. The introduction of ICT in the country is highly attributable to the development of the telecommunication industry in the country which paved the way for this new invention or tool in the hands of many today. Allotey and Akorli (1995) in their study of the telecommunication industry in Ghana, attempt to provide a historical account of the development of this industry in the country. A detailed account of the history is provided in the next section. This section deals with the development of the telecommunication industry just before Ghana's independence period.

3.2 The Development of the Telecommunication Industry Before Independence

The first telegraph line in Ghana (then known as the Gold Coast) was a ten mile link installed in 1881 between the castle of the colony's then governor in Cape Coast and Elmina. This line was then extended to the Christianborg Castle near Accra, which became the seat of government, and later extended further to Aburi, 26 miles outside Accra. In 1882, the first public telegraph line stretching over a distance of 2.5 miles, was erected between the Christianborg castle and Accra. These lines were extended to cover Accra, Prampram, Winneba, Saltpond, Sekondi, Ankobra, Dixcove, and Shama which were all colonial castles or fort towns as well as commercial ports and fishing centres between 1887 and 1889. In 1886, telegraph lines were extended to the middle and northern parts of Ghana into the territory of the Ashantis. This new communication technology was later used to subdue the Ashantis in the Yaa Asantewaa war between 1900 and 1901 (Allotey and Akorli, 1995).

The first manual telephone exchange (70 lines) was also installed in Accra in 1982 to improve communications in the southern part of the country. A second manual exchange consisting of 13 lines was installed in Cape Coast twelve years later in 1994. According to Allotey and Akorli (1995), Ghana's telecommunication infrastructure was laid down and expanded by the colonial administration mainly to facilitate the economic, social, and political administration of the colony. According to the latter study, before the beginning of the World War I in 1914, 170 telephone subscribers had been served in Ghana, but it was between World War I and 1920 that the backbone of the main trunk telephone routes which were Accra-Takoradi, Accra-Kumasi, Kumasi-Takoradi, and Kumasi-Tamale were built using unshielded copper wires. By 1930, the number of telephone exchange lines in Ghana had grown to 1,560 linking the coastal region with the central and northern parts of the country. In 1953 also, the first automatic telephone exchange with 200 lines was installed in Accra to replace the manual one erected 63 years earlier. The trunk lines connecting Accra, Kumasi, Takoradi, and Tamale were upgraded through the installation of a 48 and 12-channel VHF network three years later (1956).

From the historical account presented, although the development of the telecommunication industry is commendable it also suggests a deliberate attempt on the part of colonialists to improve their livelihood through communication. Taking into consideration that the colonialists were in the Gold Coast to exploit it of its natural resources the development of the these infrastructure further enhanced this exploitation agenda by making communication more accessible and effective for them. One wonders why infrastructure was developed only in the big towns like Accra, Takoradi, Kumasi and Tamale which are the capital towns of some of the country's regions. Also, although

telecommunication was developed to improve communication channels among the colonialists, these were mostly done in the industrial hubs of the country at the time. The account does not present how the telecommunication infrastructure developed improved the livelihood of local people in their respective communities as well as those who worked with the colonists. The telecommunication industry prior to the independence period of Ghana has continuously developed and this was captured in the account presented by Allotey and Akorli (1995). The next section therefore takes us to the development of the telecommunication industry in the post-independence period.

3.3 The Development of the Telecommunication Industry in the Post-independence Period

Allotey and Akorli (1995) assert that Ghana's attainment of independence in 1957 brought new dynamism to the country's telecommunications development. A seven-year development plan launched just after independence hastened the completion of a second new automatic exchange in Accra in 1957. By the end of 1963, over 16,000 telephone subscribers and 32,000 rotary-type telephones were in use in Ghana. In response to the rapid growth in commercial activities in mining, timber, cocoa, shea-butter, and the like in outlying parts of the country, new manual exchanges were installed at Cantonments, Accra, Swedru, Koforidua, Ho, Tamale, Sunyani, and Kumasi during the post-independence years.

The historical account does not tell which group of people benefited from this expansion of telecommunication channels. Considering that the economy of Ghana is greatly dependent on agriculture, it would have been an interesting discovery to know that farmers were also influenced by the expansion of these communication channels

which also boosted their trade. Also, the question of how these communication channels were used to improve trade as well as the livelihood of the inhabitants in these towns is unknown. Societies in the world thrive on communication hence their adoption of symbols as dictated by their culture which enables them to relate with each other, it would have been useful to know how the inhabitants in these towns (especially the local people) adopted these new forms of communication channels that were introduced into their communities.

The management of Ghana's telecommunication institutions which was initially assigned to the Public Works Department was transferred to the post office following the enactment of the Post Office Ordinance in 1886. Telecommunications was later administered by the government's Post and Telecommunications Department until early 1970s (Allotey and Akorli, 1995). The telecommunication industry has further developed and grown due to the tremendous effort made by governments since the independence period. The next section of this chapter deals with the development of the telecommunication industry as we presently have it Ghana.

3.4 The Telecommunication Industry in Modern Ghana

The development of Ghana's telecommunication system saw a new chapter beginning in November 1974, when the Post and Telecommunication Department was declared a public corporation by the National Redemption Council (NRC) Decree No. 311. The department was placed under the authority of the Ministry of Transport and Communication, which is still responsible for policy formulation and the control of Ghana's telecommunications sector. Under the instrument of incorporation, the Post and

Telecommunication Corporation (P & T) was to be administered by a board of directors who function as the corporation's governing body.

This regulatory body is headed by a director general, who is the chief executive accountable to the board of directors and responsible for the organization, maintenance, and development of all the corporation's services (domestic and international) as well as the determination of financial policies. The director general also ensures that government policies on telecommunication are implemented and also rules and regulations governing the various services as well as international conventions are correctly interpreted and acted upon. He is assisted by two deputies- the deputy director general for engineering and the deputy director general for posts (Allotey and Akorli, 1995). Today, this body has been renamed the National Communications Authority (NCA) which monitors and regulates the activities of telecommunication companies as well as media houses operating in the country. This is done by offering companies the licenses needed to operate as well as ensure that quality services are offered to consumers.

The telecommunication industry in Ghana since the inception of the NCA has seen tremendous growth. Today the country records a total of six mobile telecommunication networks which is on a higher side compared to other countries in the sub-region. These include companies like MTN, Expresso, Vodafone, Tigo, Globacom, and Airtel. Some of these companies were re-branded to their names due to mergers and acquisitions by some company partners. The huge presence of these telecommunication networks and the high demand for data use with the introduction of 2G and 3G bundles to assess the internet is what led to the growth of internet usage in the country. This has further made it imperative for the use of ICT because of the growing demand for the packages and

products offered by these companies. The increasing growth of subscribers to these telecommunication networks has made ICT a useful tool for many not only to communicate but also to entertain oneself with a range of social media platforms. It is the growth in subscribers that has created the awareness of ICT usage in the country hence the development of the ICT4AD policy. ICT has now come to stay with the Ghanaian populace and cannot be neglected.

The question many have asked is how prepared Ghana is in this ICT-dominated world and what benefits the country can derive from this digital age. Ghana has suffered tremendously like other countries from the challenges of ICT use. Activities like internet scams, hacking and fraud are a few of the challenges encountered since the inception of ICT use in the country. These challenges were not addressed in the historical account presented by Allotey and Akorli (1995). Also, the development of the regulatory body as presented by the account does show its preparedness in effectively regulating the growing nature of the telecommunication industry which today has added the ISP[9] component to its facility. Taking into consideration that the regulatory body was previously overseeing the transport and postal services of the country which were previously the main channels of communication, it is unclear how the communication channels are being regulated today considering the diversification of their operations. It is in view of the introduction of ICT use in Ghana that the next section of this chapter turns to how ICT has played a major role in the lifes of Ghanaians and also looks at how it has been used over the period of its existence. These inventions were however not captured by Allotey and Akorli (1995) because their study only ended at the development of the telecommunication

[9] ISP: Internet Service Provider

industry after independence. A few studies have been done to document some of the interventions made by ICT in Ghana which inform this study. The next section of this study leads us to the growth of ICT in Ghana.

3.5 The Emergence of ICT in Ghana

The implementation and use of ICT was birthed through the formulation of a policy on ICT called the ICT for Accelerated Development (ICT4AD) in March 2003. This policy had a four year rolling plan and an operational life span of between 15 to 20 years. The 14 priority areas which were referred to as the 14 ICT4AD concentrated on promoting rapid ICT physical infrastructure development, modernize agriculture and facilitate development of the private sector (Ankomah, 2004). There were efforts made by government to push for the use of ICT as a way of setting the path for development. The Kofi Annan ICT Centre of Excellence which is a joint Ghana-India project was also commissioned on 9th December, 2003 with the responsibility of producing the human capacity needed for the emerging ICT industry in Ghana and the sub-region. Despite attempts made by the Kufuor-led administration to extend communication channels to encourage and improve ICT use, many areas in the capital town were still detached from these interventions hence the springing up of ICT centres that offered training in the use of ICT. Also, the high cost of training as well as the acquisition of the ICT devices left many people out of reach with ICT. Training at the Kofi Annan ICT Centre of Excellence is also costly and allows only a few people with the interest in ICT studies and the ability to afford it gain admission into this institution.

The Multi-Media Centre located in Ghana House (the former GNTC Building renovated by the Kufour-led government) also serves as an incubator where start-up

companies in the ICT industry are nurtured and later relocated to the Technology Parks Business Centre which is to be set up in the Free-zone area of Tema (Ankomah, 2004). Information about such opportunities was not readily available for interested persons. The establishment of this facility raised speculations among many Ghanaians that the facility was made to offer jobs to faithful supporters of the NPP[10].

The Kufour-led administration also expanded the telecommunication industry by a credit facility arranged for Ghana Telecom (which was the dominant telecommunication company at the time and also publicly owned) from Alcatel Shangai Bell Company Ltd (Sinosure Facility). This initiative was taken to help Ghana Telecom to acquire more switches to undertake a massive expansion program throughout the country including the wiring of second cycle schools and colleges to facilitate the deployment of ICT facilities. Ankomah (2004) asserts that over the years, the government and other agencies like Abdul Salam International Centre for Theoretical Physics (ICTP) and the Government of India have helped to train over a thousand professionals in ICT and its related areas with the aim of providing the requisite knowledge and skills to support ICT activities in Ghana. This training has propelled a drive of ICT use in the country with the establishment of ICT centres in tertiary institutions. Today, universities like the University of Ghana have huge ICT facilities which are manned by professionals in the ICT sector to train students as well as outsiders interested in studying ICT. Also, students unable to qualify for or were unable to pass their second-cycle exams (WASSCE) have been given an opportunity to upgrade themselves through ICT training and also enabled

[10] NPP: New Patriotic Party. It is the largest opposition political party in Ghana and was the party which brought the Kufuor-led administration to power in the year 2000. Its biggest rival is the National Democratic Congress (NDC) which is the party currently in power.

them gain employment. Some students from tertiary institutions who have been trained in the use of ICT have started their own businesses by developing software applications.

In Ghana's quest to promote the use of ICT in the country, some Ghanaians have been very instrumental in trying to put the country on the ICT map of the world by establishing ICT related industries or companies. Ankomah (2004) identifies a number of them. The list of some of the contributors is presented in the table below:

No.	ICT CONTRIBUTOR	CONTRIBUTION TO ICT SECTOR	(CONTRIBUTOR'S POSITION)
1	Prof. F.K.A Allotey	Studied the telecommunication industry in Ghana and a strong advocate for ICT use in educational curriculum	Ghanaian international scholar and renowned mathematical physicist
2	Prof. Clement K. Dzidonu	Served as the chairman of the committee that developed the national policy on ICT.	President- Accra Institute of Technology (AIT)[11], Ghana
3	Dr. Sam Somuah	Instrumental in helping the UG to establish ICT	Head of UGCS[12],

[11] AIT: Accra Institute of Technology. A private tertiary institution in Ghana that trains people in ICT as well as other programmes like Business, Engineering, and Education.

		facilities for the distance learning.	University of Ghana
4	Mr. Kojo Yankah	Instrumental in the pushing the agenda for ICT use in Ghana.	i)President of the AUCC[13]. ii)A communications expert at Yankah and Associates
5	Mr. John Dramani Mahama	Instrumental in the development of the ICT policy and also pushing the bill on through parliament.	i)Currently the president of the Republic of Ghana ii) Formerly a member of parliament and minister of communications.
6	Mr. Ashim Morton	Advocate for ICT use in Ghana.	i)Former Ambassador of the republic of Ghana. Ii)Founder of the Millennium Excellence awards (MEA)
7	Mr. Leslie Tamakloe	The brain behind the	i)Board chairman, Internet

[12] UGCS: University of Ghana Computing Systems. It was formally called the ICT centre for the University of Ghana and serves as one of the technology hub of the University.

[13] AUCC: African University College of Communications. A private tertiary institution established in Ghana in 2002 for the study and teaching of journalism, communication studies, information technology convergence, business and African studies.

		introduction of Internet connectivity, being Ghana's first digital access to the Global Internet resource.	Ghana.com
8	Mr. Kwami Ahiabenu	Trained many people in the rudiments of ICT on several educational platforms in the country. Also a strong advocate of ICT use in Ghana.	i) Co-chair of the African Media Forum on Geospatial Information Systems (AMFGIS) under the auspices of the United Nations Commission for Africa (UNECA) and is currently on the Reagan-Fascell Democracy Fellowship.
9	Mr. Kofi Kludjeson	Instrumental in the introduction of mobile communication networks into Ghana.	i)Ghanaian entrepreneur ii) Former president of the AGI[14] and iii) Former director of Celltel Ghana Ltd (later

[14] AGI: Association of Ghana Industries. A body that seeks the welfare of private companies (mostly small and medium scale companies) in Ghana.

			named Kasapa)
10	Dr. Gershon Adzadi	His wealth of experience was brought to bear in the development of the ICT policy.	i)Head of ICT, Ghana Airports Company Limited
11	Dr. Amos Anyimadu	His knowledge in technological processes influenced the development of ICT use in Ghana.	i)Lecturer, Political Science Dept. (University of Ghana) ii) Scientific Coordinator of the Technology Assessment Project, University of Ghana and Technical University of Denmark
12	Prof. Nii Quaynor	Instrumental in introducing some of Africa's first internet connections. Also one of the founding members of the Computer Science department in the University of Cape Coast.	i)Computer scientist and engineer ii)Chairman, Network Computing Systems (NCS)

13	Mr. Herman Chinery-Hesse	i)Advocate of the use of technology as a tool in developing Ghana. ii)His company has developed software programs that has helped many multi-national companies in Ghana.	Founder, Soft Tribe
14	Mr. Kweku Nsiah	Instrumental in the development of the ICT policy in Ghana and in the establishment of the ICT facilities in the country.	i)Technical advisor, Ministry of Communications, Ghana (2004)
15	Mr. Yaw Poku Ansah	One of the pioneers in providing ICT facilities and delivering ICT services in Ghana.	Office Automation System international Ltd.
16	Mr. De-graft Johnson	Instrumental in the provision of ICT products in Ghana.	Persol Limited
17	Mr. Yaw Owusu	Advocate of ICT use in the	i)Music artist manager

		country.	ii)Curator, music festivals and events
18	Dr. Walter Alhassan	Advocate of the use of ICT in agriculture as a way of speeding development.	i)Agriculture consultant
19	Prof. Gregg Pascal Zachary	Advocate for the use of ICT in Ghana.	i)Scholar, Arizona State University
20	Mr. Ahmad Farroukh	During his tenure as MD in Ghana was the introduction of data packages available to enable mobile phone users browse the internet.	i)Former MD of Scancom Ghana Ltd (MTN Ghana formerly Spacefon and later named Areeba)
21	Mr. Amar Deep Singh Hari	He established his company to train Ghanaians in the use of ICT.	i)CEO, IPMC[15]
22	Mr. Mark Davies	He established the Busy Internet in Ghana in 2001 to serve as an ICT	i)Technology entrepreneur

[15] IPMC: Intercom Programming and Manufacturing Company Limited. A company in Ghana that trains people in the use of ICT. There are a number of programs offered ranging from software, hardware etc.

		incubator for Ghanaians and also provide them the opportunity to use the internet in the café facility.	

According to Ankomah (2004), besides efforts made by some Ghanaians and non-Ghanaians in promoting the use of ICT in the country, various investments have been made in the country through ICT infrastructure. These investments have come through Internet Service Providers (ISPs) and telecommunication companies such as Ghana Telecom (now Vodafone Ghana), Spacefon (which was renamed Areeba and is currently called MTN), Kasapa Limited (which was renamed Expresso), Celltel Limited and Millicom Ghana Limited (which begun with the brand name Buzz and is currently operating under the brand name Tigo Ghana Limited). These companies at the time helped to improve communication and internet service delivery. Today, many of them have expanded and have consequently covered the whole country. Other companies like IP Planet Network Limited and Ecoband Dot Net (Internet connectivity and Solution Providers) jointly launched the Vip SAT. Internet Ghana has also launched the Digital Subscriber Line (DSL) which has the potential of providing a high speed access to the internet and multimedia capabilities and One-Dial Communications Limited which is also trying to create Information Technology (IT) Villages at specific places comparable to the Silicon Valley in California (U.S) with the possibility of attracting companies from within and outside the country to site ICT and other related industries. Although a lot of investment was made in the ICT infrastructure, it took quite some time for the Ghanaian

populace to adopt ICT use hence the merging or adoption of some of the telecommunication companies by bigger multinational companies in the same industry. It was until the emergence of social media with platforms like Facebook and recently Whatsapp that developed the growing demand for ICT use. The invention of smart phones which made it easier for users to enjoy the use of these social media platforms further diversified and also increased the usage of ICT in the country especially among the youthful population.

