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THE ROLE OF ICT TOOLS IN EDUCATIONAL DELIVERY: A

STUDY WITHIN THE TAMALE METROPOLIS.

UNIVERSITY FOR DEVELOPMENT STUDIES

GEORGE YAW AKUFFU

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BY

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THESIS SUBMITTED TO THE DEPARTMENT OF AFRICAN AND GENERAL STUDIES, UNIVERSITY FOR DEVELOPMENT STUDIES IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF MASTERS OF PHILOSOPHY DEGREE (MPHIL) IN DEVELOPMENT STUDIES.

OCTOBER, 2020

DECLARATION

Student

I hearby declare that this piece of work is my original work submitted towards

Master of Philosophy in Development Studies and it contains neither materials

previously published by anybody or presented to other University for the award

of a degree, except all due acknowledgement has been made in this work.

Candidate's

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Name: George Yaw Akuffu.

Supervisor

I hearby declare that the preparation and presentation of this thesis was

supervised in accordance with the guidelines and supervision of thesis laid down

by the University for Development Studies.

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Signature………………………………….Date………………………………….

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ABSTRACT

Technologies can improve educational delivery in schools. This study examined the role of ICT tools in lessons in thirty (30) public basic schools in the Tamale Metropolis. Diffusion of Innovation (DOI) Theory anchored the study. The study as a mixed method, adopted cross-sectional design. Simple random, cluster and purposive sampling were used to select a sample size of 398 to participate in the study. Questionnaires were used for the quantitative data and semi-structured interview guide were used for the qualitative data. The quantitative data were analysed using SPSS and presented in frequencies and percentages whilst the qualitative data were analysed using content analysis. The study revealed that ICT tools had positive impact on lesson delivery, but with the limited tools in the study area, this impact was achieved due to limited ICT tools. Also, teachers were challenged with skills of integration. The study concluded that, ICT tools were inadequate in the public basic schools for all students to access. However, majority of the teachers showed that they had knowledge on ICT tools. Finally, the study revealed how these tools had a positive impact on teaching and learning and the improvement of student understanding, motivation of student learning and a positive influence for improving school attendance. The study recommended improved government's policy commitment in the provision of basic schools with ICT tools, offering laptops for teachers on hire purchase bases, regular training of teachers in ICT integration skills and connecting the public basic schools to the national grid for effective ICT integration for quality education delivery were suggested.

ACKNOWLEDGEMENT

DEDICATION

I dedicate this piece of work to my dad Akuffu Kwasi for his love in our

education and my kids Wayne Kudui-Marfo Akuffu, Michael Obuanasi

Akuffu and Bridget Akuffu.

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LIST OF ABBREVIATION

BBC	British Broadcasting Corporation
BECE	Basic Education Certificate Examinations
CBD	Central Business District
CD	Compact Disc
CD-ROM	Compact Disc Read Only Memory
DBE	Diploma in Education
DLA	Discovery Learning Alliance
DOI	Diffusion of Innovation Theory
DVD	Digital Versatile Disc
EFA	Education for All
E-MAIL	Electronic Mail
EU	European Union
fCUBE	Free Compulsory Universal Basic Education
FM	Frequency Modulation
GES	Ghana Education Service
GIPC	Ghana Investment Promotion Centre
GoG	Government of Ghana
GPRS	Ghana Poverty Reduction Strategy
GSS	Ghana Statistical Service
HND	Higher National Diploma
ICT	Information and Communication Technology
ICT4AD	ICT for Accelerated Development
ID	Identity Document
IEA	International Association for the Evaluation of Educational Achievement
IT	Information Technology
IT&T	Information Technology and Telecommunication
JHS	Junior High School
JSS	Junior Secondary School
LI	Legislative Instrument
MDGs	Millennium Development Goal
MMDAs	Metropolitan, Municipal and District Assembly
MoE	Ministry of Education
NABCO	Nation Builders Corps
NTV	North Television
PNDC	Provisional National Defence Council
ROMs	Read Only Memory
SACMEQ	Southern and Eastern Africa Consortium for Monitoring Educational Quality
SDA	Seventh Day Adventist
SDGs	Sustainable Development Goals
SHS	Senior High School
SMRS	School Records Management System
SMS	Short Message Service
SPSS	Statistical Package Social Sciences
SSS	Senior Secondary School
STV	Sagani Television
TaMA	Tamale Metropolitan Assembly

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TTH	Tamale Teaching Hospital
TV	Television
TVET	Technical and Vocational Education and Training
UDS	University for Development Studies
UK	United Kingdom
UN	United Nation
UNESCO	United Nations Educational, Scientific and Cultural Organization
VCR	Videocassette Recorder
WAEC	West African Examination Council
Wi-Fi	Wireless Fidelity
WSIS	World Summit on the Information Society

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CHAPTER ONE

1.0 Background

The advent of Information and Communication Technologies (ICTs) is proven to be a powerful catalyst for economic growth and social development. In this current global context, ICTs are transforming how people work and changes educational systems (ICT in Education Policy, 2015). ICTs have become one of the fundamental building blocks of societies, in a very short time (Daniels, 2002).

Information Technology (IT) was first introduced in the early 1980s to indicate the convergence of computer technology and communication technology. However, in the 1990s, the term Information and Communication Technology (ICT) was more widely used to replace Information Technology, thus which is to give a greater emphasis on communication aspect. Pelgrum et al. (2003) has reported that by the middle of the 80s, the term 'computers' was substituted by 'Information Technology' to show a change from computation to information storage and retrieval by users. Later, the term 'Information and Communication Technology' was introduced by 1992 when e-mails was opened to the general public.

According to UNESCO (2007), the term Information and Communication Technologies (ICTs) are the forms of technology used for the transmission, processing, storage, creation, display, sharing or exchanging of information in an electronic medium. This broad definition of the ICT includes technologies such as radio, TV, video, DVDs, telephone (fixed and mobile), satellite, computer and network hardware and software as well as video-conferencing, e-mail, and blogger equipment or services associated with these technologies.

In this contemporary age, ICTs are now numerous and that is why both developed and developing nations now see the use ICTs as a way to understand and master core skills and concepts, together with reading, writing and digital learning. In this current times, several studies have highlighted the opportunities and the potential benefits of Information and Communication Technologies (ICTs) in educational delivery in schools especially at the early stages of education. ICTs spans a broad spectrum of products, including web-based services. There are different kinds of ICT products which have relevance to our current educational system. They include email, teleconferencing, television lessons, audio conferencing, interactive voice response system, radio broadcasts, interactive radio counselling, audiocassettes and CD ROMs and others are used in education for various purposes (Sharma, 2003; Sanyal, 2001; Bhattacharya and Sharma, 2007). More also, Information and Communication Technology includes all the technology used for data handling and interaction, particularly in education, and their use. These include computers, audio visual systems, broadcast receiving systems and telecommunication systems, media such as compact discs and videodiscs, microcomputer-based laboratories, virtual learning centres, the Internet, local and wide area networks (wired and wireless), educational television, instructional software, e-mail, printed media, voice mail, satellite communication, VCRs, cable TV, conventional and interactive radio (ICT policy for education, Namibia). The ICT catalogue is inexhaustive and is still growing till now. More recent entries cover tablets, virtual TVs and robots.

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Globally, there is the recognition of the role of ICT in development efforts which rises in modern time, such as the 1998 World Development Report and the 2001 Human Development Report called for Software used for Human Development. ICT now offer vast and diverse economic growth opportunities, better service provision, enhanced healthcare services, and prompt global education according to these reports. The increasing permeation of ICT in all aspects of modern life has brought about the concept of a "knowledge-based society". Castells (2001), refers to this as a 'knowledge economy', an economy in which the prompt provision of knowledge and ideas leads to product development, economic growth and progress.

ICT tools are recognised internationally as extremely important to education delivery and countries are urged to include them in their curriculum planning. The World Summit on the Information Society (WSIS), which was held in two phases in Geneva, December 2003, and Tunis, November 2005, brought global commitment towards "building a people-centred, inclusive and development-oriented Information Society, where everyone can create, access, utilise and share information and knowledge, enabling individuals, communities and peoples to achieve their full potential in promoting sustainable development and improving their quality of life" resulted in a "clear commitment by governments to foster the achievement of an inclusive information society." To this end, the WSIS Geneva Plan of Action identified ten targets to be achieved by 2015. The Geneva Plan of Action includes target 2 to "Connect all educational institutions", target 7 to "Adapt all primary and secondary school curricula to meet the challenges of the information society" as well as target 8 to "Ensure

that all have access to television and radio services" (World Summit on the Information Society, 2003-2005).

The European Commission in 2010 implemented a Digital Agenda in Europe (European Commission, 2010b), The Agendas aim was to tap the social and economic benefit of ICTs for its citizens. It acknowledged that for the Agendas aim to be achieved, there is the need for them to develop high-level ICT knowledge, including digital and media literacy for its citizens. As a result, all the European countries developed and adopted national policies to foster the use of technologies in all areas of their educational system. In view of this, some policies where formulated to provide the necessary basic ICT skills to pupils of all levels as well as to provide ICT training for teachers to ensure effective educational delivery. Another defining feature of the Agenda was the provision of up-to-date modern technology and infrastructure at all schools throughout European countries.

The use of ICT tools in education has brought about better communication between schools and parents of students, an important part of the daily process of school management of the countries of Europe. According to Commission for Europe (2011), most schools in Europe have online newsletters that parents can often sign up for, or address many problems to give feedback to their wards school. Eventually, other organisational materials are also available, such as circular letters or ads, for parents to read on-line. The use of ICT in certain schools is not limited only to the delivery of everyday knowledge to parents, but also to the enhancement of family engagement and to promote education

outside the schoolroom (Commission for Europe, 2011). Furthermore, Schools use Intranets, in specific primary and secondary, through certain administrative authorities to support various operations in the schools. This includes surveillance of participation, appraisal documents, reporting to parents, financial management, and the exchange of data among school staff. A study carried out in 2014 by Education Technology Charity Tablets for Schools in Europe shows that nearly 70% of primary and secondary schools in Great Britain use tablet computers for their learning purposes (BBC, 2017).

The use of ICT tools in education can reduce barriers to education for students and teachers throughout the country irrespective of their location. Through ICT tools, learning can occur anytime and anywhere by one. Thus, it can eliminate geographical barriers for teachers and pupils to access any information from any location in the world. For instance, vital information can be accessed on the internet 24 hours a day, seven days a week by learners. Based on the use of ICT tools, teaching and learning no longer depend exclusively on printed materials, multiple resources are abundant on the Internet for one and also, knowledge can be acquired through video clips, audio sounds, visual presentation and others. The use of technology can have great effect on non-formal education including campaigns for illiteracy and health campaigns (UNESCO, 2002). According to UNESCO (2007), ICT tools can be employed as an educational instrument to improve learning outcomes by enabling the learners to learn more interactively and involving themselves more closely in the topics being thought. It can improve their motivation for learning through the enhancement of the relevance of content and learning.

According to the United Nations (2013), 95% of current global jobs are in the domain of technologies, and encouraged girls across the globe to get themselves involved in technology, a statement to mark the International Day of Girls. It further added that this can bridge the gender gap between males and females in the employment sector. Technologies has drastically changed how people work, communicate, learn and live in this modern era. ICT tools can help teachers to provide innovative ways of teaching and learning as well as effective ways of delivering school management system if used properly. According to European Commission (2008c), Embedding ICT in education and training systems requires further changes across the organisational, technological, teaching and learning environments of classrooms, workplaces, and informal learning settings. The basic skills or key competences of using ICT tools are the outcomes of the educational process and therefore form part of the conceptual shift 'from a content-based input approach to a competence-based output approach' (Malan 2000, p. 27). The use of ICT by teachers can have great benefits to them and this may even be increased if pupils themselves are allowed to use the tools in their learning processes in the classroom. It has been proven that the use of ICT tools can raise students' motivation to learn in schools, this is done by giving learners more control of their learning experiences (Condie et al., 2007; Passey et al., 2003). The use of ICT tools by pupils can also facilitate their personalised and individualised learning process both at school and at home.

UNESCO (2015), held a World Education Forum to unite the world's community and lead the world towards a powerful new life-oriented educational agenda in Incheon, Korea. In the *Incheon Declaration*, the vital role of ICT in achieving the new global education stated that: *"Information and Communication Technologies (ICTs) must be harnessed to strengthen education systems, knowledge dissemination, information access, quality and effective learning, and more effective service provision."* (UNESCO, 2015a).

The International Conference on ICT in education was further hosted by UNESCO in Qingdao, China, in May 2015. The conference stressed the vital role of ICT tools in education in the future by putting together around 65 education ministers, leading to the Qingdao declaration. Based on this declaration, countries are expected to integrate technology into their educational systems (UNESCO, 2015b). Target 4 stated that in order to achieve the goal of inclusive and equitable quality education and lifelong learning by 2030, technologies must be harnessed to strengthen the education system, information access, knowledge dissemination, quality and effective learning, and more efficient service provision (Qingdao Declaration, 2015). Target 5 also stated that, technology offers more opportunities to bridge the long-existing gab learning divide in communities especially less developed areas.

The Sustainable Development Goals (SDGs) also acknowledged the importance of technologies in education. Its target 4a acknowledged that countries need to: *"Build and upgrade education facilities that are child, disability and gender sensitive and provide safe, non-violent, inclusive and effective learning*

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environments for all." Finally, the SDGs also recognise that technology in education is important for achieving SDG Target 4.4, which states that, "*By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship.*"

In many developed nations, ICT tools are already firmly established in their education system as compared to many developing countries where it is at the lowest stage (UNESCO, 2016a). However, Africa, the continent is low in terms of acceptance, usage and development in the ICT industry according to Zhao and Frank (2003). As a consequence, people lack adequate and better-managed learning programs and institutions, despite the significant contribution of ICT tools to education around the world.

Efforts which has been made to improve the educational foundations in developing countries to tap from the use of technology to address the challenges that cause poor learning outcomes in our schools are still faced with many challenges. Such challenges most at times include teachers' limited knowledge, absence of books, inefficient school management, poor decision making at the central level, and irrelevant lessons to the lives of students. These problems hinders the development of literacy and numeracy skills of pupils in schools, as well as their higher-order thinking skills to enable them to participate in the global economy after completion. The uses of technologies such as mobile phones, radio, computers, the internet, and other modern tools can help provide opportunities in schools especially developing countries.

The development of the ICT infrastructure in Ghana rose to 2.9% in 2000 as compared to other least-developed countries worldwide from 0.4% in 1995 and 1.1% for sub-Saharan Africa (Nii Armah et al., 2015). The Government of Ghana (GoG) and other agencies strengthened the ICT infrastructure to enable the country to meet the developed countries with the objective of shortening the digital divide in terms of technology. The Kofi Annan ICT Excellence Center, a Ghana/India joint project was established to improve the human resources required in the country and the sub-region for the developing of the ICT industry in the country. Many of the investments included the establishment of Internet service providers and telecommunications companies in ICT networks to help improve the country's availability of communication services. Certain programs that seek to improve high-speed internet and video connectivity are also being introduced. The Ghana government also signed an agreement with Microsoft Corporation to provide funding for ICT learning in the country by the world's largest ICT firm. The fastest Internet cafe in Africa, Vodafone Ghana also launched a café and retail shops with a bandwidth of over 40 megabytes per second and wi-fi in Cantonments, Accra North, Koforidua, Accra Central, Tamale, Accra Mall, Tema, Kumasi, Ho, and Takoradi (GIPC, 2015).

The telecommunications sector was also liberalised and reformed to allow more businesses to enter and operate. Six (6) mobile network providers in Ghana are in service, including Scancom Ghana Limited (MTN), Millicom Ghana Limited (Tigo), Vodafone Ghana Limited, Airtel Telecom, Globacom Ghana Limited (Glo) and Expresso. These companies provide internet services to help make

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access to information easy for all Ghanaians irrespective of their location in the country.

In the educational sector, the computer-student ratio at the national level is 42:1, with Northern Region having the highest at 50:1 and Volta Region the lowest at 33:1 (ESPR, 2010). The ICT in Education Policy was implemented to improve the socio-economic development efforts and to direct more resources in improving educational delivery in the country (ICT in Education Policy, 2015) by integrating ICT into the educational system. The Ministry of Education (MoE), Youth and Sports, Education Managers, ICT Experts and other Stakeholders with diverse experiences came together and drew the ICT in education Policy for the country. The policy goal was to ensure the education sector to offer Ghanaians with enough opportunities to improve the skills needed to benefit from the knowledge system, irrespective of education (both formal and non-formal). This led to the introduction of ICT as learning and teaching tool in the curriculum at all levels of our education in the country by Ministry of Education (MoE). This was done by providing computer labs, internet access, provision of laptops to pupils and teachers, and teachers capacity building programs (ICT in Education Policy, 2015) in the country as well as being made an examinable subject at the Basic Education Certificate Examination (BECE) level. A developmental plan was formulated to provide 1000 Community Learning Centres in primary schools and 2000 Community Learning Centres in JHS. It also included 496 SHS, 26 TVET and 38 colleges. The *One Laptop Per Child Policy* was to provide 1000 laptops to 30 Primary Schools including three in each region in the country (ESPR, 2010). This was

to addressed the resource gap in terms of the use of ICT tools in the education sector in the country.

Also, in 2008, the Government of Ghana (GoG) partnered with *rlg* again and provided laptops to pupils through it one laptop per child policy and teachers in the basic sector in the country. This was to facilitate the teaching and learning of ICT in our basic schools. The use of ICTs in Education should be able to create new possibilities for teachers and students to access and analysed information easily and its use should also allow access to education and improve the quality delivery in schools (ICT in Education Policy, 2009). It is the tertiary sector that is more efficient in the acquisition and use of ICT tools in the country (ESPR, 2015). For instance, all the major universities in the country have their own ICT policies, including ICT levy for students to pay. This gives students the opportunities to access computer labs as some are connected to the internet for use. The tertiary sector also engaged students through the online and e-portal system. The use of technological tools like laptops, projectors, microphones, loud speakers and the internet are common in our tertiary and second cycle institutions in the country. Some tertiary institutions are not fully endowed, enabling private sector to run cyber cafés on campuses for students to be able to have access to the internet (Kofi, 2007). The Cloud Network Limited operates wi-fi-networks to provide students in some Ghanaian Universities with broadband connections. Its service delivers broadband wi-fi enabled smartphones, laptops, and entertainment devices to have access to the internet. The company connects various devices to its wi-fi network at any location in

the country for students to use for their educational purposes. This is widely used on UDS Wa campus by students for research purposes.

However, basic school which is the first 11 years of education comprising kindergarten, primary and junior high schools (ESPR, 2015) in the country ICT tools usage level is different as compared to the tertiary sector in the country. 87% of the Second Cycle Institution have laboratories (ESPR, 2010) equipped with computers. The use of ICT tools at the basic school level is very important at the early age of children education since it has great effects on their learning environment and their wellbeing. It will be important that children should be made to use ICT tools at the basic level to support their learning process since they need the opportunity to explore and play with some of the tools.

Similarly, notwithstanding the significance of ICT tools in education and the progress made so far in the country, basic schools in the country still witness low use of ICT tools in their educational delivery. This might be one of the reasons why many schools faced challenges managing the large enrolment rate in basic schools leading to poor performances of students at the Basic Education Certificate Examinations (BECE) conducted by the West African Examination Council (WAEC).

The ability of ICT tools to be able to handle diverse kinds of problems in school through its usage has made it easy for the challenges to be overcome by users. ICT tools need to be provided to basic schools to ensure effective educational delivery in the country. This will help in areas like the collection of student

information, teaching and learning, results recording and other school records keeping. Information of all kind can be programmed into the computer for future use by school authorities. Also, information on students, teaching and nonteaching staff, teaching and learning can also be done with the use of ICT tools in our basic schools in the country. The integration of technology in education can be a way of providing effective and efficient solutions to our educational problems that would have been difficult, if not impossible to solve through human efforts in the country.

