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DEPARTMENT OF INFORMATION STUDIES

UNIVERSITY OF GHANA, LEGON

THE USE OF ICT FOR TEACHING AND LEARNING IN SENIOR HIGH SCHOOLS IN GHANA: A STUDY OF NUNGUA AND PRESBYTERIAN, TESHIE.

BY

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THIS DISSERTATION IS SUBMITTED TO THE UNIVERSITY OF GHANA, LEGON IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF MA INFORMATION STUDIES DEGREE

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DECLARATION

I hereby declare that this dissertation was solely undertaken by me, except for references to other studies, which were duly acknowledged, under the supervision of Prof. A. A. Alemna of the department of Information Studies, University of Ghana, Legon. No part of this dissertation has been presented in whole or in part of any institution for any award.

……	……
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(Student)	(Supervisor)
Date:……..	Date:……..

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DEDICATION

I dedicate this work first and foremost to the Almighty God for the gift of life and knowledge He has bestowed upon me to undertake this research work. Secondly, to my caring and supportive father, Mr. Prosper Boni, my sister, Elsie Ama Boni, my mentor, Mr. George Mensah Okley, and to my loving wife, Esther Antwiwaa Boni and finally, to all who supported me throughout the programme duration. God richly bless you all.

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LIST OF ABBREVIATE WORDS

TERM	DEFINITION
BECTA	British Educational Communications and Technology Agency
CK	Content Knowledge
ICT	Information and Communication Technology
ICTs	Information and Communication Technologies
MGS-ONE	Metal Gear Solid – ONE
PCK	Pedagogical Content Knowledge
PK	Pedagogical Knowledge
SHS	Senior High School
TCK	Technological Content Knowledge
TK	Technological Knowledge
TPACK	Technological Pedagogical Content Knowledge
TPK	Technological Pedagogical Knowledge

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ABSTRACT

The introduction of Information and Communication Technology (ICT) in Senior High Schools has been recognized as a medium of revolutionizing the teaching and learning process. This ideology has led to the introduction of computers and internet access in some Senior High Schools in Ghana. This research reports on a study conducted to investigate the use of ICT for teaching and learning in Senior High Schools in Ghana specifically, Nungua Senior High School and Presbyterian Senior High School, Teshie. The study focused on the availability of ICT infrastructure in both schools, the perception of teachers and students on the use of ICT tools as well as the computer literacy skills of teachers and students. The survey research method was adopted for the study. The sample size used was 342, made up of 138 teachers and 204 students. Questionnaires were the main instrument used to obtain information from the respondents. The results revealed that majority of the students and teachers did not use ICTs during normal classes. They only had access to computers during ICT lessons. They also lacked access to functional computers for private studies, training, and recreation. The researcher concluded that the students and teachers could not confidently and creatively use ICT for teaching and learning. It was recommended among others that the schools extend ICT application to other subjects. The research identified some current knowledge gaps pertaining to the barriers and strategies of technology integration, and offers pertinent recommendations for future research. These results are of particular importance to policy makers and school leaders and shed light on the process of ICT integration into teaching and learning in Senior High Schools in Ghana.

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CHAPTER ONE
INTRODUCTION

1.1. BACKGROUND TO THE STUDY

The sudden rise in Information and Communication Technology has introduced a phenomenal change in contemporary society which has affected the demands of present-day civilization. It is an undisputable claim that Information and Communication Technologies play a crucial role in the advancement of every country these days. "The importance of technology to modern concepts such as e-commerce, teleconferencing, e-governance, and telecommunication have all arisen as a result of the application of technology in almost every aspect of human activity" (Amoaful, 2011). Countries all over the world, including Ghana have identified the pivotal role ICT plays in all aspects of human endeavour of which education forms a part. To counter the industrial and societal development, individual nations are drafting programs and guidelines that integrate the application of ICT or computer technologies into education. Several nations have set up national policies that show a synopsis of how ICT should be implemented to improve the educational system in the various countries (Komza, 2003).

There is therefore an increasing demand on educational establishments to apply ICTs in teaching and learning and to equip students for the modern day job market. In education, the application of computer technologies can improve teaching and learning and several studies have confirmed this assertion. As posited by Fathima (2013), the use of ICT in learning environment can bring about a rapid change in the student‘s performance. The ideology that ICT can for a fact improve educating and learning has compelled the Government of Ghana to draft guidelines geared towards the integration of ICT in education. Having noticed the impact of ICT on education towards national development, the Government in 2007 introduced a new educational reform

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which stressed on the requirement for more significance on ICT and education. This prompted the incorporation of ICT in both the Basic and Secondary School's educational module where the subject is presently an examinable one.

The essential capacity of most instructive approaches is to furnish institutions with the needed accoutrements such as computers, information and communication related technologies, and to a lesser degree, the expert improvement of educators (Jones, 2003; Owston, 2007).

Education is at the core of every developing and developed nation. It has contributed immensely to the increase in development of knowledge and providing a conducive atmosphere for advancement and in building human capital needed for a possible development in the economy. ICT is considered a basic tool in equipping and teaching students with the required abilities for the worldwide work place. Amoaful (2011) posits that we are now living in a world of revolution. This revolution is termed the computer revolution or information revolution in history books. In this revolution, the computer is the agent transforming the way people do research, business as well as teaching and learning. Opoku, Badu, & Alupo (2016) noted that the rate at which ICT is developing and its impact on socio-economic activities cannot be overemphasized. According to him, the United Nations Development Programme (UNDP) expressed that ICT has been characterized to incorporate the full scope of electronic advancements and strategies used to manage information and innovations. Notwithstanding all the benefits ICT has got to offer, the system is fraught with challenges and one of the major problems associated with the integration of ICT in an academic environment is the inadequacy of ICT infrastructure to improve teaching and learning. Other challenges against the use of ICT by students and teachers are the lack of requisite skills necessary to operate computers and ICT gadgets in education. Similar studies have also indicated that, such barriers include network

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problems, user unfriendly programs and inadequate access to the internet contribute to the disadvantages of ICT integration in education.

1.1.1 NUNGUA SENIOR HIGH SCHOOL

Nungua Senior High School is situated in the heart of the Nungua Township along the Accra-Tema beach road. It was founded in the year 1958 by Nii Daniel Quaye Tawiah, a native of Nungua, known in private life as Nii Quaye Nungua. In 1960, the government of Ghana absorbed it as a public secondary school. The school is within the Ledzokuku-Krowor Municipal Assembly and is mandated to formulate policies and programs in line with the Ghana Education Service Act 1995 which regulate pre-tertiary education. The school currently has a staff strength of one hundred and seven (107) out of which seventy-three (73) are teaching staff. The total student population from form one to form three is one thousand, six hundred and ninety-seven (1697) out of which seven hundred and ninety (790) are males and nine hundred and seven (907) are females. The school has a well-furnished ICT laboratory with three professional ICT teachers assisted by two National Service personnel. In the year 2013, the government of Ghana under the Better Ghana Agenda ICT project donated fifty (50) MGS-ONE Netbook computers to the school to enhance the integration of ICT in the school's curricular. (Source: Five Year Strategic Development Plan (2016-2020), Nungua Senior High Scool).

1.1.2 PRESBYTERIAN SENIOR HIGH SCHOOL, TESHIE.

Presbyterian Senior High School, Teshie was established by the Old Boys and Girls Association (AGABOT) in 1981. The school used to be Teshie Middle Boys‘ Boarding School and through the hard work of some of the Old Boys such as Dr. T.A. Osae, Mr. J.M Akita, Mr. E.M Boye, and Dr. E.A. Kwei, the school was converted to a secondary school in 1984 and was absorbed by the Ghana Education Service, and became a Government Assisted Secondary School. The School currently offers five programs namely; General Arts, Visual Arts, Business, Home

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Economics and General Science. The student population stands at one thousand six hundred and fifty (1650). The staff population which is made up of teaching and non-teaching staff also stands at one hundred and thirteen. The school is under the Ledzokuku-Krowor Educational Circuit of the Ledzokuku-Krowor Municipal Assembly. The Ledzokuku-Krowor Educational Circuit is under the jurisdiction of the Ghana Education Service.

The Ghana Education Service is in charge of the co-ordination of the authorized national policies and projects relating to pre-tertiary education which originates from the Ministry of Education. The overall objective of the Ministry is to give relevant and quality education for all Ghanaians which will enable them obtain the competence that will make them practically literate and productive in order to mitigate poverty and advance the fast financial development of the nation. In line with the new educational reform of 2007, ICT was integrated into the Ghana Education Curricula in 2010.

1.2. STATEMENT OF THE PROBLEM

The introduction of ICT as an essential instructive standard, standout amongst the most powerful developmental strategies in this era of revolution (Aviram and Tami, 2004) and portrays an emitting worldview originating from a desire to better equip people for life after school. The rate of ICT revolution has caused an exceptional and accelerated advancement in the method of teaching and learning, impacting ways students and teachers engage in the instructive framework. These advances remain a crucial aspect of teaching and learning at all levels of education in our Ghana. The Ghana Education Service has made some attempts at attaining the objective of enhancing the nature of education through the use of ICT with the help of some

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policies and adaptation of ICT as an examinable subject. Programmes such as the two month training for ICT teachers which was held at Academic City University College, Circle-Accra were organized by the Greater Accra Regional Director of Education in collaboration with Academic City University College in August, 2017. The training was aimed at improving teachers‘ knowledge in the use of ICT tools and in turn impact it onto students. In spite of every one of these ventures on ICT infrastructure, equipment and expert advancement to enhance teaching in Ghana, it is evident that potential for ICT to help students' learning has not been achieved. Therefore the inadequacy of ICT tools in second cycle institutions, lack of the requisite skills on the part of the teachers as well as lack of interest on the part of most teachers in the use of ICT tools have led to this study. This study seeks to investigate teachers and students' perceived usefulness and ease of use of ICT in teaching and learning, to identify possible challenges in ICT integration in teaching and learning and to come up with solutions to enhance effective and efficient use of ICT to enhance teaching and learning to improve secondary education.