A Wide Area Network called the Research and Educational Network (REN) was also established in the year 2000 with the help of the World Bank INFODEV project where Ghanaian Universities and local research institutions such as Council for Scientific and Industrial Research (CSIR) and Ghana Atomic Energy Commission (GAEC) were linked to serve as nodes for the broad network. This network among other things was to create an enabling environment for the use of ICT, foster information exchange among local scientists and to facilitate the interactions and collaboration between researchers in institutions and the world (Ankomah, 2004). It has also been reported that Ghana signed an agreement with Microsoft Corporation under which the largest and richest ICT Company in the world at the time would provide resources to improve ICT education in Ghana. It is also reported that Ghana in 1995 became the first country in Sub-Saharan Africa to have full internet connectivity (Ankomah, 2004). The question however is the extent to which these interventions have produced the necessary results that provide an ICT-resourced personnel. Although Ghana's ICT infrastructure is not fully developed, it has been able to chalk some successes in attracting foreign investors to the country. Some of these investors include Affiliated Computer Services (a Fortune 500 company and a

global leader in IT and Business Process Outsourcing), Data Management Information Inc., Rising Data Solutions, Global Response, Busyinternet, AQ Solutions and Supra Telecom (Ankomah, 2004). Today, the presence of these companies has created more awareness of the use of ICT in the country and has enabled many individuals to be trained in the use of ICT. These companies sometimes liaise with tertiary institutions to equip them with resources to enable them train their students in the use of ICT. It is in view of these changes that the next section of this chapter discusses the use of ICT in the educational sector in Ghana.

3.6 The Use of ICT in the Education Sector of Ghana

In as much as efforts have been made by way of the policy to encourage and implement the use of ICT in schools especially in the second cycle level, very little has been done to realize this goal (www.ginks.org). This is because the infrastructure to support this vision is inadequate for students' use. Although the government, through this policy has placed a strong emphasis on the role of ICT in contributing to the country's economy, not much evidence is available to boast of (www.ginks.org). In a statement released by Mr. Alhaji Mohammed Haroon (director, Tamale Metropolitan Education office), a number of challenges faced by schools in his area in the pursuit of the ICT agenda were identified. These among many included the lack of ICT trained teachers, cost of broad band internet connection, inadequate computers and electricity. This statement was made during a lecture series in the July session of the Northern ICT4D held at the Institute for Local Government Studies in Tamale. The theme for the event was "The introduction of ICT into the Ghanaian Educational Curriculum; Successes, failures and the way forward" (www.ginks.org). Ghana has been reportedly named as one

of the first African countries to liberalize its telecommunication sector, which has made tremendous progress in ICT infrastructure deployment but like many parts of Africa, the ICT revolution in Ghana has left behind the internet and computing (Mangesi, 2007). It is not clear what Mangesi (2007) meant in this statement but it is however clear to note that there is a great distinction between the practice of ICT as an industry as well as internet usage. Ghana as a country is gradually coming to terms with adopting the different distinctions hence the growth of many internet service providers as well as computing schools. The challenge however lies in the regulating body that guides the operations of these companies. There is no doubt that telecommunication companies in the country have chalked success and paved the way for many ICT companies to invest in profitable businesses in the country. Typical examples of these include Busy Internet, IPMC, NIIT, Kofi-Annan Centre of Excellence (KACE) among many others. According to Mangesi (2007) there are also significant differences in urban and rural access to ICTs which are major factors to consider in bridging the digital divide in the area of ICT proliferation. Some of these challenges are being resolved by the extension of communication lines to the hinterlands to extend network coverage there. The problem however lies with the people living in these areas due to the lack of resources to purchase the ICT facilities needed. The inadequate power supply in such areas also makes it difficult for them to effectively use ICT tools and resources making it difficult to close the digital divide gap.

The Ghanaian tertiary education sector is today the most advanced in the deployment and use of ICTs in the country. All the country's major universities have their own separate ICT policy, which includes an ICT levy for students. This levy enables students to have access to 24-hour computer labs with broadband connection. The policy adopted

by the universities has however not benefited all tertiary institutions in the country due to the unequal endowment of ICT infrastructure. There are also instances where the computer facilities are run purely by the private sector such as cyber cafes on the university campuses (Mangesi, 2007). These innovations have made it possible for many students who initially were not exposed to the use of ICT to gain first-hand information in using the facilities available on the school campus. Also, the regular culture of assignments, seminar presentations and group projects handed out to students by their course instructors or lecturers keeps them busy and forces them to make use of ICT tools. This is because students are required to research topics given them in order to do the assignments given them in which they make use of the internet to come up with answers to mind-boggling questions. This therefore develops in them the skills needed in using ICT as well as exposing them to a range of ICT devices.

In the basic and secondary education sector, a project to set up computer laboratories in all science schools in the country has led to a significant number of computers being installed across the country. A computer levy of ₵30,000 (USD$3.20) developed by the GES was being charged in most secondary schools. There is however a great disparity between public and private schools as well as between urban and rural areas in access to ICTs. In schools where ICTs exist, a number of teachers use the internet for research. Smart boards and projectors are also available in such schools. The school curriculum is also not yet on CD, even though it has been a policy issue for many years (Mangesi, 2007). The impact of ICT in the basic and secondary level is gradually picking up although the pace is a bit slow in the public schools. Today, the country has no doubt accepted the importance of ICT in its development framework but is being faced with

numerous challenges in supplying schools with the resources needed to implement the ICT agenda. Many of the schools that own ICT facilities today received these facilities through the kind donations of benevolent individuals or from their PTA contributions which makes it difficult for other schools that are not so fortunate with such generous donations to make use of ICT. It is therefore imperative that government ensures that public schools receive ICT facilities that would enable them train their students especially at the basic level to help equip them in the use of this important tool.

CHAPTER FOUR

RESEARCH METHODS

4.1 Introduction

This chapter looks at the research methods that were used in the study as well as some experiences and challenges encountered on the research field. The sections covered in this chapter include the research design, research approach, study sites, the target population, data collection approaches, sampling procedures, research tools, data analysis, ethical issues and limitations of the study as encountered by the researcher. The first section of this chapter begins with the research design.

4.2 Research Design

Sociologically, the distinctive aim of social research is to study, understand, explain and make predictions about existing social structures and social relationships (Twumasi, 2001). To achieve this goal, a research design is developed by the researcher to enable him undertake his study.

A research design is the strategic plan for a research project or research program, setting out the broad outline and key features of the work to be undertaken, including the methods of data collection and analysis to be employed, and showing how the research strategy addresses the specific aims and objectives of the study, and whether the research issues are theoretical or policy-oriented (Marshall, 1998). There are different types of research designs namely descriptive, correlational, semi-experimental, experimental and review (www.google.com). This study however adopted a descriptive research design which refers to the type of research question, design, and data analysis that will be applied to a given topic. (www.acet.org). The researcher taking into consideration the

fact that this was considerably a new study being done adopted this design to enable him study the key actors (students and teachers) in the study as well as understand the society they live in.

4.3 Research Approach

Researchers employ different methods in carrying out their study. The two main forms of doing research are quantitative and qualitative research methods. The latter half of the 20th century introduced the mixed method research (Creswell & Plano Clark, 2007). The study therefore used a mixed method approach in seeking the views of respondents on a number of issues that related to their use of ICT which was the subject matter.

A mixed method approach is a research approach which combines or associates both qualitative and quantitative forms of research (Creswell & Plano Clark, 2007). This method involves philosophical assumptions, the use of qualitative and quantitative approaches, and the mixing of both approaches in a study. According to Creswell (2007), although this method was not so popular due to the use of either qualitative or quantitative research approaches, the method originated in 1959 when it was used by two researchers (Campbell and Fisk as cited in Creswell 2007) as a way of studying the validity of psychological traits. This therefore encouraged other scholars to employ their multi-method matrix to examine multiple approaches to data collection.

The mixed method approach was also adopted by researchers because of the recognition of the limitations encountered with the use of other methods (quantitative or qualitative) and also because researchers felt there were biases inherent in any single method hence their adoption of the mixed method in cancelling the biases of these methods (Creswell, 2007). A sequential mixed method approach was used in seeking the

views of teachers and students respectively who were the respondents of the study. The mixed method approach was selected among two other methods namely the concurrent and transformative methods. A sequential mixed method involves procedures in which the researcher seeks to elaborate on or expand on the findings of one method with another method. This may involve beginning with a qualitative interview for exploratory purposes and following up with a quantitative, survey method with a large sample so that the researcher can generalize results to a population. Alternatively, the study may begin with a quantitative method in which a theory or concept is tested, followed by a qualitative method involving detailed exploration with a few cases or individuals (Creswell, 2009). The study therefore employed a combined use of a quantitative, survey method for the students and a qualitative approach (in-depth interviews) for the teachers of the selected study sites.

4.4 Study Sites

The study sites considered for the study were two public senior high schools in the Greater Accra Region of Ghana namely St. John's Grammar Senior High School and Ghanata Senior High School which respectively represented schools in an urban and rural setting. The schools which are both mixed-sex schools offer boarding facilities to a number of students on their campuses and are located in and out of Accra (the capital town of the region) respectively. The reason for the choice of these schools was because of their role as model schools to a number of schools in their catchment areas of which some cases shared their facilities like science laboratories and ICT facilities with some of these schools. Although these schools are not considered by educationists as some of the best schools in Ghana, they can equally match up to some of the best schools in Ghana

(based on academic performance) like Mfantsipim School, Wesley Girls High School and Presbyterian Boys' Senior High school among others. This has been proven over the years through the excellent performance of their students at the West African Senior Secondary Certificate Examinations (WASSCE[16]). The successful passing of the WASSCE is a pre-requisite for students' entry into any tertiary institution in the country. Some of these tertiary institutions include the University of Ghana (UG), Kwame Nkrumah University of Science and Technology (KNUST), University of Cape coast (UCC) and University of Education, Winneba (UEW) which admit many of the students from these schools.

Although an ideal way of conducting this study would have been selecting the leading second cycle schools in the country, the researcher upon considering that many of these schools were exclusively male or female deemed the choice of using the leading second cycle schools in Ghana as unsatisfactory based on some of his objectives. The choice of St. John's Grammar SHS by the researcher was to use it as a model school in investigating the extent of ICT usage in second cycle schools in an urban town and that of Ghanata SHS as a model school in investigating the extent of ICT usage in second cycle schools in a rural area. Some critics may not consider Ghanata SHS as a rural school due to the prevailing rate of development in Dodowa in recent times. The reason for the choice of this school was because of the role it plays in the community in serving as a model school to many underprivileged and sub-standard schools in the community. The

[16] WASSCE (West African Senior Secondary Certificate Examination): A final exam written by final year students in senior high schools in Ghana. It is organized by the West African Examinations Council (WAEC) which is a body that is mandated by law to organize these exams for candidates in and outside Ghana as well as other external exams for a selected number of schools in the West African region of Africa.

township of Dodowa also has a number of settlements in the area with building structures like those of rural areas as well as a major part of economic activities predominantly being agriculture and trade. The town is also located in the outskirts of the capital, Accra with people of different ethnicities. Schaefer (2007) defined a rural community as a spatial or political unit of social organization that gives people a sense of belonging based either on shared residence in a particular place or on a common identity. It was based on this definition that an area like Dodowa was selected as a rural community for the study.

4.4.1 St. John's Grammar Senior High School (Urban Setting)

St. John's Grammar senior high school is a second cycle school located at Achimota, a suburb in Accra. The school was founded on 16th May 1954 by the late Mr. John Hayford Mensah with the assistance of Mr. P.K.K Quaidoo, Nana Essilfie Bondzie, Mr. Charles Ocansey and Mr. S. M. Arko. It was a co-educational boarding institution which was accommodated in temporary structures at Kokomlemle, a suburb of Accra. The school started with four students which besides the traditional subjects taught French, Latin and Greek.

The school was moved to its present location in Achimota on the Accra-Nsawam road in 1964 and was absorbed into the public school system in January 1965. In 1968 the government acquired the entire land and buildings on the school compound and later in 1970, Mr. Mensah moved the Preparatory Primary School to new buildings behind the Achimota Brewery Company Limited. The Grammar School then expanded and covered the whole of the compound. Mr. Mensah acted as both the manager and the headmaster of the school in 1965.

The school offers a number of programs with courses that prepare students in the school for the next phase of their lives in tertiary institutions. The courses offered by the school include General Science, General Arts, Business, Visual Arts, Home Economics and Agricultural Science. The school which started with four students now has a total enrolment of 1,973 which includes 1,057 boys and 916 girls. Out of this number, there are 550 boarders which are made up of 248 girls and 302 boys. The school is equipped with a staff-strength of 117 (constituting 78 teaching staff and 39 non-teaching staff). The school also has a number of social clubs which includes an ICT club which informs and prepares students in the schools with the use of ICT (60th Anniversary magazine, St. John's Grammar SHS).

The School was selected as a study site for a number of reasons namely: firstly, because it was a mixed-sex school. Secondly, it had well-equipped facilities for students' learning (eg. library, classrooms, science laboratory, ICT laboratory, football and basketball courts etc.) which are essential for the students' development of health and academic work. The third reason was in the location of the school of which its proximity for the researcher was convenient (taking into consideration his insufficient resources for travel). The fourth reason had to do with the role the school played as host to other schools in their vicinity (in terms of sharing their facilities like science laboratories among others with less privileged schools which needed them).

4.4.2 Ghanata Senior High School (Rural Setting)

Ghanata senior high school formerly called the Gold Coast People College, was founded formerly as a national co-education institution on 3rd February, 1936 at Adidome in the Volta region by Rev. Isaac Doe Osabutey-Aguedze and Rev. F.K. Fiawoo with

quite a representative group of sixteen students from almost all the parts of the Gold Coast, British and French Togoland except the Northern territories.

The name Gold Coast People College meant a national institution, which has been founded, controlled and operated by the people of the Gold Coast for the education of the African youth. The school was established in response to cries of the people of the Gold Coast for complete and efficient educational opportunities of national character. On the 6th December, 1941 after six years nursery at its original home in Adidome, the Gold Coast People College moved to Ada and re-opened for the term on 23rd January, 1942. The school was moved to Dodowa in January 1945 and later moved from its old site in the Dodowa Township to its permanent site after it had been elevated to the status of a district model school in 2003.

Ghanata secondary school had its name changed to Ghanata Senior High School. This was due to the government's policy of changing all second cycle schools to senior high schools while implementing its four year program as a way of adopting the old school system as it existed under the colonial era. This new school system adopted by the government at the time was deemed good enough to solve the problem of poor academic standards that existed. The school is today a proud government assisted mixed-sex district model high school and offers boarding facilities with an enviable record of discipline, hard work and high academic performance. The school which begun with sixteen students today has a student enrolment of 1500 (with 800 males and 700 females).

The school offers six courses which are General Arts, General Science, Agricultural Science, Business, Home Economics and Visual Arts which are all elective subjects. The core subjects offered in the school include English Language, Mathematics, Social

Studies, Integrated Science, ICT and Physical Education. The number of teachers in the school is 165 which consists of dedicated teachers in the twelve departments (Students' Handbook, Ghanata SHS). The choice of the school as study site was for a number of reasons that were satisfactory to the researcher. The first and foremost reason for the choice of Ghanata SHS as a school in a rural setting was the fact that the gender of students in the school was mixed-sex (males and females). Another reason for the choice of the school was the fact that the school served as a model school to other schools in its catchment area (thus shared some of its facilities like science laboratories with less endowed schools in the area). The third reason for the school's choice was the environment in which the school was located making it an interesting place of study. As discussed earlier, although Dodowa (the town where the school is located) has seen a lot of development, livelihood in the town is still slow and undergoes the setting of a rural area with farming as a predominant economic activity in the town coupled with a lot of outmoded or old-fashioned buildings in the area. Considering that a school of good standing (by academic performance) exists in an environment like this, it was of interest to the researcher to see how ICT use would have affected the mode of education in that area hence its selection.

4.5 Target Population

In social research, a target population is required to ease the work load of the researcher in the selection of respondents for a particular study. This is because, not all individuals or groups in a particular environment can be studied. According to Singleton and Straits (2010), a target population is the population to which the researcher must specify the criteria for determining which cases are included in the population and which

cases are excluded. Twumasi (2001) also asserts that the target population requires the researcher to have a research design that would enable the researcher successfully adopt techniques to gather the information the researcher desires by way of data from the field.

The target population in this study was the student body as well as some teachers (from the Mathematics, English, Science and ICT departments) in second cycle schools. The reason for the choice of these two groups was because of the role they played in the school. The teachers selected from the Mathematics, English and Science department were selected because of the peculiar importance of their subjects to the researcher. These subjects are generally considered as key subjects that students are required to pass to enable them gain admission to any tertiary institution of their choice hence the name given to them (core subjects). Teachers from the ICT department were also selected because of their role in driving the use or implementation of ICT knowledge and devices. The students form the main part of the study since the standard of the school (by way of academic performance) is determined by their performance in the final examinations (WASSCE)

4.6 Data Collection Approaches

The study employed two methodological approaches (quantitative and qualitative) which were respectively used on the two groups of respondents selected. This method referred to as a mixed method approach involves a combination of both qualitative and quantitative methods (Creswell, 2007). In view of this, the study employed a quantitative approach in gathering information from the students on the subject matter (ICT use in second cycle schools) and a qualitative approach which involved interviewing the teachers on the subject matter (ICT use in second cycle schools). To achieve this goal, the

researcher administered questionnaires to selected students coupled with a series of interviews which were conducted with the selected teachers. The interviews conducted with the teachers were done with the aid of an interview guide. This approach was adopted by taking into consideration the research questions and objectives of the study hence its choice of use by the researcher. In social science research, the interview develops a series of questions or a series of points of interest to discuss with the interviewees (Quinlan, 2011).

Quantitative research methods are used in collecting data from large samples whereas qualitative research methods are used for studies with smaller samples. Quantitative research approaches involve the use of survey methods. This can be done in many ways the dominant of them being the use of questionnaires. It can also be carried out in other ways like the use of online resources, email, by post, telephone or asking the questions in person. The combination of the two methods in this study therefore enabled the researcher gather information from the two groups selected in the study.