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1.1 Problem Statement

For every nation to have its future generation at heart, it must commit more of its resources into its human capital development for growth and competitiveness in the global level (ICT in Education Policy, 2015). Education is the way to develop human resources in order for them to contribute to a nation's socio-economic development. Based on this, the Government of Ghana (GoG) has placed more seriousness on the basic education system in the country. This is done by improving it opportunities for pupils through some policy measures in the form of social intervention programs such as capitation grant, school feeding, free BECE registration, provision of school uniforms, provision of sandals, provision of exercise books and materials support for needy pupils in the basic schools. This has enabled more children, especially those from deprived homes to access education more than ever, thus increasing enrolment rate at all levels in the country (Ministry of Education, 2010).

According to figures for the period 2013/14 to 2014/15, the amount of actual enrolment in basic education has increased dramatically, with enrolment growth of 7.4%, 5.5% and 8.0% respectively for the KG, Primary and Junior high schools (Education Sector Performance Report, 2015). Also, from 2008/09 to 2015/16 academic year, enrolment in Primary Schools increased from 3.7 million to 4.3 million representing 60% increased and at the Junior High School, enrolment also increased from 1.3 million to 1.6 million representing 30% increased (Naana, 2016).

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Unfortunately, basic schools in the country are not provided with ICT tools for teachers to use in their lessons in recent times as there is a rise in enrolment at the country's basic school level. Developing nations use of ICT tools in education is limited (UNESCO, 2016) of which the country is not an exception to the limited use of these tools in their lesson delivery. There is also little data on ICT tools in basic schools in the country, this is because not much studies have been done on it. The use of ICT tools in the country's basic schools will improve administration, process and store large digital information created by teachers, but little emphasis has been placed on embracing ICT tools in our basic schools in the country to improve lessons.

Jones (2004), outlined some barriers in integrating ICT tools into lessons by teachers in schools as less confidence in teachers during lesson integration, limited access to ICT resources, insufficient time, limited training, technical challenges with software, and the age of teachers as some of the challenges faced by the teachers. Boit and Menjo (2012) also observed inadequate ICT skills of teachers, insufficient administrative equipment for computation, time factor and inadequate administrative tools as some challenges schools faced in using ICT tools. All these and many others were influential in the restricted use of ICT tools in schools and several schools managed and stored their data by hand in remote areas. Technology usage is still in its early stages in Ghana regardless of the fact that the country was the first to access internet connectivity in sub-Saharan Africa (Intsiful et al. 2003).

In the Tamale Metropolis, the Metropolitan Director of education enumerated inadequate computers and electricity, cost of broadband internet connection,

insufficient ICT trained teachers, as some of the challenges the basic school curriculum faces (Northern ICT4D Series, 2009). Notwithstanding that Government of Ghana (GoG) implemented ICT for Accelerated development (ICT4AD) policy in 2003; ICT in Education Policy in 2008, provision of *rlg* laptops to basic schools, and the training of teachers in ICT in basic schools, that have still left many teachers not integrating ICT tools into their lessons. This failed to improve the use of ICT tools in basic schools in the Tamale Metropolis. It is against this background that the study examined the role of ICT tools in educational delivery in the public basic schools in Tamale Metropolis.

1.2 Main Research Question

What role does ICT tools play in educational delivery in basic schools in the Tamale Metropolis of the Northern Region of Ghana?

1.2.1 Sub Research Questions

1. What are the availability level of ICT tools in the public basic schools in the Tamale Metropolis?
2. How knowledgeable are teachers in ICT tools for lesson delivery in the Tamale Metropolis?
3. How does ICT tools impact on lesson delivery in basic schools?

1.3 General Objective

To determine the role ICT tools play in educational delivery in basic schools in the Tamale Metropolis of the Northern Region of Ghana.

1.3.1 Specific Objectives

1. To determine the availability level of ICT tools in public basic schools in the Tamale Metropolis.

2. To determine how knowledgeable teachers are in ICT tools for lesson delivery in the Tamale Metropolis.

3. To determine the impact of ICT tools on lesson delivery in basic schools.

1.4 Scope of the Study

The study was on the role of ICT tools on educational delivery within the Tamale Metropolis. The study examined ICT tools that are available and used for educational delivery in the basic schools. Public basic schools were used in the Metropolis because they all used the same curriculum and possessed similar characteristics in the country.

1.5 Significance of the Study

According to UNESCO (2002), technology can facilitate universal access of children's education, bringing about equity in education, delivery of quality teaching and learning, development of teachers' skills, Schools' administration and governance, provided the right policies, technologies and capacities are properly mix in the country. The study highlighted the integration of ICT tools in education for an interactive learning (UNESCO, 2015; ESPR, 2015) towards improving learning outcomes of learners. Additionally, this research highlighted and deepened the conscious raising and awareness amongst teachers

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on the use of ICT tools in Education as a way of improving the technological knowledge of teachers.

The study also encouraged the use of ICT tools for an interactive learning (UNESCO, 2015; ESPR, 2015) and thereby easing the work of teachers in the basic schools. Finally, the study amplified the need to invest in ICT tools in basic schools towards the implementation and achievement of the ICT in Education Policy (2008), thus improving the poor performance of pupils at the Basic Education Certificate Examination (BECE) level.

1.6 Organization of the Study

The entire study was organised into five chapters. Chapter one presented the background, problem statement, research questions, research objectives, scope, significance of the study, and the organization of the study. Chapter two provided a theoretical framework and a study of relevant literature. Chapter three provided a detailed analysis of the methodology and techniques used for the study. Chapter four dealt with the presentation, interpretation and analysis of findings. Lastly, Chapter five presented the summary, conclusion and recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

Reviewing related literature is very important in any research to be undertaken. It provides a good basis for development of knowledge, promotes a wide range of available research areas and identifies areas of study (Webster and Watson, 2002). This section explored the theoretical framework and reviewing of relevant literature on how ICTs have impacted on educational deliveries in schools. This discussed the historic awareness on fundamental education in Ghana and the ICT in the fields of education, policies and principles that help the issues of education in elementary schools. It also included ICTs in basic schools, teachers and ICTs, and the impact of ICTs in basic schools.

A lot of research have been done about the use of technology in schools especially the basic level of education and emphasis have been made on ICT in the early years in education. Although, some scholars have expressed the safety concern about ICTs integration in early childhood education and warn about its risk to the children. Cordes et al (2000) expressed the worry about how technology use in children education may waste money, time and childhood itself which speed up the pace and reducing the essential learning experiences of children at the early stage in their lives. Haugland (2000) also argued that since children learn through their bodies, technology integration is not appropriate at that stage of children's lives because screen-based medium activities are not effective as manipulative in developing skills and understanding in children. However, current studies and research about ICTs in

education had refuted this claim. ICTs integration in basic schools in an appropriate way and where skilled personnel and ICT tools are available, it can significantly support and enhance learning and the development of children (Wang et al, 2006). For instance, Papert (2006) is one of the early proponents of ICTs in education for children even in the early 1960s. He stated that computers open and widen opportunities for new forms of learning that are in line with young children nature than older people. This is because ICT tools can help children to tell and listen to stories, creates or draws something and interacts with others. The use of technology can greatly make contributions to children's literacy development such as listening, speaking, reading and writing (Van et al, 2002).

Many research has also been done about ICTs and education in Ghana and the Tamale Metropolis as well. Wahab (2012), in his study on 'Teacher Motivation and Quality Education Delivery' in the Tamale Metropolis came out with the findings that the major challenges to quality education in the Metropolis is the lack of Teaching materials such as pupils text books, teachers' guide and the syllabuses, mathematical instruments and equipment in laboratories for teachers to use. He also added that, teachers' commitment to work, and insufficient motivation of teachers were some of the factors that brought about low-quality educational delivery in the Metropolis. James et al. (2015), also investigated how school administration, teaching and learning were promoted through the use of technologies in basic schools in Ghana. A total of 333 Primary schools and 295 Junior High Schools in four regions in the country were selected for the study.

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The study presented its findings and it showed that, primary schools in the selected regions had relatively low computers (4%) than junior high schools (10%). They further added that in the primary schools, 69% of female teachers use ICT tools, whiles 50% of their male counterpart use ICT tools to teach. Another study conducted by Iddi (2016) in Tamale Metropolis on the topic "Academic Performance among Public and Private Junior High Schools" showed that there was high academic performance among private school pupils in basic schools than their counterparts in the public basic schools in the Metropolis. He added that teachers in private schools (67%) had greater access to teaching and learning materials than teachers in public schools (18%) having access to teaching and learning materials.

All these and many more studies were geared towards the improvement of quality education in the Metropolis but what this study sought was to access the role ICT tools play in educational delivery in basic schools within the Tamale Metropolis. This was also expected to provide knowledge to help improve educational quality in the Metropolis.

2.1 Theoretical Framework

Many theories had been propounded about the process of adopting technology and the most preferred adoption model that suited this study was the Diffusion of Innovation Theory (DOI) by Everett Rogers. According to Rogers (2003), diffusion is the process whereby an innovation is communicated through specific channels over time among members of a social system. This process heavily depends on human capital for successful implementation, likewise

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teachers who are the implementers in education policies are very important in terms of the use of ICT tools in lessons. Teachers' knowledge and skills in ICT tools is paramount in the successful implementation in the ICT in Education policy in the country.

Rogers (2003) described the process of innovation decision-making as a system of data finding and information processing, which allows a person to minimise confusion as to the benefits and disadvantages of an invention to be implemented. Rogers (2003), classified the innovation-decision process into five stages. The first stage is the knowledge stage. In this stage, the existence of a new knowledge is made known to an individual and questions are asked about the innovation and how it will be used in their work. "What?" "how?" and "why?" are some of the critical questions asked at this stage by potential adopters. The next stage is when prospective consumers are persuaded about the new technology before they are entirely accepted. At the third stage, potential users make a choice either to accept or reject the innovation in their work. The fourth stage is the implementation stage, and the last stage is user's verification. This is where the person seeks to support his or her decision. According to Rogers (2003), an individual can reverse the decision if the person is confronted with challenges regarding the innovation he or she has adopted.

Rogers (2003) grouped adopters of innovations as innovators, early adopters, early majority, late majority, and the laggards. According to Rogers (2003), the innovators are venturesome and willing to experiment new ideas in their daily work. He also added that they are able to take risk and the first to try out an

innovation. The next which is the early adopters, they tends to hold leadership roles in the society and some members in the society rely on them for information about the innovation to adopt. The early adopters' attitudes toward an innovation is more important, and they are able to adopt by approving a new idea. The next which is the early majority are cautious in adopting a new idea and they would never be the first nor the last to adopt a new idea. Thus, decision making normally take more time to adopt. There is absence of leadership role in them as compared to early adopters have. The late majority wait until almost all their mates adopt an innovation before they will then accept an innovation by themselves. Economic reasons and peer pressure may enable them to adopt a new idea, although they may be sceptical about the new idea. The final group are the laggards according to Rogers (2003). They are static and more sceptical about an idea and change agents than the late majority. They take the decision of accepting an idea after assessing its use been adopted by others in their society. Their decision making normally takes more time.

2.1.1 Use of the Theory for This Study

To be able to use the diffusion of innovation theory for this study, teachers who are the centre of adopting and usage of ICT tools in their work must have adequate knowledge and skills about ICT tools since that is the starting point of an innovation. Teachers need to be trained to acquire knowledge and skills about how to use ICT tools appropriately in research, preparations of lessons, teaching and learning as well as documentation of pupils' information in the schools. This is supported by Wetzel (1993), that schools that have the tools may not integrate the technology into their lessons if they do not have the right

knowledge as to how to use it in their work. Stakeholders in education should also educate teachers about the importance of using ICT tools in lessons. An individual knowledge about an innovation may not necessarily mean they will adopt a new idea since their attitudes also influence their acceptance or not. Therefore, teachers should be persuaded to shape their attitude towards the use of ICT tools in their work to improve their productivity. Rogers (2003) further added that the knowledge stage is more cognitive centred, and the persuasion stage is more affective centred. Other people's subjective assessment of an innovation that reduces uncertainty about the innovation outcomes are usually more important to the individual. If information of an idea is available, teachers will usually prefer to acquire it from trusted friends and mates whose individual opinions of a new idea can be convincing to them (Sherry, 1997).

Teachers should be given training about ICT tools at the decision stage. This will influence their adoption process for them to integrate it in their lesson preparation, teaching and learning process in the classroom. There should be partial trial basis during training sessions to facilitate the adoption of the innovation by majority of teachers, since most people first want to try a new idea on their own situation and then make the decision to adopt. In the implementation stage, teachers may assess the importance of integrating technology in their work and then determine their commitment to its usage. They may need some assistance from experts and their mates to eliminate the degree of uncertainty about the effects of using it in their work. Also, there should be an opportunity for reinvention since it is also crucial at the implementation stage. According to Rogers (2003), there should be an

opportunity for reinvention. This is about how an innovation can be changed or modified by a potential user in the process of its adoption and usage. He further adds that if an innovation is more easily to reinvent, the more rapidly that innovation can be adopted. ICTs tools have many possible opportunities and uses in education, so technologies are more open for reinvention by users to suit them.

2.1.2 Limitation of the Theory for This Study

The Diffusion of Innovation Theory does take into consideration an individual's resources or social support to adopt a new idea or not. In this case, the government does not take much concentration of teachers at the centre stage of integrating ICTs in education. Teachers who are at the centre of this study lack the knowledge and the resources for integration into their lessons. Theoretical consideration was not given to a certain category of adopters who have certain innovation characteristics, but to a rate of adoption because of certain innovation beliefs and culture. Ultimately, the theory has not established the basis for predicting or leading the way to speed up technology acceptance.

2.2 Conceptual Framework

The concept of ICTs in educational delivery is presented in Figure 1 to guide the study. It summarized the key elements in the use of ICT tools in educational delivery in schools.

Figure 1. Conceptual Framework
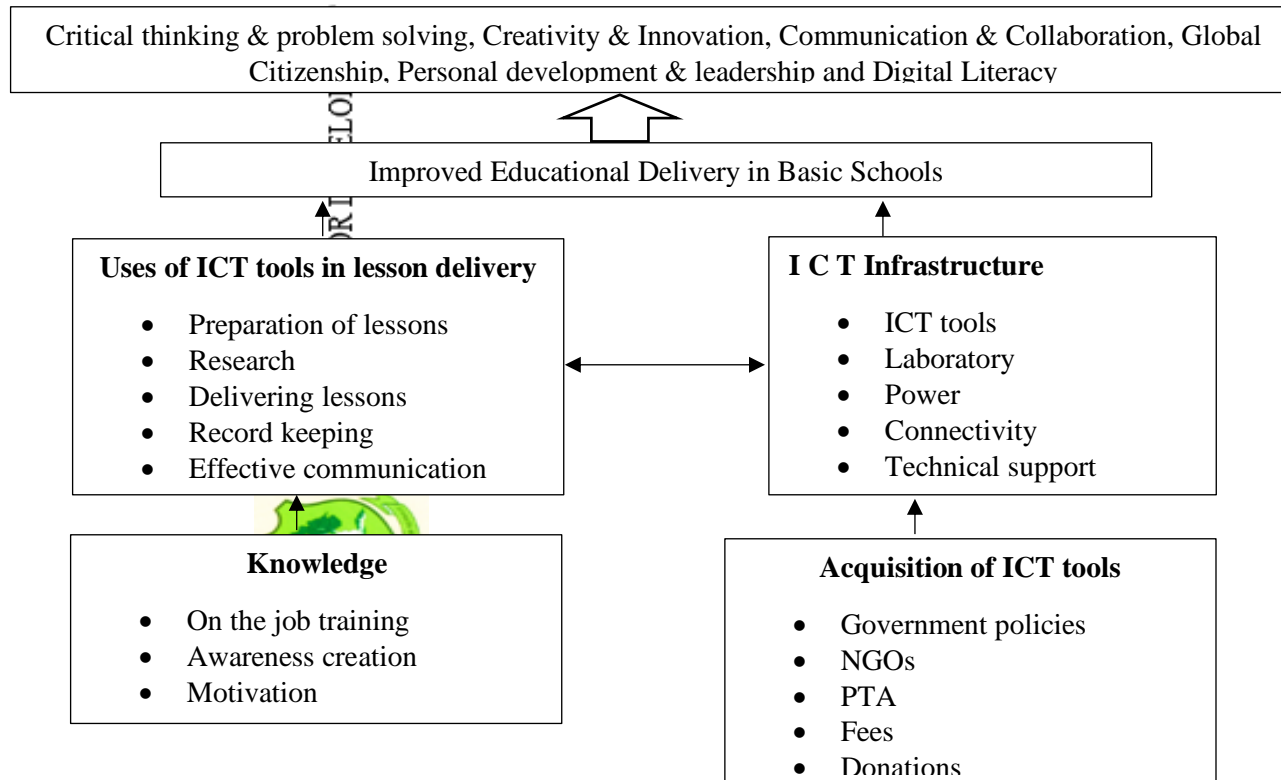
Source: Authors' Own Construct (2019).

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2.3 Basic Education

Basic education comprises of two years of Kindergarten (KG), six years of Primary and three years of Junior High School (JHS) (ESPR, 2015). However, in the current education reforms (National Pre-Tertiary Education Curriculum Framework, 2018), Basic Education has been redefined as a concept to include Secondary education covering technical, vocational and agricultural education (Ministry of Education, 2017). Basic education also includes non-formal and informal public and private activities intended to meet the basic learning needs of individuals of all ages (UNESCO, 1990). Basic education intended to give students the opportunity to become respectable and responsible global citizens, to further contribute to their own economic well-being and that of their families and communities as a whole, to understand and explore different opportunities and to enjoy productive and satisfying lives in future. Basic education also creates an opportunity to provide the right channel for children to progress to higher levels of learning and those who are not able to move, it offer them the possibilities to acquire work-related skills (Oduro, 2000).

2.3.1 History of Ghana's Education System

Ghana's education started back to around 1592 in pre-colonial era. Over many years, Ghana's education has different goals starting from the Gospel spreading to creating of an elite groups to run the colony in pre-independence times. After Ghana gained independence in 1957 from the British colonial rule, the education system in the country have undergone numerous reforms till date. In the 1980s, the reforms in the education sector were geared towards the country human resource needs of the nation. Presently, the structure of education in the

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country, which starts at the age of 4 years, consists of 2 years of kindergarten, 6 years of primary education, 3 years of Junior High School, 3 years of Senior High School and 4 years University education or courses at other tertiary institutions in the country. The first 11 years forms the basic education and is free and compulsory for every Ghanaian child in the country.

2.3.2 The Educational Reform Programme of 2007

Ghana's Education Act of 1987 and 1992 required that the government ensures that education for all children in Ghana is progressively universal and free. The education reforms of 2007 reaffirmed education as a privilege and the free compulsory universal basic education (FCUBE) provided for in the Constitution shall benefit all Ghanaian children. In 2002, the government introduced another important policy initiatives to strengthen and revitalise the fCUBE policy implementation process in the country. Some key policy initiatives included the introduction of the capitation grant, the school feeding programme and other policies to achieve the desired goals in the basic education sub-sector (Nudzor, 2012). The educational committee that was tasked to undertake this reform made it possible for the Constitutional mandatory of ten years of fCUBE to elapse in 2006 before the new reforms to take effect in 2007.

Some of the major highlights in the 2007 education reform included the addition of two years to the basic education to make it eleven years. This comprises 2 years of Kindergarten, 6 years of Primary School and 3 years of Junior High School. To order to improve access to early childhood education for all children the program aims to increase the psychological development of children as one

of the key factors in the attainment of quality education. Besides, the capitation grant policy was also introduced to reinforce the existing fCUBE policy of attracting and retaining children in to schools (Nudzor, 2012). The policy has changed the terms of the junior secondary school into junior high school and the senior secondary school into the main secondary school. It also extended the duration of secondary education from three (3) years to four (4) years. Greater emphasis was also put on Science and Technology and Information and Communication Technology (ICT) (Ministry of Education, 2007).

ICT was highlighted as a cross-cutting issue in education in the and therefore some strategies were outlined including to implement ICT programmes at the pre-tertiary level in a phases, resources all educational institutions in the country with computers and ICT tools in a prioritised way. To start with schools that already have enough teachers and laboratories, to also gradually expand other schools as well and when ICT teachers and equipment are available and adequately resourcing computer science and IT departments in public tertiary institutions to enable them to produce human skilled capital to meet the requirements of the industries in the country. The reform was also expected that, the introduction of ICT into schools will be able to cover the teaching of ICT to all students to acquire the skills, enhancing teaching and learning through ICTs and preparing students for the ICT professions (Education Reform, 2007 cited in ICT in Education Policy, 2008).