1.3. THE PURPOSE/AIM OF THE STUDY

The purpose of this study was to investigate the use of ICT as a tool for teaching and learning in Nungua Senior High School and Presbyterian Senior High School, Teshie.

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1.4. OBJECTIVES OF RESEARCH

1. To determine the availability of ICT infrastructure for teaching and learning in Nungua Senior High School and Presbyterian Senior High School, Teshie.
2. To investigate the computer literacy skills of students and teachers of both Nungua Senior High School and Presbyterian Senior High School, Teshie.
3. To find out the perception of teachers and students on the use of ICT tool for teaching and learning in Nungua Senior High School and Presbyterian Senior High School, Teshie.
4. To determine the level of awareness and usage of some selected computer applications and programs available to students of Nungua Senior High School and Presbyterian Senior High School, Teshie.
5. To assess the challenges related with the use of ICT.

1.5. THEORETICAL PERSPECTIVE OR CONCEPTUAL FRAMEWORK

The theoretical framework of Technological Pedagogical Content Knowledge (TPACK) developed by Mishra and Koehler (2006), was adopted for this study. The theory developed as a generally established framework to give interpretation of teachers' task in using ICTs for teaching (Mishra & Koehler, 2006). It is a theory that emerged to describe the set of intelligence that teachers must poses to effectively teach their students using ICTs. The TPACK framework explains the use of ICT for teaching and learning from a knowledge context. It classifies three basic forms of knowledge that must be available in any ICT integrated class: Technological Knowledge (TK), Pedagogical Knowledge (PK) and Content Knowledge (CK). The TPACK model has introduced a new structure that guides the use of ICTs for teaching and learning

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purposes and how it fits into the structure of the classroom to enable quality educational practices when using ICT.

The use of ICT for teaching around a particular topic desires creating sensitivity to the dynamic, value-based connection between these segments of learning arranged in special settings. Instructors, grade-level, school-particular elements, socioeconomics, culture, and different elements guarantee that each circumstance is exclusive, and no single blend of substance, innovation, and instructional method will apply for each educator, each course, or each perspective of educating. The TPACK model puts forward two basic arguments;

1. Mindful interweaving of technology, instructional method and content knowledge is required by the educator to guarantee a beneficial utilization of ICTs in teaching and learning.
2. There is no single mechanical arrangement that applies for each instructor, each course, or each perspective of educating. (Mishra & Koehler, 2006)

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include the general mission and vision of education as well as values and aims of education. Pedagogical Knowledge deals with understanding the way and manner in which students attain knowledge as well as understanding general classroom administration skills and student evaluation (Koehler & Mishra, 2009).

Pedagogical Content Knowledge (PCK) is the first intersections created by the overlapping of pedagogy and content knowledge. Fundamental to Shulman‘s conceptualization of PCK is the presumption of the revolution of the topic for educating. In the words of Shulman (1986), this transformation takes place as teachers teach a particular topic, adapting several strategies of describing teaching materials and also presenting lessons that suits students' understanding. PCK covers the foundation of business of instructing, learning, educational programs, appraisal and revealing, for example, the situation that advance learning and the connections among educational programs, evaluation, and teaching method (Koehler & Mishra, 2009).

Technological Content Knowledge (TCK) is the second intersection which originates from the overlap between technology and content. It deals with the importance of understanding the influence of technology on specific content or subject. A comprehension of the way in which technology and substance impact and compel each other. ―Teachers need to master more than the subject matter they teach; they must also have a deep understanding of the manner in which the subject matter (or the kinds of representations that can be constructed) can be changed by the application of particular technologies. Teachers need to understand which specific technologies are best suited for addressing subject-matter learning in their domains and how the content dictates or perhaps even changes the technology—or vice versa” (Koehler & Mishra, 2009).

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Technological Pedagogical Knowledge (TPK) forms the intersection between technology and pedagogy. This intersection deals with how instructing and learning can change when specific innovations are utilized in specific ways. Diverse types of technology can empower the improvement and use of various types of instructional method. Then again, extraordinary academic techniques will require diverse types of technology.

Technology, Pedagogy and Content Knowledge (TPACK), is the use of technological knowledge, pedagogical knowledge and content knowledge that when adopted into teaching and learning leads to effectiveness and enhances the educational process. TPACK is the framework that involves the use of technologies in teaching and learning and this requires the representation of ideas using ICT. Pedagogical techniques also uses ICTs to teach content while information of what makes ideas problematic or simple to learn and how innovation can help review a portion of the issues that students confront; knowledge of students' earlier information and hypotheses of epistemology; and information of how technologies can be utilized to expand on existing learning to grow new epistemologies or reinforce old ones (Koehler & Mishra, 2009).

Shulman (1986) indicated that PCK is an exclusive model of teachers' intelligence that incorporates the teacher's PK and CK to guide students in closing the gap that exist in understanding a subject. It could be in the form content-specific or topic-specific instructive methodologies (Graham, Borup, & Smith, 2012). In the same way, TPK is an exclusive scheme of PK that is linked to the use of ICTs. TCK involves the use of ICTs to represent content knowledge that was not meant for teaching. Finally, TPACK refers to the coordinated type of learning that can be made through various mixing of the six types of knowledge. This type of information is made through educators or instructive technologists' outline effort when they produce new practices to incorporate ICT into classroom instructing (Tsai, Chai, Wong,

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Hong, & Tan, 2013). Presently, the idea of TPACK is spreading and being received by numerous educational institutions worldwide to comprehend and improve instructors' capacity to coordinate ICT into educating and learning (Chai, Koh & Tsai, 2013)

In today's world, ICT is coming up with improved methods to gain and process knowledge in every aspect of life. ICT is also improving teaching by providing improved methods to involve students.

Skilled and experience educators are those that can use ICT tools to teach, thus enhancing the knowledge of the subject matter. This integration is known as TPACK. It is also referred to as the inclusion of ICT into the traditional approach of teaching and learning.

As of now, technology is treated as though it is separate from instructing and learning. Keeping technology as a different learning set causes issues, yet when it comprehends the system of TPACK, it can incorporate technology into the substance and teaching method in classrooms. The integration will enable students to take in more adequately. Mishra and Koehler (2008), propose that TPACK should direct educational modules improvement and educator training.

The inadequate knowledge of TPACK separates education from technology when being used for teaching and learning purposes thus, leading to four main challenges in the classroom. First is the accelerated rate in the advancement in technology which makes it difficult to keep up. The second challenge is that software‘s are designed for other purposes and not for teaching and learning. This entails that students study the use of applications and programmes and not the content of their curricular. The next challenge is associated with fusing technology in a situational classroom. A teacher can modify a lesson to suit the needs of varied students, but an

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instructional video cannot. Finally Mishra and Koehler (2008), state that keeping technology separate places an emphasis on ―what" not "how."

The synchronous joining of innovation, teaching method and content has an awesome effect in understanding the objectives of interest in instructive innovation. This model was used to explain the effective use of ICT in teaching and learning in Nungua Senior High School and Presbyterian Senior High School, Teshie.

1.6. SCOPE/LIMITATIONS

The study focused on teachers, first and second year students of Nungua Senior High School and Presbyterian Senior High School, Teshie. This was due to the fact that the final year students had completed their final West African Secondary School Certificate Exams (WASSCE) at the time the researcher was there to collect data. There have been several technological developments and changes that the institutions has undergone which first and second year students were privy to during their stay in the various schools. Both teachers and students of the mentioned schools were able to give clear account of some challenges encountered with respect to the utilization of ICT in educating and learning.

The research should have covered students and teachers in all Senior High Schools in Ghana but time allocation for this study did not permit for a larger population to be covered. For this and other reasons the researcher concentrated on teachers and first and second year students of both schools as the target population for the study. Nungua Senior High School and Presbyterian Senior High School, Teshie was used for the study due to their proximity to the researcher and

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also due to the fact that not much related research has been conducted within the Municipal Assembly.

1.7. SIGNIFICANCE

The discovery of this study will add to the benefit of society considering that ICT plays a vital role in education today. The significance of this study lies in the fact that it will add to a body of already existing information in the field of ICT and education after the work is published.

The researcher also believes that the findings of the study would be beneficial not only to the two schools under investigation, but to teachers in general, the Ghana Education Service and other agencies responsible for the formulating of ICT policies into teaching and learning curricula in schools in Ghana.

For researchers, practitioners and policymakers, the study will help them reveal critical areas in the educational procedures that numerous researchers were not able to investigate. Thus, another hypothesis on learning with ICTs may be arrived at.

A proper assessment of teaching and learning with ICTs will be useful to researchers and scholars; as it will add to the already existing scholarly research and literature in the field as well as creating awareness of the importance of teaching with ICT in both schools.

The result of this study would add to the already existing policies which would promote adequate ICT usage in the teaching and learning of various subjects throughout the country.

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Hopefully, the result of these findings will improve upon the use of ICT tools in teaching and learning in Senior High Schools in Ghana of which Nungua Senior High School and Presbyterian Senior High School, Teshie are a part.