4.7 Sampling Procedure

The study adopted a combination of probability and non-probability sampling procedures. A probability sampling procedure gives each and every unit within the population an equal chance of being selected (Twumasi, 2001). A non-probability sampling procedure also does not give every unit in the sample an equal chance of being included in the sample (Twumasi, 2001). The non-probability sampling procedure used in this study was the purposive sampling procedure. According to Twumasi (2001), it is the way a researcher, adhering to the objectives of the study, selects respondents who can answer his research questions. This is done with good calculation and a relevant research

strategy, in which the researcher can pick the respondents he wants to be included in his group.

The purposive sampling procedure adopted in this study was used in two ways. First, it was used to select the schools participating in the study (St. John's Grammar SHS and Ghanata SHS) and secondly it was used in selecting the teachers for the study. The teachers selected were drawn from four departments in the school namely Mathematics, English, Science and ICT. The reason for the choice of this procedure was because teachers in these departments were considered the best people to answer the questions demanded by the study. A total of twelve (12) teachers were selected and interviewed from the two schools. The initial idea of researcher was to interview sixteen (16) teachers drawn from the four departments of the two schools as mentioned earlier. The researcher was however unable to meet the number of teachers initially planned as some of them were either on leave or absent from school at the time of research. The breakdown of the number of teachers in the departments selected from St. John's Grammar SHS is Mathematics-1, Science-1, English-2 and ICT-2. In Ghanata SHS the breakdown of teachers studied was Mathematics-2, Science-1, English-1 and ICT-2.

The probability sampling procedure used in this study was the cluster sampling procedure. A cluster sampling procedure is used when the units or the people who make up the population of the study are to be found in groups or clusters. This is carried out by randomly selecting a sample of the clusters to study, rather than randomly selecting from the population (Quinlan, 2011). A sampling frame is a complete list or chart of every individual, unit or case within the population (Quinlan, 2011). The students in the two schools were selected using the cluster sampling procedure. The reason for the choice of

this procedure was because of the subject matter which in this case was ICT use. ICT is not only a subject studied by students but also a tool which can be used by them in their studies hence the selection of all students. To achieve this goal, a sample of 120 students was selected from a total student population of 1973 in St. John's Grammar SHS and 1264 in Ghanata SHS. The students selected for the study were drawn from the six elective course departments in the two schools which the researcher used as his sampling frame. Students were selected randomly from the Generals Arts, General Science, Agricultural Science, Business, Visual Arts and Home Economics departments. The reason for using a sample size of 120 was because 10% of the population is usually considered as an adequate sample for quantitative research in social research. It was this consideration by the researcher that made the number 120 satisfactory to represent the entire population as well as feasible enough (considering the time, cost and resources involved) to make a generalization of the study's findings. The students selected in both schools were selected in clusters of the forms they belonged to. Thus, students selected were in forms 1 and 2 from the respective departments selected. The reason for this procedure of selection was because ICT as a subject was taught to students in these forms (1 and 2). Form 3 students in the schools were excluded from studying ICT because it was a non-examinable subject by WAEC. The students selected for the study were gathered in classrooms where they were handed the questionnaires to be filled. A total of 240 questionnaires were administered in the two schools and supervised by the researcher.

4.8 Research Tools

The research tools used in this study were questionnaires, a recorder, a note pad and an interview guide. The questionnaires were used for the quantitative research which was done with students from selected departments of study in the school. The questionnaires were designed with a combination of closed and open-ended questions that expounded the objectives and research questions of the study. A total of 240 questionnaires were administered in the two study sites (thus 120 in each school). Quinlan (2011) describes different types of questionnaires that are used by researchers. These include postal questionnaires, drop and collect questionnaires, group administered questionnaires and online questionnaires. The study in reference to Quinlan's (2011) assertion used a group administered questionnaire. This type of questionnaire is a questionnaire which the researcher administers to a group when a group is gathered together (Quinlan (2011).

The interview guide, the recorder and the note pad were also used to conduct the qualitative research. The purpose of the interview guide was to guide the interviewer with a series of questions that covered his research objectives. The views given by the respondents during the interview were recorded and documented in the researcher's note pad. Qualitative research involves different types of data collection methods which are mostly done by conducting interviews. Some of these methods include group interviews, focus group discussions (FGD), narrative analysis, case studies, content analysis, documentary, field notes, one-to-one interviews, among many others. The study therefore used a one-to-one interview procedure in conducting interviews with the teachers selected. Quinlan (2011) defines one-to-one interviews as interviews carried out generally face-to-face and on a one-to-one basis between the interviewer and the

interviewees. The interview guide was therefore used to interview teachers in the two schools to get their views on the subject matter (ICT use).

4.9 Data Analysis

According to Creswell (2007), data analysis in mixed methods research relates to the type of research strategy chosen for the procedures. In reference to Creswell (2007), the study used a sequential mixed method approach which begun with a quantitative procedure and followed it up with a qualitative procedure. The researcher begun by analizing the data collected from the quantitative research with the questionnaires. This was done by using a cluster sampling procedure. This was first done by coding the responses given in the questionnaire. The data was later entered into the 20th version of the SPSS (Statistical Package for the Social Sciences) software and analized accordingly.

The data from the qualitative research done through the interviews conducted was also analized. This was done by first transcribing the views recorded by the researcher with a digital recorder. The transcription was done by listening and recording the information captured. The information was later edited and analized. The data from the qualitative research was analized descriptively by using themes to capture and explain into details the issues discussed during the interview.

4.10 Ethical Consideration

Ethics are the moral principles governing the conduct of an individual, a group, or an organization (Quinlan, 2011). The study like any another social research considered the following ethical issues: anonymity of the respondents, informed consent of the respondents, informed consent of the school authorities to carry out the research on their premises, submission of the research topic for review at the Institutional Review Board

(IRB) and confidentiality of the findings received. This was very important because without these ethical considerations the study would not have been successfully carried out. This is because the researcher's institution (University of Ghana) required that all researches are scrutinized to ensure that it meets ethical standards as demanded by the institution's policy before giving the researcher the permit to carry out his research. It is in view of this policy that the researcher submitted his study to the Institutional Review Board.

The issue of informed consent of the authorities was achieved by issuing a letter of permission from the department of Sociology of the University of Ghana which was the department under whose jurisdiction the researcher undertook the research. This enabled the researcher to obtain permission to conduct the research at the selected sites. The letter from the department was also issued to enable the researcher obtain important documents for the purpose of his work. These documents included the final examination results (WASSCE) of students in the school, magazines, handbook or journal and any other document that provided information about the school.

The researcher also sought the respondents' permission in participating in the research before engaging them in it. This was important to obtain the respondents' full consent and participation. Punch (2005) asserts that it is important to identify a problem that will benefit the individuals being studied, one that will be meaningful for others besides the researcher during the identification of the research problem. Students selected from the two schools to participate in the research were first of all made to understand the purpose and importance of the research as a way of encouraging them to participate in it. There were letters given to the heads of the two schools who introduced the researcher to the

ICT teachers who assisted the researcher by providing the facilities needed for the researcher. The assistance offered to the researcher was introducing the researcher to the teachers selected for the study as well as organizing some classrooms for carrying out the study with the students. It was in the classrooms that students selected to participate in the study were administered the questionnaires to be filled.

4.11 Limitation of the Study

The study was successfully conducted in both schools but not without a number of challenges. The first challenge was the difficulty in obtaining documents in the form of students' final examination results (WASSCE) and other supporting documents that would assist the researcher in his work (especially in Ghanata SHS). The researcher therefore had to depend on the ICT tutors interviewed to provide any useful information about the school. Also, because of the inability to get the WASSCE results from Ghanata SHS, the researcher during his analysis changed the research question related to that particular need for the WASSCE results to enable him work with the data collected from the research field.

Some other challenges encountered by the researcher were the difficulty in getting some of the teachers to participate in the study. This was a challenge encountered mostly in the urban school. Many of the teachers were absent or on leave at the time of the study. Another challenge was the difficulty in controlling the students in the classroom while administering the questionnaires. This was because most of the males were mostly distracted by their friends and classmates who walked along the verandah of the classroom where the research was taking place. These friends of the selected students were either teasing their colleagues or making noise on the compound. This challenge

was overcome by the researcher in engaging the assistance of some of the prefects in the school to control their mates.

The overall limitation of the study was the research design adopted by the researcher. This limitation is what some researchers refer to as study design limitations. According to Hindle (2015), a study design limitation occurs when the available or specific constraints on the study population may ultimately affect what outcomes are obtained. The study although useful in finding out the perceptions and uses made by both students and teachers about ICT usage focused on these two groups as the key players of ICT use in second cycle schools. Another limitation to this study was the unavailability of literature on the subject matter within the Ghanaian context which posed a major difficulty in doing this study. It is as a result of this limitation that the researcher tried to present a chapter on the history of ICT in Ghana. Although, the researcher sought to use this study as a pacesetter in revealing the situation (ICT usage) presented in Ghanaian second cycle schools it was limited in fully expounding on the issues discussed. The lack of literature as well as difficulty in obtaining useful documents for the research made it even more difficult. The study tries to present some of the details of the situation as they were obtained from the research field and also from the few documents received during the study. Future studies should therefore take into consideration the dynamics of the challenges presented as it occurred in the two different schools and attempt looking further at other stakeholders in the educational sector to ensure the provision of ICT facilities as well ensure their maximum usage.

CHAPTER FIVE

DATA PRESENTATION AND ANALYSIS

5.1 Introduction

This chapter deals with the analysis of data collected from the research field. The data presented were discussed with reference to the research questions asked. The chapter begins with the analysis of data, presentation of data and discussion of the quantitative data. The quantitative data were analyzed using the 20th version of the Statistical Package for Social Sciences (SPSS) while the qualitative data was subsequently analyzed using descriptive analysis with thematic discussions on different subjects.

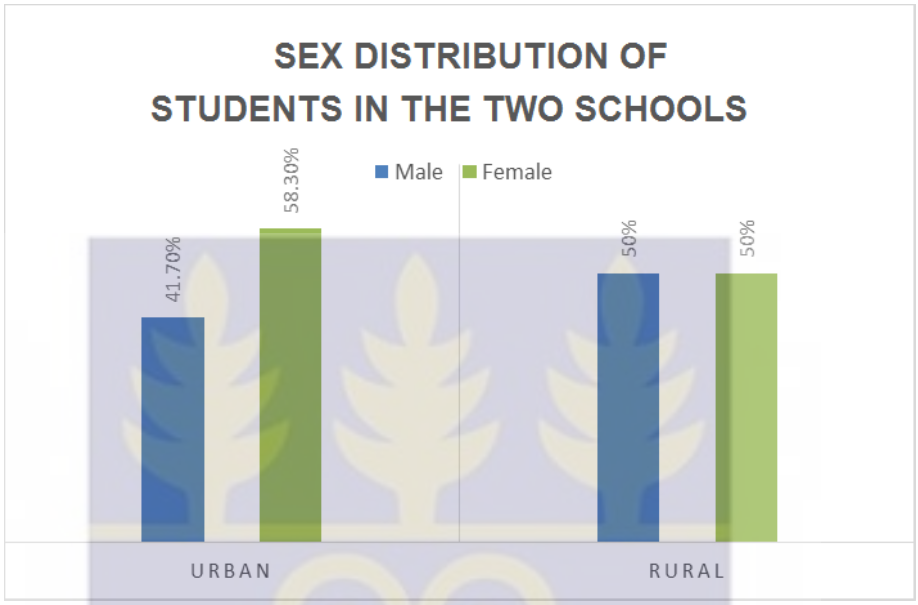
5.2 Socio-Demographic Data

This section presents the findings on the respondent's socio-demographic data. This includes the gender, age and the occupation of parents of the respondents.

5.2.1 Gender distribution of respondents

Respondents were asked to indicate their gender to enable the investigator determine which gender knew more about ICT. Also, because the study was carried out in a mixed-sex school it was important to identify this variable in order to distinguish the views of respondents. The distribution of students' gender as pertaining to the percentage of students who participated in the study is presented in the graph below.

Figure 1: Gender distribution of respondents



Source: Field Data, April 2014

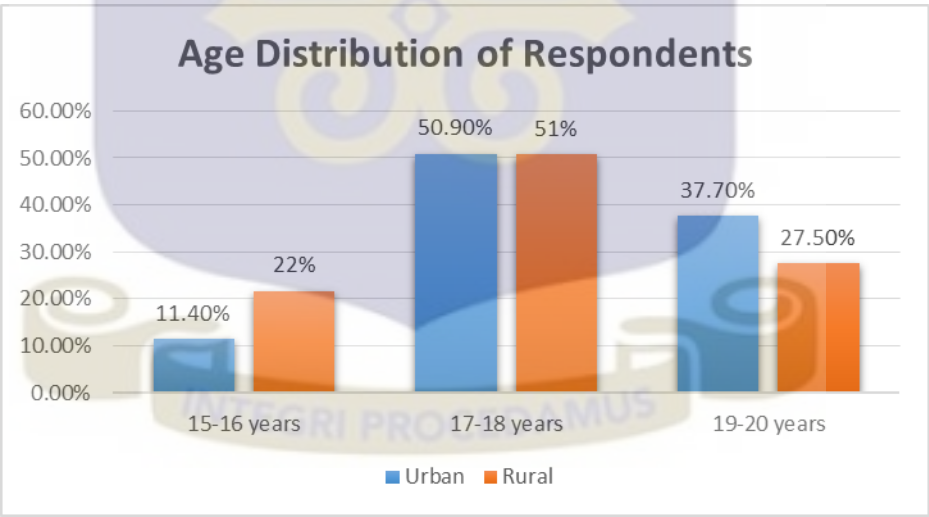
From figure 1, there is a disparity in the gender distribution of respondents. Respondents from the urban school had a greater proportion of females as compared to males. This was represented as 58.3% females and 41.7% males which was an indication of a higher number of females than males who participated in the research in the urban school. The rural school on the other hand recorded an equal proportion of both male and female respondents (thus 50% males and 50% females). Respondents in both schools were randomly selected from the six elective subject departments of the respective schools studied. The high proportion of female respondents presented in the graph was a reflection of their willingness to participate in the research which also gave the researcher an impression of their keenness in learning about the use of ICT.

5.2.2 Age distribution of respondents

The age of the respondents was sought by the researcher to find out which age group showed more interest in the use of ICT as well as easily adopted and embraced the idea of ICT use faster. This was because the case study done on India's success in training children with the skills of ICT tends to suggest that the younger a person is, the faster his or her ability to learn the use of ICT. It was this assumption that informed the researcher's decision in finding out the age groups of the respondents studied.

To find out the age groups of the respondents studied, respondents were asked to provide their ages in the questionnaires given them. The ages as captured by the responses given are presented in the graph below.

Figure 2: Age distribution of respondents



Source: Field Data, April 2014

In figure 2, the data reveals a significant disparity in the age brackets of respondents from both schools. Respondents in the age bracket of 17-18 constituted 50.9% and 51% from the urban and rural school respectively. The age of respondents from both schools

revealed a proportion of students within the 19-20 years age group. Students in the 19-20 year group are mostly referred to as elderly ones among their mates hence it was of some surprise to the researcher to find some of them participating in the study. The proportions of respondents in this age group were 37.7% in the urban school and 27.5% in the rural school. Respondents in the 15-16 years age group constituted 11.4% from the urban school and 22% from the rural school. The study in view of the age groups that participated revealed that respondents from the older age groups (thus 17-18 and 19-20) showed more willingness in their participation in the study which possibly indicates more willingness from them to adopt ICT use as a study tool. This therefore discredits the assumption that younger individuals are keener in learning ICT than the older ones.

5.2.3 Parents'/ Guardians' Occupation

Respondents in both schools were asked to indicate the occupation of their parents or guardians. This was important to the researcher to have a fair idea of the status or social class that the respondents belonged to. The reason for this question was because access to ICT and its use is linked to particular classes of people in the society. This is because many of the ICT devices (especially the modern ones) are expensive or costly to acquire. Also, it is the categorization of people in society into different social classes that has contributed to introduction of the digital divide phenomenon.

A very important concept in the field of Sociology is social stratification which is concerned with the status of people in society hence the consideration of this subject. Although social class systems are not clearly defined in Ghana, a person's social class can to some extent be indicated by the person's occupation. Income is another indicator of one's socio-economic status. Socio-economic status largely puts people in one of the

following categories: low, middle and high income status. Although the information sought by the researcher on this subject was not easily ascertainable, it provided information on the occupations of respondents' parents or guardians. This information guided the researcher in having an idea of the different societies the respondents belonged to. The purpose of this section in the chapter was to find out the availability of internet services in the homes of the students. This was important to the researcher because the provision of internet facilities in the home is a very costly venture which is not easily sustainable for many households. Although the provision of the facility at home is expensive, it is helpful for family members and can enable students in SHS to do research for information when at home during the vacation on topic taught them in their various subjects of study.

The tables in this section which have been labelled as table 1 and table 2 presents the different occupations of respondents' parents in relation to the availability of internet service at home from the two schools. This was done with the use of table 1 presenting the occupations of respondents' fathers and table 2 presenting the occupation of respondents' mothers in relation to the availability of internet services at home. The focus in this case was on students hence a look at the ICT facilities that were available in their homes. This is because the provision of these facilities formed a very important part of students' exposure and preparedness to ICT use as well as the acquisition of knowledge in ICT.

Table 1: The Occupation of Respondents' Fathers and its relation to the availability of Internet Services at home

URBAN SCHOOL					RURAL SCHOOL				
FATHER'S OCCUPATION	INTERNET SERVICES AT HOME				FATHER'S OCCUPATION	INTERNET SERVICES AT HOME			
	YES (Y)		No (N)						
	F	(%)	F	(%)		F	%	F	(%)
PROFESSIONAL[17]	19	26.8	8	19	PROFESSIONAL	16	21.9	6	14.3
EDUCATION[18]	4	5.6	6	14.3	EDUCATION	5	6.8	7	16.7
INDUSTRY	13	18.3	4	9.5	INDUSTRY	10	13.7	10	23.8
ARTISAN[19]	6	8.5	6	14.3	ARTISAN	7	9.6	4	9.5
OTHER	29	40.8	18	42.9	OTHER	35	48	15	35.7

Source: Field Data, April 2014

[17] Professional: This term was used to represents all professional occupations. This includes occupations doctors, lawyers, accountants, architects, engineers among others.