However, in 2010 the Education (amendment) Act was passed on 2nd August, 2010 by a majority vote in Parliament. This new Act reversed the duration of

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Senior High School from four (4) years to three (3) years, but the arrangements put in place in the 2007 reform remained the same and this was as a result of the change in government in 2009 in the country.

2.4 Concept of ICT

To understand the term 'Information and Communication Technologies' (ICTs), we need to look at how the term technology came about. The term technology is derived from the 17th century as a "systematic study... or the terminology of a particular art" according to Williams (1983). The term is identified with the actual arts, which eventually contributes to a common contemporary dividing, within the chosen field, between information (science) and its practical usage (technology) (Williams, 1983).

ICT tools refer to technologies that gives access to information for one. The Internet, wireless networks, cellular telephones and other technologies are some examples of technology (Christensson, 2010). UNESCO (1999), describes ICT as a range of technical resources and tools used for the interaction, development, dissemination, processing and management of data. In educational processes, communication and information are very important, so the use of ICT in education has a long history. In the formal and non-formal contexts, ICT played an educational function in services offered by state agencies, private and public educational institutions, profiteering corporations and non-profit organisations and lay and religious communities. The ICTs described in Education Policy (2008) information management resources, including apps and services for the creation, storage, sharing and distribution of information. Including 'old'

information technologies, such as radio, TV and telephones and 'new' ICTs, including computers, Satellite and Internet. According to Sara et al. (2010), ICT includes any application or communication device such as radio, TV, mobile phone, computer and network hardware as well as satellite and computer software associated services and applications such as video conference and distance learning.

ICT is a relatively recently established tool in the war against poverty and hunger. In its ICT Strategy Paper for 2002, the World Bank says that ICTs are the gateway to sustainable growth and development. They offer global connectivity opportunities while maintaining the identity of traditional societies. ICT will improve disadvantaged people's economic and social security and inspire people and communities. Eventually, ICTs will improve public sector performance, efficiency and accountability, including the provision of social services.

2.4.1 ICT Policy

Universities have described ICT as an important part of increasing economic growth across virtual technologies, the delivery of private and public services, and achieving wider socio-economic goals in schooling, health care, work and socio-cultural development, according to UNESCO (2015). Consequently, countries develop ICT strategies to promote economic growth and help drive the creation and competitiveness of their population in the global environment in a number of socio-economic sectors.

Kozma et al. (2003), argued that ICT policies will be able to serve several important functions in a country's development needs. In the first, ICT policies can provide a set of goals, a rationale and a vision of how education systems should work if ICTs are introduced into the teaching and learning processes for teachers and students to use. They can also benefit, teachers, students, parents and the general population of a given country. Education is one of the public sectors identified as one that is most which is influenced by technology (Kozma, 2005). The formulation of ICT policies in education is seen to be crucial as it plays an important role in preparing individuals for work after completion of their study. If technology is properly integrated into education, it will have the potential to facilitate the acquisition of relevant life skills that buttress the development process in the prevailing economic and information age society.

In the United Kingdom (UK), policy actions in the 80s made the integration of computers in their schools effectively leading to wider institutional and individual access to computers in the UK. Prior to the policy, computers were used only in some few schools but after the implementation of the policy, more schools were now using computers for teaching and learning purposes by teachers and students. For instance, the Department of Trade and Industry (DTI) in 1983 provided a fund of £ 2.1million for schools to purchase printers, monitors, disk-drives and other peripheral devices which subsequently made them available for computers in primary schools in 1984 (Don Passey, 2016).

African countries have now focused on implementing national ICT policies and programme to support their socio-economic development plans and policies for ICT in education. Now, many African have now focused their priorities on the provision and use of ICTs in their education system (David et al., 2012).

A study conducted by infodev in 2007 about policy development in ICT in education in Africa shows a growing trend in the continent. According to the survey in 2000, out of 53 countries, 13 countries had ICT policy, 10 countries had policies under development and 30 had no policy development underway. In 2005, 28 countries had policies, 15 had policies under development and 10 had no policy under development and in 2007 36 hade policies, 12 had policies under development and 5 countries had no policy in place. This shows that African countries have improved tremendously in terms of integrating ICT into their educational system to support the olden ways teaching and learning patterns as much as it can be used to support moves to resourced-based and open learning for schools. It is clearly seen that the formulation and implementation of national ICT policies acts as a catalyst for ICT policy development in the education sector. In some cases, for instance Botswana and Rwanda, the developmental goal and implementation plans for the education sector is an integral part of the larger process of developing the national plan. Eritrea and Equatorial Guinea are the only countries that are excepted from this generalisation because they do not have a national ICT plan put in place.

In Ghana, the Government is committed to the provision of quality education to its citizens and as a result of that, the ICT in Education Policy was formulated and implemented in the country. This was to ensure that all students at the pre-tertiary institutions in Ghana acquire ICT literacy skills through the use of ICT tools for teaching and learning.

2.4.2 The Ghana ICT for Accelerated Development (ICT4AD) Policy 2003

In Ghana, the ICT for Accelerated Development (ICT4AD) Policy was implemented to project the Vision of Ghana in the information age. This was based on a previous policy framework document, 'An Integrated ICT-led Socio-economic Development Policy and Plan Development Framework for Ghana'. The Ghana ICT for Accelerated Development (ICT4AD) Policy Statement fully considers the aspirations and the provisions of some key socio-economic development framework documents including: The Vision 2020 Socio-Economic Development Framework; the Ghana Poverty Reduction Strategy (GPRS) (2002-2004) and the Co-ordinated Programme for Economic and Social Development of Ghana (2003-2012). The Policy acknowledged the emergence of the information age has brought, the important role that information play, and acknowledged how knowledge and technology can play in facilitating socio-economic development of a nation. The effective use of knowledge and information is becoming the most critical factor in recent times for rapid economic growth, development and wealth creation, as well as for improving socio-economic well-being of people.

The overall objective of the policy document is to facilitate an ICT-led socio-economic development process with the potential to transform Ghana into a middle income, information-rich, knowledge-based and technology-driven economy and society. ICT4AD's vision is for the quality of life of people in Ghana to improve significantly through the rapid development and modernisation of economy and society, which uses information and communications technologies to accelerate and sustainable economic and social

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development, and the enhancement of their social, economic and cultural goods and services. In order for Ghana to achieve the aspirations of the ICT4AD Vision, some broad policy goals were formulated to serve as the cornerstones of the ICT4AD Policy being pursued. This include the following targets:

- Developing Ghana's Information Society and Economy.

- Pursuing Multi-Sectorial ICT-led Socio-Economic Development Goal.

- Developing Ghana's ICT Sector and Using ICTs as a Broad-Based Enabler of Development Goal.

Ghana needed to develop and implement a comprehensive integrated ICT-led socio-economic development policies, strategies and plans within the broader context of the country's socio-economic development goals for moving its industrial-weak, subsistence agricultural economy toward knowledge and information economy. In Ghana, it is certainly important that we embrace and use the ICT to accelerate their development process in the newly emerging global economy, driven by information and knowledge-based economies.

2.4.3 ICT in Education Policy 2008

Initially, Ghana's National ICT Education Policy, was drawn in 2003 and underwent two reviews in 2006 and 2008. The plan acknowledged that more funds should be earmarked to boost academic access in the world for the government to accomplish its socio-economic development efforts. The key role ICTs will play in improving access to quality education to a broader population and literacy educations to promote the provision and learning of

education at all levels has been recognised as a major focus field in the country's education reforms in 2007.

In the broader vision of the policy, ICT will be make use to support and alignment the sector departments with policy objectives, targets and strategies which will include equal access to quality education, adequate learning, management, scientific and technological education and labour market needs. The policy goals was derived from the National ICT4AD Policy document include the following:

1. Facilitate the implementation, use and application of the education system to improve access to and provision of information in favour of primary education and learning.

2. Modernise education systems to enhance the quality and access to education, training and research resources and equipment on all stages of the education system and broaden access.

3. Orientation of science and technology at all stages of the national educational system to promote the acculturation of science and technology in society and create a critical mass of human resources and well-informed people.

4. To achieve universal basic education and improve the level of basic and computer literacy in the country.

5. To ensure a population in which all citizens are at least functionally literate and productive.

6. To expand and increase access to secondary and tertiary education.

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7. To strengthen science education at all levels and in all aspects of the educational system, especially at the basic and secondary levels.

Additionally, four key elements were considered crucial to planning for ICTs within the educational sector. These four (4) key elements include the following:

- Equity

- Access to ICT Infrastructure

- Capacity Building, and

- Norms & Standards.

The overall goal of the ICT in Education Policy is to:

In order to enable Ghanaians graduates– both formal and non-formal – to use ICT tools and resources comfortably and creatively to acquire required skills and knowledge, they had to engage in the global knowledge economy in 2015. For any country to be able to implement its educational policies successfully, there should be some level of commitment from relevant stake holders in education such the government, educational authorities, teachers, students and parents (Yidana, 2018). He further stated that there has been some level of commitment from the government in the implementation of ICT policy in the country. For instance, the government of Ghana have integrated ICT in the curriculum to facilitate its teaching, learning and management by providing computer labs, internet to schools, provision of laptops to pupils and teachers and teachers capacity building programs (ICT in Education Policy, 2015).

2.5 Availability of ICT Tools in Basic Schools

The availability of ICT tools such as the computer, television, internet and others are a key determinant to the successful implementation of the ICT in Education Policy. The successful implementation of the educational policies will have to depend on the availability of resources (Mankoe, 2006). He argues that programs designed under policies require resources for their implementation and mostly inadequate. This normally leads to its failure during its implementation stage.

The European Commission asserts that ICT tools are important drivers for economic activity and everyday life activity and as a result of that, many people in Europe now use computer technology for a variety of reasons in their daily activities. This is a normal thing for the younger generation in Europe to use computers in their daily activities. The results of integrating computers into their education system makes this possible (European Commission, 2011). The integration of ICT tools in all European schools system is one of the European Commission's planes to ensure the effectiveness of European education systems and the competitiveness of the European economy as a whole (European Commission, 2011). The European Commission also implemented the eLearning initiative in the year 2000 where the central theme was to focus on the development of Europe in technology in the coming years (European Commission, 2000). The eLearning is seen as 'the use of new multimedia technologies and the Internet to improve the quality of learning by facilitating access to resources and services' (European Commission 2008a, p. 6). The European Commission further adopted a new Digital Agenda for Europe in

2010 to address some challenges in the use of technology and this was to maximise the economic and social potential of ICT use. It was acknowledged that this can only be successful through the use of high-level ICT skills, including media and digital literacy among its citizens in the Europe. This has resulted in all the European countries now having national strategies in place to facilitate the use of ICT in education (European Commission, 2011).

Statistics from the National Center for Education Statistics in US findings on educational technology in public schools in 2008 estimated that, 100 percent of all public schools in the US had one or computers for instructional purposes with internet access. This was about 3.1 to 1 pupils' computer ratio. The study further states that, 97 percent of all public schools had one or more computers in their classrooms for instructional purposes (Gray et al., 2010).

However, the adoption and implementation of ICT policies in education in African countries are in a transition stage. There is now a shift from donor-support, small-scale, NGO-led, pilot projects to now national government policies of integrating ICTs in education. A study conducted by Isaacs (2012) on ICTs in African Schools reveals that on computer penetration ratios in schools in some selected African countries, Egypt with 32,000 numbers of schools, 10,000 schools were with computers representing 31.25%. "Ghana with 35,000 number of schools, only 500 schools were with computers representing 1.43%. Also, Mozambique with 7,000 number of schools, just 20 schools were with computers representing 0.29%. Namibia with 1,519 number of schools, only 60 schools were with computers representing 3.94% and South Africa with

28,978 number of schools, 5,000 schools were with computers representing 17.36%. The five selected African countries depicted above, Egypt was the highest in percentage level of computer use in most schools with 31.25% of schools reported to having computers and the least was Mozambique with only 20 schools representing 0.29% were having access to a computer in their schools. The study further reveals that radio is the most widely available technology on the African continent. South Africa and Ghana were the only countries for which both radio and computers in schools data were available. In the study, it is clear that in Ghana only about 1.43% of schools have access to a computer and 23.8% of people have access to a radio. Whales in South Africa, 17.36% of schools have access to a computer and 31.6% of people have access to a radio (Isaacs, 2002). UNESCO also studied the various ICTs such as radio, television and computers in primary schools in sub-Saharan African countries and the results showed that there were wide variations of ICTs within primary schools in sub-Saharan Africa countries. In Malawi, Mozambique and Zimbabwe, ICTs were not so common where 25% or less of schools did not have radio or computer or television services; in Malawi for example, only 14%, 1% and 2% respectively had radio, television and computers. In most of its schools, many African countries could not provide radios. In these countries, most children in primary schools have no access to ICT, including Malawi, Mozambique, Tanzania, Uganda and Zimbabwe. However, in countries such as Lesotho could provide 80% of its schools with radios, Kenya 89% and Zambia 64% to bridge the ICT gap. In the Southern African countries, ICTs were relatively well integrated into schools. In Botswana, Namibia and South African, more than 60% of primary schools have access to television, radio, or

computers, while this figure more than 90% of schools in Seychelles and Mauritius.

In Ghana, we seem to be doing well in terms of ICT usage. For instance, mobile phone penetration is about 106% with internet usage increasing to about 40.7% (NCA, 2013). The Ministry of Education formulated a Development Plan to cover all aspect of the education structure in the country (Education Sector Performance Report, 2010). Under the Plan, it was targeted to provide 1000 Community Learning Centres in primary schools and 2000 Community Learning Centres in JHS. It was also to include 496 SHS, 26 TVET and 38 colleges in the country at the tertiary level. The One Laptop Per Child Policy was also formulated to provided 1000 laptops to 30 Primary Schools including three in each region through the country (ESPR, 2010). The report further indicates that it is the Ghanaian Second Cycle Institutions in the country that have been equipped well with about 87% of all the institutions reported to have a laboratory in their institutions. However, there was e-readiness assessment by the Ministry of Education to suggest that 56.92% of computers were functioning in the schools. The computer-student ratio at the national level is 42:1, with Northern Region having the highest at 50:1 and Volta Region the lowest at 33:1 (ESPR, 2010).

According to James et al. (2015), in their study "Promoting teaching and learning in Ghanaian Basic Schools through ICT" which was conducted in Northern, Upper East, Upper West and Volta regions of Ghana. In terms of availability of ICT tools in basic schools, it was revealed that Volta region has

more ICT tools in their basic schools, thus projector (62%), printer (46%), digital camera (44%), desktops (40%), laptop (36%) and mobile phone (27) compared to the other regions in the country. The Upper West region is the least supplied with ICT tools in basic schools. The study also revealed that the most available ICT tool in the regions is a personal mobile phone. Teachers in the Northern region recorded the highest proportion of personal mobile phone (48%), while the Upper East recorded the lowest proportion of personal mobile phone (12%).

2.5 Knowledge of Teachers in ICT Tools

According to Yidana (2018), teachers are the core factors in terms of implementation of the ICT policy in education. Mingaine (2013), also assert that teachers' knowledge in ICT and access to professional development will play a major role in the implementation of ICTs in schools.

The European Commission states that the significant use of ICTs in education can be achieved through some factors and one of them is teachers' level of knowledge and the use of technology in classrooms for teaching and learning purposes. Technologies are essential to assist teachers in providing their students with innovative educational and learning opportunities, and to play an important role in delivering an efficient system of school administration (EU Commission, 2008c). It further added that for learners to be able to use ICTs for learning purposes during lessons is related to their teachers' knowledge level and confidence level in ICT competences, their opinion about the usefulness of

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ICT use in classroom for teaching and learning and their access to ICTs at school (European Commission, 2013).

The physical availability of ICT tools is a good starting point, but that alone will not lead to its effective use by teachers or enhanced learning outcomes of students, but teachers' knowledge in the use and application of these tools will be one essential requirement for a successful use of it in lessons. Barber et al. (2007) argued that the main factor of the variation in students' academic performance at school is the quality of teachers available. The positive outcome for any educational institution is essentially the sum of the quality of the instruction that its teachers deliver in that school. Therefore, the ultimate goal of any institution is to make sure that teachers have the best materials, the expertise, the skill and the desire to get every student up to standard everyday as he reaches the classroom.

Korte et al. (2007) also states that teachers' knowledge and use of ICT tools can have multiple benefits at schools and can be improved even if learners are allowed to use the devices themselves. They added that schools need to integrate these technologies in their curriculum to help improve teaching and learning situation especially, in developing countries.

Teachers who do not have adequate knowledge and experience in ICTs are rare across the EU. Teachers who use ICT for teacher training are most common; 30-45% of teachers are taught ICT every day, or at least once a week (European Commission, 2013). Statistics from the National Centre for Education Statistics

in US findings on educational technology in public schools in 2008 stated that about 70% of teachers in the US are sufficiently trained in technology usage, 64% are sufficiently trained to integrate technology into classroom instruction, and 93% are interested in using technology in classroom instructions.

In Ghana, the new National Teacher Education Curriculum states that advances in digital technology and ICT have led to the applications of ICT in the educational sector. It further agreed that the use of ICT is recognised as an effective tool both for teacher education and for student learning. The Curriculum Framework proposes the integration of ICT into the teacher education programmes for teachers to fully embrace ICT so that they will be fully aware and have positive attitudes, acquire the right knowledge and skills, implement and innovate the right kinds of technologies, and to become responsible citizens (Ministry of Education, 2018). Results from many research carried out in Ghana indicate that much has not been done to upgrade the knowledge level of teachers in technology for a successful implementation of the ICT in Education Policy. For instance, Adebi-Caesar studied assessment of ICT in Senior High Schools in the Lower Manya Krobo District and one of the findings is the lack of knowledge and training of teachers in computer. Also, at the July, 2009 session of the Northern ICT for development series in Tamale, Alhaji Mohammed Haroon the Tamale Metropolitan Education Director stated the lack of ICT trained teachers in the basic schools as one of the challenges facing the implementation of ICT into the Ghanaian school curriculum. Agyei (2013) also studied the integration of ICT in the Ghanaian educational system and reported that ICT teachers had only basic ICT skills. That is basic

knowledge in application software such as spreadsheet, word processing, presentation application and the internet. Ha added that integration of ICT tools as a teaching tool for all subjects was a common practice since the teachers did not have the level of competence to enable them to use ICT tools in their teaching and learning process.

The above findings and many more suggest that many teachers in Ghana are either not trained or they are ill-trained in ICT for a successful implementation of the ICT in Education Policy.