1.8. ETHICAL CONSIDERATION

Ethics is very important in all aspects of research work especially when it involves human subjects. Permission was sought from management of both schools in a form of an introduction letter from the Department of Information Studies at the University of Ghana, before administering questionnaires to respondents (See Appendix I and II). The protection of the privacy of the research participant was ensured. In order to ensure this, no personal information such as name, student registration number and staff ID was requested from respondents. Adequate level of confidentiality of the research data was ensured. The principle of voluntary participation required that people should not be coerced into engaging in the research. Approval was obtained from the respondents prior to the study. Respect for the dignity of the study participant was prioritized.

The researcher did acknowledge all materials consulted such as books, articles, online materials and thesis. Maintenance of the highest level of objectivity in discussions and analysis throughout the research was upheld. Finally the researcher adhered to the University of Ghana's Code of Conduct on research.

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1.9. DESCRIPTION OF CHAPTERS

The study is organized into five main chapters.

- **Chapter One** is the introduction which consists of background to the study, statement of the problem, the purpose of the study, objectives of the study, theoretical perspective, scope of the study, significance of the study, setting of the study, ethical consideration and description of chapters.
- **Chapter Two** focuses on the literature review which consists of World view, African view and Ghanaian view on ICT and Education. Literature was reviewed under the following themes; the perception of teachers and students on the use of ICT, availability of ICT infrastructure for teaching and learning, traditional mode of teaching versus ICT integration, effective integration of ICT for teaching and learning, and challenges of using ICT for teaching and learning.
- **Chapter Three** is made up of the methodology adopted for the study. The chapter covered; introduction, research design, selection of cases, selection of subjects, instrumentation, method of data presentation and analysis, problems encountered and limitations of the study.
- **Chapter Four** deals with the analysis and findings.
- **Chapter Five** comprises of the summary of the findings, conclusion and recommendations.

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CHAPTER TWO
LITERATURE REVIEW

2.1 INTRODUCTION

The literature review is an evaluative report of information found in other studies which are related to the study being conducted (Creswell, 2003). The review is not just a summary of materials available but rather a theoretically based framework of the research investigation which summarizes the literature available to develop a research study (Taylor and Procter. 2001)

The use of ICT for teaching and learning in senior high schools is an area that has been covered extensively by other researchers all over the world. In relation to this work, related literature was reviewed to present the progress of research conducted in the use of ICT for teaching and learning.

Literature was reviewed under the following themes:

- The perception of teachers and students on the use of ICT.
- Availability of ICT infrastructure for teaching and learning.
- Traditional mode of teaching versus ICT integration.
- Effective integration of ICT for teaching and learning.
- Challenges of using ICT for teaching and learning.

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2.2 THE PERCEPTION OF TEACHERS AND STUDENTS ON THE USE OF ICT

The utilization of ICT in senior high schools in Ghana is recognized as a medium for revolutionizing the educational process, and has since been welcomed with momentous eagerness (Mfum-mensah, 2003). ICT integration into educational curricula for students in senior high schools does impact positively on the knowledge and abilities on both students and teachers (Pittard, Bannister, & Dunn, 2003). British Educational Communications and Technology Agency (BECTA) (2004), noted that the perceived benefits of fusing ICT into education could be measured by the pedagogical knowledge of both students and teachers.

In a study of students of some selected schools in Hong kong, the research found out that the positive result that came out of the educational methods that utilized ICT was the endorsement it gave educators and students. Consequently, teachers over the globe keep on ascribing an importance to the use of ICT in teaching and learning (Law, Lee & Chow, 2002). Gragert (2000) noted that students in second cycle institutions were more anxious to study as a result of using ICT related devices and also through computer-based knowledge acquisition. Teachers in the study affirmed the fact that using ICT for teaching and learning increased student‘s participation in the educational process. In similar research, Schulz-Zander, Büchter & Dalmer (2002) perceived students cooperation and concluded that students tend to assist each other technically with problems that arise from the use of ICT thereby functioning as an academic discourse community, and working together in joint associations with different schools.

Haddad and Drexler (2002) revealed that ICT integrated teaching and learning stimulates scholarly interest and offer a feeling of satisfaction that will shift the students from the static part of beneficiaries of knowledge to the dynamic part of manufacturers of information.

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In an empirical study conducted by Hennessy, Ruthven, & Brindley (2005), it was established that there was an anticipated pressure with the integration of ICT in the educational process and this conformed to external conditions of traditional examinations. Conditions needed to integrate ICT into education to intensify teaching and learning were deemed problematic. For instance, the use of ICT gadgets was not allowed during examinations and this action brought about a decline in motivation amid educators and students using ICT for teaching and learning (Hennessy et al., 2005).

In a study conducted by Eugene (2006), an observation method was used to investigate educators‘ expectation and perception on the use of ICT for teaching. The study found out that there were disparity between educators‘ expectation and their perception on the substantial utilization of ICT in the classroom. Another study carried out by Simonson (2004) to investigate the beliefs of high school teachers confirmed that there was a correlation between teachers' perception and their use of ICT in teaching. Drent and Meelissen (2008) confirmed the assertion made by Simonson (2004) which revealed a study of two hundred and ten teachers showing a confirmation of teachers' technological use and positive attitude towards the utilization of ICTs had a correlation on the innovative use of ICTs in teaching.

Huang & Liaw (2005) in a related study involving six European Union countries affirmed that teachers‘ perception with the use of ICT has a positive effect on their recognition of the benefits of ICT and its use in education.

A study also conducted by Rozell & Gardner (1999) revealed an interrelationship between teachers' ICT knowledge experience and their perception in the integration of ICT into teaching and learning. Van Braak, Tondeur, & Valcke (2004), supported this assertion with a study

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conducted which revealed that knowledge in ICT is envisage to allow for an efficient use of computers and their related technologies in instructing and learning.

In Africa, Mbah (2010) also explored the influence of ICT integration on the learning pattern of students of University of Buea in Cameroon and found out that students were more comfortable using ICTs and used it to improve their learning habits. The study also highlighted the positive relationship between students‘ approach towards the use of ICT and their study habit.

Buabeng-andoh (2012) however stated that in Ghana, study of teachers' perception in the utilization of ICT in education in second cycle institutions is limited as compared to senior high schools in developed countries. His study therefore spanned from teachers' perception, their perceived skills through to the extent of using ICT for teaching and learning. In the study, a greater percentage of the research participants strongly agreed that ICT can improve students‘ engagement in the educational process, assessment to educators and also increase students‘ participation. The discovery of the study also revealed a positive correlation between ICT use and competences and inferred that educators' capability and certainty were indicators of utilizing ICT in educating and learning.

2.3 AVAILABILITY OF ICT INFRASTRUCTURE FOR TEACHING AND LEARNING

The utilization of ICT in education became popular in educational policy-making in the early 1980 when microcomputers became accessible to individuals due to its low cost as compared to the days when computer came into existence. Policy makers have been commended for the introduction of ICT into education especially in secondary schools in Ghana due to the positive

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impact of ICT integration (Mfum-mensah, 2003). A careful study of some research on the availability of ICT infrastructure in Ghanaian senior high schools explains the serious injustice meted out to some schools with regards to the distribution of ICT resources for teaching and learning (Mfum-mensah, 2003). This assertion was supported by Parthemore (2003), who revealed that there was a bias in the distribution of ICT infrastructure among senior high schools found in urban and rural centers. The study also revealed that senior high schools were placed into categories and those found in "Grade A" institutions benefited more from the distribution of ICT resources for teaching and learning as compared to the other categories. Even before the use of ICT into educating and learning in senior high schools, resources meant for formal education was skewed to favor schools that were located in urban centers as compared to those in the rural areas (Folson, 1995).

Since the emergence of formal education in Ghana, there has been an unequally sharing of educational resources among schools found in urban and rural centers, 'Grade A, B, C and D' schools and also among private owned and public owned schools (Asiedu-Akrofi, 1982). The unequal distribution of ICT resources amongst senior high schools has led to the unavailability of ICT infrastructure amongst some senior high schools in Ghana especially those that are less endowed.

The introduction of second cycle institutions in Ghana especially those in the rural areas are faced with a dilemma of access and availability of ICT for teaching and learning. Mfum-mensah (2003) again revealed that most rural senior high schools in Ghana are faced with inadequate infrastructure, lack of trained educators who have the expertise in the use of ICT, unsupported curriculum and a well-established ICT integration policy coupled with inaccessible electricity.

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All these hinder the access and availability and access of ICT for teaching and learning in some deprived communities.

Notwithstanding these challenges which have affected the accessibility of ICT for instructing and learning, the Ministry of Education in Ghana has put in measures which encourage policy makers, non-governmental organizations (NGO), and school administrators to put in a shared endeavor to encourage the use of ICT in Ghanaian senior high schools. The endeavors of the Ministry of Education and other philanthropist have led to the expansion of ICT facilities to senior high schools in Ghana, especially deprived communities (Parthemore, 2003). Parthemore (2003) again revealed that senior high schools in Ghana can now pride themselves with the availability of ICT infrastructure in the various schools through which students are gaining basic computer knowledge. Mfum-mensah (2003) also posited that some of these senior high schools who are beneficiaries to these government and donor support can now boast of internet access which enables teachers and student have access to more information relating to their subject area of teaching and learning. According to Hawkins (2002) senior high schools which are found in either urban or rural centers, 'Grade A, B, C or D', private owned or public owned are now benefiting from the availability of ICT infrastructure which was made possible by the government, NGO's and other donor organization. Parthemore (2003) again argued that ICT integrated teaching and learning has been centered in major cities within Ghana depriving the less endowed ones in the rural centers. The under privileged schools are also undertaking steps to close up the gap created by their urban and premier counterparts by outsourcing the training of the use of ICT for teaching and learning to private individuals and firms (Mfum-mensah, 2003). Mfum-mensah (2003) again pointed out that the amount to be paid for outsourcing has a huge

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repercussion on the school's budget due to budgetary constraints of most public and private senior high schools.