[18] Education: This term was used to represent all types of occupations in the educational sector. This included among many occupations like lecturing, teaching, administration among others found within the sector.

[19] Artisan: This term was used to represent all jobs of menial nature. This includes jobs like carpentry, masonry, painters among others.

From table 1, there is a distribution of the occupation of respondents' fathers or male guardians. It was due to the multiplicity of occupations captured that the following categories were chosen to find out the social class in which students belonged to and also to know if there were internet services in their homes. The following categories were given to the occupations found. These included professional, education, industry, artisan and other. Occupations in the group named 'Other' from the urban school recorded the highest proportion with 40.8%. Thus, parents from the professional group had a minimal percentage of them with internet services at home. This was represented by 26.8% of them. The group with 'Education' had the lowest proportion represented by 5.6%. Thus students from this social class had a few of them with internet services at home.

In the rural school also, the group 'Other' had the highest number of responses with internet services at home. The group 'Education' also recorded the lowest proportion of 6.8%. Thus respondents from this group had few people with internet services at home. Thus students in the rural school equally had access to internet services at home. The data therefore shows that regardless of the social class that person belong to, there was to some extent the availability of internet service at home due to the diversity of internet services that has been made available through mobile phone technology.

The use of mobile technology to provide internet services at home is what confirms Alzouma's (2006) assertion that the characteristic of cell phones as being versatile is what has increased its use as a preferred choice of use. The increase in cell phone use is what has made internet services available for many to use the internet for many purposes.

The next table in this section is table 2 which presents the distribution of the occupation of respondents' mothers or female guardians. These occupations were distributed in relation internet service at home.

Table 2: The occupation of Respondents' Mothers and its relation to the availability of Internet Services at home

MOTHER'S OCCUPATION	INTERNET SERVICES AT HOME (%)				MOTHER'S OCCUPATION	INTERNET SERVICES AT HOME (%)			
	YES		NO			YES		NO	
	F	%	F	%		F	%	F	%
PROFESSIONAL	10	14.1	3	7.1	PROFESSIONAL	7	11	5	11.9
EDUCATION	3	4.2	4	10	EDUCATION	5	6.8	4	9.5
INDUSTRY[20]	1	1.4	0	0	INDUSTRY	0	0	1	2.4
TRADER[21]	42	59.2	29	69	TRADER	49	67.1	27	64.3
OTHER[22]	15	21.1	6	14.3	OTHER	11	15.1	5	11.9
TOTAL	71	100	42	100	TOTAL	72	100	42	100

Source: Field Data, April 2014

[20] Industry: This term was used to categorize all jobs or occupations found within manufacturing or industrial companies. These included jobs like factory workers, supervisors, marketers among others that the researcher acknowledged within the context.

[21] Trader: This term was used to refer to occupations that were within the informal sector. This includes jobs like a businessman, petty trader among others.

[22] Other: This term was used to refer to occupations that were not in the categories captured earlier on. These included occupations like clergy, security services and civil servants among others.-

From table 2, the occupation 'trader' had the highest proportion in the urban school with 59.2%. The same category also had a higher number of them without internet services at home. This was represented by 69%. Also, the occupation labelled 'industry' recorded the lowest proportion with 1.4% and those without internet service in this category as 0%.

In the rural school also, a similar data was recorded with those in the trader category having the highest proportion with 67.1% and those without internet service at home but within the same group with 64.3%. The occupation with the lowest proportion was those in industry category with 0% and 2.4% of them without internet service at home. Respondents in the rural school had their parents in similar occupations as their mates in the urban school.

The data therefore suggests that although there exists a digital divide among students in the availability of internet service at home, the increase in mobile use which has provided technology has made the availability of internet service pos+sible for many households regardless of their social class.

5.3 Students' Knowledge and use of ICT

5.3.1 Students' knowledge of ICT

In order to examine how students in the schools used ICT, the researcher first sought to find out if the students knew about ICT before investigating how they used the ICT devices available to them. This is important because the knowledge of ICT by a student would enable him develop 21st century skills which are important in meeting the demands of this age. These 21st century skills according to the Assessment and Teaching of 21st Century Skills (ACT21S) which is a project developed by three technology giants (Cisco,

Intel and Microsoft) include ways of thinking; ways of working; tools for working and skills for living in the world (www.act21s.org). The knowledge of ICT is also important for students to enable them acquire information for their studies and not only depend on their teacher's notes. Students' knowledge of the ICT use especially for academic studies would not only develop them into all-round students but would also serve as a measure for completing the syllabuses in time. This would help to make room for teachers to pay attention to students lagging behind in class to offer them further tutorials.

The views of respondents were sought with a number of questions including whether they knew about ICT, and how often they used them. The responses given to students' knowledge about ICT use are presented in table 3 below. This presents the statistics of students who had knowledge about ICT as well as those who did not. The information presented shows data collected from respondents in the urban and rural school. Respondents in these schools were asked if they knew about ICT or not.

TABLE 3: STUDENTS' KNOWLEDGE OF ICT

	Urban School (%)	Rural School (%)
Students with knowledge of ICT (%)	93	94.2
Students without knowledge of ICT (%)	7	5.8

Source: Field Data, April 2014

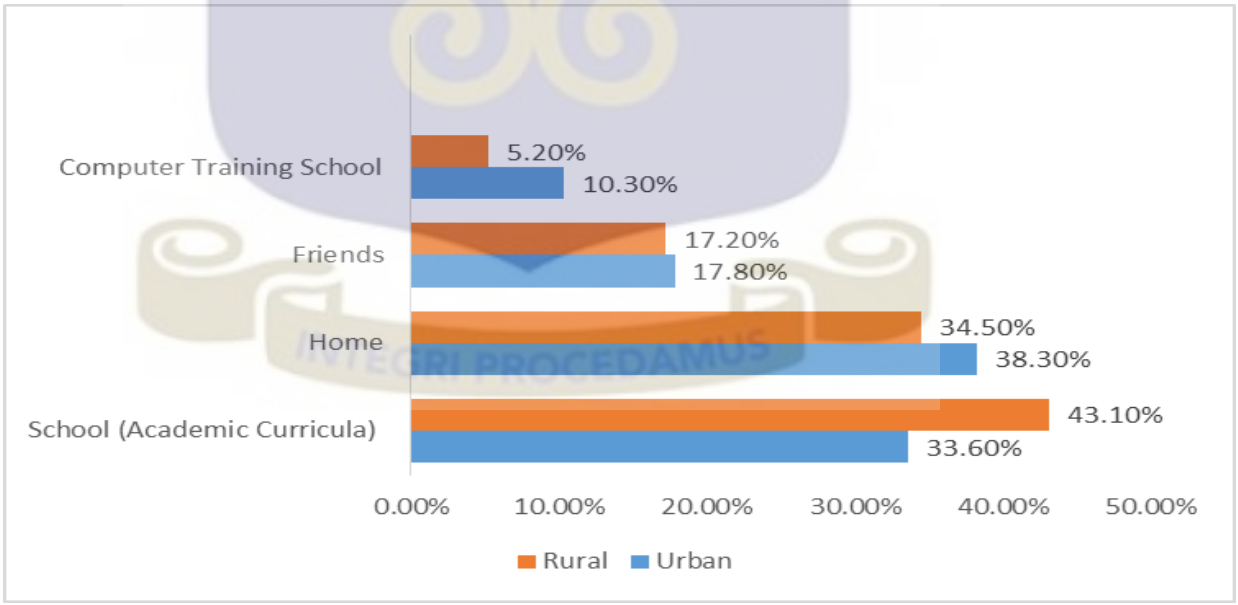
From table 3, we see a significant percentage of students with knowledge of ICT. In the urban school, 93% of respondents had knowledge about ICT as against 7% of them who did not have any knowledge about it. The rural school presented a rather interesting statistics of respondents who knew about ICT and had knowledge in the subject. This was

represented by 94.2% of them who knew about ICT as against 5.8% of them who did not. The statistics therefore suggests that regardless of the availability of ICT facilities in the school, a greater proportion of students still had knowledge about ICT through other means.

5.3.2 Medium through which ICT was learnt

The researcher in an attempt to find out the means through which respondents learnt about ICT followed up with a question that would reveal the answer. The aim of asking this question was to find out what other mediums existed through which respondents learnt about ICT and how to use it. The responses to this question are presented in figure 3 below:

Figure 3: Medium through which respondents learnt to use ICT



Source: Field Data, April 2014

From figure 3 respondents indicated a number of mediums through which they learnt ICT. These were from a computer training school (where they took lessons in ICT training), from friends, home and the school. In the urban school, 38.3% of the students learnt or acquired knowledge in the use of ICT from the home, 17.8% from friends, 10.3% from a computer training school and 33.6% from the school. Data from the urban school suggests that the majority of students (38.3% and 33.6% respectively) acquired knowledge of the use of ICT from both home and school. This therefore proves the importance of ICT tuition given to students in the school hence the need for ICT facilities to be provided in the schools. Also, the data revealed the impact of friends in introducing ICT to their mates. This was represented by 17.8% of respondents' views which ranked third in the number of responses given.

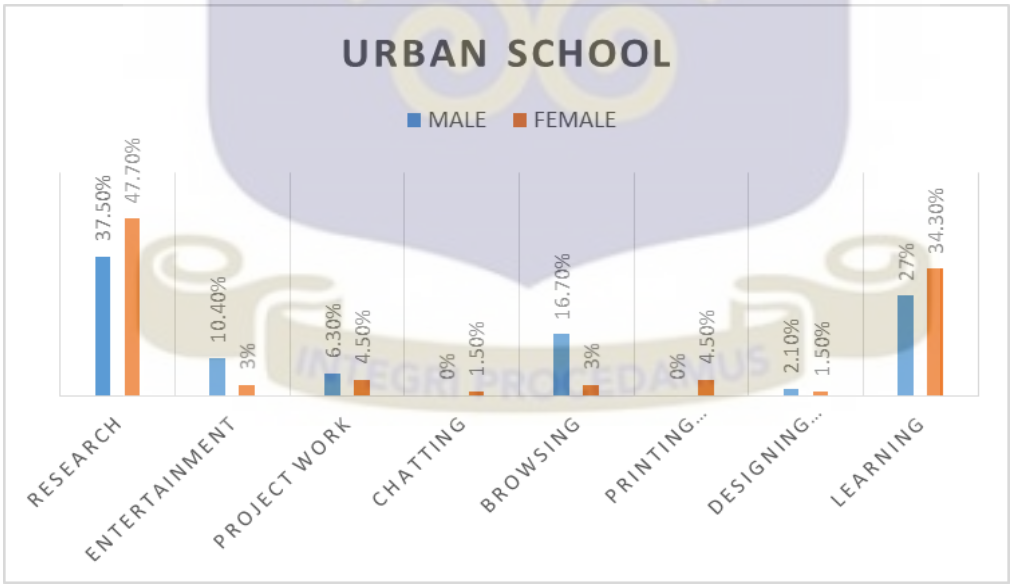
In the rural school also, similar mediums were mentioned by respondents. This was represented by 43.1% of them learning it from the school, 34.5% from home, 17.2% from friends and 5.2% from a computer training school. In the rural school, there was a higher proportion of respondents who learnt about ICT use from the school as compared to the urban school where most of the respondents learnt it from home. This suggests that although many students in this school learnt ICT through other mediums, the school was the first institution that introduced and trained students in the use of ICT. This data confirms the assertion made by Aktaruzzman et al (2011) that the appropriate use of ICT can catalyze the paradigmatic shift from teacher-centred pedagogy to a more effective learner-centred pedagogy.

5.4 Gender Disparity Among Students in ICT use

5.4.1 Gender disparity among students in ICT use in the urban school

In view of the gender disparity that exists in the educational sector, the researcher sought to find out which gender showed more interest in using ICT and which of them used it most. To do this, a number of questions were asked to the two genders of respondents about what they used the ICT facilities available to them for. The responses to these questions are presented in graphs below. The graph in figure 4 shows the findings of data collected in the urban school. The data below reveals the different uses of ICT by students in the urban school. This was distributed in relation to the gender mix of respondents in the school

Figure 4: The Gender of Students in the Urban School and their ICT usage patterns



Source: Field Data, 2014

From figure 4, the graph presents the usage patterns of ICT by students in the urban school. These include research, entertainment, project work, chatting, browsing, printing, designing and learning. The proportion of usage patterns presented varied among the gender of students in the school. The data revealed that male students generally used ICT more than their female mates. This was revealed in the statistics presented from the field. The data also revealed that males (who although used ICT more than females) used ICT facilities for mostly entertainment purposes. This was depicted by the statistics of the male's usage patterns which were entertainment- 10.4%, browsing-16.7%, and designing-2.1%.

The female respondents in the school who equally used ICT effectively engaged it more in their academic work. Thus a high proportion of the responses given by females revealed the use of ICT by them in their academic work. The ICT usage patterns of the female respondents included research-47.7%, project work-4.5%, printing-4.5% and learning-34.3%. Although there were a proportion of females who engaged in entertainment with ICT which were presented as browsing, chatting and entertainment these were very small in proportion and constituted 3%, 1.5% and 3% respectively. The data presented therefore suggests how keen females saw ICT as a tool for academic work and informed their use of ICT with this awareness.

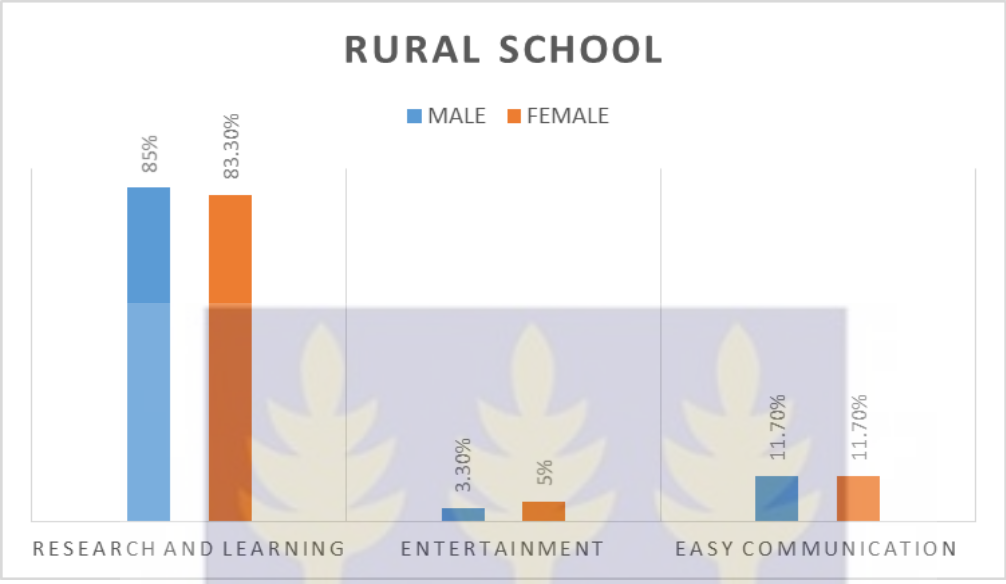
To clarify the usage patterns of ICT presented by the data in the graph, the researcher sought to find out what kind of uses respondents were engaged in with the ICT facilities or tools that were available to them. In order to make meaning of the entertainment uses such as chatting, browsing and designing as presented by the data in the graph, the researcher discovered that these activities were undertaken because of respondents' active

use of social media. The usage of ICT for entertainment as presented in the chart also refers to the use of ICT for entertainment purposes like watching movies, playing music and games. Some of these 'entertainment' activities were witnessed by the researcher upon observation during the study. The other uses of ICT like printing were undertaken by respondents in doing their assignments during vacations. Designing which was presented in the graph was an activity mainly used by students in the Visual Arts department of the school. Research which was presented by the graph was in reference to respondents' use of ICT tools like the internet to do research about information on their assignments they were given either in school or during the long vacation. Also, project work and learning as presented in the graph refers to the use of ICT tools like the internet to find information about their subjects that enabled them learn the subjects as well as do work on projects that were given them.

5.4.2 Gender disparity among students in ICT use in the rural school

Respondents in the rural school were equally studied to investigate which gender used ICT more and was more skilled in doing so. The study also sought to find out the usage patterns of ICT that respondents in the school were engaged in. The usage patterns of ICT in the rural school are presented in the chart below:

Figure 5: The Gender of Students in the Rural School and their ICT usage patterns



Source: Field Data, 2014

From figure 5, the data presented shows three uses of ICT that students were engaged in. These are research and learning, entertainment and easy communication. Male students in this school used the ICT tools and facilities to them for academic purposes. This was presented by the graph with a proportion of 85% of them engaged in this activity. Unlike the males in the urban school who mostly used ICT for entertainment, a keen effort was made by male students in this school to use ICT for studies. This was because many of these students learnt to use ICT in the school and have been guided in using it for learning, which is the main reason for their stay in the school. Although the males were engaged in some entertainment uses of ICT such as communication and entertainment, the proportion of those engaged in them was less as compared to their mates from the urban school. These were represented as 3.3% for entertainment and 11.7% for easy

communication. Easy communication here refers to communication with their mates through emails or social media platforms.

The female students in the rural school were more engaged in using the ICT tools and facilities available to them for entertainment purposes. This was revealed by the statistics from the graph: entertainment- 5%, easy communication- 11.7%. A large proportion of the females were also engaged in using the facilities for academic purposes which in this case was research and learning. This therefore reveals a more rigorous approach on the part of students from this school to improve their academic performance with the use of ICT.