2.5.1 Teachers Attitude Towards the Use of ICT Tools

As one of the key drivers of the use of technologies in the educational circles, Albirini (2006) found out that the attitudes of teachers to computer play a significant role in computer acceptance and real use in education. In general, it is the individual teacher who makes decisions concerning the use of technology in classroom practice. Teachers obviously use tools and practices that support their views on 'good learning' and instruments that easily cope with the existing classroom conceptual and social organisation. The use of technologies mainly retains the current culture and has a minimal possibility for changing the teacher work and how it can affect their teaching and learning in schools, according to Ms Marx, Blüemenfeld, Krajcik and Soloway (1998). It was found in the studies of Hakkarainen et al. (2001) and Moseley et al. (1999) that there is a connection between the educational concepts of teachers and the type of teaching use of ICTs. The importance of using technology to facilitation student participation in advanced research, collaborative learning and the active involvement of

learners in the process of knowledge training was emphasised by teachers using intensely information technology, but the relationship between conception and practice of teachers, as Lin (2001) says, is complex, unclear or simple. Teacher with strong ICT expertise have used ICT more and more often and have seemed to be equipped with ample pedagogical tools to follow new pedagogical methodology (Hakkarainen et al. 2001). In their case study, Lim and Barnes (2002) described the way a teacher who has been successful in using the digital application has had many years of ICT training experience in teaching his or her students and has the attitude, skills and knowledge to recognise plan and organise activities to exploit their opportunities to tackle their limitations. It is also found that teachers are challenged in using ICTs in teaching because they do not see it as a means of teaching because of a teacher-centric view of teaching as a transmissions or absorption image. It is found by Norton, McRobbie and Cooper (2000). As why teachers do not use technology was based on these convictions, they did not take any measures to enhance the expertise or access to information and communications services. Selwyn (1999) reports that he wrote about 'computer identity' as far as the subjects and teacher classes are concerned. Such computer identities are determined by many variables, including the personal interests of an individual, and crucially by his teacher's identity, including their identification as a subject teacher. Some subjects teachers are more familiar to technology than other teachers, for instance music teachers are optimistic about the promise of new technologies, for composition and performance (John, 2005). Computers are a natural means of student learning of literacy in English (Zhao & Frank, 2003). Overall, it is probably not necessary to have strong ICT expertise and to use ICT for a teacher's identity at

this time, although ICT widespread to schools. Teachers differ in sex and age, in which both are key factors behind the use of technologies. The results show a general trend: Male teachers in all age groups (20-35, 36-47, 48-62) were assessed more than female teachers of the same age. The study by (Ilomäki et al. 2001) showed teachers of different age groups and genders, and the results showed a general trend. In school and during leisure, they also used ICT more. The youngest female group of teachers were roughly the similar as compered to the middle-age group of male teachers. Comparing the results of the two years, the youngsters and middle groups of female teachers have improve their self-appraised use of ICTs and, although they still use less than other teachers, their pedagogical use of ICT has improved.

For Ghana to successfully implement the ICT in Education Policy, teachers are required to develop skills and knowledge that will enable the teachers to teach ICT as a subject with a suitable pedagogical approach or use their ICT knowledge and expertise to improve teaching and learning in the classroom.

2.6 Impact of ICT Tools on Educational Delivery

The use of technology in education will change education and learning as well as helped to acquire key skills in contemporary technology. "Virtual fluidity" must be accomplished by learners (EU Commission / ICT Cluster 2010, p. 11). This is important as the basic competencies in technology are subject-specific or cross curricular and must therefore, be acquired in the education process.

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The whole process of education and training includes teacher-student communication and it is important to understand the means of communication best suited to a specific educational and learning process. The use of technology as one of the modes of communication can enhance and improve the delivery of lessons by teachers to aid the understanding of their pupils in a class. The use of technology in classrooms will help students build up knowledge as young people, think objectively and navigate their educational experiences, function together autonomously, explore information and support when they need it, and make good use of all the new technology possibilities (European Commission, 2008c). Plomp et al (1996) identified three objectives which separated the use of ICT in education. It includes the use of ICT as an object of study, the use of ICT as an aspect of a discipline and the use of ICT as medium for teaching and learning processes. The use of ICT tools by teachers can have greater opportunities in schools, and this may even be high if students are enabled to use the ICT tools in their learning process in classrooms. Records have shown that the use of ICT tools can increase pupils' motivation to learn through giving the learners more control over the learning experience (Condi et al., 2007; Passey et al., 2003). The use of ICT tools can also facilitate personalised and individualised learning of students both at school and at home.

Fundamentally, ICT tools helps in teaching and learning of students at all stages of the educational curriculum. We are in a world where almost every part of our life is consumed by technology, a world that there is more opportunities for young students who are just setting out on their educational journey. Furthermore ICT is not just an essential component to the overall operation of

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the school, it can also help to increase achievement levels of students, motivate creative thinking and encourage the acquisition of skills that will be beneficial the real world. ICT tools can help students to observe, explore, engage, solve problems and make exciting discoveries for themselves if they are given the opportunity to use them in their learning process by their teachers. The use of ICT instruments can also boost collaborative and interactive learning among students and school teachers. The use of ICT services not only provides the tools to foster and improve these abilities, but it also allows us to participate in creative training creatively and increases education and learning efficacy and enjoyment for all students. The use of ICT tools in education has a lot of prospects for both teachers and learners in their preparation, teaching and learning process provided the right mix of knowledge and tools are provided. The importance of ICT tools for educational systems in third-world countries is as follows, according to Akarowhe (2017). In the classroom, which in third world countries, education is still the use of chalk and board scenarios, can increase the productivity of the teacher. Teachers' use of ICT seems to move from the model of communicating information to the paradigm of co-building awareness (Lee, 2002, p. 8 quoted in Yeboah, 2015).

With ICT tools, the teacher can achieve better performance by utilising various ICT materials for improving their students (Akarowhe, 2017). Secondly, the use of ICT resources will increase students' participation in classroom teaching and learning. In less developed countries, students are still mainly confronting audio and almost a teaching method in which teachers use verbal expression and chalk to write or draw in a way that makes the teaching and learning process less eager

for students. Using the ICT audio-visual resources, improved performance in the short term and long term will draw students' attention. When students are commonly believed to be inspired by what they see, ICT methods are used to encourage strong and successful student retention. ICT facilities such as computers, projectors, radios, TVs and internet-related equipment are capable of helping school students' success. Finally, school administrators can efficiently plan school work in a number of ways, using ICT tools, to make teaching and learning more effective by using a school-level approach.

The use of ICT tools in schools can ensure effective and efficient communication between teachers and parents of wards in the school. Clear and regular communication between teachers and parents is one of the most important elements of a child's educational journey. It is important that parents are actively involved in their children's education to improve the positive impact on their cognitive, social and emotional development in schools. When there is regular communication between teachers and parents, parents are encouraged to take an active role in their children's education. Parent – teacher meetings are obviously a great opportunity to discuss student issues, but they typically only take place few times during the school year and sometimes not at all due to a lot of factors such as a barrier to communication and busy schedules of parents. With the use of ICTs in education, parents and teachers communication can effectively take place by the use of phone, e-mail, radio and television messages to bridge the gap between teachers and parents. The use of technologies simplifies the entire communication process and ensures that parents and teachers can get in touch with one another when needed in no time. Traditionally, all communication in our basic schools are by word of mouth or

on paper from teachers to parents. Messages aren't passed on, bits of papers are lost, forms aren't filled, permissions aren't given and absence aren't properly authorised making communication very difficult. The use of ICT tools will provide opportunities for calls, SMS notifications, announcements and e-mails to be sent to the right recipients for a prompt response. Most parents now have a smartphone or a tablet, and this will enable schools to communicate directly with parents, who then become involved in all aspects of their children's education. Messages will be able to pass on to the right recipient without delay, there will be no bits of papers to get lost and it is easy and convenient for both senders and recipients.

Jo (2013) has mentioned some of the benefits of using ICT tools in education as to help students gain efficient and effective access to digital knowledge, encourage student-centred and independent learning, build an innovative learning environment, facilitate cooperative learning in a distance learning context, give more opportunities to develop essential (order-based) thinking skills, enhance the learning environment. Neil (2003) has described the availability of educational resources, contact facilitation, knowledge sharing and the creation and utilisation of data bases as among ICTs educational benefits. The results of learning from the use of technology in the classroom as social growth, solving problems, peer learning and exploration are outlined in Murphy (1995). In the field of education, technology played a dictatorial role. Researchers showed that integrated technology into mainstream classrooms could encourage students to develop higher levels of learning and thinking skills (Naser et al. 2010). The potential use of ICTs in schools is of great interest to

learn more by students. Pelgrum (2001) indicated that computers are both socially and economically beneficial in schools. The costs of education can be reduced, and the computer industry supported, students prepared for work and to live in a technological society and made the school more attractive for its potential clients.

The debate now is whether ICTs are directly connected to school performance. Several studies have been conducted to understand the role and added value in classrooms and student performances of these technologies. On the one hand, some research indicates that ICTs key role in higher education is unknown. Leuven et al. (2004) reported that the link between increased education use of ICT and the performance of students is not evidence documented. Indeed, they find a relationship between the use of ICTs and a number of student achievement measures that is negative and marginally important. They added that students could use ICTs in order to increase their time and study time. Online gaming and growing communications do not necessarily mean improved performance. Several research have, on the other hand, shown that the use of ICTs have a real impact on educational student achievement. According to Kulik's (1994) study, it was revealed that, averagely, pupils who are given the opportunities to use ICT-based instruction are able to score higher than students without computers. In fact, once ICT related teaching is included, students learn more in less time and enjoyed their classes more. In their study Attzwell and Battle (1999) explored the connection between home and school success in a sample of about 64,300 students in the United States. In this study they have studied the relationship between home and school performance. The results

show that children who have software access at home for learning have higher reading and mathematics ratings in school.

Fuchs and Woessman (2004) also examined the relationship of using ICTs in instruction and   students' performance and presented two hypotheses explaining the mixed results. According to their study, the first says, ICT is an input that should help to produce a better learning result, all being equal. They also added that ICT use could improve training by increasing the reliance on education on different quality teachers and making education accessible at home every day. Some researchers have proposed that ICT use can transfer information favourably to students. In fact, the use of ICTs will help students take advantage of vast opportunities to gain knowledge for school purposes and improve education through interaction.

On the other hand, Fuchs and Woessman (2004) stated that technology based lessons induces reallocations, substituting alternative, possibly more effective, forms of instruction. Given a constant overall instruction time, this may reduce student performance. Also, given that financial resources are not perfectly elastic, the introduction of technology based instruction for students can result in a reallocation of funds to favour ICT acquisition, possibly substituting more effective instructional materials.

However, ICT may divert students from home, particularly if the Internet connection can become a distraction through chat rooms and online games, reducing the time they spend doing homework or learning. The effect on student

learning from the use of ICTs thus depends heavily on its particular uses. ICTs tends to allow for only limited interactive opportunities to act in a predefined way. This could reduce the ability of the students to solve problems and to think in predetermined plans but not their ability to develop autonomous creative solutions alone.

Vawn (2019) studied technology in the classroom and stated that the use of technological tools in classrooms could be distractive to students in the classroom. Students may find it difficult to concentrate in lessons when a wide range of tools are around them in class, and it can disconnect students from social interaction, enables cheating in classrooms and homework, the quality of information and source as well as planning lesson becoming tedious due to technology use for teachers.

Based on the analysis of various research works, I can therefore, say that the use of ICTs in schools and at home is a double cut edge sword and with proper regulations in it use, it will have a very positive impact in educational delivery in our schools if proper measures are put in place.

2.6.1 Impact of ICT Tools on School Record Keeping

The importance of information in every aspect of human endeavour cannot be over-emphasized. It is important that information should be reliable, accurate, complete, precise and sufficiently up-to-date for use. That is why records and record keeping are very crucial for the day to day operations in schools. Management of record keeping is very important, especially in other areas, for

achieving educational objectives. Emerson (1989, cited in Oredien, 2008) states that the documents in any way that the institution has obtained or created due to the information contained in them are records which they hold. Record keeping is the art of keeping records of schools that every educational institution at all levels must maintain according to educational law to make the administration of school effective and smooth. The records detail the students and the whole of the staff of the schools. The continued presence of the school as an organisation requires records in the management and utilisation of education. This data will enable both directors and teaching staff to learn something about their students if it is made available and used at the appropriate time and, by this means, will be in a better position to help the students academically, morally and socially (Oredien, 2008). UNESCO (2018) notes that school records demonstrate what the school does, they include data and information about different aspects of the activities of the university, including data on its pupils, staff, classes, services, and finances. The main aim of the SMRS is to systemically record, keep and update the records of the school. School managers need up-to-date and accurate information to make good decisions. Records of school management help school administrators to regularly compile, analyse and store school data so that they can quickly obtain appropriate and trustworthy information to support school management decisions (UNESCO, 2018). Schools records are information banks of what has been done or known, of what is to be done and of how things are to be done (Kok & Nwiyi, 2006).

The goal is to ensure accurate records of student performance, growth, school activities, and issues to support efficiency and efficiency in schools for effective

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management in schools (Akanbi 1999). Keeping records commonly known as information storage, is an important task for a school's teaching and administrative personnel. According to Ahmed (2013), school records are documentation that schools produce, maintain, and provide for their families, students, school bodies and other partners because they must take account of all institutional institutions to validate their lives. Also, Osakwe (2011) also mentioned that records of school are official documents, books and archives containing relevant and essential details about the actions and events that are stored and preserved by the school bureau for use and retrieval if appropriate. Such records are kept by teachers, principals, administrative staff and counsellors.

Ibara (2010), maintains that the performance of quality, the performance of tasks and measurable results are more and more important tasks and depend on the availability and accessibility of usable school records. Without access to records, the responsibility of acts cannot be established and people accountable for their actions. Records and records keeping is considered as the life wire of any formal organization and schools are not an exception. Good management and governance of any organisation including schools will be very complicated if the officials do not properly maintain and handle documents. Academics and non-academics data on the college, the school staff, the students and other assets, including educational material are included in the school records. Record keeping and supervision by school authorities should be considered a key duty as they play an important role in the successful day-to-day operation of education. Ololube (2013, pp. 103-104. Cited in Rose and Nwachukwu, 2015)

stated accountability as one of the factors for keeping school records. He further elaborated that keeping records is very important to any educational institution as a whole.

Records in school are very vital means proof of accountability of the day to day running of the school for higher authority. Also, school records enable administrators to make recommendations for school authorities and teachers to be implemented. Records in schools are able to data to enable coherent, objective and balanced decisions on important issues such as teacher's promotion, student and staff discipline and the performances of both teachers and students in a school. If proper records on the human resources in schools are kept, it will be useful for employment and planning related issues in the school. Number of staff and their areas of specialization, qualifications, gender and age will be able to help the authorities to determine the human resource needs and assets of the school. Regularly kept information about employees in schools can also be used in the appraisal of the teaching and non-teaching staff. Another reason stated is for guidance counselling purposes. This is because records keeping is of great importance to school guidance and counsellors, as these records provide a holistic view about students in the school. It can also be useful for the counsellors to be able to track student progress both at school and at their various homes. The last but not the list that school records serve as information for parents of wards in the school.

The enrolment of pupils in schools are increasing throughout the world on a daily basis and the resources available in schools are limited may be over-

stressed or inadequate. This situation is becoming more frightening in the country as some pro-poor policies in the educational sector are implemented by various governments. Therefore, proper record-keeping of the human and material resources in the various public schools are needed to address the issue of ever-increasing enrolment rate students in schools. For instance, the free compulsory universal basic education (FCUB) has continue to increase enrolment rate of students in public basic schools and the free Senior High School Policy in 2018 in the country by the Nana Addo government also continue to increase the net enrolment of students in the various schools in the country.

Many public basic schools in the country information are done manually and recorded on papers and kept in files in the schools which are more vulnerable to destruction by mice, rain or fire. Teachers still face problems such as the failure to classify ratings from assessment tools, lack of record-taking and recording expertise, the absence of record-keeping facilities and a scarcity of teaching staff that are often administrative (Rosen & Well, 1995).

To order to manage large volumes of school records, documentation is stored by ICTs and, thus, computers in such a manner that data is easily processed, checked and recovered in future. The computer is a digital tool able to enter, process and produce logical information. A computerised individual may easily interpret and rapidly produce different descriptive reports, performance indicators, tables and charts, and even detailed information on school management, such as the list of students and teachers, list of curricula and

books, furniture and any other usable content in a computerised system, apart from minimising the use and handling of documents.

In-active school records like CD-ROMs, DVDs, pen drives or other means for efficient storage or retrieval may also be archived using computers (UNESCO 2018). In most organisations, record-keeping is becoming increasingly electronic. The existence of personal computers in each organisation shows that organisations utilise digital records to ensure quality and protection of information.

Research has revealed that the application of ICTs in record keeping in Nigeria is near to zero (Aduwa-Ogiegbaen & Iyanmu, 2005), and the electronic records management system was not unsatisfactory based on their findings. The same can be said of many institutions in Africa (Ngulube, 2004b).

In Ghana, Abigail et al. (2018), states that despite the increasing importance of electronic records management since the advent of information technology, record management in basic schools is still a manual activity where teachers and head teachers use the cupboard and shelve system for record-keeping. This does not ensure proper pupils record keeping in the schools as most of it in future find it difficult to get their basic school records when the need arises.

2.6.2 Challenges of Using ICT Tools in Education

The use of technologies in education has proven to have great benefits in education if properly installed, and teachers are well trained as to how to use it.

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However, in African and for that matter, Ghana has not been able to achieve this status of properly integrating ICT in education despite the many policies introduced in the country to integrate the use of technology in the public schools curriculum. Some hindrances are bedevilling the use of information and communications technologies in most developing countries educational systems according to Akarowhe (2017). In the first place, teachers do not cooperate and some pose negative attitude towards technologies in the schools. This may include non-adoption and non-usage of modern ways of teaching by integrating technologies into their teaching and learning process even if they are available in their various schools. This situation in some cases has hindered the potential benefits technologies may bring to both teachers and learners. He also added that supervision and implementation are inadequate concerning ICT projects in public schools. Agencies responsible for ICT projects monitoring often feel reluctant in the process of monitoring and supervision of ICT facilities in most institutions of learning to ensure the effective integration of ICTs in lesson of teachers. This situation has make some ICT facilities and equipment provided in most public schools to lie waste. Thirdly, there is insufficient financial support for ICT in education in developing countries. Financial constraint in terms of low budgetary allocation for ICT facilities. Due to insufficient funds available for the acquisition of ICT related facilities it makes teachers to complain about how difficult it is acquire or having access to computers. According to Granger et al. (2002) cited by Yeboah (2015), the lack of appropriate up-to-date equipment will restrains the integration of ICT into the school's curriculum. Akarowhe (2017) also stated inadequate knowledge as one of the challenges teachers encounter in the schools. Most teachers in developing

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countries do not have enough skill to use ICT resources to ensure effective teaching of their pupils. This is as a result of the absence of in-service training for teachers and this normally result in the minimal utilisation of the ICT tool for effective teaching and learning in most schools. In a similar studies, Beggs (2000), stated that one of the top three challenges to teachers' non-use of technology in teaching their students is the absence of training. In the same way, Pelgrum et al. (2001) also stated that teachers' insufficient knowledge is one the main barrier to their acceptance and adoption of ICT tools in their work.

In the Tamale Metropolis, the Metropolitan education chief, Alhaji Mohammed Haroon, described some of the difficulties of integrating ICT into the Ghanaian school program: the shortage of trained educators in ICT, costs of broadband Internet, insufficient software, and power (Northern ICT4D Collection, 2009). Also the assistant headmaster of St. Charles Minor Seminary in Tamale, Mr**.** George Nego Fugluu outlined lack of ICT infrastructure, lack of power supply in some rural areas, inadequate trained personnel, lack of administrative support, and the lack of internet connectivity in most schools and cost as some of the challenges in the implementation of ICT in education curriculum (Northern ICT4D Series, 2009).

2.7 Definition of Key Terms

Basic Schools

Basic Schools are the schools which provide the first cycle of basic education to pupils from age 4 to 14 years of age. It comprises 11 years of basic education starting from Kindergarten, Primary School and Junior High School (JHS).

Information and Communication Technologies (ICTs)

They consist of a variety of technological tools and resources that are utilised by schools in the communication, dissemination, storage and management of information (UNESCO 1999).

Knowledge

Understanding of or information about a subject that you get by experience or study, either known by one person or by people generally (Cambridge Dictionary).

Availability level

Availability is the level of availability normally expected by users. At this level, once you commit to a schedule of system availability, there should be *no* unscheduled or unplanned outages or downtimes (Michael, 2001).

Impact

The strong effect or influence that something has on a situation or person (Cambridge Dictionary).

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter described the techniques and methods used to gather and analysed data for this study. This included the study area, the research design, sampling and sampling procedure. Validity and reliability of instruments as well as the collection and analysis of data. Ethical issues were also taken in to consideration to ensure the accuracy of this piece of work.

3.1 Profile of the Study Area

This piece of work was done in the Tamale Metropolis. Tamale Metropolis is located in the Northern region of Ghana, as a result of its central location, The Metropolis serves as the centre for all commercial and administrative activities in the Northern region of Ghana, thus making the Metropolis as the political, financial and economic capital of the region. The legislative instrument (L. I) 2068 of 2012 was used to establish the Tamale Metropolitan Assembly (TaMA) (TaMA, 2014).