Notwithstanding the challenges faced by the availability and access to ICTs in senior high schools, most urban and rural schools in Ghana now have ICT rolled out in their respective schools. However, there still are some schools in rural and deprived communities and even in urban communities that are yet to benefit from the Ministry of Education's ICT integration policy as part of their school's curriculum (Mfum-mensah, 2003).

The emergence of information and communication technologies has brought about collaboration among students and teachers in secondary schools which has led to the contribution to knowledge acquisition and information dissemination.

2.4 TRADITIONAL MODE OF TEACHING VERSUS ICT INTEGRATION

Traditional mode of education is mainly identified by the use of pendulums, chalkboards and pencil for writing. Teaching and learning with these are effortless and straightforward in relation to their functions (Simon, 1969 cited in Koehler Mishra & Cain, 2017). According to Fraser (1983), traditional method of education involves the availability of procedures and practices established to sustain a conducive atmosphere in which the educational process can take effect. A traditional mode of teaching and learning involves rules and regulations for prudent student attitudes. Lim, Teo, Wong, Chai, & Divaharan (2003) also argued that rules and regulations that govern a traditional classroom can also be applicable to an ICT integrated classroom. He added that there are additional procedures to be followed for an ICT integrated classroom.

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A research conducted by Koehler & Mishra (2008) revealed that most teachers earned their teaching certificates at the time when ICT was at a developing stage and they consider themselves inadequate to be ready to utilize ICT in the classroom for instructing and learning. The study also found out that teachers of senior high schools had a challenge of acquiring new set of technological knowledge.

Butzin (2004) postulated is his study that teachers felt more comfortable using the traditional method of teaching rather than using technology because ICT integration into education required additional time and expertise to apply appropriate application to suit the lesson objectives. The teachers in his study preferred facing students since they can monitor the activities of students who are not concentrating.

The utilization of ICT for instructing has contributed to the development of teachers‘ skills in teaching which has led to the advancement in the drafting of teaching lessons, gaining knowledge and improving classroom interaction with students (Amenyedzi, Lartey, & Dzomeku, 2011). According to Fouts (2002), using computers to administer questions to students are easy and quicker to mark. He also stressed on the fact that ICT enhances the traditional mode of teaching and learning which has led to higher tests resulting from some field of studies.

ICT integration into teaching and learning by Cuban, Kirkpatrick, & Peck (2001), was defined as the utilization of computer technologies in the classroom by teachers, their technological know-how, and their experience in the use of computer technologies. Other researchers also view technology integration into instructing and learning in connection with how instructors manipulate technology to aid in teaching and learning in the classroom (Hennessy, Ruthven, &

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Brindley, 2005). Some scholars also examined ICT integration as instructors utilizing technology to improve students‘ learning abilities (Lim et al., 2003).

A study conducted by Newhouse (2001) revealed that an ICT integrated classroom meant that teachers needed to be abreast with technological skills such as how to manipulate computers and its related devices.

According to Dai & Fan (2012), traditional method of teaching has been with us for a very long time with little improvement while the evolution of ICT integrated education has brought about much development to the teaching skills and abilities of instructors which has improved the quality of education. The same study by Dai & Fan (2012) also found out that the burnout and stress that results from the traditional mode of teaching and learning has been eliminated by the use of ICT in education which provides a conducive learning atmosphere for students due to the diversity of knowledge content expressed by ICT. A similar study conducted by Serbessa (2006) also emphasized on the need to improve on the traditional –chalk and talk" approach to meet the changing trends of the modern generation of students. The study also commented on the importance of the traditional approach to teaching and learning but stressed on the need to adopt a technology-driven classroom, smart interactive boards, interdisciplinary learning, collaborative learning, flipped classroom and a host of others to enhance students‘ participation in the education process. The use of ICT in education increases the capacity and fields of teaching and learning since computers can be utilized for large scale and remote instructing which relieves the pressures associated with the use of crowded classrooms (Dai & Fan, 2012).

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2.5 EFFECTIVE INTEGRATION OF ICT FOR TEACHING AND LEARNING

Several researches have been conducted on the integration of ICT into teaching and learning in senior high schools in several countries. A research carried out by Kennedy, Judd, Churchward and Grey, (2008) on two thousand Australian students established that both students and teachers preferred to use ICTs for general study whiles others preferred to use it for entertainment purposes like streaming videos and movies and playing games. A further study by Kvavik (2005) on four thousand, three hundred and seventy-four students revealed that students and teachers preferred to use the computer for email services, internet surfing and social media applications.

Teachers should just not only acquire knowledge in ICT, they also need to understand how to incorporate ICT into teaching and learning which will then stimulate and improve on the subjective abilities, improve learning and furthermore add to the acquisition of skills needed for a lifelong learning (Tchombe et al., 2008).

In the words of Tomei (2005), ICT integration into teaching and learning is contributing to the cognitive knowledge of individual subjects and enhancing effective teaching and learning in various schools.

The major reason for the adoption of ICT into education is to improve teaching and learning as compared to the traditional way of handling education (Bates 2000; Zhao 2007; Lee et al. 2011). The integration of ICT into education in second cycle institutions intensifies the quality, accessibility and efficiency in educational practices (West 1998). Replacing the traditional mode of teaching and learning with ICT integrated approach involves the usage of different mode of teaching and learning but with the same instructional goal (Hew & Brush, 2007). According to Hew & Brush (2007), teachers can now present their poems using the projector and a power

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point application instead of the old method of writing on the board. This task was easily achieved by the use of technology effectively without modifying the instructional goal of impacting into the students (Pea, 1985).

An effective approach to the integration of ICT into teaching and learning is to view the whole process as an interaction between teachers and which technological knowledge needs to be applied in their classrooms (Breiner, Harkness, Johnson, & Koehler, 2012). To be able to achieve full integration of ICT into education, Wang and Liang (2009), stressed on the need for secondary schools to have an ICT plan to achieve its vision. Implementation all the time is the challenge within the component of the ICT plan. Breiner et al., (2012) argued that for the ICT plan to be implemented successfully there must be a degree of quality and reliability of its ICT plan. There is therefore the need for heads of institutions to supervise the progress of ICT implementation and measure the evaluation results to the ICT plan.

According to Inan & Lowther (2010), integration of ICT into education differs from each schools therefore there is a need to categorize it into three broad fields; ICT for preparing lessons, ICT for teaching, and ICT as a tool for learning.

ICT for preparing lessons involves teachers‘ knowledge in the use of ICT tools in the preparation of classroom exercise. This classroom exercise according to Bebell, Russell, O‘Dwyer, (2004) involves preparing teaching materials, cooperating with colleagues, students and their folks. According to Schiller (2002), teachers‘ professional use of technology involves their level of education, their age, and number of years worked. Personal characteristics can therefore influence the effective integration of ICT into teaching and learning. According to Masoumi and

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Lindström (2003), teachers‘ knowledge in ICT is a major contributing factor for a successful integration of ICT in education.

ICT as a tool for teaching to enhance effective integration involves ICT competence which takes into account the right hardware and software and also having the capacity to deal with an extensive variety of computer applications for various purposes (van Braak et al., 2004). According to Barron, Ivers, Lilavois, & Wells (2006), teachers can teach students by using a projector to present to students which brings about an effective and efficient interaction with students leading to an effective integration of ICT into teaching and learning.

The third category according to Morrison and Lowther (2010), describes ICT as a tool for learning as the ability for students to be able to use basic software applications to enhance their capabilities in the classroom. Applications such as Microsoft word enhance word processing abilities of students and also the use of web 2.0 tools increases their internet usage abilities (Brown and Adler 2008).

Educational policymakers in Ghana have welcomed the integration of ICT in teaching and learning in second cycle institutions as an exceptional approach aimed at impacting on knowledge production, communication and information sharing among students and teachers in the various schools.

Buabeng-Andoh (2012) emphasized that the integration of ICT into education has been seen as a powerful avenue to improve education in Ghana and better prepare students for the information age. He again stressed on the fact that a successful integration of ICT into education largely depends on teachers' support and attitude.

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2.6 CHALLENGES OF USING ICT FOR TEACHING AND LEARNING

Despite the use of ICT into educating and learning having several benefits, the system comes with a myriad of challenges. According to Koehler et al. (2012), the use of ICT for teaching and learning comes with several challenges and it is further complicated with the introduction of new technologies each and every day. Several challenges have been identified from review of previous empirical studies. There would therefore be the need to classify the challenges into four main categories which are resources, knowledge and skills, institution and subject culture (Koehler et al., 2012).

Educational policymakers and stakeholders in Ghana are focused on the way students and teachers integrate ICT into teaching and learning in the various secondary schools and how this adoption has supported their practices. This notwithstanding, educators have not encouraged the meaningful use of ICTs by students for learning activities (Becker, Ravitz, & Wong, 1999).