Although both genders in the rural school appear to be skilled in the use of ICT and used them to a large extent, students in the urban school revealed a significant disparity in the use of the facilities among the genders. Also, students in the urban school had many uses of the facilities as compared to the counterparts in the rural school. The main reason for this significant diversity in usage patterns was because of the inadequacy of the ICT facilities in the rural school. Students in this school therefore maximized the little time they had to use the facility which was mostly channelled in using it for academic work as was presented by the data. The diversity in the gender disparity of ICT usage in the two schools as presented by the data supports the views made by Van Dijk (1999 as cited in Dijk and Hacker, 2003) which talks about the barriers of ICT use. These include the lack of elementary digital experience caused by lack of interest, computer anxiety, and unattractiveness of the new technology (mental access), no possession of computers and network connections (material access), lack of digital skills caused by insufficient user-friendliness and inadequate education or social support (skill access) and the lack of

significant usage opportunities (usage access). The barriers of material access, skill access and usage access were mostly encountered by students in the rural school. Those of mental access were encountered mostly by the female students in the urban school.

THE TEST FOR THE HYPOTHESIS

In order to ascertain the validity of the study (based on data collected on the gender disparity in the use of ICT), a hypothesis was tested. The tests represent the data collected from the two schools studied to investigate the disparity that exists among the gender of students. The hypothesis tested was stated as: Male students are more skilled in the use of ICT than female students.The data from the field by which the hypothesis is tested is presented in Table 4 below:

Table 4: Gender of Student and The ICT Usage Patterns (Cross tabulation)

Gender		ICT Usage Patterns								
		Research	Entertainment	Project works	Chatting	Browsing	Printing questions	Designing software	For learning	Other
Male	% within Sex	61.3%	8.5%	7.5%	.0%	7.5%	.0%	.9%	9.4%	2.8%
	% within usage	46.1%	60.0%	57.1%	.0%	80.0%	.0%	50.0%	30.3%	100.0%
Female	% within Sex	60.3%	4.8%	4.8%	.8%	1.6%	2.4%	.8%	18.3%	.0%
	% within usage	53.9%	40.0%	42.9%	100.0%	20.0%	100.0%	50.0%	69.7%	.0%
Total	% within Sex	60.8%	6.5%	6.0%	.4%	4.3%	1.3%	.9%	14.2%	1.3%
	% within usage	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

(χ^2= 19.486, p=.021)

Source: Field Data, April 2014

STATEMENT OF HYPOTHESIS

H_o: There is no relationship between the sex of students and their ability to use ICT

H_1: There is a relationship between the sex of students and their ability to use ICT

SELECTING SAMPLING DISTRIBUTION

Chi-square distribution

DECISION RULE

If X^2-test (obtained) is greater than X^2 critical, you reject the null hypothesis.

DECISION

A further analysis was performed to determine if there is any relationship between the gender and ICT usage patterns of respondents using the chi-square test of independence. The result is presented in a cross tabulation in table 4. With a Chi-square value of 19.486 and the p-value of 0.021 (which is less than 0.05)[23], we reject the null hypothesis and conclude that there is a strong evidence of a relationship between the gender of students and their ICT usage patterns (or their ability to use ICT). This in effect suggests that the result of the cross tabulation matrix is not due to the randomness in the data but there is a relationship. It also implies that there are gender disparities among students in the uses of ICT in second cycle schools. This is a major concern for stakeholders considering the fact that a larger proportion of females outstrip that of males at the senior high school level (a

[23] See Appendix for the raw results from SPSS package.

gap that policymakers would have to fill if we should make greater incursions in the future).

5.5 The influence of ICT use on Students' Academic Performance in their Core Subjects.

One importance of ICT is the impact it has on the user which could either be positive or negative. It was therefore imperative on the researcher's part to find out the impact of ICT on the academic performance of students. This is not an easy task considering the many roles ICT plays in the lives of students. Also, the inability in getting the final examination results of students in the study sites due to the refusal of the headmaster of the rural school to release them to the researcher made it difficult to measure this particular objective. The researcher therefore depended on the responses given by respondents in the study. This was done by asking them how their use of ICT had influenced their academic performance. Academic performance of the students was derived by finding out from them the influence ICT had made on their understanding of the core subjects[24] they studied and also the use of ICT as a tool in enabling them improve on the grades they scored in their core subjects.

The data from respondents on this particular objective is presented in the table below. Table 5 presents responses given by respondents on the influence of ICT on their academic performance. These responses were obtained by asking respondents if they agreed or disagreed that ICT had had an influence on their academic performance.

[24] Core subject: These include Mathematics, English, Social Studies and Integrated Science. For the purpose of this study, the researcher focused on Mathematics, English and Integrated Science. This was because these formed key subjects that require passes by candidates to qualify for admission into a tertiary institution.

TABLE 5: The influence of ICT on Students' Academic Performance

Percentage of Students	Urban School	Rural School
Students who agree (%)	80	81.7
Students who disagree (%)	20	18.3
Total (%)	100	100

Source: Field Data, April 2014

From table 5, the data is presented for responses given on the influence of ICT as a tool in enhancing students' understanding of their core subjects. Respondents to a large extent agreed (80% in the urban school and 81.7% in the rural school) that ICT had an influence on the understanding of their core subjects. 20% of respondents in the urban school as well as 18.3% of them in the rural school also disagreed that ICT had influenced the understanding of their core subjects. This therefore proved to the researcher that students in both schools acknowledged the importance of ICT in influencing the understanding of their core subjects. These subjects mostly pose challenges to many of these students. Many students in second cycle schools are unable to pass their core subjects like mathematics and Science hence a useful tool like ICT which provides information on the internet would make the understanding of these subjects simpler for them and would also make the teachers work easier.

5.6 ICT as a Tool in Improving the Grades of Students in their Core Subjects

In order to study the influence of ICT on the academic performance of students, it was imperative for the researcher to adopt a strategy in measuring the academic performance of students. Another strategy of assessing academic performance was in asking students

how ICT was used as a tool that improved their grades in their core subjects and the responses to this question are presented in table 6 below:

Table 6: **ICT as a Tool in Improving the Grades of Students in their Core Subjects**

Percentage of Students	**Urban School**	**Rural School**
Students who agree (%)	78.3	72.5
Students who disagree (%)	21.7	27.5
Total (%)	100	100

Source: Field Data, April 2014

In reference to the use of ICT in second cycle schools which are called senior high schools in Ghana, information keeps coming up for students' use online through websites and many other social media platforms where students can interact with other students not only from other schools but also outside the world. This would not only introduce them to online resources for their studies but would also give them a broader understanding of their subjects which place them in a better position to improve their academic performance in school. According to Ravitz (2002), one way technology can be of substantial help to teachers and learners is by improving the ability to offer formative assessments of a learner's knowledge and skills, assessments that can support teachers and learners in the classroom.

Table 6 therefore reveals the extent of ICT's influence on students' academic performance which varied among students in both the urban and rural schools. This was also assessed by asking respondents how the use of ICT had improved the grades in their core subjects. In the rural school there were a significant number of students who attested to the fact that ICT had improved their grades. This was represented by 72.5% of the total

number of respondents as against 27.5% of them who disagreed to ICT use improving their grades. The urban school also had 78.3% of the students who agreed to ICT having enabled them improve their grades. Also, 21.7% of students in the urban school disagreed that their use of ICT had made an impact in improving their grades. The results produced by respondents from both schools suggest that there is indeed an influence of ICT on a student's academic work. The help given by ICT tutors in the two schools by introducing them to ICT tools that can help them in their studies have influenced their academic performance by improving their grades in their core subjects.

In as much as academic performance of a student depends on the effort of the student, a lot is expected on the part of the teacher to ensure that their students understand whatever topic they treat in their respective subjects. The data presented to an extent confirms the assertion by Ablimi and Adu-Manu (2013) that the focus of teacher training institutes should not be limited to training teachers on how to use ICT but rather should provide teachers with the skills and expertise required to use ICT to teach a curriculum which is better suited to prepare students for the 21st century. Thus, if teachers are effectively trained with the skills in ICT use, they can apply them in their teaching methods to make their subjects more exciting and applicable to their students.

TEST OF SECOND HYPOTHESIS

This section explores the relationship between access to ICT facilities and its utility by students to enhance academic performance. In other words, if there is any relationship whatsoever between the access to ICT facilities in the schools and the academic performance of the students of these facilities. This was tested in view of the hypothesis stated by the researcher as: The higher the access of ICT facilities in a school, the more

its use by students to enhance their academic performance. Access to ICT can however be made possible when there are a number of ICT facilities (especially computers) in the schools for students use. There is therefore a need for school authorities to ensure that ICT facilities are made available for students use. The hypothesis was tested using a Chi-square test. The results of the cross tabulation analysis and Chi-square test for the hypothesis are presented below.

STATEMENT OF HYPOTHESIS

H_o: There is no relationship between access to ICT facilities in a school and its influence on the academic performance of students in the school.

H_1: There is a relationship between the availability of ICT facilities in a school and its influence on the academic performance of students in the school.

Table 7 presents a cross tabulation analysis of respondents' views on the availability of ICT facilities and its relationship with the influence had on students' academic performance by improving their grades in their core subjects. Respondents were asked if they agreed or disagreed to the influence of ICT in improving students' grades in their core subjects. The results used to test one of the hypotheses of the study are presented in the table.

TABLE 7: Availability of ICT Facilities and its Influence on Academic Performance (Chi-square distribution)

ICT's influence in improving students' grades in their core subjects	ICT facilities available in the schools						
	Desktop computers	Laptop computers	Tablets	Projectors	All the above	None of the above	Total
Frequency of respondents who agree	108	24	2	2	38	0	174
Percentage of respondents who agree	62.1%	13.8%	1.1%	1.1%	21.8%	0%	100%
Frequency of respondents who disagree	43	4	1	1	8	1	58
Percentage of respondents who disagree	74.1%	6.9%	1.7%	1.7%	13.8%	1.7%	100%

(χ^2= 9.236, p=0.510)

Source: Fieldwork Data, April 2014

DECISION RULE

If X^2-test (obtained) is greater than X^2 critical, you reject the null hypothesis.

DECISION

Since the p-value is 0.510 (i.e. greater than 0.10), the null hypothesis is accepted at a 90% confidence level. In other words, the calculated chi-square of 9.236 is lesser than the critical chi-square value.[25] We therefore accept the null hypothesis and conclude that there is no evidence of a relationship between the availability of ICT facilities in a school and its effect on students' academic performance. Thus the values as indicated in the

[25] See Appendix for the raw results from SPSS package.

cross tabulation matrix merely show a pattern of sample data that may be due to randomness. The result implies that although, the availability of ICT facilities makes teaching easier for teachers and also makes learning fun-loving for students, there is no guarantee that it would improve or enhance students' academic performance especially in improving their grades in their core subjects.

The availability of ICT facilities in the school also provides the access to these facilities hence the test of the hypothesis. From the test, we also find that access to ICT regardless of the availability of the facility does not guarantee its use. Despite the outcome of the results from the test, the use of ICT as a teaching tool should not be neglected by stakeholders in the educational sector but a conscious effort should be made to provide institutions especially those in the second cycle schools with the ICT facilities to enable them acquire the requisite skills demanded by the global age of the 21st century. This is what the ACT21S has recommended for schools because 21st century skills which are categorized into four broad areas: ways of thinking; ways of working; tools for working and skills for living in the world (www.act21s.org) would provide students in second cycle schools with these skills making them students with a global mind set.

5.7 Digital Divide Phenomenon

The issue of the 'digital divide' is a global phenomenon with regards to ICT and its use. The term was introduced to identify groups of people in society who owned and used ICT. This distinguished those who owned and used ICT from those who did not. It was in view of this phenomenon that the researcher considered the selection of the two schools (urban and rural) in different locations of the capital town for the study to investigate the existence of the phenomenon.

The digital divide phenomenon was not an easy one to investigate by the researcher but was unravelled based on the responses received from the field and also through observation in the schools studied. This was done by first assessing the ICT facilities available in the two schools and also looking at how accessible these facilities were to students. The usage patterns expected from the two schools was another way of measuring the digital divide phenomenon that existed in the schools.

In table 8 there is a presentation of ICT facilities in the two schools. This was imperative on the researcher's part to measure the digital divide in the two schools. This was important because of the subject matter of this study (the usage patterns of ICT in the two schools). This however, cannot be assessed without the availability of the facilities in the schools. Although Ghana has adopted a policy on ICT called the ICT for accelerated development (ICT4AD) many schools especially in rural areas do not have the facilities that would enable them acquire and develop the skills needed in the use of ICT. It is in view of this that table 8 introduces the data collected from the schools on the ICT facilities available.

TABLE 8: ICT FACILITIES AVAILABLE IN THE SCHOOLS

Facilities	Urban (No. of units)	Rural (No. of units)
Desktop computers[26]	54	30
Laptop computers	50	32
Projectors	2	2
Routers	1	2
Internet Servers	4	-
Printer	1	-
UPS	6	-
Power Invertor	1	-
Rack	1	-
Solar panels	3	-

Source: Field Data, April 2014

From table 8, we see a distribution of the ICT facilities available in the two schools studied. This was important to the researcher in understanding the kind of tools students in the schools were working with and how these facilities and tools were being used. A number of ICT facilities were listed namely desktop computers, laptop computers, projectors, routers, internet servers, printers, UPS (Uninterruptible power supply), power invertor, rack and solar panels.

A look at the facilities listed shows a vast difference in the numbers of ICT facilities in the two schools. For instance desktop computers in the urban school were 54 units as

[26] The ratio of desktop computers to students in the schools are as follows:

i) Urban school- 1:51

ii) Rural school- 1:37

The laptop computers received by the school were not accessible by students to ease the pressure on the desktop computers.

against 30 units in the rural school. Laptop computers in the urban school were also distributed in 50 and 32 units respectively in the urban and rural schools. The vast disparity in the availability of facilities revealed the diversity of usage patterns of ICT among students in the two schools. Also, the availability of internet services with the facilities that served these purposes such as internet servers, routers, power invertors, rack and solar panels put students in the urban school at a higher advantage than those in the rural school. Although students in the two schools were taught the same syllabus those in the urban school had the privilege of using their free periods to use the ICT facilities in the computer lab. Their mates in the rural school did not have such privileges because of the inadequacy of the facilities in their school. The availability of internet services in the urban school made the students there use the facilities often because teenagers are mostly attracted to the use of ICT when internet services are available.

The disparity of ICT facilities available in the two schools is a description of what Van Dijk (1999 as cited in Dijk and Hacker, 2003) referred to as material access which is a barrier to ICT use. According to Van Dijk (1999 as cited in Dijk & Hacker, 2003), there are four kinds of barriers to access and the type of access they restrict which are:

1. Lack of elementary digital experience caused by lack of interest, computer anxiety, and unattractiveness of the new technology (mental access).

2. No possession of computers and network connections (material access).

3. Lack of digital skills caused by insufficient user-friendliness and inadequate education or social support (skill access).

4. Lack of significant usage opportunities (usage access).

The material access in the context of data found on the field in the rural school was a lack of internet connection. This was due to the lack of internet service providers or facilities that would enable the school provide internet services for students in the school. The definition for digital divide as given by Leon-Guerrero (2009) also defines the situation found in the two schools with regards to the disparity in the distribution of ICT facilities. According to Leon-Guerrero (2009), digital divide refers to the gap separating individuals who have access to new forms of technology from those who do not. In reference to this definition, although students in the rural school had ICT facilities like desktop computers to work with, the new forms of technology (which in this case is the internet service) was absent in their schools. This therefore limited their usage of the facilities. To further ascertain the validity of this outcome, a test was conducted by testing the hypothesis stated on this particular situation and this is presented in the next section of the study.

TEST OF THIRD HYPOTHESIS

In a bid to empirically ascertain the measure of the digital divide phenomenon (which was done by comparing the ICT facilities and uses done in the two schools), a test was conducted using the chi-square approach to find if there is any relationship between ICT usage and the location of the school. To do this the researcher stated the hypothesis as: Schools in the urban areas are better skilled in the use of ICT than schools in the rural areas. The chi-square test and cross tabulation analysis for this test is presented in the table below.

STATEMENT OF HYPOTHESIS

H_o: There is no relationship between schools in the urban or rural areas and their skills in using ICT.

H_1: There is a relationship between schools in the urban or rural areas and their skills in using ICT.

TABLE 9: ICT Usage Pattern of Students and the Location of a School

(Cross Tabulation)

Location of school		ICT Usage Patterns									
		Research	Entertainment	Project works	Chatting	Browsing	Printing questions	Designing software	For learning	No response	Total
Urban	Frequency	37	7	6	1	10	3	2	33	13	112
	Percentage of respondents in the school	33%	6.2%	5.4%	0.9%	8.9%	2.7%	1.8%	29.5%	11.6%	100%
Rural	Frequency	104	8	8	0	0	0	0	0	0	120
	Percentage of respondents in the school	86.7%	6.7%	6.7%	0%	0%	0%	0%	0%	0%	100%

(χ^2= 94.025, p=.000)

Source: Fieldwork Data, April 2014

Table 9 presents the data collected in measuring the digital divide phenomenon of the study. This was done by operationalizing the term to look at the ICT facilities in the two

schools as well as the ICT usage patterns of the students in the two schools. These values were later used to test the hypothesis stated in view of this phenomenon to find out the validity of the phenomenon. The usage patterns which were the main focus of this study revealed a number of ICT usages in the two schools. These were research, entertainment, project works, chatting, browsing, printing questions, designing software and learning. These uses were generally categorized into two groups which are academic purposes and entertainment purposes. There was a disparity in usage patterns between the two schools because of the availability of the ICT facilities for students' use in the two schools. A look at the data reveals that students in the urban school used ICT better than those in the rural school. This however was tested to prove the validity of the assumption that students in the urban schools were more endowed and skilled in the use of ICT.

In using a chi-square test, the hypothesis was tested as follows:

DECISION RULE

If X^2-test (obtained) is greater than X^2 critical, you reject the null hypothesis.