3.1.1 Location and Size

The Tamale Metropolitan Assembly is one of 26 districts in the Northern Region of Ghana. The Metropolis is located in the northern part of central Sagnarigu, is bordered by Northern Sagnarigu, East Tolon, South West Central Gonja and South East Gonja. The Metropolis total land area is projected to be 550km^2 comprising about 12% of the region's total area (TaMA 2014). The Metropolis lies between latitude 9º16 and 9º 34 North and longitudes 0º 36 and 0º 57 West geographically (GSS, 2014). The Metropolis is Ghana's fourth-

largest city and the fastest growing city in West Africa. The area is located about 600km north of Accra, the capital city of Ghana. Figure 2 below shows the map of the Tamale Metropolitan Assembly.

Figure 2. Map of Tamale Metropolitan Assembly

MAP OF TAMALE METROPOLITAN ASSEMBLY
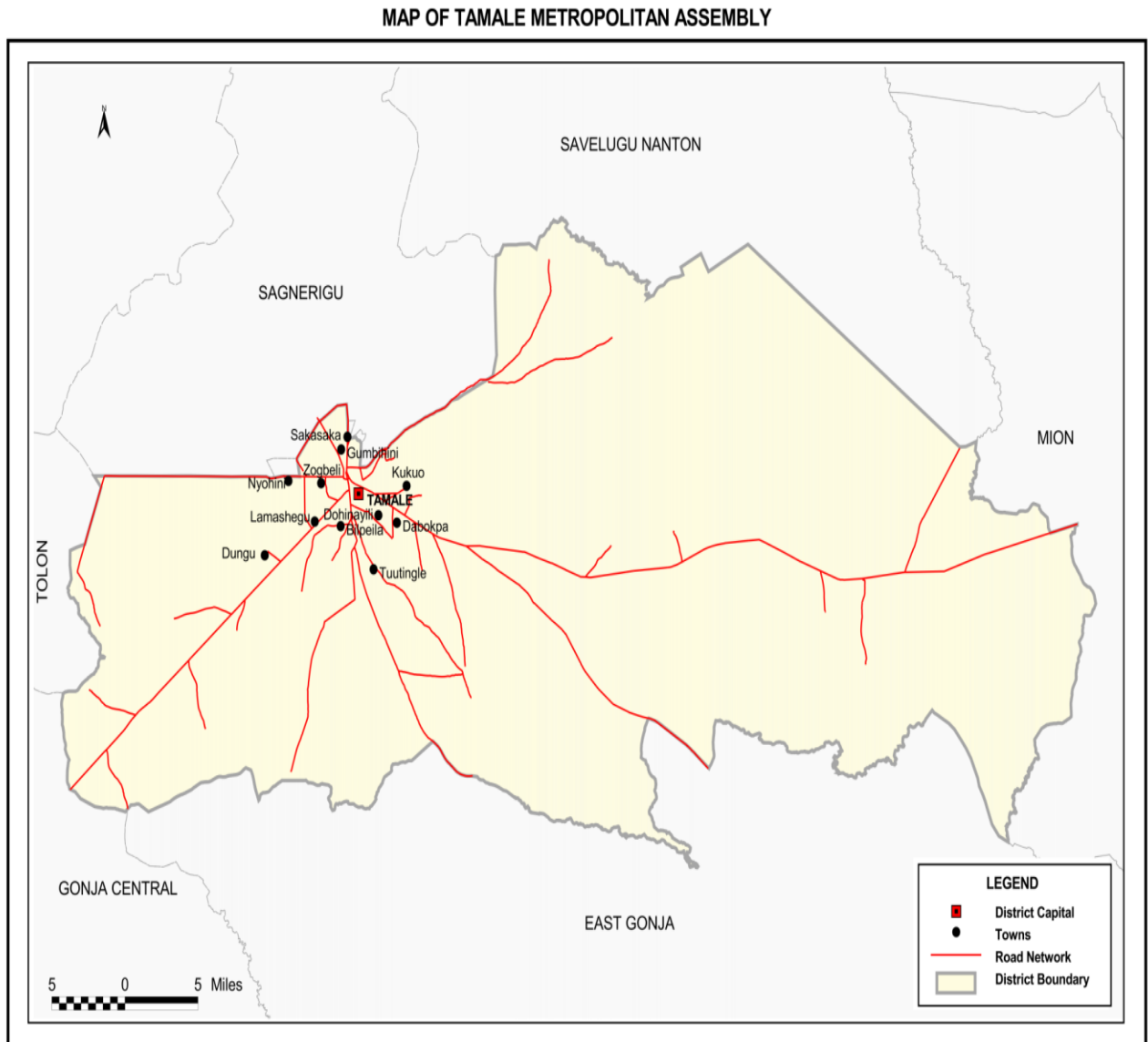
Source: Ghana Statistical Service (2014).

3.1.2 Relief and Climate

The Tamale Metropolis is usually approximately 180 meters above sea level, with generally some undulating hills. The area experience one rainfall season a year, which has affected efficient farming production in the place. The Metropolis's average temperature differs between seasons. In the rainy season people experience high humidity, moderate weather and strong storms, as opposed to the warm Harmattan winds from November to February, and high sunlight from March to May.

3.1.3 Political and Administrative Structure

The place has two constituencies, Tamale Central and Tamale South and two sub-metros are located in Tamale. The Metropolitan CEO is the head of the political Metropolis. There are a total of 59 members of the assembly of which 18 are appointed, and 41 are elected members of the metropolis, together with 205 members from the unit committee.

3.1.4 Population

From the 2010 population and housing census, the Tamale Metropolis has about 223,252 and the most-growing area in West Africa, according to Ghana Statistical Service (2014). The number is 111,109 (49.7%) and 112,143 (50.2%), while a percentage of the total urban population stands at 80.8% and a percentage of 19.1% is of the rural population. The population of 11 years and above is 60.1% being literates and 39.9% being non-literates. Among the literate, 69.2% are males and 51.1% are females. According to the census, 54.8% indicated that they can speak and write both Ghanaian languages English.

3.1.5 Literacy and Education

The 2010 population and housing census indicated that 60.1% of the population are literates and 39.9% of the population are non-literates. Males constitutes the highest literate population of 69.2% as compared to the females of about 51.1%. About 52.29% of the population attending school are males and 45.1% are females. The Metropolis has 15.1% of its people attending school in nursery, 18.2% in JHS, and 12.5% in SHS. It is only 5.7% of the population in the metropolis who are currently attending various tertiary institutions in the area according to the 2010 census data. Generally, more males are enrolled in schools than the females in almost all the levels of education in the metropolis. This may be as a result of religious and cultural factors where females are mostly marginalized as compared to their male counterparts in communities in the area. The economically active population in the area about 63.3% and 36.7% are economically not active in the area.

In the 2017/2018 academic year, the number of public kindergarten schools in the Tamale Metropolis were 145, and that of the private kindergarten schools were 86, bringing the total number to 231. In the same way, the number of public primary schools during this period was 165 and that of the private primary schools were 81, resulting in 246 primary schools respectively. In the same manner, the number of public Junior High Schools were 79 and private Junior High Schools were 30 in the Metropolis amounting to 109 Junior High Schools (Tamale Education Directorate, 2018). The creation of the Sagnarigu District led to the re-demarcation of schools into 15 circuits in the Tamale Metropolis in the year 2012 by the government.

3.1.6 Information Communication Technology

The 2010 population housing census states that 53.7% of the population aged 12 years and above had access to mobile phones. Males constitute the majority of 55.5% whiles females were 44.4% of the population that use mobile phones. Also, about 7.4% of the population had access to the internet according to the census and about 9.5% of the total households have access to computers. In the Metropolis, more men are using the Internet than women. This can be attributed to the gender differences that could be associated with internet use in education and work in the formal sector.

3.1.7 Utilities and Services

The Metropolis is endowed with basic utilities and services. Water, markets, electricity, roads, and communication services are available in most communities in the Metropolis. The roads network in the metropolis is good making commuting of people in and around the metropolis easy to other adjoining district capitals. There is no major traffic congestion in the metropolis unless in the evening that there is mostly slightly build traffic congestion in the Central Business District (CBD) when business close. The major commercial transport services available in the metropolis are taxi cabs which are stationed at the Central Business District (CBD) and motor tricycle popularly known as *yellow-yellow* in the area. The State Transport Company (STC), Imperia, Metro Mass Transit, VIP, and O. A. Travel and Tours and other private bus services operates in the metropolis with other towns and cities in the country. Majority of the inhabitance use motorcycles with *mapukas* being the most patronized as their own means of transport in and around the metropolis.

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The metropolis gets it source of water from the Nawuni and Dalun Water Treatment Plants in Kumbungu District. The primary source of water in the Metropolis is pipe borne water which is managed by the Ghana Water Company Limited in Tamale.

The Metropolis enjoys electricity supply from the National. In a report by the Ghana News Agency, the Metropolitan Chief Executive Alhaji Abudulai Haruna Friday said that about 159 out of 197 communities have been linked to the national grid and the rest was expected to be connected by 2012 (GNA, 2013). Electricity supply in the area has been relatively stable, and this enhances the expansion of small businesses and the generation of income in the Metropolis.

There are many international, local and national financial institutions located within the area. This include the Bank of Ghana as the Regulator, Standard Charted Bank, Barclays Bank, National Investment Bank, Stanbic Bank, Eco Bank, GCB Bank, Agricultural Development Bank, Access Bank, Zenith Bank, Consolidated Bank of Ghana, Fidelity Bank and amongst others.

The Metropolis has a good telecommunication services operating from mobile telecommunication service providers such as MTN, Vodafone and Airteltigo. Broad band services also available in the Metropolis making institutions, business as well as people are able to access the internet thereby linking the area to the worldwide web. The Metropolis has recently witnessed an increase in media activities in the area. For instance, there are about 15 radio stations and

5 TV free to air stations in the area. There are also North Television (NTV), Sagani Television (STV) and PIO TV located in the area. There are also newspaper supply vendors in the metropolis scatted around the Central Business District (CBD). The Media houses serve as a source for organising educative programmes on government policies in the local languages such as Dagbani, Gonja as well as akan and some entertainment programmes for the population in the Metropolis and its surroundings.

The Metropolis has a teaching hospital thus Tamale Teaching Hospital (TTH) for treatment and referral cases within the northern zone in the country. It collaborates with the University for Development Studies to offer undergraduate and post-graduate programs in medicine, nursing and nutrition for the region and beyond. The area can also boast of a multipurpose sports Stadium used for football matches does contribute to boosting sporting activities in the Metropolis. Other social events are organized in the stadium among them is the maiden 62nd National Independence Day celebration in 2019.

In terms of educational facilities, the area has many educational institutions, including University for Development Studies (UDS) Tamale campus, Tamale Technical University, Tamale College of Education (TACE) and Bagabaga College of Education (BACE). There is a nursing school, community health nursing college, adult education institute, Ghana language school and hygiene school. A number of Senior high schools (SHS) and some private senior high schools are also located within the Metropolis.

3.2 Research Methodology

3.2.1 Research Design

Cross-sectional was used for the study. This design provided a clear 'snapshot' where one-off data was collected, thereby, making the design quick and cheap to undertake unlike the longitudinal where time series data are collected over different time intervals (de Vaus, 2001). Also, the design allowed for the use of both qualitative and quantitative approaches in the study to complement each other (Creswell 2009). This is because the weakness of one is balanced by the advantages of the other to maximize the reliability of the research results (Gray, 2009). This design was used to investigate the role of ICT tools in educational delivery within basic schools within the Tamale Metropolis in Northern Region, Ghana.

3.2.2 Target Population

The study targeted Teachers, Head teachers and Pupils in public basic schools in the Tamale Metropolis. This is because these respondents were the ones that use the tools in their lesson delivery in the schools, and also execute administrative functions delegated to them by their head teachers in the schools. The head teachers were also targeted because, they also carry out administrative functions and the distribution role of teaching and learning materials in the public basic schools in the Metropolis. Finally, the pupils were targeted because they were the beneficiaries of the use of ICT tools in lessons by teachers.

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3.2.3 Sample Size

The total sample size used in this study was 344. Out of the sample frame of 2,488 teachers (Tamale Metro GES office, 2019), the estimated sample size was calculated based on Yamane's formula.

(Yamane, 1967). This is shown below.

$$n = \frac{N}{1 + N(e)^2}$$

Where:

"n" is the sample size being estimated

"N" is the sampling frame (target population) =2,488

"e" is the margin of error (in which case this study makes room for 0.05 margin of error)

Substituting these figures into the formula,

$$n = \frac{2488}{1 + 2488(0.05)^2}$$

n=344

This comprised of 344 teachers excluded the 30 head teachers and 30 pupils (Girls' Prefect and Boys' Senior Prefect). As explained by Kothari (2004) a sample should not be too large, nor should it be too small, but, rather be optimal.

3.2.4 Sampling Techniques

The study adopted both probability and non-probability sampling techniques. The probability sampling techniques used were cluster sampling and simple random sampling for the study. The cluster sampling was used by putting schools in to clusters which this study termed as circuits. In each circuit, the schools were obtained through a proportional representation from the total of

15 circuits in the Tamale Metropolis. As a result, a minimum of 1 and a maximum of 3 schools were chosen per circuit. This differences between the maximum and minimum schools chosen per circuit was 2. Thus, this leads to the selection of 30 basic schools in the Tamale Metropolis. The chosen schools automatically had their head teachers included in the study.

Neuman (2012, p.161) explained that

> "Once you get a sample of clusters, creating sampling frame for elements within each cluster becomes more manageable. A second advantage for geographically dispersed population is that elements within each cluster are physically closer to one another. This may produce a savings in locating or reaching each element"

This enhances the reliability of the representation within the population (Nicholas, 2011) in the Metropolis.

Also, the study used the simple random sampling through the lottery method and selected both schools and teachers for the study.

In every circuit, the names of schools were written on pieces of papers, folded and kept in a bowl and mixed to ensure randomization. Then the proportional sampling was applied in selecting the schools. In the case of the teachers, the names of teachers once again were also written on pieces of papers, folded and mixed up in a bowl. The teachers drawn at random were included in the study. The case where a teacher chosen through this method declined, the folded paper bearing the teacher name was mixed up again, and a new teacher is selected for inclusion in the study.

The simple random sampling gives equal chance to all sampled elements to be chosen (Neuman, 2012; Cohen, Manion and Morrison, 2011; Baker, 1994). Bhattacherjee (2012 p.68) upheld that 'this is the simplest of all probability sampling techniques; however, the simplicity is also the strength of this technique. The sampling frame is not subdivided or partitioned, the sample is unbiased and the inferences are most generalizable amongst all probability sampling techniques'.

Also, purposive sampling under the non-probability sampling was used for the study. In this type of sampling, the respondents (head teachers, Girls' Prefect and Boys' Senior Prefect) of the chosen schools were purposively chosen deliberately by the researcher for inclusion. The head teachers of all the selected basic schools were purposively included in the study due to their responsibility for the allocation of ICT tools as teaching and learning materials, and the supervision on the use of these ICT tools in their respective schools. The head teachers were therefore considered to have information about the availability and functioning of these teaching resources in their respective schools.

Similarly, the Boys' Senior Prefect and the Girls' Prefect in the selected schools were included in study because they were part of the beneficiaries on the use of ICT tools by their teachers. Also, these prefects had supervisory role over their colleague students in monitoring the availability, utilization, functioning and improper handling by their colleagues of these ICT tools in the chosen schools. In case where any of these prefects was not in school, the respective assistant was included as a substitute in the study.

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Purposive sampling allows for in-depth investigation on an issue for deeper understanding since the respondents have prior or expert knowledge on the issues under investigation (Neuman, 2012; Cohen, Manion and Morrison, 2011; Kothari, 2004; Baker, 1994). Purposive sampling as a non-probability sampling, permits the researcher to choose a particular sample units from the population that are of significant importance to the study (Kothari, 2004).

3.3 Sources of Data

This study was done relying basically on primary and secondary sources of data. The sources of data are discussed below:

3.3.1 Primary Data

According to Kothari (2004), primary data are those type of data which are collected afresh and for the first time by researchers, and thus, happened to be original in character. The study obtained primary data from the following categories of respondents.

- Teachers: This group of respondents were sampled and first-hand information about the availability and impact of ICT tools were collected from them. The teachers are those who integrate ICT tools into their lessons, and also undertake administrative and managerial duties assigned to them by their superiors.

- Head teachers: This group of respondents were selected as key informant and interviewed to obtain first-hand information in the schools about the availability and functioning of the ICT tools.

- Pupils: These were the Boys' Senior Prefect and the Girls' Prefect of the respective schools. This category of respondents were purposively selected and interviewed to get first-hand information about the use of ICT tools in their schools.

3.3.2 Secondary Data

The study obtained secondary data from staff chart, attendance register, Log book, inventory book of the respective schools, books, and publications. Data from of the numbers of teachers were obtained from the statistical office of the Ghana Education Service (GES), Tamale Metropolis. Records from the schools enables the researcher to authenticate and corroborate or the otherwise of what the researcher was briefed by the school head teachers and teachers of the available and utilization of the ICT tools of the respective schools. In this way, the researcher actually had the hard fact on the existed ICT tools in each school, and this allowed the researcher to balance the responses of the head teachers, teachers and students. So the researcher had the opportunity to interrogate inappropriate records and/or responses and not just to accept any response.

The study believed these various data sources really constituted secondary data since Kothari (2004) observed that these data are those type of data which have already been collected by someone else or other researchers (Kothari, 2004).

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3.4 Data Collection Tools

3.4.1 Questionnaires

The questionnaire is one of the data collection tools used for this study. It was used to collect primary data from the respondents. The questionnaires had both open and closed ended questions that were administered to respondents for this study. The questionnaires for teachers comprised of four main sections. The first section gathered information about the socio-demographic characteristics of teachers. The second section obtained information about the level of availability of ICT tools in the basic schools. The third part obtained information about teacher's knowledge in ICT tools, and the fourth gathered data on the effects of integrating ICT tools into lessons. The questionnaires were administered to the teachers because, they are the implementers of education.

Upon arrival of the researcher at any of the selected schools, the researcher introduced himself with the student identity card (ID) to the head teachers or assistants and seeks permission to collect the data. Respondents that were selected were allowed to answer the questionnaires at their own convenience. Those who could afford to complete the questionnaires were encouraged. The researcher did this to minimize the non-response rate amongst the respondents. However, those who could not have enough time to start or complete theirs were permitted to do that during their convenient time. These respondents were given 2 weeks to fill the questionnaires. Unfortunately, a return of the researcher after the 2 weeks, these respondents did not complete the questionnaires. This made the researcher to give the respondents another 3 weeks. As a result, the researcher went back to the respective respondents for the completed

questionnaires. Even with this, others could still not complete the questionnaires within this 5 weeks duration as the second deadline. After this second deadline, the researcher relied on known staff members to pick up those filled questionnaires that could be completed. Even with this, the researcher witnessed non-response rate. This non-response rate did not affect the sample size needed. This is because, 34 additional questionnaires representing 10% of the teacher sample size was added to the number of questionnaires administered to the respondents.

Neuman (2012) was of the view that questionnaires permits researchers to merge responses of the respondents, and thereby, making comparison of responses easier. Also, questionnaires allowed the respondents to easily and quickly answer, and through this, the researcher had wide coverage of the respondents (Neuman, 2012) across the study area.

3.4.2 Interview guide

The semi-structured interview guide as a tool for data collection was used for collecting the qualitative data from the Head teachers, Boys' Senior Prefect and the Girls' Prefect for this study. The interview guide had open ended and closed ended questions. The checklist of questions in the interview guide were aligned to the study objectives. This allowed the data generated to reflect that of the quantitative. By so doing, the qualitative data generated complemented the quantitative data. The interviews with the head teachers were flexible depending upon the time schedules of the head teachers. The interview was flexible and

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not on any order. This permitted the researcher to ask follow up and probing questions to solicit and clarify information given.

The interview for the Boys' Senior Prefect and the Girls' Prefect took about 20 minutes for each interviewee. The questions on the interview guide were framed, broken down and asked in a simplified way for easy understanding of the students: Boys' Senior Prefect and the Girls' Prefect.