Inadequate resources arise when there is the need for ICT to be integrated into teaching and learning. Resources may include technology, access to the needed application and support from technical expert. Inadequate technological resources includes obsolete and insufficient computers, incompatible hardware and software (Karagiorgi, 2005), leads to little chance for teachers to include ICT into teaching and students into learning. Integration of ICT into teaching and learning according to Koehler et al. (2012), goes beyond the availability of technology in the schools, it includes making the right hardware and software accessible to teachers and students for use. Insufficient time is also a resource-type challenge in the use of ICT for teaching and learning. Teachers according to Butzin (2001) need more time to go through web pages and to identify pictures they need for multimedia assignment they give to students. Inadequate technical support as a resource as posited by Rogers, Medina, Rivera, & Wiley (2005), has led to teachers

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and student not able to use different technological approaches in integrating ICT into teaching and learning.

British Educational Communications and Technology Agency (BECTA) (2004), also laid emphasis on some challenges to the use of ICT for teaching and learning and attributed it not only to the lack of access to ICTs but rather poor organisation and utilization of availability of resources. This affirmation was supported by Empirica (2006), who saw lack of access as the predominant challenge in the utilization of ICT. The use of inappropriate equipment and lack of infrastructure are among the challenges associated with the integration of ICT into senior high schools (Gomes, 2005).

Insufficient technological knowledge and skills, unsupported pedagogical knowledge and skills have been captured as a crucial challenge to the integration and use of ICT for teaching and learning (Koehler et al., 2012). Inadequate technological know-how is a major reason why teachers and students are not using ICT (Snoeyink & Ertmer, 2001). In an empirical study conducted in Scottish schools, Williams, Coles, Wilson, Richardson, & Tuson (2000), identified that insufficient skills in the use of databases and Microsoft excel was a major factor by some secondary school teachers and students. A study also conducted in Australia by Newhouse (2002), emphasized on the inadequate knowledge and skills by teachers and students to manipulate computers characterized the challenges faced by the use of ICT for teaching and learning. According to Newhouse (2001), teachers were not excited about the changes and integration of ICT into teaching and learning practices. In the study of high schools in the United States of America, Snoeyink and Ertmer (2001), noted that inadequate pedagogical knowledge was a contributing factor to the challenges associated with the use of ICT for teaching and learning. In the same study, teachers made sure they acquired basic skills such as connecting to a

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network, surfing through applications, and simple word processing techniques before they engage in technology-related activities with their students and this they also found to be time consuming. This was justified by Hughes (2005), who argued that teachers must poses the requisite technological skills to be able to integrate ICT in teaching.

Institutional challenges can also be associated with the use of ICT by teachers and students and these may include school authorities and school time table or calendar as posited by Koehler et al., (2012). Studies have proven that school authorities can impede the integration of ICT into teaching and learning. Fox and Henri (2005) affirmed to this in their study which highlighted that most Hong Kong teachers felt their heads in secondary schools did not have knowledge in technology and its importance to the country's shift to more leaner-centered activities. A time table which is not flexible can also be a challenge in the use of ICT by teachers and students. In a research which covered over four thousand teachers in more than one thousand one hundred high schools in America, students had less than an hour period for subjects they learn in a class (Somekh, 2008). Such limited time will not allow for the variety of ICT usage by both student and teachers.

Subject culture in the context of ICT integration alludes to the "general arrangement of standardized practices and desires which have grown up around a specific school subject, and shapes the meaning of that subject as a particular area of study" (Goodson & Mangan, 1995). Subjects taught in secondary schools are shaped by their content and subject pedagogy. Teachers do not have the urge to use ICT to teach subjects which seem incompatible with ICT (Hennessy, Ruthven, & Brindley, 2005). Selwyn (2004) also emphasized on an art teacher who rejected the use of computers when painting, arguing that a student will be more inclined with using his physical hands. The art teacher believed that using a computer mouse makes one's mind and

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hands disjointed. In Africa, Alemneh & Hastings (2006) conducted an empirical study which suggests the lack of trained teachers who will impact into the intellect of students in secondary school as the major challenge that is faced with the use of ICT for teaching and learning. The same study also found out that trained teachers who were well equipped in the use of ICT for teaching and learning purposes preferred leaving the continent to the western world due to poor remuneration coupled with inadequate ICT infrastructure.

In Ghana, the use of ICT in education is fraught with several challenges. Mereku, Yidana, Hordzi, Tete-Mensah, & Williams (2009) found out that out of ten Ghanaian senior high schools in Ghana which had computer laboratories, the ones accessible to both students and teachers easily got damaged due to inoperative air-conditioners in the computer laboratories, power fluctuations, obsolete computers and malware attacks. The study also found out that none of the computer laboratories in the ten schools were connected to a server and only four computers out of twenty computers in one of the schools was connected to the internet.

Mereku et al. (2009) maintained that the official curricula designed for the ten schools emphasized on the need to improve students' proficiency in manipulating ICT but not as a medium of learning other subjects aside ICT. The Ghana Education Service at then was at the stage of integrating ICT into teaching and learning but eight years after the study, the situation has not changed, and ICT is seen as a different entity standing on its own whiles other subjects being taught are in isolation (Mereku et al., 2009).

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2.7 CONCLUSION

The purpose of education is to aid people to acquire knowledge, develop their skills, contribute meaningfully to society and enable them tackle the requirements of the future and be beneficial in tomorrow's world.

In as much as there are several challenges associated to the use of ICT for teaching and learning, measures must be put in place to mitigate such challenges since averting totally the challenges faced with the use of ICT in education is not feasible. Teachers and students must know the importance of ICT integration in education to be able to appreciate it and adapt it for teaching and learning purposes. An acceptance of the benefits and usefulness of ICT in teaching and learning will enhance the positive usage of ICT in education in senior high schools in Ghana. The availability of ICT infrastructure for teaching and learning can either make or unmake the effective integration of ICT into education possible according to the literature reviewed in this study.

The Ministry of Education in partnership with the government of Ghana, according to the literature reviewed should create an enabling environment for non-profitable organizations and philanthropist to contribute to the provision of ICT infrastructure to deprived and rural schools within the country since it will be impossible for the government alone to bear all the cost of ICT integration in all senior high schools across the country.

Inadequate computers, incompatible hardware and software, limited time, lack of technical support, inadequate qualified teachers, lack of funding, resistance to change, teachers' and students‘ attitude towards computer use, insufficient computer skills and inadequate training

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opportunities for teachers sum up to hinder the effective integration of ICT into Ghanaian senior high schools.

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CHAPTER THREE
METHODOLOGY

3.1 INTRODUCTION

The chapter describes the methodology used. It begins with the research design and it is followed by the selection of cases. The selection of subjects and their distribution are then discussed. Data collection instrument and data analysis strategies used are also explained.

3.2 RESEARCH DESIGN/STRATEGY

The study adopted the social survey research approach under the quantitative research design. Creswell (2012), indicated that survey researchers normally select and study a sample from a population and generalize the outcome from the sample to the population. The strength that surveys have is that they are useful in describing the characteristics of a large population. This design has the benefit of measuring current dispositions or practices. It additionally gives data in a short measure of time, for example, the time required for overseeing the survey and gathering the data.

No other research method can provide this broad capability, which guarantees a more precise sample to assemble targeted results to make inferences and settle on essential choices. The obscurity of surveys enables respondents to reply with more genuine and meaningful answers. Surveys conducted anonymously provide a channel to a more legit and unambiguous reactions than different kinds of research philosophies, particularly if it is obviously expressed that survey answers remained totally classified. However, surveys rely on standardization which is also

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inflexible because they require the initial study design to remain unchanged throughout data collection (Fraenkel and Wallen, 2006).

3.3 SELECTION OF SUBJECTS

3.3.1 POPULATION

According to Dattalo (2008), a population is a theoretically specified aggregation of elements. All individuals or objects within a particular populace more often than not have a typical, confining trademark or innate quality. Population can be defined by age, ethnicity, level of education, location and religion. The target population for this research was 2180 comprising all teachers, first and second year students of Nungua Senior High School and Presbyterian Senior High School, Teshie. The table below describes the breakdown of the units in the population.

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Table 3. 1 Population and Sample

INSTITUTION	POPULATION			SAMPLE		
	Teachers	Students	Total	Teachers	Students (10%)	Total
Nungua Senior High School	73	1082	1155	73	108.2	181.2
Presbyterian Senior High School, Teshie.	65	960	1025	65	102.5	167.5
TOTAL	138	2042	**2180**	**138**	**204.2**	**342.2**

3.3.2 SAMPLE SIZE

According to Dattalo (2008), sampling is a procedure used to choose components from a populace. An example is a subset of the populace components that results from a sampling strategy.

According to Gay and Diehl (1992), the sample size of a population should be 10%. This assertion was supported by Alreck and Settle (1995), who argued that a sample size of 10% of the population is adequate enough to achieve certainty in the results. For the purpose of the study, the researcher selected 10% of the total population to obtain a definite confidence in the result for students of both schools. Based on this reasoning, 10% of the total population of 2042, gave us a sample size of 204.2 for students. For teachers of both schools, the

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researcher used the entire population since it is well defined and small. Using the entire population eliminates any potential bias occurring through sampling technique. This assertion is justified by Creswell (2012) who argued that it is possible for a researcher to study the entire population if it is small and well defined. Therefore the sample size for teachers of both schools was 138 which represent the entire population for teachers. The total sample size was therefore 342.

3.3.3 SAMPLING TECHNIQUES

There were no sampling techniques for the distribution of questionnaire to teachers since the whole population was adopted for this study due to the small size.