DECISION

The result which is presented in Table 9 leads to the rejection of the null hypothesis since the p-value of 0.00 is less than 0.01 that is, the Chi-square value of 94.025 is greater than the critical chi-square and therefore significant at 99% confidence interval.[27] This invariably implies that indeed there is strong evidence of a relationship between schools in the urban or rural areas and their endowment and skilfulness in using ICT. This in effect suggests that the results of the cross tabulation matrix are not due to randomness in

[27] See Appendix for the raw results from SPSS package.

data but there is a relationship. This therefore suggests that schools in the urban areas are more endowed and skilled in the use of ICT simply because of the availability of the facilities that makes the teaching of the subject better. This does not only benefit ICT tutors but is also a major boost for teachers of other subjects who can make use of the facilities. ICT tutors can for instance use the facilities for projects to make their lessons more diverse, exciting and easily comprehensible by their students. It is therefore imperative that school authorities liaise with government and other stakeholders of the educational sector to ensure that their schools are provided the requisite ICT facilities demanded to ensure effective and sustainable standard of education for their students.

After conducting studies with the students teachers from four departments as mentioned earlier were also interviewed to find out what their views were on the study conducted. These views were transcribed, coded and analyzed accordingly by assigning themes to the different issues discussed. The discussions done with the teachers have been treated in the next section of this study.

QUALITATIVE ANALYSIS AND DISCUSSION

5.7 Introduction

This section discusses the findings of the study based on responses from the teachers in the two schools (rural and urban). The respondents here were interviewed during the research about the use of ICT facilities that were available to them. These responses were recorded, transcribed, edited and analysed accordingly with the use of themes determined by the researcher for each topic of discussion.

The total number of teachers interviewed in both schools was twelve and were drawn from the English, Mathematics, Science and ICT departments of these schools. The teachers' views were captured under the following themes: the knowledge of ICT by teachers, the acquisition and use of ICT by teachers, the personal ownership of an ICT device by teachers, the availability of ICT facilities owned by the school, the use of the school's ICT facilities by teachers, the use of ICT in the teaching approach of teachers, the influence of the school's environment on a person's ability to use ICT, the challenges encountered by teachers in using ICT, the support from school authorities in ICT use and the support from government in ICT use.

5.8 Discussion with the teachers interviewed

Teachers in the urban and rural schools were asked a number of questions which included their knowledge of ICT, how they acquired the knowledge to use ICT, whether they owned ICT devices and how they used them. Some questions were also asked about the impact of ICT use on their knowledge base as well as in their teaching field and how it enhanced their teaching style. The final part of the interview asked the teachers about some of the challenges they encountered with the use of ICT, the support they received

from school authorities as well as government in implementing the use of ICT as well as other kinds of support they expected from both parties.

The observation made from the rural school revealed the inadequacy in the number of ICT facilities (30 units) as compared to a higher number of these (54 units) in the urban school. Out of the 30 units of desktop computers seen in the rural school, 5 of them were broken down. Also, the computer lab lacked air-conditioners which is a requirement for any ICT lab to keep the facilities cool all the time. There was only one ceiling fan working in the ICT lab which was very old and blew hot air. In order to solve the problem of heat in the ICT lab, the windows were opened anytime the facility was being used which only ushered in dusty winds that blew from outside the compound. This practice always made the ICT lab dusty because of the dusty winds blown into the lab that came from outside the compound and the untarred roads throughout the school. The urban school on the other hand had a serene environment to work with the facilities available. The ICT lab had air-conditions with a projector that was used in teaching the students.

Teachers interviewed in the rural school were generally informed about the importance of ICT in their field of work. Teachers in the urban school were also not ignorant of the importance of ICT. Although all the teachers interviewed in the two schools appreciated the importance of ICT, only six of them interviewed really understood the dynamics of its use and actually applied them in their field of work. These included teachers in the ICT, Mathematics and Science departments of both schools.

5.8.1 The Knowledge of ICT by Teachers

The interview began by asking teachers what they knew about ICT. This was to find out how well teachers understood ICT because it is impossible to adopt and use ICT in his field of work if he does not know about it. It was also in view of Ablimi & Adu-Manu's (2013) assertion that the focus of teacher training institutes should not be limited to training teachers on how to use ICT but rather should provide teachers with the skills and expertise required to use ICT to teach a curriculum which is better suited to prepare students for the 21st century. Studies from other scholars about the use of ICT in schools revealed the inability of teachers to integrate ICT in their teaching instruction due to a number of barriers one of which is the lack of knowledge in ICT use (Ottevanger et al, 2007; Snoeyink and Ertmer, 2002; Jones 2004). The researcher therefore sought to investigate the assertion identified by these scholars in the urban and rural schools. To do this, teachers were asked to explain what they knew about ICT.

The study in the urban school revealed that it was only the ICT tutors who had more knowledge about ICT and could clearly define what it was. This was evident in the responses they gave in defining what ICT was. Some of the responses given by the ICT tutors to this question in the urban school are as follows:

"*ICT is how to convey information to someone by technology*". Another response was also given as "*ICT is the use of computing data to send information and also the use of computer hardware and software to process data into information*"

ICT as a new invention made a breakthrough in the world somewhere in the 1990s and was introduced in the school curriculum in the early part of the year 2000, a period which was characterized by the term 'Y2K' (Year 2000). This therefore makes it difficult

for older teachers or teachers with a longer teaching experience to adopt and implement in their field of work. This was affirmed in the interview done with one of the English teachers in the urban school who responded by saying that although she knew about ICT she was not conversant with its usage. The only thing she knew about ICT was the fact that her mobile phone supported applications that could help her browse the internet as well as the ability of using her laptop to do so. Most of the functions according to her were performed by her children and some of her male colleagues who were skilled in the use of these ICT tools. She also stressed the fact that she was still learning to use ICT as she knew the importance of ICT in improving her teaching style."

In the rural school also, all the teachers interviewed by the researcher had knowledge about ICT and could effectively use it. This was because the teachers interviewed in this school were fairly younger than those interviewed in the urban school. To the question on what ICT is, some responses were given as: "*ICT is concerned with the information usage, processing and for improving upon our lives*." Another response was given as "*the modern form of tutorials and application of subjects in a different and easy way*.

5.8.2 The Acquisition of ICT Knowledge by Teachers

It was imperative on the researcher's part to know how teachers gained the knowledge they had about ICT. This was done by the researcher in order to measure which medium was the most common to teachers. This would enable school authorities train their staff in the use of ICT and also guide them in selecting the most appropriate medium for this purpose. Two teachers in the urban school reported learning to use ICT from a workshop organized to train teachers in using the facility. Another teacher from the Science department in the urban school also reported that he learnt about ICT from

the university. This was as a result of the need to use it for assignments that were required during the period.

In the rural school also, one of the ICT teachers said he acquired the knowledge to use ICT from the training he had in a computer training institution. This according to him was informed by a publication he saw in the newspapers about the importance of ICT use. It was this information that made him develop the interest in learning ICT. Two other teachers in the school (from the Science and Mathematics department respectively) reported that they learnt to use ICT from a workshop organized by GES in their district for training school teachers in the relevance and use of ICT.

5.8.3 The personal ownership of ICT Devices by Teachers

In an attempt to know how well teachers used ICT the researcher sought to find out if teachers owned any ICT device. The teachers interviewed were therefore asked if they personally owned any ICT device. The reason for asking this question was because of the importance of teachers to own ICT devices to enable them develop the skills as well as the confidence in using the device. In doing so, they can adopt the use of ICT in their teaching approach and also encourage their students to use it for studying.

Observations made in the urban school revealed that many of the teachers in the staff common room (the venue for conducting the interview) of the school owned a laptop. Although many of the teachers in the school owned laptops, only three of the teachers interviewed owned one. One of the ICT tutors interviewed reported owning a laptop computer, printer and mobile phone. The second ICT tutor interviewed reported owning only a mobile phone because his laptop computer had been stolen. The remaining four teachers interviewed owned mobile phones but only two of them had mobile phones that

had applications that supported internet usage as well as other functions that could be used for their work. Also, out of the group of four teachers interviewed (besides ICT tutors), only two of them owned laptop computers.

In the rural school also, the researcher's observation of teachers interviewed revealed that all teachers interviewed owned laptop computers and mobile phones. Three of the teachers (from the ICT and Science department) also owned tablets which they sometimes used to deliver their lessons. One of the teachers from the Mathematics department reported that he owned a laptop computer, a modem and a digital camera. The modem owned by teachers was used to provide internet services for those who needed them for research, and other activities that demanded the service. This was because of the lack of the service in the school. Teachers from the ICT department owned laptop computers, tablets and modems.

5.8.4 The ICT Facilities Available in the School for Teachers' Use

The choice of the researcher in finding out the facilities available in the school was a way of investigating the kind of ICT facilities that were available in the schools and how accessible they were to teachers. The observation made in the urban school revealed the school's endowment of ICT facilities with a number of desktop computers in an air-conditioned room and a projector to deliver lessons. Overall, the facilities available in the school at the time of the research were desktop computers, a router, internet servers, projectors, printers, solar panels, stabilizers, a rack and a power inverter. The breakdown of these facilities were as follows: 54 desktop computers, 4 internet servers, 2 projectors (of which one was faulty at the time of research), 1 printer, 3 solar panels, 6 UPS, 4 stabilizers, 1 power inverter, 1 router and 1 rack which were reported as insufficient by

the ICT tutors. They also reported the difficulties they encountered in teaching the students with the limited number of facilities (especially the desktop computers) available in the laboratory. Teachers in the ICT department were the only ones able to give information on the state of ICT facilities available in the school. Apart from the ICT tutors, the other teachers interviewed reported that they occasionally used the ICT facilities in the school when they needed to use internet services.

The observation made by studying the urban school suggested its ability to adopt E-learning procedures. The situation found in the urban school was a reflection of the assertion made by Omwenga (2004) who talked about e-learning as an example of the use of ICT-supported teaching and learning methods whose use in educational institutions is gaining momentum with the passage of time. Reports given by the ICT teachers interviewed were that "*teachers visited the ICT lab when they had no classes and also when the facilities were not being used by students".*

In the rural school also, the researcher observed that the school had an ICT laboratory but without adequate ICT facilities as compared to those of the urban school. Although the school had facilities like desktop computers, five of them were broken down due to the frequent power outages that occurred over a period of time. Most of the computers had been covered with dust because of the prevailing dusty winds that blew through the windows of the laboratory. This was because the room was not air-conditioned and depended on a single ceiling fan to keep the place cool. This was a major challenge that the ICT tutors complained of. The breakdown of the facilities available in the school at the time of the research were 30 desktop computers (out of which 25 were functioning), 32 laptops (of which 2 were available for teachers' use during lessons), 2 routers and 2

projectors. Reports from the interviews with teachers revealed that teachers in the rural school did not use the ICT facilities in the school's lab because they were inadequate to share with the students. Also, the lack of internet services in the rural school hindered teachers from using the ICT facilities for their work. Teachers who owned modems also used them to access internet services in the comfort of their offices (most of which were in the staff common room).

5.8.5 The Use of ICT Facilities in the School by Teachers

As a way of assessing the level of usage of ICT facilities provided by the school, the researcher sought to find out from teachers how often they used the school's ICT facilities as well as the uses they were engaged in. In response to these questions the researcher found out that teachers from the urban school used the ICT facilities in the school more often than those in the rural school.

In the urban school, the two ICT tutors interviewed said that teachers frequently came to the lab to use the facilities to check their e-mails, print examination questions and also check their pay slips using the internet. The four other teachers (from the Science Mathematics and English) interviewed revealed that they did not use the facilities in the ICT lab. One Science teacher for instance said that "*because he owned a modem, he accessed the internet from the comfort of his office with the use of his laptop. Also, he used a projector to tech his students during his class periods.*" Although more than 50% of the teachers interviewed reported that they did not use the school's ICT facilities, they all appreciated the importance of doing so.

In the rural school also ICT tutors whose work entailed the frequent use of ICT facilities complained bitterly about the inadequate facilities they had to work with. Apart

from the ICT tutors interviewed, the other four teachers said they did not use the computers available in the lab. One teacher from the Science department said he sometimes used the projector to teach his students. Also, because of the lack of internet services in the school the teachers interviewed said they used their modems to access internet services. A teacher from the Mathematics department for instance said that he had to access internet services from an internet café or a Communication and Business Centre outside the school. The ICT tutors also used computer tablets to do research online to prepare their teaching notes and also used the projectors to teach during class sessions. Observations made by the researcher however revealed that students mostly visited the ICT lab and teachers who needed to do any ICT-related work had to move to town to get it done.

5.8.6 The use of ICT by Teachers in their Teaching Approach

To ensure that teachers inculcate the use of ICT in students, there is the need for teachers themselves to use the device for students to learn by example and adopt its use in their studies. It was in view of this assertion that the researcher asked teachers if they used ICT in their teaching approach. Other questions that were asked in relation to this topic were whether teachers encouraged their students to use ICT tools in studying their subjects and also if they engaged their students in the use of ICT during their teaching approach. These questions were of importance to the researcher because of the view that teachers (besides school authorities) are the drivers of ICT use and can inculcate the habit in their students because of the regular interaction they have with them. The choice of these questions was also informed by the assertion made by Ablimi and Adu-Manu (2013) on the importance of teachers being provided the requisite skills and expertise

needed in treating the curriculum that would better prepare their students for the 21st century.

Responses given by teachers in the urban school on this issue were not so positive. Observations made during the period of the study revealed that it was only the ICT tutors who used ICT in their teaching approach. The researcher during the study witnessed the use of a projector by ICT tutors to teach their lessons. One teacher from the Science department also reported that he used a projector to teach his students although this was not witnessed by the researcher. He was however seen using a laptop to do research online with the use of a modem. He also confirmed that he mostly worked from his office because of the modem he owned to offer him internet services.

The other teachers interviewed from the other departments reported that they did not use ICT in their teaching approach due to the limited time they had to deliver their lessons and also to complete the syllabus. The only male teacher in the English department when asked whether he used ICT in his teaching approach had this to say:

> "We should be doing it but we are always racing against time. The system is such that we are not permitted to do so because of the three year duration within which we try to complete the syllabus before the students prepare for their final exams."

A female teacher from the same department (English) reported that she did not use ICT because she was not conversant with the use of ICT and would not want to be embarrassed in her attempt to use it. For her, it was the lack of skill in using the device as well as the unavailability of the facilities (in this case, a projector) to do so during their class sessions. On the issue of whether teachers encouraged their students to use ICT for their studies, the ICT tutors interviewed said they also engaged them in using the ICT

tools available. One of the ICT tutors went on to tell the researcher that he was really impressed with the rate at which his students were learning to use ICT. He emphasized that some of the students were very good and were even learning skills like programming and networking. Another revealing fact presented to researcher was the fact that the school had an online platform developed by the GES[28] called the Internet Study Mate (ISM). The platform as explained to the researcher brings together students within and outside the school together to interact and share ideas on the subjects being taught them. Teachers on the platform also bring past questions for students to solve. The other teachers interviewed said they encouraged their students to use ICT for their studies but did not engage them in using ICT for this purpose because of the unavailability of the facility for their use. One Science teacher said he encouraged his students to use ICT tools to do research for additional notes on his subject as well as download software that could enable them learn the subject.

In the rural school also, it was only ICT tutors who used ICT facilities to teach their students. The four other teachers interviewed admitted their preparedness to use the facilities if they were available. The inadequacy of the ICT facilities in the school hindered them from using the facilities in their teaching approach. In relation to the question on whether teachers encouraged their students to use ICT in studying, one of the ICT tutors said although efforts were made to encourage students to use ICT in studying it required monitoring and supervision to ensure its success. In his response, he had this comment to make:

[28] GES: Ghana Education Service. This is the governing body of education under the ministry of education of Ghana with the mandate to oversee the activities of educational institutions in Ghana as well as ensure that government policies on education are fully implemented. The GES in collaboration with other institutions like the ministry also regulates the activities of basic and second cycle schools in the country.

"*The Ghana Education Service (GES) has approved the use of tablets by students to study. However, students do not use such devices for studies but entertainment*."

5.8.7 The Influence of ICT use on Teachers' Behaviour

The purpose of this section was to find out how teachers had been influenced by the use of ICT. The reason for this question was because ICT use has a way of influencing ones' behavior. Thus, the way we think and do things are informed by the adoption of ICT which enables one to work faster and achieve more in the field of work if the right tools are used effectively for that purpose. Teachers in particular would experience a lot of good when they adopt the use of ICT in their work. Activities like doing research online, the use of projectors to display their lessons among others are typical examples of using ICT in their field of work. To address this issue, teachers were asked if their use of ICT had made an impact on their style of teaching, the impact of ICT use on their knowledge base in their subject area and also if the use of ICT had made any impact in the academic performance of their students.

The responses given by two of the teachers in the urban school revealed that their use of ICT had made teaching efficient and more practical. This is because it offered them software that made teaching easier. The other four teachers however did not comment much on this issue because they did not use the ICT facility for this purpose. Three teachers (from the ICT, Mathematics and Science department) in the urban school also confirmed that their use of ICT had made an impact on the knowledge they had in their subject area. For instance, one teacher from the Science department when asked what impact ICT had made on his knowledge base in his subject area had this to say "*ICT has enabled me to understand my subject better and also use different methods in teaching*".

Teachers interviewed were also asked whether the use of ICT by their students had made an impact on their academic performance. In response to this, teachers found it difficult to tell since they could not relate the use of ICT to the academic performance of their students. ICT tutors interviewed in the school felt that ICT use may have had a positive impact on students' academic performance by taking into consideration the fact that students had access to the ICT lab to use the facilities there for their assignments and projects. The four remaining teachers on the other hand were not sure that ICT use by students had an impact on their academic performance because for them, they felt students rather spent more time playing with these tools rather than using it for studies.