Bhattacherjee (2012, p.78) explained that semi-structured interview allowed 'the interviewer the opportunity to clarify any issues raised by the respondent or ask probing or follow-up questions'.

Kusi (2012) confirmed that semi-structured interview allows the interviewer to vary the order of the questions such that each interviewee will flow in shearing his or her opinion on the issues under study. Through this, the researcher got the opportunity to solicit detailed information that addressed the study objectives.

3.5 Data Analysis

The quantitative data collected from the field were collected, gleaned and coded according to various relevant variables and organized for computer analysis using SPSS Version 20.0. The analysis of the quantitative data included descriptive statistics such as frequencies and percentages. This was presented using tables, pie charts and bar graphs in accordance to the study objectives for clear understanding.

The qualitative data obtained were analysed using content analysis basing on the research objectives. The data was then presented in a narrative form

describing the responses of teachers in use of ICT tools for preparation, teaching and learning as well as school administrative purpose. This was used to support the quantitative data.

3.6 Validity and Reliability

3.6.1 Validity

According to Seidu (2015:88), validity generally considers whether the measurement actually measures what it is supposed to measure. The two types of validity were considered, this included face validity and content validity. Face validity deals with whether the test or procedures measures what it is supposed to measure, whiles content validity deals with whether the test or procedure adequately collects and represents all the information that was required for validity. To ensure both content and face validity in this piece of work, the researcher developed the instrument based on the stated objectives of the study. The researcher also sought the approval of the supervisor regarding the instruments for the data collection administering.

3.6.2 Reliability

According to Kothari (2004), a measuring instrument is reliable if it provides consistent results. Reliability describes the stability of your measurement technique. It addresses the important issue on how the same thing can be measured in the same way in repeated tests (Seidu, 2015). To ensure that accuracy has been accomplished in this study, the data collection tools were pilot-tested to ensure that they are suitable for the project prior to data collection.

3.7 Ethical Considerations

The researcher took an introductory letter from the university based on which he introduced himself to the Education Office and Head teachers of various sampled schools. This enabled him to seek permission from the Head teachers. So informed consent was adhered to in conducting the research. According to Armiger (1997), it means that a person knowingly, voluntarily and intelligently, and in a clear and manifest way, give his consent. The researcher explained to respondents about what their participation in this research was to be and the requirements of the study and its importance. This enabled the researcher to get their consent before proceeding with the data collection. By explaining to the respondents about the purpose of the study, the researcher did not force any participant to participate in any way but allowed individuals to decide whether to participate in the study by themselves. The data was then collected from the head teachers, teachers, Boys' Senior Prefects and the Girls' Prefects for this study.

Also, anonymity and confidentiality of responses were also ensured by the researcher. Anonymity was used to ensure the confidentiality of respondents by not asking the names of respondents on the questionnaires given. Analysis of the data given by the respondents was collectively analyzed without linking a particular information to particular individual or group of individuals and their various respective schools.

Finally, the researcher made sure that there was no plagiarism in his work by acknowledging other people's work that references were made. In furtherance

of this, the entire thesis plagiarism was checked using the plagiarism software at the University Library. The findings have been reported as per the respondents' answers and not otherwise.

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CHAPTER FOUR

PRESENTATION, INTERPRETATION AND ANALYSIS OF

FINDINGS

4.0 Introduction

This chapter presents the results and analyses of data gathered from the field based on the study objectives of the research. The data is presented in tables and figures for clarity of work. Three sets of research instruments were administered to three categories of respondents namely teachers, head teachers and pupils in the sampled schools within the Tamale Metropolis. The sample size used for the study was 398.

The main focus of this chapter was to identify the level of availability of ICT tools in public basic schools and how it can impact on lesson delivery in the Tamale Metropolis. Tables, frequencies and percentages were used for the analysis of this study. Where necessary, details are graphically represented to explain the issues discussed in order to ensure better understanding.

4.1 Demographic Characteristics of Respondents

The demographic characteristics of the respondents covered in this study included sex, age, professionally trained, academic qualification and number of years of working experience.

4.1.1 Teachers

The demographic characteristics of teachers collected included sex, age, professionally trained, academic qualification and number of years of working experience.

4.1.1.0 Sex of Respondents

The sex of respondents who took part in the study is illustrated in the table below.

Table 1. Sex of Respondents

Sex	Frequency	Percentage (%)
Male	212	61.7
Female	132	38.3
Total	**344**	**100**

Source: Field Survey (2019).

From Table 1 above, 344 sampled respondents took part in the study. The males constituted 212, representing 61.7% whiles 132 were females representing 38.3%. The majority of male teachers to female teachers is in line with Ilomäki et al. (2001), that male teachers of all age groups used ICT tools more often both in school and during their leisure time than their female counterparts.

4.1.1.1 Age Structure of Respondents

Respondents' age were grouped into four categories with a ten-year interval starting from 20 years to 50 years and above. This is seen in the table below.

Table 2. Age Structure of Respondents

Age	Frequency	Percentage (%)
20 – 29	70	20.3
30 – 39	226	65.6
40 – 49	46	13.3
50 +	2	0.8
Total	**344**	**100**

Source: Field Survey (2019).

From Table 2 above, 20.3% of respondents were between the ages of 20 and 29 years. The majority (65.6%) were between 30 and 39 years old. Respondents between the ages of 40 and 49 years constituted 13.3% and only few (0.8%) were 50 years and above. From the sample, it showed that respondents are youthful, active labour force, and relatively matured teachers in terms of age. As a result, they were able to provide this study with relevant information about ICT tools in relations to the objectives of the study.

4.1.1.2 Teachers with Professional Training

The study sought to find out about teachers who have acquired professional training from the Colleges of education and Universities to teach the public basic schools.

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Table 3. Respondents with Professional Training

Trained	Frequency	Percentage (%)
Yes	269	78.1
No	75	21.9
Total	**344**	**100**

Source: Field Survey (2019).

From Table 3 above, 78.1% are professionally trained from either the Colleges of education or the Universities to teach in the Metropolis and 21.9% have not acquired the professional training to teach. This is because public basic schools are fed with teachers from the colleges of education resulting in the high percentage of trained teachers in the public basic schools in the Metropolis.

4.1.1.3 Academic Qualification of Respondents

Qualification of teachers was also obtained for this study. This is seen in the table below.

Table 4. Qualifications of Respondents

Qualification	Frequency	Percentage (%)
Certificate A	0	0
Diploma	158	46.1
Degree	183	53.1
Masters	3	0.8
Total	**344**	**100**

Source: Field Survey (2019).

Concerning teachers' academic qualification, Table 4 above shows that, majority (53.1%) of the respondents had Degrees including Bachelor in Education, Bachelor of Arts and Bachelor of Science. Also, 46.1% of teachers were Diploma in Basic Education (DBE) and Higher National Diploma (HND) holders and the rest (0.8%) had Master's degree. None of the sampled respondents was a certificate 'A' holder. All the teachers in the Metropolis had passed through a tertiary level of education where different ICT tools were used and hence their awareness of the importance of ICT tools in educational delivery.

4.1.1.4 Working Experience of Respondents

The survey also obtained information about the number of years teachers have been teaching. This is seen in the table below.

Table 5. Working Experience of Respondents

Working Experience	Frequency	Percentage (%)
0 – 4	108	31.3
5 – 9	118	34.4
10 – 14	70	20.3
15 +	48	14.1
Total	**344**	**100**

Source: Field Survey (2019).

Regarding the working experience of sampled teachers who took part in the study, 34.4% of them have taught for 5 to 9 years, 31.3% have taught for 1 to 4 years, 20.3% have taught for 10 to 14 years, and 14.1% have taught for 15year and more. 68% of the teachers have teaching experience of 5 years and beyond.

Therefore, had experience to respond to the questionnaires regarding the use of ICT tools in educational delivery.

4.1.2 Head Teachers

The demographic characteristics examined from head teachers included sex, age and academic qualification.

4.1.2.0 Sex of Head Teachers

The table below shows the sex of sampled head teachers who took part in the study.

Table 6. Sex of Head Teachers

Sex	Frequency	Percentage (%)
Male	10	41.6
Female	14	58.4
Total	**24**	**100**

Source: Field Survey (2019).

From Table 6 above, the number of head teachers who took part in the study, 58.4% of them were females' whiles 41.6% of them were males.

4.1.2.1 Age Structure of Head Teachers

The age structure of head teachers is seen in the table below.

Table 7. Age Structure of Head Teachers

Age	Frequency	Percentage (%)
45 – 49	0	0
50 – 54	6	25
55+	18	75
Total	**24**	**100**

Source: Field Survey (2019).

Concerning the age group of head teachers, none of them was between 45 and 49 years, 25% were ranging from 50 to 54 years and 75% were 55 years and above. It can be seen that head teachers in the Tamale Metropolis were advanced in age. The age structure of the head teachers can likely influence their decisions in the adoption and use of ICT tools in the basic schools. According to Rogers (2003), for an innovation to be adopted and use, it must not be too complicated for the potential adopters because new ideas that are easy to understand are adopted more quickly than those that require new skills to use. Head teachers also take administrative decisions as to the full adoption and use of ICT tools in their various schools.

4.1.2.2 Qualification of Head Teachers

The table below shows the academic qualification of head teachers who were sampled for the study.

Table 8. Qualification of Head Teachers

Qualification	Frequency	Percentage (%)
Diploma	3	12.
Bachelor Degree	19	79.2
Masters	2	8.3
Total	**24**	**100**

Source: Field Survey (2019).

Concerning the academic qualification of the sampled head teachers who took part in the survey, 79.2% of them were Degree holders, 12.5% were Diploma holders and 8.3% were Masters Holders. All the head teachers have experienced in management and in a position to acquire and allocate ICT tools in their schools.

4.1.3 Pupils

The demographic characteristics that were taken from the pupils were their sex. The sex of pupils was taken in to concentration because the researcher wanted equal representation of both sexes of pupils for gender balance.

Out of the 30 pupils sampled, the researcher sampled 15 males representing 50% and 15 females also representing 50% of the sampled pupils' population.

4.2 Level of Availability of ICT Tools in Basic Schools

The level of availability of ICT tools in basic schools included findings of availability and functioning of ICT tools such as Desktop computers, Laptops, Pen drives, Printers, Televisions, Video/DVD/CD Decks, Radios, Phones, Loud speakers and Projectors. In addition, teachers who own their personal laptop/computer and integrating them in the delivery of their lessons was also established in the study.

4.2.1 Availability and Functioning of ICT Tools in the Basic Schools

In other for the researcher to examine the availability and functioning level of the ICT tools in the basic schools, teachers were provided with questionnaire of which they were to indicate whether they are available or not in their schools. Also, they were to indicate whether those available tools were functioning or not functioning.

Table 9 below gives the summary of the responses of teachers on the availability and functioning of ICT tools in the Basic schools in the Metropolis.

Table 9. Availability and Functioning of ICT Tools

ICT Tool	Available		Functioning	
	Yes (%)	No (%)	Yes (%)	No (%)
Desktop Computer	99 (28.9)	245(71.1)	56 (57)	43 (43)
Laptop	62 (18)	282 (82)	46 (74)	16 (26)
Pen drive	148 (43)	196 (57)	73 (49)	75 (51)
Printer	40 (11.7)	304 (88.3)	24 (60)	36 (40)
T V	145 (42.2)	199 (57.8)	126 (87)	19 (13)
Video/DVD/CD/Deck	92 (26.6)	252 (73.4)	80 (88)	12 (12)
Radio	67 (19.5)	275 (80.5)	51 (76)	16 (24)
Phone	97 (28.1)	247 (71.9)	54 (56)	43 (44)
Loud Speakers	27 (7.8)	317 (92.2)	8 (30)	19 (70)
Projector	19 (5.5)	325 (94.5)	8 (42)	11 (57)

Source: Field Survey (2019). **n= 344**

From Table 9, majority (43%) of the teachers who responded to the study indicated that they had pen drive in their school, 42.2% indicated TV was available in their school, 28.9% and 28.1% indicated that desktop computers and phones were available respectively in their school whiles 26.6% had video deck in their school. Another 19% indicated radio was available in their school, 18% indicated that laptop was available. Also, 11.7% of teachers indicated printer was in their schools. Additionally, 7.8% and 5.5% of teachers indicated loud speaker and projector was available respectively in their various schools. From the study, it was found out that pen drive was the majority (43%) ICT tool in the Metropolis whiles projector is the least (5.5%) in the Metropolis. The revealed that 29% of computers are available in the public basic schools.

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Computers are inadequate in the Metropolis to ensure that, all students access it during lessons. The study also confirmed a similar study by Bernard (2012), that computers which are the major teaching and learning resources are inadequate (77.4%) in the Cape Coast Metropolis.

On the other hand, pen drives (43%) and televisions (42.2) were the most available ICT tools in the basic schools in the Tamale Metropolis. Most schools acquired the Television sets by themselves and the operation of Discovery Learning Alliance (DLA), a non-governmental organisation in Tamale Metropolis supplying some basic schools with Television sets, Video decks, CDs and pen drives for teachers to integrate them into their lessons. This is in line with James et al. (2015) that Television-assisted-instruction is one of the most effective ICT tools that aid in teaching and learning in basic schools in Ghana. They further added that it is as a result of the efforts of the Government of Ghana's Presidential Special Initiative on Distance Learning as well as efforts of some NGOs which distribute television sets to schools for distance learning purposes. A teacher commented that:

"The technological tools in this school is inadequate and limit our efficiencies in terms of innovations in our work" (Zogbeli JHS, 21st June, 2019). Another also said*, "Two lap tops are available but not working well in this school" (SDA JHS, 18th September, 2019).*

The inadequacy of the technological tools in the basic schools are a serious challenge to most teachers which further defeats the ICT in Education Policy implemented in the country. This therefore neglects the participatory and

interactive teaching methods in favour of lecture and rote methods in schools as desired by the policy (ESPR, 2010).

Concerning the functioning of the ICT tools available in the basic schools, 88% and 87% of the available Video decks and TVs respectively were functioning in the Metropolis. 76% of available radio were functioning and 74% of available laptops were functioning. Additionally, 60% and 57% of available printers and desktop computers respectfully were functioning, 56% of available phones were indicated to be functioning. Finally, 49% of available pen drives, 42% of available projectors and 30% of available loud speakers were functioning in the schools in the Metropolis. The results shows that televisions and video deck players were the most available and functioning ICT tools in the basic schools in the Tamale Metropolis.

This is as a result of the operation of Discovery Learning Alliance (DLA) program, a non-governmental organisation operating in the Tamale Metropolis by supplying basic schools with television sets, video decks, CDs and pen drives for teachers to integrate into their lessons.

Through interview, the study revealed that some the schools acquired some of the ICT tools through donations from the government, non-governmental organization of the Parent Teacher Association (PTA) of the school and from internal generated funds. For instance, Little Way Academy School had 12 lap tops which were donated to school by the government of Ghana through the '*Better Ghana*' lap top policy in the country in 2012. Zogbeli Junior High

Schools also had a desk top computer in the head teachers' office, and this was acquired by the school itself through internal generated funds. The study further revealed that, schools like Jakarayili SDA Primary and Junior High School, Sobriya Primary School, Banvim Junior High School and Lamashegu Primary B had Samsung televisions, Samsung DVD players and pen drives donated to them by the Discovery Learning Alliance (DLA) Programme.

Head teachers were asked to comment on the availability of ICT tools in their schools. One of the head teacher said;

"The ICT tools in my school lacks the requisite capacity for teaching and learning for both teachers and pupils in this school" (Head Teacher Ansuriya Islamic Primary Schools, 10th July, 2019*).*

76% of the head teachers indicated that ICT tools were not available in their schools for teachers to integrate into their lessons. They head teachers indicated that it will be appropriate for the children to be exposed at the early age of their lives since the world is now spinning on technology.

The study further revealed that, the few ICT tools available were not fully utilised in the schools by the teachers due to inadequate installation, functioning, skills, electricity supply and inadequate administrative support. Some of the head teachers complained about how some the current government policies have neglected the basic school sector of education in the country.

Pupils were also asked by the researcher to comment on the availability of ICT tools in their schools, 11 students representing 36.7% said in their schools they

have ICT tools whiles 21 students representing 63.3% said they do not have ICT tools in their schools. The available tools stated by the pupils included desktop computers, television sets, DVDs, radios, pen drives and laptops. This confirmed that, the teachers did not effectively use the few available tools in their lessons prompting the pupils to state that in their schools they do not have ICT tool base on their understanding of the questions. Some of the ICT tools captured from the study are seen below.

A monitor

Television

Pen drives

Generator

4.2.2 Teachers with Personal Computers

The researcher also find out teachers who had their personal computers/laptops

for use. The results is seen in the diagram below.

Figure 3. Teachers with Personal Computers/laptops

TEACHERS WITH PERSONAL COMPUTERS/LAPTOPS

Yes 42%

No 58%
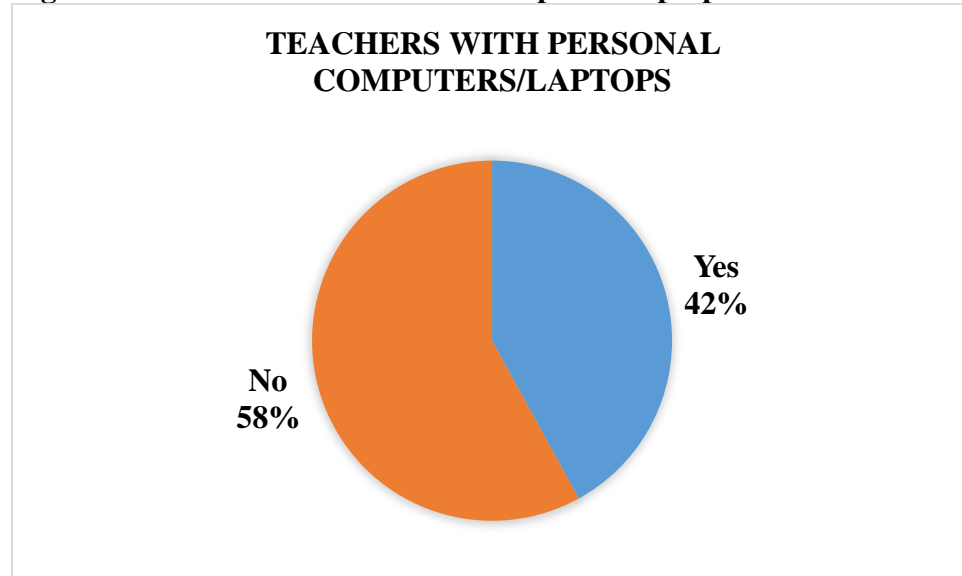
Source: Field Survey (2019).

Figure 3 above revealed that majority of the teachers (58%) sampled indicated

that they do not have personal computers for use whiles 42% indicated that they

have personal computers for use. This is in line with the Government of Ghana

(GoG) through the "*Better Ghana Agenda"* Project in 2016 to distribute laptops

to basic schools and second cycle institutions in the country to promote ICT use

in basic schools (Ministry of Education, 2017).

4.3 Knowledge Level of Teacher in ICT Tools

The knowledge level of teachers in ICT tools in the basic schools was also

examined by the researcher. According to Rogers (2003), knowledge is the first

stage in the innovation-decision process. The level of knowledge of teacher will

determined how they fully accepted and adopted the use of ICT tools in their

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work or rejected it. Sampled teachers were asked to tick whether they have any knowledge in ICT tools.

Figure 4 below shows the responses of teachers who have knowledge in ICT tools.