The researcher adopted the stratified sampling technique for students to achieve the same proportion of students selected in both schools since there were several classes in both schools. There were five programmes with each having a class in both schools. Each programme had students in both form one and form two. The total strata in both schools summed up to twenty. Therefore 5% of the total sample size for students was drawn out from each class. A simple random technique was used to draw out the 5% of the total sample size from each stratum.

3.4 DATA COLLECTION INSTRUMENT

3.4.1 QUESTIONNAIRES

Questionnaire was used as data collection instrument for this study due to the number of subjects involved in the study (See Appendix III and IV). The questionnaire was semi-structured in nature, comprising both close-ended and open-ended questions allowing the sharing of in-depth knowledge, views and ideas relating to the study. Questionnaires help to gather responses in a

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standardized way. It is relevant especially when respondents cover a wide geographical area such that interviewing all respondents is impossible as a result of limited resources. The limitations to questionnaires however is that returns may be low if they are not responded and delivered to the researcher. Also, it is not conceivable to clarify any focus in the inquiries that respondents may misconstrue. This could be mostly answered by piloting the questions on a little gathering of students or colleagues.

3.4.2 PRE-TESTING

According to Creswell (2012), a group of participants should be selected from the population to pre-examine the questionnaires designed by the researcher. Pre-testing of questionnaires ensures that the participants in the sample are equipped for finishing the survey and that they can comprehend and answer the inquiries. A pilot test of the questionnaires on a few participants can enable you to choose which questions to add, take out, rephrase or maintain (Creswell, 2012).

For the purpose of this study, a pilot study was carried out using 20 students and 10 teachers from Labone Senior High School and Presbyterian Senior High School, Osu. The researcher used the institutions under study due to its proximity and time constraints.

3.4.3 DATA COLLECTION PROCEDURE

The researcher employed both primary and secondary data for the study. Primary data was a collection of raw data from the field which includes the data collected by the researcher using questionnaires. Questionnaires were administered by the researcher to students with the help of course representatives from the various departments in the various campuses (See Appendix III and IV). The researcher divided the questionnaires according to the number of students drawn out of the strata and handed it over to the various course representatives to be distributed. They

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filled and submitted the questionnaires that same day. For teachers, the questionnaires were handed to the headmaster in charge of academics with directives to administer to teachers during the course of the week and submit when duly filled.

Secondary data included data from previous works, reports, reviews on the study topic from various literature, articles, newspapers, official publications, thesis and other print and online sources (Published and unpublished).

3.5 DATA ANALYSIS

The Statistical Package for the Social Sciences (SPSS) was used to analyze data collected from the respondents for the study. SPSS is an application software used in statistical analysis of data. The results were presented using figures, tables, graphs, frequencies and percentages of the responses given by the respondents. According to Healey (1993), SPSS is the most widely used statistical software in the social sciences, especially for quantitative study.

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CHAPTER FOUR
DATA ANALYSIS AND DISCUSSION OF FINDINGS

4.1 INTRODUCTION

This chapter focuses on the analysis of data collected based on the stated objectives of the study. Respondent answered questionnaires based on;

- Computer literacy skills
- Perception on the use of ICT for teaching and learning
- Availability of ICT infrastructure
- Awareness of some selected computer applications
- Challenges associated with the use of ICT for teaching and learning

After the instruments have been administered and data have been collected, the next step was to tabulate the responses and attribute scores to them after which the scores were described in a summarized form using one or more descriptive statistics (Fraenkel and Wallen, 2000).

In total, 204 questionnaires were distributed to students of both schools based on the strata adopted for the study and 138 questionnaires to all teachers of both schools. Out of the 204 questionnaires distributed to students of both schools, 198 (97%) were retrieved and found to be suitable for analysis. Teachers also returned 126 out of the 138 questionnaires administered, securing the response rate of 91%.

Data analysis using frequencies and percentages was made possible with the help of SPSS version 21. The researcher interpreted the response from the analyzed data and came with findings.

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4.2 DEMOGRAPHICS

The main aim of data collection exercise of the study was to collate the general responses of students and teachers on the use of ICT for teaching and learning in Nungua Senior High School and Presbyterian Senior High School, Teshie, without any special attempt to balance gender and age of respondents. As part of data collection, the study tried to identify the demographic make-up of the respondents.

4.2.1 DISTRIBUTION OF RESPONDENTS

Table 4.1 depicts the number of student and teacher respondents that make up the population for the study. From the Table below, 50.5% (100) of the student respondents were made up of students from Nungua Senior High School while 49.5% (98) of them were made up of students from Presbyterian Senior High School, Teshie. On the other hand, 54.8% (69) of the teacher respondents were made up of teachers from Nungua Senior High School while 45.2% (57) of them were made up of teachers from Presbyterian Senior High School, Teshie. It was therefore concluded that most of the respondents were drawn from Nungua Senior High School.

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Table 4. 1 School of Participants

School	Students		Teachers		Total
	Frequency	Percentage	Frequency	Percentage	
Nungua SHS	100	50.5	69	54.8	**169**
Presbyterian SHS, Teshie	98	49.5	57	45.2	**155**
Total	**198**	**100**	**126**	**100**	**324**

Source: Fieldwork (2018)

4.2.2 GENDER OF RESPONDENTS

With the total of 198 student respondents, 85(42.9%) were males and 113(57.1%) were females. Out of the 126 responses from teachers, 81(64.3%) were males and 45(35.7%) were females. This gives an indication that there were more male teachers than females. The respondents for students also imply that there were more females' responses as compared to males.

4.2.3 STUDENT YEAR OF STUDY

97 respondents representing 49% were found to be in Form One and 101 respondents representing 51% were also found to be in Form Two. This meant that there was a slight difference in respondents from the various forms even though the researcher's aim was to have an equal representation of the various forms using the stratified approach of instrumentation.

4.2.4 PROGRAMME OFFERED BY STUDENTS

In the bid to have equal representation of all courses offered in both schools, the various programmes were divided using a strata and this enabled the researcher to have an equal

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representation amongst the various courses offered in both schools. Table 4.2 below indicates the various responses about the courses offered by the student respondents.

Table 4. 2 Programmes offered by Students

Programmes	**Nungua SHS**		**Presbyterian SHS, Teshie**	
	Frequency	**Percentage**	**Frequency**	**Percentage**
General Arts	20	20	20	20.4
Visual Arts	20	20	19	19.4
Home Economics	20	20	20	20.4
Business	20	20	19	19.4
Science	20	20	20	20.4
Total	**100**	**100**	**98**	**100**

Source: Fieldwork (2018)

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4.2.5 AGE DISTRIBUTION OF TEACHERS

Table 4. 3 Age distribution of Teachers

Age	Frequency	Percentage
30 years and below	36	28.6
31 – 40 years	34	27
41 – 50 years	42	33.3
51 and above	14	11.1
Total	128	100

Source: Fieldwork (2018)

Table 4.3 gives a description of the age distribution of teachers in both schools. In the Table above, it is evident that majority of the respondents fell within the age range of "41-50 years" which is represented by 42(33.3%) out of 126. Teachers who fell within the ranges of "50 years and above" were within the minority of respondents which is represented by 14(11.1%) out of 126 respondents. It was therefore concluded that most teachers fell between the "41-50 years" age ranges.

4.3 COMPUTER KNOWLEDGE

Computer knowledge is a necessity for a successful integration of ICT into teaching and learning therefore the researcher sought to find out the computer literacy skills of the respondents. When

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teachers and students possess little or no knowledge of ICT, the possibility of integration of ICT into educational practices is seriously compromised (Boakye & Banini, 2008).

4.3.1 COMPUTER LITERACY

The findings of the study revealed that for Nungua Senior High School, 59(85.5%) teachers were found to be computer literate while 10(14.5%) were not and in Presbyterian Senior High School, Teshie, 54(94.7%) teachers agreed to be computer literate while 3(5.3%) stated they were not computer literate. For students of Nungua Senior High School and Presbyterian Senior High School, Teshie, 96(96%) and 96(98%) respondents indicated they were computer literate respectively before enrolling into the school while 4(4%) students from Nungua Senior High School responded in the negative. 2(2%) students from Presbyterian Senior High School, Teshie were also found not to be computer literate. This situation depicts a high computer literacy level of student and teachers of both schools and this is evident in Table 4.4 below.

Table 4. 4 Computer literacy

Computer literacy	**Students**				**Teachers**			
	Nungua SHS		**PSHS, Teshie**		**Nungua SHS**		**PSHS, Teshie**	
	F	**%**	**F**	**%**	**F**	**%**	**F**	**%**
Yes	96	96	96	98	59	85.5	54	94.7
No	4	4	2	2	10	14.5	3	5.3
Total	**100**	**100**	**98**	**100**	**69**	**100**	**57**	**100**

Source: Fieldwork (2018)

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4.3.2 COMPUTER KNOWLEDGE RATE OF RESPONDENTS

A follow up question sought to find out how the respondents of both schools rated their computer literacy skills. It was discovered that majority of student respondents from Nungua Senior High School rated their computer knowledge as 'Good' and this was pegged at 39%(39) of a 100 student respondents. Students respondents from Presbyterian Senior High School, Teshie also rated their computer knowledge as being 'Good' and this was represented by 45(45.9%) out of 98 respondents. Table 4.5 indicates that 27(39.1%) of teacher respondents in Nungua Senior High School rated their computer knowledge as being 'Good' and 21(36.8%) of Presbyterian Senior High School, Teshie, teacher respondents also rated their computer knowledge as being 'Good'. The respondents within the missing category from the Table were the respondents who responded ‗No' when asked if they were computer literates.