In the rural school also, teachers interviewed had some interesting responses to give on the questions asked. On the question of how ICT use had impacted their teaching style, one of the ICT tutors said that the use of ICT had helped to make the presentation of his lessons easier and faster and also helps to cover a lot within the period allotted. The other teachers interviewed especially two of them from the Mathematics department said the use of ICT had a good impact on their teaching style. Teachers in the rural school also claimed that ICT had an impact on the knowledge they had in their subject area. For instance, one ICT tutor said that his use of ICT had made available information on the internet which made it easier for him to teach and had also increased the knowledge he had in his subject area. Another teacher from the Mathematics department said that the use of ICT had made a good impact on the knowledge he had in his subject area. This enabled him replicate this knowledge in his teaching lessons making his students develop a positive interest in his subject. In responding to the question on whether the use of ICT had an impact on the academic performance of their students, teachers in the rural school

had different views. One teacher from the Mathematics department said that it had an impact on the academic performance of the serious students and did not have an impact on students who were not serious. Another Mathematics teacher asserted that the impact was low due to the low efficiency of ICT use in the school. ICT tutors on the other hand asserted that the impact on academic performance was not easily accessible but had impacted them in developing ICT skills like typing, opening and creating of folders. The three other teachers interviewed on these issues disagreed with the views shared by their colleagues simply because they felt that the ICT facilities in the school were inadequate and also the time allotted for them to teach was very short. Although 50% of the teachers interviewed in the rural school had positive opinions to share about the influence of ICT use in their field of work, the other 50% were divided in their views and did not think ICT had much influence in their field of work. The reason for this outcome was attributed to the challenges faced by teachers in the use of ICT in the school. It is in view of this that we turn to the next section of the study which deals with the challenges encountered by teachers in their use of ICT.

5.8.8 Challenges Encountered by Teachers in their use of ICT

The researcher in studying the kinds of uses teachers were engaged in with their ICT devices (which was one of his objectives) was also interested in the challenges they faced with the use of these tools. This was because ICT use also comes with a number of challenges which has in some cases discouraged people from engaging in its use. It was therefore imperative to find out the kind of challenges teachers were involved in with the use of ICT in order to inform other teachers. Also, investigating this aspect would help in finding solutions to curb some of these challenges from reoccurring. To do this, teachers

were asked during the interview to talk about the challenges they encountered in their pursuit of ICT in their field of work. Teachers from the schools had a number of challenges to report on but it was the teachers in the rural school who really had a lot of challenges to talk about. Also, teachers in the ICT department shared completely different challenges from their colleagues in the other departments. The responses given by the teachers in the two were documented and discussed as follows:

In the urban school, the ICT tutors reported some of their challenges as the inadequacy of computers for students' use. The inadequacy of computers made some students have to stand during lessons because they did not have computers to work with especially during the practical sessions. Another challenge for them was consistent power cuts which damaged some of the computers as well as the neglect of ICT tutors in decision making by school authorities especially concerning matters of running the ICT lab. They explained to me that they were mostly not consulted about the ICT facilities that were procured for the lab and in some cases this became a major problem as some the procured facilities did not last long and made their work very difficult. Teachers from the other departments interviewed had the major challenge of inculcating the use of ICT in their teaching approach simply because they claimed the time allotted them was too short and also the class sizes were too large for them to handle. One Science teacher for instance mentioned some of his challenges as interrupted power supply as well as internet service, the class size being too large for him to use ICT facilities like a projector to teach especially during practical sessions and the time schedule being too short for any meaningful work to be done.

In the rural school also, teachers interviewed were asked if they had encountered any challenges in their use of ICT. One of the ICT tutors said that the major challenge he faced was the breaking down of the computers as a result of the frequent power outages. Also, he reported the incidence of theft cases as some of the students stole some of the computer accessories whenever they visited the ICT lab. Reports from the other teachers interviewed were that their challenge had to do with the inadequacy of the ICT facilities in the school for teachers use. For instance one teacher from the Mathematics department mentioned some of the challenges he faced as the lack of internet service and viruses on his laptop computer which destroyed most of his files. Two other teachers from the Science and English departments mentioned the lack of ICT facilities such as a projector for their use as a major challenge. They further went on to say that the lack of a separate lab (for their respective departments) to accommodate their students made it very difficult for them to comprehensively teach their students since many of them did not take their subjects seriously. In view of the responses given by teachers in the rural school it appeared that teachers in the two schools encountered similar challenges although those in the rural school had major ones due to the fact that the ICT facilities in their school were inadequate for both teachers and students' use. Also, the lack of internet services in the school made it very difficult to adopt and implement any meaningful use of ICT in their teaching approach. As a result of this teachers requested the support of both school authorities as well as that of government to come to their aid and salvage the situation. It is in light of this response that the next section of this study turns to the support given to the schools as reported by the teachers interviewed.

5.8.9 The Support or Assistance given to the School in relation to ICT

The issue of support or assistance in the area of ICT is a key to the development of any school. This is important because the absence of support will deprive the school of ICT use. This will therefore lead to lack of skills in the use of ICT by students and teachers. In view of this, the researcher sought to find out what initiatives had come through support by the school authorities and government. The question about support or assistance was also asked in reference to the 6th objective of the government's policy on ICT (ICT4AD) which is "promoting an improved educational system within which ICTs are widely deployed to facilitate the delivery of educational services at all levels of the educational system." Teachers interviewed were therefore asked questions on the kind of support or assistance they had received and also what support they expected from government. This was important for the researcher to know the extent to which government was implementing its policies on ICT.

According to one of the ICT teachers in the urban school, the ICT department received some support from government by the provision of 10 laptops under the government's 'Better Ghana Agenda' initiative which was aimed at promoting ICT literacy in the country. These initiatives were carried out through the Ministry of Education (MoE). He also mentioned that his department had received a donation of 15 desktop computers from a minister of state. ICT tutors on the hand requested that ICT be made a core subject in addition to the list of examinable subjects set by WAEC for students to take its lessons seriously. Another teacher from the Science department also reported that his department had received support from government in the form of laboratory equipment as well as three desktop computers. The support given was a

collaboration between the government and I-Tech (an NGO). The two English teachers interviewed reported that they had not received any support from government but would be grateful if the government provided them with a language laboratory which would provide them with a conducive environment to offer comprehensive teaching to their students. This facility would expose their students to online tools that would offer them a better comprehension of the English language. The Mathematics teacher interviewed also requested support from government in the provision of laptops for teachers. According to him, because these facilities were costly he felt that if teachers were provided these facilities or were given the opportunity to purchase these facilities on loan it would enable them have access to the device as well as inculcate its use in their teaching methods. He also requested that internet services should be more reliable in the school for teachers use to enable them do intensive research for their teaching notes as well as other purposes that may demand the use of the internet.

The teachers in the urban school were also asked if they received support from the school authorities to inculcate the use of ICT in their field of work. This was important to the researcher because of the role played by school authorities in championing some of these initiatives. It was therefore imperative to find out from the teachers if they received support from their superiors to use ICT. In response to these questions, ICT tutors said they received support from school authorities but with much difficulty. This was because the school focused more on the other subjects taught since ICT was not examinable by WAEC. They also complained about the fact that they were not involved in the decision making process especially with decisions that pertained to procurement of equipment for the ICT lab making the school purchase inferior or low-standard equipment which did not

last long. The teachers from the English department said they were encouraged by school authorities to use ICT but they could not because of the limited time they had to work with. The Science teacher interviewed said that he received support from school authorities through the opportunity given him to participate in a workshop which trained teachers in the use of ICT. This workshop he said had enabled him become better prepared to use ICT in his teaching. He however requested the support of school authorities in providing constant internet service delivery through wireless connection (Wifi) as well as the provision of projectors and cameras for his department. A Mathematics teacher also said he received support from school authorities to use ICT through encouragement to do so but had not received the requisite tools or facilities to implement it.

In the rural school also, teachers responded to similar questions asked them. The two ICT tutors interviewed in the school said that their department through the school had received support from government through a donation of 50 laptop computers under the government's "Better Ghana Agenda" initiative. They also received the establishment of a computer laboratory and the provision of internet services. This was a joint collaboration between the government of Ghana and an NGO. The ICT tutors also requested that their subject be made examinable by WAEC to enable their students take the subject serious. The two teachers from the Mathematics department interviewed said they had not received any support from government but requested that the government provide their department with a laboratory as well as make the learning of Mathematics interesting for students by the formation of Mathematics and Science clubs. One teacher from the Science department also said that his department had not received support from

the government and wanted government to provide his department with modern ICT facilities like projectors and cameras that would make teaching easier for his students.

Government policies in developed countries are what have placed many educational institutions in a technologically advanced position. Typical examples of these are the invention of the 'Aakash' computer tablet in India with the goal of providing children (especially the unprivileged) in basic school with the device as a way of introducing ICT to them at an early age and also as a way of bridging the digital divide gap in the country. Other countries like South Korea and Taiwan have also done same. Ghana as a country also developed the ICT4AD as a policy to push the agenda of ensuring an ICT-propelled country with development of ICT literacy among the youth. It was based on this information that the researcher sought the respondents' views on the kind of support they had received from either the school authorities or government. Based on responses given by the teachers in the rural school, the researcher discovered that the rural school just like the urban school had similarly received some support from government through the "Better Ghana Agenda" initiative. This initiative provided 50 laptops for the school. The government in response to the school's plight as well as a way of implementing its policy on ICT also contributed to the establishment of the computer laboratory and the provision of internet services. This intervention made by government was in collaboration with an NGO. The school also received support from the PTA towards the establishment of the ICT facility. Teachers in the rural school have not received much support from the school authorities with regards to ICT usage but there was pressure on ICT tutors by school authorities to maintain a good level of ICT awareness for students in the school to develop the requisite skills. There was also no encouragement on the part of school

authorities for teachers to use ICT in their teaching style. Teachers in the rural school therefore requested more support from the school authorities to provide them with training workshops in ICT. Other requests made by the teachers in the school were the establishment of ICT laboratories for the other departments like Mathematics and Science, internet services in the school and the provision of ICT devices for the ICT laboratory to make the teaching of ICT and its usage easier for teachers and students. Teachers in the ICT department also requested the provision of modern ICT facilities by the government to enhance the provision of ICT skills.

Responses given by teachers in the urban school revealed attempts by them to use ICT although this views were divided among teachers in the various departments selected. Teachers in the ICT department were implementing the use of ICT but with difficulty because of the lack of support from school authorities. Teachers from the other department besides the Science department did not use ICT because of the unavailability of the facilities to do so hence the call on government to come to their aid and provide them with the requisite tools and facilities to enable them do so.

CHAPTER SIX

SUMMARY, CONCLUSIONS AND POLICY IMPLICATIONS OF THE STUDY

6.1 Introduction

This chapter discusses the key findings of the study and ends by making recommendations that can be implemented to improve the conditions of ICT use in second cycle schools in Ghana.

6.2 Summary of the Study

The study began by giving a background to the development of information communication technology (ICT) and touched on the usage of ICT in the second cycle schools in the country. The study also looked at the development of a policy on ICT called the ICT for accelerated development (ICT4AD) which called for the study of ICT usage in second cycle schools in Ghana. The policy also led to the introduction of ICT as a subject taught in the basic and secondary schools. In view of these findings, the study restricted itself to the usage patterns of ICT in second-cycle schools.

To explore these findings, a number of issues on the use of ICT in senior high schools were discussed. The main objective of the study was to find out the usage patterns of ICT in second cycle schools. Usage patterns in the study referred to the different uses or activities that both teachers and students in the schools were engaged in with the ICT devices and tools available to them. The study was therefore guided by a number of objectives which were as follows: To examine the type of ICT tools available in the senior high schools studied, to examine how students and teachers in the rural and urban schools use the ICT tools available to them, to investigate if a gender disparity

exists among students in terms of ICT usage, to investigate how ICT use by students in the schools (urban and rural) has influenced the academic work of these students in their core subjects (if any), and to find out if there existed a "digital divide" gap between the two schools (if any). The reason for these objectives was to find out the impact of these issues on teaching and learning in the schools studied.

The research methodology of the study used two selected sites which were two senior high schools in Ghana namely St. Johns' Grammar SHS and Ghanata SHS. These schools were selected by the researcher to represent a school in an urban and rural area respectively because of the objective of investigating the digital divide phenomenon that existed between the two schools. The study used a mixed method approach as its research methodology. This involved using a quantitative approach for studying the students and a qualitative approach in studying the teachers. A total of 240 students were selected from the two schools to participate in the research with the use of a cluster sampling method. Twelve teachers were also drawn from both schools using a purposive sampling method and interviewed for the study. Responses from the students were collected using questionnaires and these were coded and analyzed using the 20th version of the Statistical Package for Social Science (SPSS). The responses received from the teachers through the interview was also recorded, transcribed, edited and analyzed accordingly using themes to discuss the different issues of concern.

6.3 Main Findings

The study through the research came up with the following findings:

1. Students in the two schools had more knowledge of ICT than the teachers (with the exception of ICT tutors). This was represented by 93% of students in the

urban school and 94% of students in the rural school compared to 50% and 66.6% of teachers in the urban and rural school respectively. Also, the statistics presented by the study revealed that students and teachers in the rural school had more knowledge of ICT than their counterparts in the urban school.

2. All six teachers interviewed in the rural school (representing 100%) complained of inadequate ICT facilities in the school for their use. Also in the urban school, three teachers (representing 50%) complained about the lack of ICT facilities in their departments hence their inability to use it in their teaching approach. The investigator's observation of the ICT laboratories in the two schools revealed that the urban school was more endowed with ICT facilities than the rural school. Thus the ratio of students to a desktop computer was represented as 1:37 in the urban school compared to 1:51 in the rural school.

3. Although 60% of the teachers interviewed in both schools claimed having knowledge of ICT, the researcher's observation revealed that close to 60-70% of them either had little or no knowledge at all about it. It was mostly the ICT tutors in both schools who were well endowed in the use of the devices available.

4. The data on the gender disparity in ICT use among students revealed a 42% male to 58% of female students in the urban school and 50% male to 50% female proportion in the rural school. A chi-square test (X^2) of 19.486 with a p-value of 0.02 (which is less than 0.05) strengthened the objective by rejecting the null hypothesis to conclude that there was a gender disparity among students in their use of ICT. This was revealed in the data gathered from the urban school which

was an indication of females showing more interest in using ICT as compared to their male counterparts thereby developing more skills in its use. Data from teachers on the other hand revealed different statistics with 90% of the males more skilled in the use of ICT as compared to 10% of the female teachers who were not too skilled in the use of ICT and did not use it in their teaching.

5. The study discovered that besides academic work, students were also actively using ICT for entertainment which was represented by 29% of this proportion in the urban school and 9% in the rural school. This use of ICT for entertainment involved the active participation in social media platforms which according to their teachers sometimes accounted for the poor academic performance in their school especially in the core subjects. Some of the social media platforms used by the students were Facebook, Twitter, Hi5, and E-buddy. The Ministry of Education (MoE) upon realizing the social media craze of students introduced a computer tablet with a social media platform called the Internet Study Mate (ISM) for teachers and students to network and interact.

6. The issue of the digital divide gap in this study was operationalized in two main ways. This was done by first looking at the ICT facilities available in the two schools and also by looking at the usage patterns of the ICT facilities by students and teachers in the two schools. The high availability of ICT facilities in the urban school however produced more uses than the rural school. The proportion of usage patterns in the urban school were as follows: research—33%, entertainment-6%, project works-5%, chatting-1%, browsing-9%, printing-3% and designing software-2%. The rural school on the other hand had usage patterns

like research-86%, entertainment-7% and project works-7%. Thus, whereas students in the urban school engaged in seven ICT uses their counterparts in the rural had three uses for the facilities available to them.

7. The study also revealed that there is no significant relationship between the availability of ICT facilities in a school and its impact on the academic performance of students. A Chi-sqaure (X^2) test of 9.236 with a p–value of 0.510 and a confidence level of 90% accepted the null hypothesis and came to this conclusion.

8. In relation to the usage patterns of ICT by students which was the main focus of this study, research was the most popular use of ICT in both schools with a proportion of 33% in the urban school and 86% in the rural school. The least popular use on the other hand was chatting in the urban school and which was represented by 1% and for entertainment in the rural school represented by 7%. The teachers in the two schools who owned laptops used them for research on the internet for their teaching notes and also to enter the grades of their students. This was represented by 50% of them. Those who also used the facilities in the computer laboratory used them to check their pay-slips, print examination questions and browse the internet. Those in this category represented 50% of the total number interviewed.

9. The study also revealed that the two schools had received assistance from the government through the Ministry of Education (MoE) and also from some NGOs who sought to advance the use of ICT in schools. This assistance came through

the provision of 10 laptops and 18 desktop computers which were given to the urban school and 50 laptops given to the rural school. The support that came for the urban school came from the government of Ghana and from a minister of state who donated the equipment to the ICT facility and the Science department respectively. The support given to the rural school was given to the ICT department by the government.

10. The study also found out that students in both schools learnt to use ICT through four main channels namely at computer training school, friends, home, and at the school. These were represented respectively in the two schools by the following proportions: computer training school- 10% in the urban school and 5% in the rural school, friends- 18%. in the urban school and 17% in the rural school, home- 38% in the urban school and 35% in the rural school and at the school- 34% in the urban school and 43% in the rural school.

6.4 Conclusions

Based on the specific objectives of the study the following are presented as the main conclusions:

1. 50% of teachers in the urban school had limited knowledge about ICT although all of them owned ICT devices. In the rural school also 60% of them had limited knowledge of ICT. This was because these teachers had been teaching in the schools for a long time and were not introduced to ICT during their training period. However, 50% of them owned devices like laptops and mobile phones which they used to browse on the internet, to do research in preparation for their lessons, to send e-mails and to enter the grades of their students as well as set examination

questions. ICT was minimally used by teachers to teach their students due to the unavailability of adequate facilities to do so and also because of the limited time allotted them to deliver their lessons.

2. More than 90% of students in both schools (93% in the urban school and 94% in the rural school) had knowledge of ICT but used the facility more than their teachers.

3. The data collected from the research field showed that ICT usage had no influence on students' academic performance. This was proven by a chi-square test (X^2) that was conducted. Also, the data showed that male students (29% of them) used their free time to use the facilities in the ICT lab for entertainment.