Figure 4. Knowledge of Teachers in ICT Tools
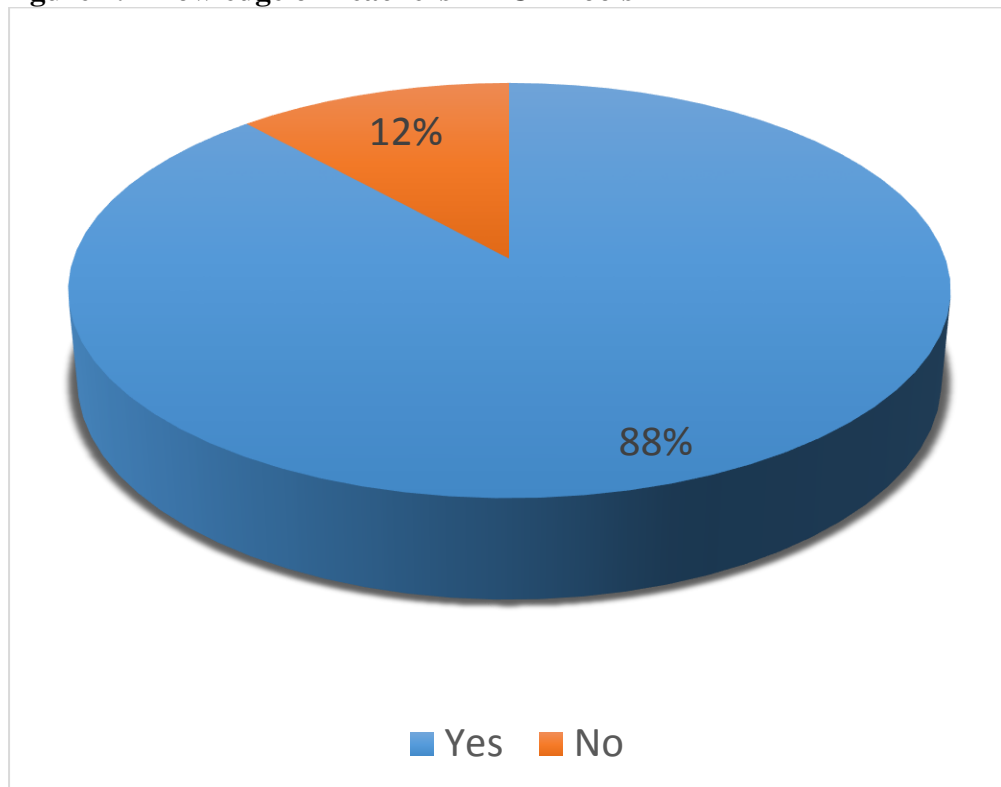
Source: Field Survey (2019).

From the study, Figure 4 above revealed that majority (88%) of the sampled teachers have some level of knowledge in ICT tools. This is in line with Bernard (2012) who studied the status to which the ICT curriculum is effectively being implemented in basic schools in the Cape Coast Metropolis and that 51.2% of the teachers have knowledge in ICTs. However, it contradicted the Education Sector Performance Report 2010, that bulk of teachers (70%) are not computer literate in Ghana (ESPR, 2010). According to Rogers (2003), in his Diffusion of Innovation (DOI) Theory, knowledge is the starting point in introducing an

innovation and since most of the teachers have knowledge in ICT tools, it will be easy for them to be equipped with skills as to how to integrate them into lessons.

If teachers have knowledge in ICT tools, it will enable them to use the tools to prepare and deliver their lessons to improve upon the understanding level of their students. According to the European Commission (2013) to achieve a meaningful use of technology in the field of education, it is teachers' level of knowledge and attitude towards the use of technology in teaching and learning process in classrooms. Barber & Mona (2007), also pointed out that the physical access to computers in schools is a starting point but alone will not lead to computer use or enhanced learning outcomes in schools. The level of teachers' knowledge in ICT tools will be one essential requirement for a successful integration of ICT tools in education. The individual teachers are mostly the one who makes the decisions in the classroom practices, also concerning technology use. Moseley et al. (1999) also stated that teachers who have good knowledge in ICT would use it more in their lessons and in a student centered manner.

Head teachers were also asked about the knowledge level of their teachers in the sampled schools. All the 24 head teachers indicated that their teachers have some level of knowledge in ICT tools for lesson delivery. One head teacher said,

"I know one of the teachers in my staff who always use his smart phone to access information on the internet to teach his pupils" (Kaladan SDA Primary School, 12th March, 2019).

4.3.1 Teachers Who had Training to Use ICT Tools

In order to better understand the knowledge level of the teachers, the researcher asked the teachers to indicate whether they had been trained to use ICT tools in lessons.

The diagram below shows the responses of sampled teachers in the study.

Figure 5. Teachers Who had Training to Use ICT Tools
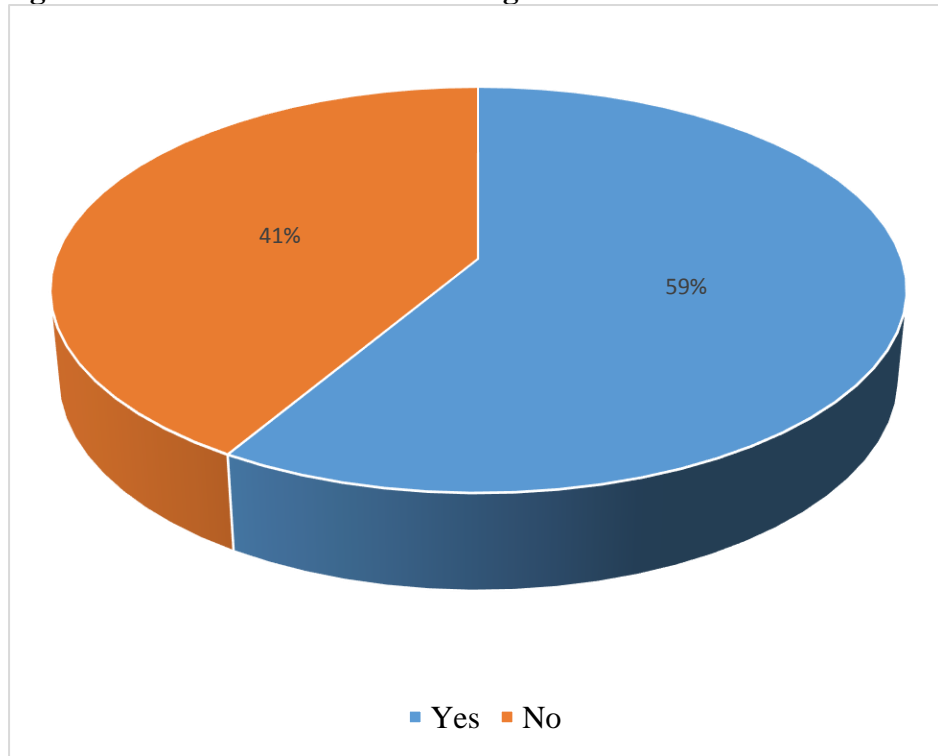
Source: Field Survey (2019).

From the study, Figure 5 above revealed that majority (59%) of the sampled teachers had received some form of training to use ICT tools in their lesson delivery. They revealed that, they had the training from the Discovery Learning Alliance (DLA) Program as to how to integrate television assisted programs in to their lessons in classrooms. Whiles, 41% indicated that they have not received any form of training to use ICT tools into their lessons. Some of the teachers also stated that, they enrolled themselves in computer training centers to

acquired knowledge in ICT but had not received any training to use ICT tools into lessons.

When the head teachers were asked whether their teachers have received any form of training to use ICT tools to aid in their lesson delivery, 96% of the head teachers indicated that their teachers have received only training to use television and deck into lessons.

4.3.2 Integrating ICT Tools into Lessons

The researcher also find out whether teachers integrate the available ICT tools into their lessons in the schools.

Figure 6 below shows the results of integrating ICT tools into lessons by the sampled teachers.

Figure 6. Teachers who Integrate ICT Tools into Lessons

Source: Field Survey (2019).

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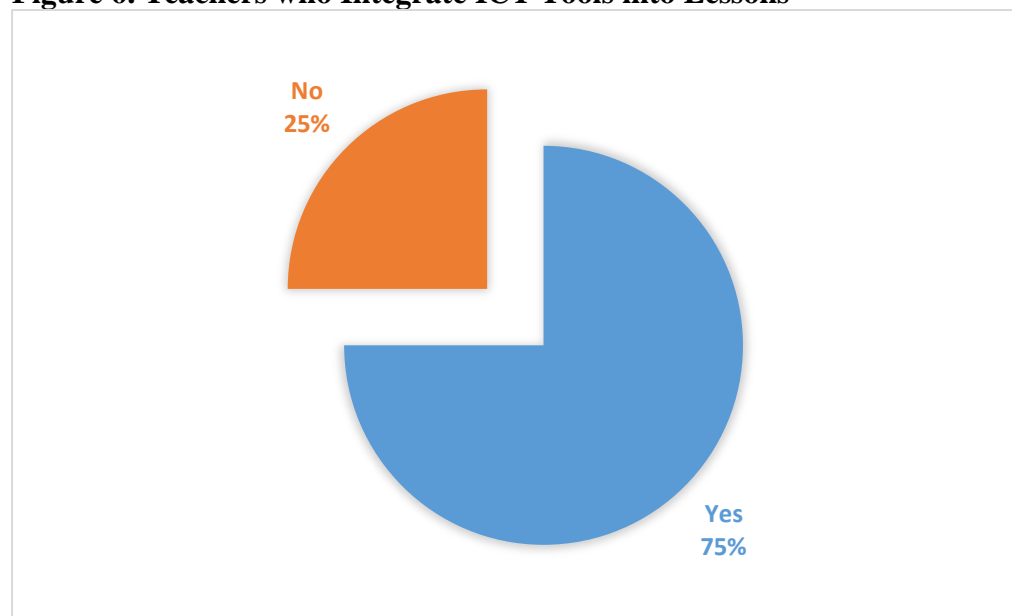
From the study, Figure 6 above, it shows that 75% of the sampled teachers responded that they integrate ICT tools into their various lessons, whiles 25% indicated that they do not integrate ICT tools into their lessons. This is in line with Cordes et al. (2000), that the use of computers and the internet is a supplementary source of educational materials for teachers. James et al. (2015) also added that teachers use ICT tools to prepare, enrich and deliver their lessons.

Head teachers were also asked to comment on their teachers integrating of the available ICT tools in their lessons in the schools. The study revealed that 96% of the head teachers indicated that their teachers integrate the available ICT tools into their lessons, whiles 4% indicated that their teachers do not integrate ICT tools into their lessons.

The students were asked to comment on their teachers integrating ICT tools into their lessons.

A student commented that;

"*Computers are available when it is ICT lessons only*" (Ambariya JHS, 3rd July, 2019).

Another student said,

"*The TV is in the staff room for teachers only to watch*" (Ambariya JHS, 3rd July, 2019).

Figure 8. A Teacher Using Laptop and Projector to Teach at Jakarayili SDA

Primary School.
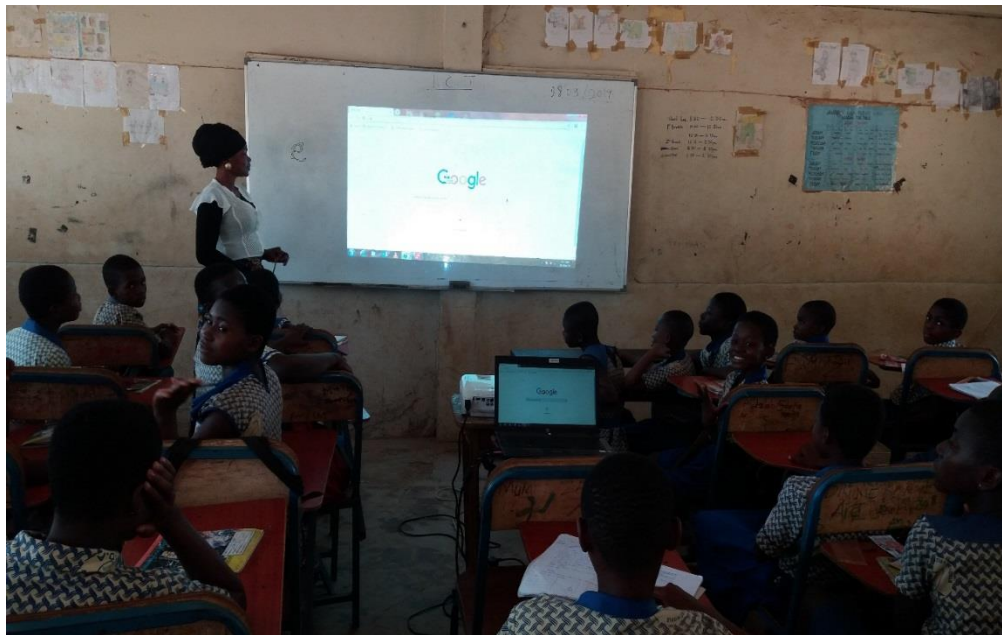
Source: Field Survey (2019). 30th May, 2019. 9:15am

Figure 7. A Teacher Using TV and Video Deck to Teach at Manguli-Anglican Primary School.

Source: Field Survey (2019). 13th March, 2019. 10:35am.

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4.4 Impacts of ICT Tools on Educational Delivery

To ascertain the effects of ICT tools on lesson delivery in basic schools, a three-point Likert scale was used. Respondents were provided with statements and they were to choose their level of agreement by indicating that they: Strongly Agreed = 3, Agreed = 2 or Disagreed =1 to the statements provided.

4.4.1 ICT Tools can Improve Lesson Delivery in Class

Sampled teachers were to state whether the use of ICT tools can improve lesson delivery in class. The results are seen in the Table below.

Table 10: ICT Tools can Improve Lesson Delivery in Class

		Frequency	Percentage (%)
Do you think ICT tools can improve lesson delivery in class?	Strongly Agreed	204	59.4
	Agreed	140	40.6
	Disagreed	0	0
Total		**344**	**100**

Source: Field Survey (2019).

The results in Table 10 above, shows that 204 respondents representing 59.4% strongly agreed that the use of ICT tools can improve their lesson delivery in class, while 140 representing 40.6% agreed that ICT tools can improve lesson delivery in class. None of the teachers disagreed that the use of ICT tools will not improve lesson delivery in class. The study results confirms with Trimmel et al. (2004), that the use of ICT tools have a positive impact on school attendance and learning in class.

A teacher commented that;

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"The use of technology in class will reduce the workload of teachers from much talking in class for pupils to see what you are talking about to help them understand the topic more" (Little Way JHS, 18th February, 2019).

4.4.2 ICT Tools Can Improve Pupils' Understanding

Sampled teachers were to state whether the use of ICT tools can improve pupils' understanding in class. The results are seen in the table below.

Table 11: ICT Tools Improve Pupils Understanding in Class

		Frequency	**Percentage (%)**
The use of ICT tools can improve pupils understanding class.	Strongly Agreed	209	60.9
	Agreed	135	39.1
	Disagreed	0	0
Total		**344**	**100**

Source: Field Survey (2019).

From the study, Table 11 above revealed that, 209 of the sampled teachers representing 60.9% strongly agreed that the use of ICT tools during lessons can improve pupils' understanding level in class whiles 135 teachers representing 39.1% agreed that the use of ICT tools can improve pupils' understanding level class. None of the teachers disagreed that the use of ICT tools cannot improve pupils' understanding room.

Here are some teachers' comments on the use of ICT tools in lessons;

"It will aid a better understanding of what is being taught in class".

*"P*upils will interact with the ICT tools during learning".*

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"Through ICT tools, pupils can adjust to modern techniques of learning".

"It can help pupils to consolidate what they learn and it help teachers to assist pupils in that regard".

"It makes pupils to understand with little explanation".

"It makes information available for pupils to access what they want, it stimulate pupils interest and makes teaching very easy" (Field survey, 2019).

The 100% agreement by the sampled teachers that the use of ICT tools will improve students understanding level in class is in line with UNESCO (2007), that teachers and learners can use television programmes and videos to enhance understanding of current affairs, culture, science and other subjects. Also, the use of technologies in class can further bring about conceptual shift 'from a content-based input approach to a competence-based output approach' (Malan 2000, p. 27).

Pupils were asked about the use of ICT tools class in relation to how it can aid them to understand in class. 12 pupils representing 40% said the use of ICT tools can help them to understand whiles 18 pupils representing 60% said the use of ICT tools in lessons will not help them to understand what is being taught in class.

4.4.3 ICT Tools Can Motivate Pupils to Learn

Sampled teachers were to state whether the use of ICT tools can motivate pupils to learn in class. Sampled teachers were to indicate their level of agreement. The results are seen in the table below.

Table 12: ICT Tools Motivate Pupils to Learn

		Frequency	**Percentage (%)**
The use of ICT tools can motivate pupils to learn.	Strongly Agreed	231	67.2
	Agreed	113	32.8
	disagreed	0	0
Total		**344**	**100**

Source: Field Survey (2019).

From the study, Table 12 above indicated 231 teachers representing 67.2% strongly agreed that the use of ICT tools can motivate pupils to learn in class whiles 113 teachers representing 32.8% agreed that ICT tools can motivate pupils to learn. A commented that,

"*ICT tools will enable pupils to physical see and touches or operates it by themselves, thereby arousing pupils' attention in lesson delivery*" (Jakarayili SDA Primary school, 2nd April, 2019).

This agrees with Condie et al. (2007), that the use of ICT tools can raise students' motivation to learn and also gives them more control over the learning experience if they practice it by themselves in class. It has also been revealed that ICT tools can motivate students to learn by bringing varieties into lessons and at the same time, sustain teachers own interest in teaching in classrooms (Slaouti & Barton, 2007, cited in Bernard, 2012, p. 28).

4.4.4 ICT Tools can Distract Lessons

Sampled teachers were to state whether the use of ICT tools can distract lessons in class. The results are seen in the table below.

Table 13: ICT Tools can Distract Lessons

		Frequency	**Percentage (%)**
The use of ICT tools can distract lessons.	Strongly Agreed	0	0
	Agreed	143	41.4
	disagreed	201	58.6
Total		**344**	**100**

Source: Field Survey (2019).

From the study, Table 13 above shows that 201 teachers representing 58.6% disagreed that the use of the tools can distract lessons in class, whiles 143 teachers representing 41.4% agreed that the use of the tools can distract lessons in class. Some teachers commented that;

> *"It makes the children happy in class".*

> *"It will encourage pupils to participate in class".*

> *"It will enable pupils to concentrate and participate in class".* (Field survey, 2019).

The results disagreed with Vawn (2019), who studied technology in the classroom and one of the conclusions was that technological tools could be distractive to students in the classroom. The teachers were quick to add that even though pupils may have divided attention upon seeing technologies in class which may not be a normal routine for them, it is left on the individual teachers

to direct their attention and make sure that students do not watch videos (especially television programs) but on the content of the program been shown.

4.4.5 The Use of ICT Tools can Improve Attendance to School

Sampled teachers were to state whether the use of ICT tools can improve students' attendance to school. The results are seen in the table below.

Table 14: ICT Tools can Improve Attendance to School

		Frequency	Percentage (%)
The use of ICT tools can improves pupils' attendance to school.	Strongly Agree	155	45.3
	Agree	182	53.1
	disagree	7	1.6
Total		**344**	**100**

Source: Field Survey (2019).

From the study, Table 14 above shows that 182 teachers representing 53.1% agreed that the use of ICT tools can improve students attendance to school whiles 155 teachers representing 45.3% strongly agreed that the use of ICT tools can improve students attendance to school and 7 teachers representing 1.6% of the sampled teachers do not agreed that the use of ICT tools can improve pupils attendance to school. This agreed with Trimmel and Bachaman (2004) who studied the impact of introducing laptops into classrooms and one of their conclusions was that Information Technology has a positive impact on school attendance and learning interest of students.

4.4.6 Medium through Which Schools Communicate to Parents

The researcher also sought information about the medium through which teachers communicate to parents of pupils to help improve educational delivery. The results is seen in the diagram below.