It can therefore be concluded that most respondents in the study rated their computer knowledge as being 'Good' and this is indicated in Table 4.5.

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Table 4. 5 Computer Knowledge Rate of Respondents

Computer literacy rate	Students				Teachers			
	Nungua SHS		PSHS, Teshie		Nungua SHS		PSHS, Teshie	
	F	%	F	%	F	%	F	%
Basic	17	17	9	9.2	14	20.3	9	15.8
Somehow Good	30	30	24	24.5	10	14.5	15	26.3
Good	39	39	45	45.9	27	39.1	21	36.8
Very Good	10	10	18	18.4	8	11.6	9	15.8
Missing	4	4	2	2	10	14.5	3	5.3
Total	**100**	**100**	**98**	**100**	**69**	**100**	**57**	**100**

Source: Fieldwork (2018)

4.3.3 ACQUISITION OF ICT SKILLS

On the issue of acquisition of ICT skills by teacher, majority of respondents from Nungua Senior High School indicated that they acquired their ICT skills from Professional ICT training which is represented by 35(50.7%) out of 69 respondents and 30(52.6%) out of 57 teachers from Presbyterian Senior High School, Teshie also indicated that they acquired their ICT skills through Professional Training. Most respondents who acquired their ICT skills through Professional Training also indicated that the training was acquired during their years of study in the various universities they attended.

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4.3.4 ORGANIZATION OF ICT TRAINING PROGRAMMES FOR TEACHERS

In assessing the computer knowledge skills of teachers in the various schools, the study again sought to find out if there had been any ICT training organized by the ICT Directorate. Table 4.6 indicates that 59(85.5%) out of 69 teachers drawn from Nungua Senior High School revealed that there had not been any ICT training organized by the Directorate. In Presbyterian Senior High School, Teshie, 39(68.4%) out of 57 respondents affirmed that there had not been any ICT training organized by the ICT Directorate. Teachers who indicated that there had been ICT training Programmes organized by the ICT Directorate for Teachers in Nungua Senior High Schools and Presbyterian Senior High School, Teshie represents 10(14.5%) and 18(31.6%) respectively.

Table 4. 6 Organization of ICT Training Programmes for Teachers

Responses	**Nungua SHS**		**Presbyterian SHS, Teshie**	
	Frequency	**Percentage**	**Frequency**	**Percentage**
Yes	10	14.5	18	31.6
No	59	85.5	39	68.4
Total	**69**	**100**	**57**	**100**

Source: Fieldwork (2018)

4.3.5 PARTICIPATION IN TRAINING PROGRAMMES FOR TEACHERS

Out of the 10 teachers that indicated that there had been an organization of ICT Training Programmes by the ICT Directorate for Teachers in Nungua Senior High Schools, 7(70%)

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revealed that they participated in all modules while 3(30%) indicated that they participated sometimes in the training programmes. No teacher from Nungua Senior High School absented him or herself from all the ICT training programs organized. In Presbyterian Senior High School, Teshie, out of the 18 teachers who indicated that there had been organization of ICT Programmes by the ICT Directorate 12(66.7%) participated in all the modules organized, 4(22.2%) in some modules and 2(11.1%) never participated in all the modules organized. It was therefore concluded that most teachers in both schools who agreed to the organization of ICT training by the ICT Directorate participated greatly.

4.4 PERCEPTION OF THE USE OF ICT FOR TEACHING AND LEARNING

The second objective of the study was to find out the perception of students and teachers on the integration of ICT into teaching and learning. Respondents in the schools under study were therefore asked to reveal their perception based on some selected questions presented under the objective. Responses are presented in table 4.7 and 4.8.

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4.4.1 PERCEPTION OF TEACHERS

Table 4. 7 Perception of Teachers, Nungua SHS

Perception	Nungua SHS – Teachers								Total
	Strongly agree		Agree		Strongly disagree		Disagree		
	F	%	F	%	F	%	F	%	F & (%)
a. Using ICT to teach is time consuming	4	5.8	13	18.8	11	15.9	41	59.4	**69 (100%)**
b. Internet use can improve your teaching	42	60.9	22	31.9	3	4.3	2	2.9	**69 (100%)**
c. ICT should be integrated into teaching	41	59.4	23	33.3	3	4.3	2	2.9	**69 (100%)**
d. Other teachers have given negative comment about using ICT for teaching	7	10.1	16	23.2	10	14.5	36	52.2	**69 (100%)**
e. I prefer using the internet to prepare my lesson than to use the library or handbook	21	30.4	26	37.7	7	10.1	15	21.7	**69 (100%)**
f. Students give negative feedback on ICT supported teaching	5	7.2	2	2.9	12	17.4	50	72.5	**69 (100%)**
g. I teach perfectly well without computers	17	24.6	35	50.7	9	13	8	11.6	**69 (100%)**
h. ICT can enhance collaboration among students and teachers	35	50.7	29	42	-	-	5	7.2	**69 (100%)**
i. It is difficult to integrate ICT into my teaching	3	4.3	13	18.8	15	21.7	38	55.1	**69 (100%)**

Source: Fieldwork (2018)

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Table 4. 8 Perception of Teachers, Presbyterian SHS, Teshie

Perception	Presbyterian SHS, Teshie – Teachers								Total
	Strongly agree		Agree		Strongly disagree		Disagree		
	F	%	F	%	F	%	F	%	F & (%)
a. Using ICT to teach is time consuming	6	10.5	6	10.5	15	26.3	30	52.6	**57 (100%)**
b. Internet use can improve your teaching	42	73.7	15	26.3	-	-	-	-	**57 (100%)**
c. ICT should be integrated into teaching	33	57.9	24	42.1	-	-	-	-	**57 (100%)**
d. Other teachers have given negative comment about using ICT for teaching	3	5.3	21	36.8	9	15.8	24	42.1	**57 (100%)**
e. I prefer using the internet to prepare my lesson than to use the library or handbook	33	57.9	21	36.8	3	5.3	-	-	**57 (100%)**
f. Students give negative feedback on ICT supported teaching	-	-	12	21.1	15	26.3	30	52.6	**57 (100%)**
g. I teach perfectly well without computers	12	21.1	36	63.2	6	10.5	3	5.3	**57 (100%)**
h. ICT can enhance collaboration among students and teachers	18	31.6	33	57.9	6	10.5	-	-	**57 (100%)**
i. It is difficult to integrate ICT into my teaching	6	10.5	6	10.5	15	26.3	30	52.6	**57 (100%)**

Source: Fieldwork (2018)

From the above Tables 4.7 and 4.8, it is evident that a greater number of Teachers from Nungua SHS 41(59.4%) and Presbyterian SHS, Teshie 30(52.6%) disagreed with the assertion that using ICT to teach students was time consuming. This assertion indicates that there is no time wastage

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in the use of ICT for teaching. Also, with the perception that internet use can improve teaching, at Nungua SHS, 42(60.9%) responded "Strongly agreed", 22(31.9%) "Agreed", 3(4.3%) "Strongly disagreed" and 2(2.9%) "Disagreed". At Presbyterian SHS, Teshie, 42(73.7%) responded "Strongly agreed" that using the internet can improve teaching. 15(26.3%) also "Agreed" to this assertion while none of the teacher respondents "Strongly disagreed" or "Disagreed". This is an indication that teachers in both schools "Strongly agreed" that internet use can improve their teaching.

With regards to whether ICT should be integrated into teaching, teachers in Nungua SHS and the Presbyterian SHS, Teshie "Strongly agreed" and pegged their response rate at 59.4%(41) and 57.9%(33) respectively. When asked if other teachers had given negative comments about the use of ICT for teaching, majority of the teachers from Nungua SHS "Disagreed" and this was represented by 36(52.2%) out of 69 teachers. This findings was also inconsonance with teachers of Presbyterian SHS, Teshie who also "Disagreed" that other teachers gave negative comments about the use of ICT for teaching and this was represented by 42.1% of the total respondents in that school. From Table 4.7 and 4.8, teachers from Nungua SHS and Presbyterian SHS, Teshie "Agreed" and "Strongly agreed" respectively, on their preference on the use of the internet to prepare lessons than to use the library or teachers' lesson manuals. 26(37.7%) teachers of Nungua SHS "Agreed", while 33(57.9) of Presbyterian SHS, Teshie "Strongly agreed" to the assertion about the preparation of lessons using the internet.

With responses as to whether students gave negative feedback on ICT supported teaching, teachers from Nungua SHS "Disagreed" and this was represented by 50(72.5%) out of 69 respondents. With Presbyterian SHS, Teshie also, 30(52.6%) out of 57 "Disagreed" that students gave negative feedback on ICT supported teaching.

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When asked if they taught perfectly well without computers, 17(24.6%) Nungua SHS teachers "Strongly agreed", 35(50.7%) "Agreed", 9(13%) "Strongly disagreed" and 8(11.6%) "Disagreed". With teachers in Presbyterian SHS, Teshie, 12(21.1%) "Strongly agreed", 36(63.2%) "Agreed", 6(10.5%) "Strongly disagreed" and 3(5.3%) "Disagreed" with the assertion that teachers taught perfectly well without computers. Based on the responses obtained, it can be deduced that teachers in both schools "Agreed" to the perception that they could teach perfectly well without the use of computers.