4. There is evidence that a digital divide exists in Ghanaian schools. This was explained by the disparity that existed between the urban and rural schools in terms of the resources that were available for both students and teachers. The responses given by respondents also attested to this fact as many of the respondents claimed to have learnt to use ICT from places where the facility was available. Other respondents like the teachers advocated for the provision of ICT facilities in the school to enable them acquire the requisite skills to use ICT individually and also in class.

6.5 Policy Implications of the Study

With reference to the findings of this study the following recommendations can be considered to further execute the agenda of seeing ICT use inculcated in second cycle schools.

1. To ensure the use of ICT in second cycle schools, the Ghana Education Service (GES) must include the study of ICT as an examinable subject in the syllabus. This is important because ICT as a subject is currently not examinable as a WASSCE subject. ICT therefore is only taught to forms one and two hence it produces very little impact. The making of ICT an examinable subject will compel students of both sexes to take the subject serious and also acquire the requisite skills.

2. School authorities must also embrace the idea of ICT use and encourage their staff and students to do so. This is vital to ensuring the establishment of the ICT facility for students and staff to adopt the use of ICT effectively. Heads of schools must also be abreast with modern trends of technology in order to be well informed as well as able to lead the initiative of ICT use in their schools.

3. Teachers (especially the elderly ones) should also be trained in the use of ICT. This would bring 'freshness' to their teaching style and also expose them to new methods of teaching as well as introduce them to current issues and new information in their subject areas.

4. Governments should provide schools with 'state of the art' ICT laboratories which would ensure that both students and teachers are abreast with the latest

form of technology. This is because ICT devices are constantly changing and are costly to acquire. Without adequate facilities, teaching the subject becomes difficult and also makes students' comprehension of the subject inadequate.

5. Governments should make available ICT devices like laptops to teachers (preferably on hire-purchase basis) to enable them own these devices. This would enable teachers to get acquainted with the use of these devices as well as develop the confidence in using them in their teaching approach.

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APPENDIX

TOPIC: INFORMATION COMMUNICATION TECHNOLOGY USAGE PATTERNS IN SECOND CYCLE SCHOOLS: A STUDY OF TWO SELECTED SENIOR HIGH SCHOOLS IN GHANA

QUESTIONNAIRE

DEPARTMENT OF SOCIOLOGY- UNIVERSITY OF GHANA

MPHIL THESIS QUESTIONNAIRE

I am a Sociology (M.Phil.) student doing a research on the topic "**Information Communication Technology usage patterns in second cycle schools: A study of two selected senior high schools in Ghana**." I WOULD BE GRATEFUL therefore IF YOU would ASSIST me with your views by taking time to fill this questionnaire for me. I assure you that all responses would be kept confidential and used purposely for this research. Please be as honest as possible. Please tick [√] in the brackets provided on the right-hand side of the possible options or fill the blank spaces where applicable. Thank you for your cooperation.

A. SOCIO-DEMOGRAPHIC BACKGROUND

1. Sex a. Male [ ] b. Female [ ]
2. Age a. 15-16 [ ] b. 17-18 [ ] c. 19-20 [ ]
3. Form a. One [ ] b. Two [ ] c. Three [ ]
4. Subject of study a. General Science [ ] b. General Arts [ ]
   c. Home Economics [ ] d. Visual Arts [ ] e. Business [ ]
5. Where do you live? State the town and region.

   .....

6. What is the occupation of your father/ Guardian? Please state the exact occupation after ticking in the spaces provided on the right hand side.

   a. Professional (doctor, lawyer, banker, nurse, manager) [ ] ……..

   b. Educational sector (teacher, lecturer, secretary, administrator) [ ]

   ……

   c. Industry worker (driver, messenger, security man) [ ] ……

   d. Artisan (mechanic, plumber, carpenter, painter) [ ] ……..

   e. Other (please state the occupation [ ] …….

7. What is the occupation of your mother/ Guardian? Please state the exact occupation after ticking in the spaces provided on the right hand side.

   a. Professional (doctor, lawyer, banker, nurse, manager) [ ] ……..

   b. Educational sector (teacher, lecturer, secretary, administrator) [ ] ……

   c. Industry worker (driver, messenger, security man) [ ] ……

   d. Trader (businesswoman, petty trader) [ ] …….

   e. Other (please state the occupation [ ] …….

B. AVAILABILITY OF ICT FACILITIES FOR TEACHING AND LEARNING

8. Do your teachers know about ICT?

   a. Yes [ ] b. No [ ]

9. Do your teachers use ICT tools or devices to teach you?

   a. Yes [ ] b. No [ ]

10. Does your school have ICT facilities?

    a. Yes [ ] b. No [ ]

11. If yes, what kind of facilities does your school have?

    a. Desktop computers [ ] b. Laptop computers [ ] c. Tablets [ ]

    d. projectors [ ] e. All the above [ ] f. None of the above [ ]

g. Other [ ].

If other, PLEASE SPECIFY……

12. Are these facilities easily accessible to teachers?

a. Yes [ ] b. No [ ]

13. Do your teachers make use of the ICT facilities in the school?

a. Yes [ ] b. No [ ]

14. Which ICT facilities do your teachers use frequently?

a. Laptop computers [ ] c. Tablets [ ] d. projectors [ ]

e. All the above [ ] f. None of the above [ ] g. Other [ ].

If other, PLEASE SPECIFY……

15. Which ICT facilities are your teachers familiar with and can use well?

a. Desktop computer [ ] b. Laptop computer [ ] c. Tablet d. projector [ ]

e. All the above [ ] f. None of the above [ ] g. Other [ ].

If other, PLEASE SPECIFY……..

C. STUDENTS' KNOWLEDGE AND USE OF ICT

16. Do you know about ICT?

a. Yes [ ] b. No [ ]

17. Do you know how to use ICT?

a. Yes [ ] b. No [ ]

i) If yes, how well can you use ICT?

a. Very well [ ] b. Not too well [ ] c. Average [ ]

18. How did you learn to use ICT?

a. At home [ ] b. From friends [ ] c. From school [ ]

d. Training from a computer school [ ] e. Other [ ],

PLEASE SPECIFY ……

19. Are the ICT facilities in the school available to students?

    a. Yes [ ] b. No [ ]

20. If yes, how often are you allowed to use them?

    a. Every week [ ] b. Once a while [ ] c. Once a month [ ]

    d. Twice a week [ ] e. Other [ ]. If other, PLEASE state

21. What do you use the ICT device available to you for?

    a. Academic research [ ] b. entertainment [ ] c. Doing assignments[ ]

22. Which of the following ICT device/ facility can you use well?

    a. Desktop computer [ ] b. Laptop computer [ ] c. projector [ ]

    d. tablet [ ] e. Mobile phone [ ] e. Other [ ].

If other, PLEASE SPECIFY …….....

23. Do you personally own any of these devices?

    a. Yes [ ] b. No [ ]

i) If yes, which of them you own?

    a. Desktop computer [ ] b. Laptop computer [ ] c. projector [ ]

    d. tablet [ ] e. Mobile phone [ ] e. Other [ ].

24. How often do you use these devices/ facilities?

    a. Once a week [ ] b. Twice a week [ ] c. Three times a week [ ]

    d. Other [ ]

If other, PLEASE STATE how often ……..

25. Do you know how to use the internet?

    a. Yes [ ] b. No [ ]

i) If yes, what do you do on the internet?

    a. Academic research [ ] b. entertainment [ ] c. Doing assignments[ ]

26. Are you aware of some advantages of the use of ICT to your academic work?

a. Yes [ ] b. No [ ]

i) If yes, what are some of the advantages that your use of ICT has had on your academic work?

a. For academic research [ ] b. Social networking [ ] c. Send e-mails [ ]

d. Browsing [ ] e. Other [ ]

27. Does your school have internet services?

a. Yes [ ] b. No [ ]

28. Do you have internet services at home?

a. Yes [ ] b. No [ ]

i) If yes, how often do you use the internet when at home?

a. Every day [ ] b. Every week [ ] c. Once in a while [ ]

d. Once a month [ ] e. Twice a week [ ] f. Other [ ]

If other, PLEASE state ……..

ii) If no, how do you access the internet when at home?

a. From a friend's home [ ] b. Internet café [ ]

c. Browse with your mobile phone [ ] d. Other [ ]

If other, PLEASE state ……..

29. Would you say that the frequency at which you use the internet is based on its many

advantages?

a. Yes [ ] b. No [ ]

30. Do your teachers introduce you to websites or online resources on the internet that can help you study their subjects?

a. Yes [ ] b. No [ ]

D. GENDER DISPARITY AMONG STUDENTS IN ICT USE

31. Would you agree to the fact that you learnt to use ICT out of curiosity?

    a. Yes [ ] b. No [ ]

i) If no, what influenced you to learn how to use ICT?

……

……

32. If you are male, what interests you most about ICT? PLEASE list them

1. ……
2. ……
3. ……..
4. ……..
5. ……..
6. ……..

33. If you are female, what interests you most about ICT? PLEASE list them

1. ……..
2. ……
3. ……
4. ……
5. ……
6. ……..

34. In your opinion which sex of students in the school tend to use ICT more often?

    a. Males [ ] b. Females [ ]

35. In your opinion which sex of students are curious enough to discover new forms of ICT devices or social media websites?

    a. Males [ ] b. Females [ ]

36. Are you currently using any social media?

a. Yes [ ] b. No [ ]

i) If yes, which one(s) are you using?

a. Facebook [ ] b. Twitter [ ] c. Instagram [ ] d. WhatsApp [ ]

e. Other [ ]

37. How did you hear about these websites that encouraged you to join?

a. At home [ ] b. From friends [ ] c. From school [ ]

d. Training from a computer school [ ] e. Other [ ]

38. Do your teachers encourage you to use ICT for your studies?

a. Yes [ ] b. No [ ]

39. Are you aware of websites on the internet that can provide you with information to better study your courses?

a. Yes [ ] b. No [ ]

i) If yes, how many of such websites do you know of?

PLEASE STATE ……

40. How often do you use these websites?

a. Every day [ ] b. Every week [ ] c. Once a while [ ]

d. Never use them [ ] e. Other [ ]

If other, PLEASE SPECIFY ……

41. Do your teachers give you 'take-home assignments' during academic breaks (mid-terms/ vacation)?

a. Yes [ ] b. No [ ]

i) If yes, how often?

PLEASE STATE ……..

42. Do you use websites on the internet to help you with information on these assignments?

a. Yes [ ] b. No [ ]

43. Has your acquisition of ICT knowledge and use of ICT made an impact on your performance in your core subjects (Core Mathematics, English and Integrated Science)?

a. Yes [ ] b. No [ ]

i) If yes, how has this impacted your performance in the core subjects?

……..

E. DIGITAL DIVIDE PHENOMENON

44. Would you say that your surrounding environment influenced your ability to use ICT?

a. Yes [ ] b. No [ ]

45. Has your school influenced your knowledge and use of ICT?

a. Yes [ ] b. No [ ]

46. Do students in the school receive support from the school authorities to use ICT in their studies?

a. Yes [ ] b. No [ ]

47. What would you want the school authorities to do for you regarding the use of ICT in the school?

……

THANK YOU FOR YOUR TIME

RESEARCH THESIS INTERVIEW GUIDE

Background

The world today lives in a digital age making the world a global village. This digital age which is characterized by the usage of Information Communication Technology (ICT) is what has transformed the way of life in society which has influenced the major social institutions that occur in any society the world over. It is in reference to this phenomenon that ICT usage has been adopted in the educational sector of any country as a way of building the capacity of people towards the development agenda of the country. Ghana, for instance has not been left out of this quest hence the rolling out of a policy on ICT which has led to the introduction of ICT as a subject area in the curriculum or syllabus of both Junior and Senior High Schools in the country. This research therefore seeks to investigate the "**The usage patterns of ICT in senior high school education in Ghana: A study of two selected senior high schools in Accra**."

The study therefore seeks to find out how teachers and students in senior high schools use the ICT that is available to them and the reasons for their choice of these usages. It is expected that the findings from this study would serve as a useful piece to enhance policy formulation for the educational sector to promote the use of ICT in senior high schools as well as encourage teachers to employ the use of ICT in their teaching approach.

Objectives:

1) To find out how effectively the teachers of the schools use the ICT and ICT tools available to them.

2) To find out how students of the schools use the ICT and ICT tools available to them.

3) To find out the gender disparity that exists among students in terms of ICT usage.

4) To find the impact of ICT usage on the performance of the students in the core subject areas.

5) To determine the extent to which the 'digital divide' phenomenon that exists in the developed countries is being played out in Ghana.

Questions:

1) What subject do you teach in the school?

2) How long have you been teaching in the school?

3) Do you know about ICT?

4) Do you know how to use any ICT device or tool?

5) What kind of ICT tools/devices can you use well?

6) Do you personally own any?

7) If no, why not?

8) What kind of ICT devices/ tools do you own personally?

9) How did you acquire these devices?

10) Does the school have any ICT facilities?

11) What kind of ICT facilities does the school have?

12) Do you use any of the ICT facilities in the school?

13) What do you use them for?

14) How often do you use the ICT facilities in the school?

15) Do you encourage your students to use ICT in studying your subject?

16) Do you engage your students in the use of ICT for the studying of your subject?

17) What impact has the use of ICT had on your teaching style?

18) What impact has the use of ICT had on your knowledge base of your subject area?

19) What impact has the use of ICT had on the academic performance of your students?

20) Do you agree to the notion that the environment you find yourself has influenced your knowledge and use of ICT?

21) What are some of the challenges you have encountered in the use of ICT?

22) Has your school received any support from the government in terms of ICT?

23) What kind of support has your school received from the government?

24) Do you receive support from the school authorities to use ICT in your teaching approach?

25) What kind of support would you want from the school authorities regarding ICT?

26) What kind of support would you want from the government regarding ICT?

CHI-SQUARE TESTS AND CROSS-TABULATION DISTRIBUTION

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Sex * What do you use it for?	232	98.7%	3	1.3%	235	100.0%

Sex * What do you use it for?
Cross tabulation

			What do you use it for?										
				Research	Entertainment	Project works	Chatting	Browsing	Printing questions	Designing softwares	For learning	9	Total
Sex	Male	Count	2	65	9	8	0	8	0	1	10	3	106
		% within Sex	1.9%	61.3%	8.5%	7.5%	.0%	7.5%	.0%	.9%	9.4%	2.8%	100.0%
		% of Total	.9%	28.0%	3.9%	3.4%	.0%	3.4%	.0%	.4%	4.3%	1.3%	45.7%
	Female	Count	8	76	6	6	1	2	3	1	23	0	126
		% within Sex	6.3%	60.3%	4.8%	4.8%	.8%	1.6%	2.4%	.8%	18.3%	.0%	100.0%
		% of Total	3.4%	32.8%	2.6%	2.6%	.4%	.9%	1.3%	.4%	9.9%	.0%	54.3%
Total		Count	10	141	15	14	1	10	3	2	33	3	232
		% within Sex	4.3%	60.8%	6.5%	6.0%	.4%	4.3%	1.3%	.9%	14.2%	1.3%	100.0%
		% of Total	4.3%	60.8%	6.5%	6.0%	.4%	4.3%	1.3%	.9%	14.2%	1.3%	100.0%

Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	19.486[a]	9	.021
Likelihood Ratio	22.700	9	.007
N of Valid Cases	232		

a. 10 cells (50.0%) have expected count less than 5. The minimum expected count is .46.

School and ICTusage patterns

School * What do you use it for?

Cross tabulation

			What do you use it for?										
				Research	Entertainment	Project works	Chatting	Browsing	Printing questions	Designing softwares	For learning	9	Total
School	St Johns	Count	10	37	7	6	1	10	3	2	33	3	112
		% within School	8.9%	33.0%	6.2%	5.4%	.9%	8.9%	2.7%	1.8%	29.5%	2.7%	100.0%
		% of Total	4.3%	15.9%	3.0%	2.6%	.4%	4.3%	1.3%	.9%	14.2%	1.3%	48.3%
	GHANATA	Count	0	104	8	8	0	0	0	0	0	0	120
		% within School	.0%	86.7%	6.7%	6.7%	.0%	.0%	.0%	.0%	.0%	.0%	100.0%
		% of Total	.0%	44.8%	3.4%	3.4%	.0%	.0%	.0%	.0%	.0%	.0%	51.7%
Total		Count	10	141	15	14	1	10	3	2	33	3	232
		% within School	4.3%	60.8%	6.5%	6.0%	.4%	4.3%	1.3%	.9%	14.2%	1.3%	100.0%
		% of Total	4.3%	60.8%	6.5%	6.0%	.4%	4.3%	1.3%	.9%	14.2%	1.3%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	94.025[a]	9	.000
Likelihood Ratio	119.186	9	.000
N of Valid Cases	232		

a. 10 cells (50.0%) have expected count less than 5. The minimum expected count is .48.

Link between ICT facilities and grades.

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Has ICT helped improve your grades in your core subjects? *What facilities*	235	100.0%	0	.0%	235	100.0%

Has ICT helped improve your grades in your core subjects? * What facilities *Cross tabulation*

			What facilities						
			Desktop computers	Laptop computers	Tablets	Projectors	All the above	None of the above	Total
Has ICT helped improve your grades in your core subjects?		Count	1	1	0	0	1	0	3
		% within Has ICT helped improve your grades in your subjects?	33.3%	33.3%	.0%	.0%	33.3%	.0%	100.0%
	Yes	Count	108	24	2	2	38	0	174
		% within Has ICT helped improved your grades in your core subjects?	62.1%	13.8%	1.1%	1.1%	21.8%	.0%	100.0%
	no	Count	43	4	1	1	8	1	58
		% within Has ICT helped improve your grades in your core subjects?	74.1%	6.9%	1.7%	1.7%	13.8%	1.7%	100.0%
Total		Count	152	29	3	3	47	1	235
		% within Has ICT helped improve your grades in your core subjects?	64.7%	12.3%	1.3%	1.3%	20.0%	.4%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	9.236[a]	10	.510
Likelihood Ratio	9.104	10	.522
N of Valid Cases	235		

a. 12 cells (66.7%) have expected count less than 5. The minimum expected count is .01.