Figure 9. Medium Schools Communicate to Pupils' Parents
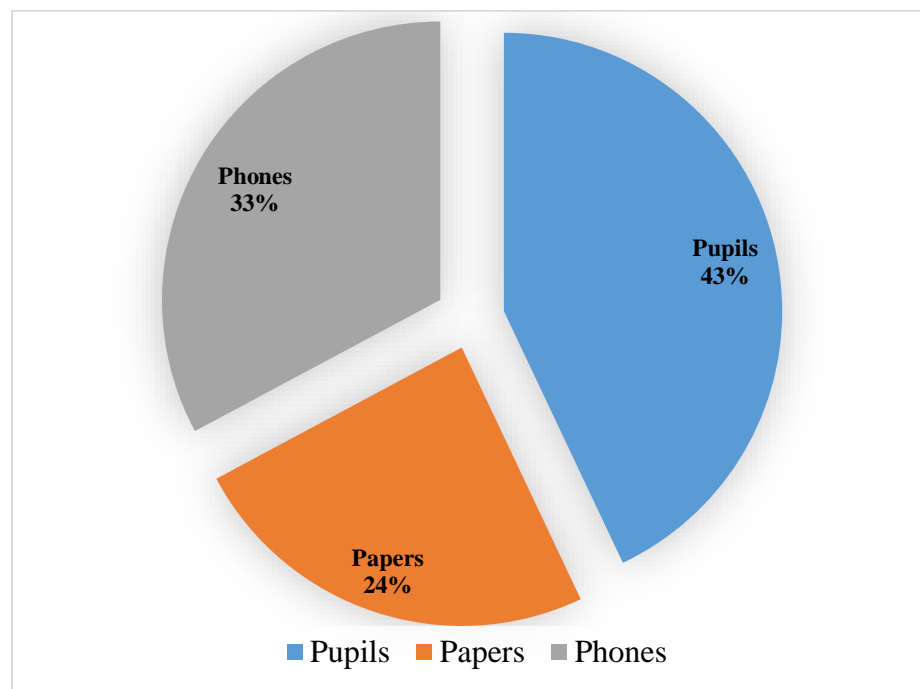
Source: Field Survey (2019).

From the study, From Figure 9 above revealed that 33% of the sampled teachers use mobile phones to communicate to pupils' parents and 43% communicate to parents through students and 24% communicate to parents through papers for feedback. This means that about 67% of teachers in the public basic schools still use the olden methods of sending and receiving information to and from parents of wards. This according to the teachers is not always an effective means of communicating to parents since most of the pupils do not send information to their parents from their teachers and sometimes, some parents are not able to

read due to illiteracy rate of parents. This does not improve effectiveness and efficiencies in terms of response rate for pragmatic measures to be taken concerning pupils' welfare in the schools. The use of ICT tools by school ensures efficiency in the communication between schools and parents to ensure effective school management system. Improving communication with parents by schools is considered to be important in reducing the home-school divide. According to Akarowhe (2017), the use of ICT tools such as phone, e-mail, radio and television messages will bridge the gap between parents and teachers.

4.4.7 Medium School Records are kept

Basic schools take students' information and other relevant information and keeps them as records in the schools. The keeping of those records are very crucial for the day to day operations of the schools, and the medium through which these records are kept is crucial in this technological world. Based on this, the study enquired about the medium through which public schools stored their information for safe keeping.

Table 15 below shows the medium schools keep their information.

Table 15. Medium which School Records are Kept

Medium records are kept	Frequency	Percentage
Hard copies	172	50.0
Soft copies	54	15.6
Both	118	34.4
Total	**344**	**100**

Source: Field Survey (2019).

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From the study, From Table 15 above revealed that 172 teachers representing 50% indicated that they kept their information by using papers whiles 54 teachers representing 15.6% said they stored their information through the soft copy medium and 118 teachers representing 34.4% indicated that they stored their information by using both the soft and hard copy. From the study, majority (50%) of the teachers still use the manual method in storing their information in the public basic schools in the Metropolis. This agreed with Abigail et al. (2018) that despite the increasing importance of electronic records management system since the advent of information technology, record management in basic schools are still a manual activity where teachers and head teachers use the cupboard and shelve system for record-keeping. Also, a study by Rosen & Well (1995), stated that many basic schools in the country information are done manually and recorded on papers and kept in files in the schools which are more vulnerable to destruction by mice, rain or fire.

Head teachers were also asked about the medium through which they stored their information in their respective schools. 79% of the responded that they keep their information/documents in hard copies only whiles 21% responded to keep their information/documents in both soft and hard copies. This confirmed with Rosen & Well (1995), that most of the schools still use the manual way to keep their records and other vital information in the basic schools.

4.4.8 Challenges Basic Schools Encounter In The Use of ICT Tools

The study also sought to establish some challenges teachers' faces in the use of ICT tools in the public basic schools. Respondents were asked to state some

challenges they are facing or will face in the use of ICT tools in their schools. Some of the responses of the respondents are listed below;

i. Inadequate or lack of ICT tools in the schools.

ii. Poor administrative support in the schools.

iii. Faulty ICT tools due to non-maintenance in the schools.

iv. Lack of power or frequent power outage in the schools.

v. Lack of skills in the use of ICT tools for lesson delivery.

vi. Lack of resource centers for ICT tools in the schools.

vii. Low-speed internet to access information on the internet.

viii. Insufficient funds to acquire ICT tools in the schools.

ix. Time factor due to short lesson periods in basic schools.

x. Theft cases related to ICT tools due to lack of resource centers in the schools.

From the study, 100% of the head teachers interviewed stated challenges like inadequate ICT tools in their schools making the use of them in lesson delivery very difficult for the teachers. Some also stated the lack of spacious and well-equipped ICT centers for proper use in lesson delivery is a challenged. 50% of the head teachers stated that inadequate skills of teachers, thus limiting their integration of ICT tools into lessons. 28% of the sampled schools stated that electricity is a challenge since most of the public basic schools are not connected to the national grid and paying of electricity bills is also a problem to those who are connected to the national grid. 17% of the head teachers also stated insecurity in their schools which led to some of the ICT tools being stolen by thieves in the schools.

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When the pupils were asked to mention the challenges their schools faced in the use of ICT tools foe lessons, all the pupils confirmed the challenges stated by their teachers and head teachers. A student commented that,

> *"Lack of ICT tools in our school makes us not to have interest in the learning of ICT lesson leading to poor performance in the subject".* (Jakarayili SDA JHS, 18th January, 2019).

The challenges stated by the basic schools confirmed the Northern ICT4D Series (2009), where the Director of Education stated the lack of infrastructure, lack of power supply, lack of administrative support, lack of internet connectivity in most schools and high cost of ICT services were some of the challenges basic schools encounter in the Tamale Metropolis.

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CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

This chapter consists of three parts. The first part presented a summary of the study findings. The second part presented the conclusions drawn from the study and the final part was on the recommendations put forward for consideration by stakeholders of concern in education.

5.1 Summary

This piece of work studied the role of ICT tools in educational delivery within the Tamale Metropolis. The study examined the level of availability of ICT tools in the basic schools, knowledge of teachers in ICT tools and the impact of ICT tools on lesson delivery.

A total of 398 respondents took part in the study. This comprised of 344 sampled teachers, 24 head teachers and 30 pupils from the public basic schools out of a total of 2,488 public basic schools in 15 circuits in the Metropolis. The ICT tools that were assessed in terms of their availability in the schools were the pen drive (43%), TV (42.2%), desktop computer (28.9%), phone (28.1%), video deck (26.6%), radio (19%), laptop (18%), printer (11.7%), loud speakers (7.8%) and projector (5.5%).

The study revealed that ICT tools in the basic schools were generally low in terms of availability and usage by both students and teachers in the Metropolis thereby, limiting their integration during lessons. According to Michael (2001),

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for an item to be available, there should be no unscheduled or unplanned outages of the item. Since the tools were not enough for all student to use during lessons, it was therefore inadequate in the public basic schools. However, the few available ones were challenged with malfunctioning, power outages, poor administrative support, theft cases, skills of teachers and inappropriate resource centres in the schools.

Majority of the teachers in the Tamale Metropolis demonstrated some level of knowledge in the ICT tools. According to the Cambridge Dictionary, knowledge is when one shows understanding of or information about a subject that he or she gets by experience or study. The teachers had acquired tertiary level of education and studying the course Information and Communication Technology (ICT) was part of the tertiary education curriculum thereby, equipping the teachers with knowledge in ICT. However, the teachers were challenged with skills in integrating ICT tools into lessons.

Finally, from the study, the use of ICT tools had positive impact on lesson delivery as it had strong effect or influence on lessons. Thus, the teachers underscored that, the use of ICT tools motivated students to learn, improved lesson delivery, improved pupils understanding in class, improved students' concentration level in class and improved the attendance rate of students to school.

5.2 Conclusion

The study found that technological tools played a major role in educational delivery. As a result of the benefits of ICT tools in education, the ICT in Education Policy was implemented by the Government of Ghana (GoG) through the Ministry of Education (MoE) in 2003 to integrate ICT into our educational curriculum. The level of usage of ICT tools in the educational sector, especially the basic level was far too low despite the training of teachers in ICT, donations of laptops and computers to schools, and construction of some computer laboratory in some schools therefore, necessitated this study. What this study sought to achieved was to examine the role ICT tools can play in educational delivery in basic schools. This study was carried out within the Tamale Metropolis in the Northern Region of Ghana. Based on the findings of this study, the following conclusions were made.

From the study, the level of availability of ICT tools in the public basic schools in the Tamale Metropolis were generally low due to the inadequacy in the schools. This made it difficult for all pupils to have access to the ICT tools during lessons. Also, teachers were not able to bring out innovations in their work since information was easily accessible on the internet.

The study also found that teachers in the Metropolis had some level of knowledge in ICT tools. As about 57% of the teachers integrated the ICT tools into their lessons. Some of the teachers acquired the knowledge by themselves through some ICT training institutions. The operation of DLA in the Tamale Metropolis had also helped to equip some teachers with skills in using videos into their lessons.

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Finally, the use of ICT tools in education had positive impact on lesson delivery thus, improving pupils' understanding, motivating pupils to learn, improving pupils' attendance to schools, ensuring effective and efficient communication and improving proper record keeping in schools.

5.3 Recommendations

Based on the data collected from the respondent and analysed during the 2018/2019 academic year on the role of ICT tools in educational delivery in the Tamale Metropolis, the following recommendations were made:

1. Governments, Non-governmental Organizations, Parent Teacher Associations, Philanthropists and other relevant Stakeholders in the educational sector should collaborate to provide public basic schools with ICT tools for interactive learning. Computer Laboratory as well should be provided to ensure safe keeping of the ICT tools. Adequate provision of these tools in the basic schools will arouse the interest of both teachers and students to use in research, preparation and teaching and learning purposes. This will go a long way to improve the quality of education desired for the future generation.

2. Government and Teacher Unions in the country should do well to offer teachers with laptops on higher purchase basis. This will give more teachers the opportunity to acquire personal laptops at ease. This will enable the teachers to use the laptops for research, prepare and to aid in their lesson delivery. This will improve teachers' motivations to acquire more skills for their lessons.

3. Ghana Education Service (GES) should liaise with Ministry of Education (MoE) to fund regular training to improve upon teachers' ICT integration skills. Teacher professional development is probably the most efficient way to obtain this result, especially given the interest shown by majority of teachers learning ICT on their own spare time.

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4. Teachers should also be encouraged and motivated by educational managers to acquire, learn and use technologies on their own as well as ICT integration in lessons. This will help them in research, lesson preparations and teaching purposes thus enabling them to be abreast with the modern techniques of teaching to improve upon their work.

5. Tamale Metropolitan Assembly should do well to connect public schools to the national grid for teachers to be able to use ICT tools in the schools. Thus, improving attendance, motivating pupils to learn, improving pupils understanding and ensuring effective records keeping.

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Appendix 1. Time Table for DLA Learning Centre

Source: Field Survey (2019).

Appendix 2. Questionnaire for Teachers

QUESTIONNAIRE FOR TEACHERS

My name is George Akuffu, a postgraduate student at the University for

Development Studies Wa Campus. I am conducting a research on Assessing the

Impact of Information and

Communication Technology in Educational Delivery in Tamale Metropolis.

This is part of the academic requirements for the degree of Master of Philosophy

(MPhil) in Development Studies.

I humbly request you to participate in the research by filling in this

questionnaire. All responses provided will be strictly confidential.

Thank you in advance.

Instructions

*Please indicate the appropriate response with a **tick** (√) in the spaces provided*

and use the provided spaces for explanation where necessary.

SECTION A: DEMOGRAPHIC CHARACTRISTICS.

1. Sex   a. Male [   ]   b. Female [   ]

2. Age bracket   a. 20 - 29 [   ]   b. 30 - 39 [   ]   c. 40 - 49 [   ]   d.
   50 + [   ]

3. Are you a professional teacher?   a. Yes [   ]   b. No [   ]

4. What is your highest professional/ academic qualification?

   a. Cert A   [   ]

   b. Diploma [   ]

   c. Degree   [   ]

   d. Masters   [   ]

   e. Other (specify)…………………………………………

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5. How long have you been teaching as a teacher?

   a. 1 – 4   [   ]

   b. 5 – 9   [   ]

   c. 10 – 14 [   ]

   d. 15 +   [   ]

SECTION B: AVAILABILITY LEVEL OF ICT TOOLS IN BASIC SCHOOLS.

6. Indicate which of the following ICT tools is in your school and functioning. Tick (√)

ICT tool	Available		Functioning	
	Yes	No	Yes	No
Desktop Computer(s)				
Laptop(s)				
Pen drive				
Printer				
T V				
Video / DVD / CD Deck				
Radio				
Phone				
Loud Speakers				
Projector				

7. Do you have your personal computer / Laptop?   a. Yes [   ]

   b. No [   ]

8. Do you use a smart phone?   a. Yes   [   ]   b. No [   ]

9. Do you use your personal computer or smart phone to aid in your lesson delivery?

   a. Yes   [   ]   b. No [   ]

10. Which of the following is the reason why you do not use ICT tools in your lesson delivery always?

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a. Knowledge [   ]   b. Non availability [   ]   c. Time factor [   ]   d. No

interest [   ]

11. Are you satisfied with the current situation in your school? a. Yes [   ]

b. No [   ]

SECTION C: KNOWLEDGE OF TEACHERS IN ICT TOOLS.

12. Do you have any knowledge in the use of ICT tools to aid in lesson

delivery?

a. Yes [   ]   b. No [   ]

13. Do you integrate ICTs into your lesson?

a. Yes   [   ]   b. No [   ]

14. How often do you use the ICT tools in your lesson delivery?

a. Always   [   ]

b. Sometimes   [   ]

c. Once   [   ]

d. Never   [   ]

15. How can you rate your knowledge level in the use of ICT tools in

lesson delivery?

a. None [   ]   b. Low [   ]   c. Medium [   ]   d. High [   ]

16. Do you get any assistance from colleague teachers in the use of ICT

tools in your lesson delivery? a. Yes   [   ]   b. No [   ]

17. What is your confidence level in the use of ICT tools in lesson

delivery?

a. Low [   ]   b. Medium [   ]   c. High [   ]   d. Very high [   ]

18. Does your pupils learn ICT as a subject in your school?   a. Yes [   ]

b. No [   ]

19. Have you received any training in the use of ICT tools in educational delivery?

    a. Yes [   ]   b. No [   ]

20. If yes to question 20 above, was it relevant to you to be able to use it in your lesson delivery? a. No [   ]   b. Yes [   ]

21. Do you think the use of ICT tools in lesson delivery will improve teaching and learning?   a. Yes [   ]   b. No [   ]

22. What are your major challenge(s) in the use of ICT tools in lesson delivery?

    a…………………………………………………………………….

    b……………………………………………………………………

    c…………………………………………………………………….

    d……………………………………………………………………

    e……………………………………………………………………

SECTION D: IMPACT OF ICT TOOLS ON LESSON DELIVERY.

23. Do you think the use of ICT tools can improve your lesson delivery in class?

    a. Strongly agree [   ]   b. Agree [   ]   c. disagree [   ]

24. The use of ICTs can increase pupils understanding in lesson delivery.

    a. Strongly agree [   ]   b. Agree [   ]   c. Disagree [   ]

25. The use of ICTs can motivate pupils to learn in class.

    a. Strongly agree [   ]   b. Agree [   ]   c. Disagree [   ]

26. The use of ICTs can raise pupils' concentration during lesson delivery.

    a. Strongly agree [   ]   b. Agree [   ]   c. Disagree [   ]

27. Do you think the use of ICT tools can improve pupils' attendance to school?

  a. Strongly agree [   ]   b. Agree [   ]   c. Disagree [   ]

28. Through which of the following means do you communicate to parents? a. Pupils [   ]   b. Papers [   ]   c. Phone [   ]

29. How effective is the means used in 28 above?

  a. Not effective [   ]   b. Effective [   ]   c. Very effective [   ]

30. Through which medium do you keep your information?

  a. Hard copies [   ]   b. Soft copies [   ]   c. Both [   ]

31. Do you think this medium is effective and efficient?   a. Yes [   ]
  b. No [   ]

32. What do you think will be a major challenge(s) in the use of ICT tools in your school?

  a..
  b..
  c……………………………………………………………………

33. Suggest ways some of these challenges can be addressed in your school.

  a…………………………………………………………………………
  b…………………………………………………………………………
  c…………………………………………………………………………

34. Give ways ICTs can be used to improve lesson delivery

  a…………………………………………………………………………
  b…………………………………………………………………………
  c…………………………………………………………………………

Appendix 3. Questionnaire for Head Teachers

INTERVIEW GUIDE FOR HEAD TEACHERS

My name is George Akuffu, a postgraduate student at the University for Development Studies Wa Campus. I am conducting a research on Assessing the Impact of Information and

Communication Technology in Educational Delivery in Tamale Metropolis. This is part of the academic requirements for the degree of Master of Philosophy (Mphil) in Development Studies.

I humbly request you to participate in the research by filling in this questionnaire. All responses provided will be strictly confidential.

Thank you in advance.

The purpose of this interview is to gather information for an academic purpose only.

1. What can you say about the availability and adequacy of ICT tools in your school

……………………………………………………………………………

……………………………………………………………………………

……………………………………………………………………………

2. How did you acquire the ICT tool(s) in your school if any?

....

....

3. Does some of your teachers use ICT tools in delivering lessons?

a. Non [   ]   b. Sometimes [   ]   c. Always [   ]

4. Are some of your teachers able to use ICT tools effectively in their

lesson delivery?   a. Yes [   ]   b. No [   ]

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5. What do you think are the reasons why your teacher use or not use ICT tools in lesson delivery?

a…………………………………………………………………………

b…………………………………………………………………………

6. How can you rate the knowledge level of your teachers in ICT tools?

a. Low [   ]   b. Average [   ]   c. High [   ]   e. Very high [   ]

7. How do you think the use of ICT tools can improve teaching and learning in your school?

....

8. In your opinion, can the use of ICT tools influence your work and how?

....

9. How do you keep school records?

....

The method in above is it effective and efficient?

a. Yes   [   ]   b. No [   ]

10. What do you think are or will be the major challenges in the use of ICT tools in your school?

....

…………………………………………………………………………

…………………………………………………………………………

11. Suggest ways these problems can be addressed in your school

…………………………………………………………………………

…………………………………………………………………………

…………………………………………………………………………

Appendix 4. Questionnaire for Pupils

INTERVIEW GUIDE FOR PUPILS

1. Sex

    a. Male   [   ]

    b. Female   [   ]

2. Do you have some ICT tools in your school?   a. Yes [ ] b. No [ ]

3. What are the type of ICT tools that are in your school?

    a………………………………………………………….

    b……………………………………………………….

    c……………………………………………………….

    d……………………………………………………….

    e………………………………………………………….

4. Which of the ICT tools does your teachers use to teach you in

    class?

    a………………………………………………….

    b………………………………………………….

    c………………………………………………….

    d………………………………………………….

    e…………………………………………………

5. Does it help you to understand what is being taught in class?

    a. Yes [   ]   b. No [   ]

6. Do you find it interesting when any of the ICT tools is used to

    teach you in class?

    a. Yes [   ]   b. No [   ]

7. How can you rate your teachers' knowledge in the use of ICT tools in teaching?

   a. Low [   ]   b. Average [   ]   c. High [   ]

8. What challenges does your school face in the use of ICT tools?

   a…………………………………………………………………

   b…………………………………………………………………

   c…………………………………………………………………

   d…………………………………………………………………

   e…………………………………………………………………

9. How do you think some of these problems can be addressed?

   a…………………………………………………………………

   b…………………………………………………………………

   c…………………………………………………………………

   d…………………………………………………………………

   e…………………………………………………………………

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