The study again found out that ICT can enhance collaboration among students and teachers and this was evident in Table 4.7 and 4.8 which indicated that, teachers from Nungua SHS "Strongly agreed" to this assertion with a response rate of 42%(29) while most teachers from Presbyterian SHS, Teshie "Agreed" to this assertion with a response rate of 57.9%(33).

With the difficulty of ICT integration into teaching, 38(55.1%) teachers from Nungua SHS "Disagreed" with the assertion that it is difficult to integrate ICT into teaching and teachers from Presbyterian SHS, Teshie, also "Disagreed" with the same assertion with a response rate of 52.6% which represents 30 out of 57 teachers.

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4.4.2 PERCEPTION OF STUDENTS

Table 4. 9 Perception of Students, Nungua SHS

Perception	Nungua SHS – Students								Total
	Strongly agree		Agree		Strongly disagree		Disagree		
	F	%	F	%	F	%	F	%	F & (%)
a. Using ICT to learn is time consuming	7	7	9	9	29	29	55	55	**100 (100%)**
b. Internet use can improve your learning	75	75	24	24	1	1	-	-	**100 (100%)**
c. ICT should be integrated into learning	61	61	36	36	3	3	-	-	**100 (100%)**
d. All my teachers are very competent in using ICT for teaching	23	23	45	45	7	7	25	25	**100 (100%)**
e. I prefer using the internet to do my assignment than to use the library	67	67	25	25	3	3	5	5	**100 (100%)**
f. ICT tends to increase students' learning motivation	56	56	37	37	-	-	7	7	**100 (100%)**
g. ICT can enhance students' language and writing skills (e.g. grammar, spelling, punctuation, etc)	66	66	26	26	-	-	8	8	**100 (100%)**
h. ICT can enhance collaboration among students and teachers	52	52	47	47	-	-	1	1	**100 (100%)**

Source: Fieldwork (2018)

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Table 4. 10 Perception of Students, Presbyterian SHS, Teshie

Perception	Presbyterian SHS, Teshie – Students								Total
	Strongly agree		Agree		Strongly disagree		Disagree		
	F	%	F	%	F	%	F	%	F & (%)
a. Using ICT to learn is time consuming	8	8.2	15	15.3	30	30.6	45	45.9	**98 (100%)**
b. Internet use can improve your learning	59	60.2	38	38.8	-	-	1	1	**98 (100%)**
c. ICT should be integrated into learning	60	61.2	34	34.7	-	-	4	4.1	**98 (100%)**
d. All my teachers are very competent in using ICT for teaching	24	24.5	48	49	4	4.1	22	22.4	**98 (100%)**
e. I prefer using the internet to do my assignment than to use the library	53	54.1	36	36.7	2	2	7	7.1	**98 (100%)**
f. ICT tends to increase students' learning motivation	53	54.1	39	39.8	1	1	5	5.1	**98 (100%)**
g. ICT can enhance students' language and writing skills (e.g. grammar, spelling, punctuation, etc)	66	67.3	32	32.7	-	-	-	-	**98 (100%)**
h. ICT can enhance collaboration among students and teachers	48	49	49	50	-	-	1	1	**98 (100%)**

Source: Fieldwork (2018)

From Tables 4.9 and 4.10, it was discovered that a greater number of students from both Nungua SHS and Presbyterian SHS, Teshie, "Disagreed" that using ICT to learn was time consuming and this was evident in their response rates of 55(55%) out of 100 respondents and 45(45.9%) out of

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98 respondents. This is an indication that students in both schools –disagreed" that using ICT to learn was time consuming. When asked if the internet could improve their learning, 75(75%) students of Nungua SHS "Strongly agreed", 24(24%) "Agreed", and 1(1%) "Disagreed" to this assertion. With Presbyterian SHS, Teshie, 59(60.2%) "Strongly agreed", 38(38.8%) "Agreed" and 1(1%) "Disagreed" to the notion that internet use could improve learning. The conclusion that can be drown out is that majority of the students in both schools strongly agree that the use of the internet can improve their learning.

For Nungua SHS, 61(61%) out of 100 students and 60(61.2%) Presbyterian SHS, Teshie students "Strongly agreed" that ICT should be integrated into learning. From Table 4.9 and 4.10, there is a clear indication that almost all the students in both schools either "Strongly agreed" or "Agreed" to the integration of ICT into learning. On the competence of teachers in both schools, students "Agreed" that their teachers were very competent in using ICT for teaching. This is represented by 45(45%) out of 100 respondents for Nungua SHS students and 48(49%) out 98 respondents for Presbyterian SHS, Teshie students. Again for Nungua SHS, 67(67%) out of 100 students and 53(54.1%) Presbyterian SHS, Teshie students "Strongly agreed" that they preferred using the internet to do their assignment rather than use the library for information.

In connection with students' learning motivation, 56(56%) of Nungua SHS students "Strongly agreed" that the use of ICT increases their learning motivation while 66(67.3%) students from Presbyterian SHS, Teshie "Strongly agreed" that the use of ICT increases their learning motivation. It can therefore be deduced that ICT as a matter of fact can increase students' motivation and encourage them to learn more. A greater number of students from both schools "Strongly agreed" that ICT can enhance students' language and writing skills. From Table 4.9, it can be seen that, 66(66%) out of 100 Nungua SHS students "Strongly agreed" to the assertion,

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47(47%) "Agreed", and 8(8%) "Disagreed". None of the student in Nungua SHS "Strongly disagreed". With regards to Presbyterian SHS, Teshie students, 66(67.3%) out of 98 respondents "Strongly agreed'" and 32(32.7%) "Agreed". None of the students from Presbyterian SHS, Teshie "Disagreed" or "Strongly Disagreed". From the above analysis, it can be concluded that majority of students in both schools agreed that ICT can enhance their language and writing skills.

Interacting with teachers from home using emails and social applications by students was found to enhance collaboration among students and teachers. The response indicates that most students either "Strongly agreed" or "Agreed" to the assertion that ICT can enhance collaborations amongst their peers and their teachers as well. From the Table 4.9, students from Nungua SHS gave the following responses; 52(52%) "Strongly agreed", 47(47%) "Agreed", and 1(1%) "Disagreed". For Presbyterian Senior High School, Teshie, 48(49%) "Strongly agreed", 49(50%) "Agreed", and 1(1%) "Disagreed".

From the responses represented by the figures in Tables 4.9 and 4.10, it is evident that teachers and students of both schools have a positive perception about the use of ICT for teaching and learning.

4.5 AWARENESS AND USAGE OF SOME SELECTED COMPUTER APPLICATIONS

This section tried to ascertain the awareness of both student and teacher respondents of the schools under the study and how often the respondents used some computer applications that have been selected under the study.

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4.5.1 COMPUTER PROGRAMMES OFTEN USED BY TEACHERS

Table 4.11 indicates some selected computer programmes often used by teachers of Nungua SHS and Presbyterian SHS, Teshie. From the Table, the researcher discovered that teachers from both schools mostly used Microsoft Word as compared to the other computer programmes. From table 4.11, 53(76.8%) teachers from Nungua SHS and 48(84.2%) from Presbyterian SHS, Teshie often use Microsoft Word. With Microsoft Excel, 31(44.9%) respondents from Nungua SHS often used it while in Presbyterian SHS, Teshie, 30(52.6%) respondents also often used the application. Also, with Microsoft PowerPoint, 25(36.2%) teachers from Nungua SHS and 33(57.9%) from Presbyterian SHS, Teshie often used the application.

Again the number of respondents in both schools that often used Search Engines was high. From table 4.11, 41(59.4%) respondents from Nungua SHS and 39(68.4%) from Presbyterian SHS, Teshie often used Search Engines. The researcher also found out that a few respondents from the two schools often used Microsoft Access. Table 4.11 also found out that, 2(2.9%) respondents from Nungua SHS often used it while in Presbyterian SHS, Teshie, 15(26.3%) respondents often used the application, an indication that Microsoft Access is not an application used mostly by the teachers of both schools.

The researcher noticed that from Table 4.11, teachers from both schools often used Microsoft Word and search engines as compared to the other applications and with Microsoft Access, just a few respondents responded in the affirmative.

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Table 4. 11 Computer Programmes often used by Teachers

Programmes often used – Teachers										
Programmes	**Nungua SHS**					**Presbyterian SHS, Teshie**				
	Yes	**%**	**No**	**%**	**Total**	**Yes**	**%**	**No**	**%**	**Total**
MsWord	53	76.8	16	23.2	**69(100%)**	48	84.2	9	15.8	**57(100%)**
MsExcel	31	44.4	38	55.6	**69(100%)**	30	52.6	27	47.4	**57(100%)**
MsPowerPoint	25	36.2	44	63.8	**69(100%)**	33	57.9	24	42.1	**57(100%)**
MsAccess	2	2.9	67	97.1	**69(100%)**	15	26.3	42	73.7	**57(100%)**
Search Engines (Google, Ask.com, Yahoo)	41	59.4	28	40.6	**69(100%)**	39	68.4	18	31.6	**57(100%)**

Source: Fieldwork (2018)

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4.5.2 COMPUTER PROGRAMMES OFTEN USED BY STUDENTS

Table 4. 12 Computer Programmes often used by Students

Programmes often used – Students										
Programmes	**Nungua SHS**					**Presbyterian SHS, Teshie**				
	Yes	**%**	**No**	**%**	**Total**	**Yes**	**%**	**No**	**%**	**Total**
MsWord	83	83	17	17	**100(100%)**	90	97.8	8	8.2	**98(100%)**
MsExcel	76	76	24	24	**100(100%)**	74	75.5	24	24.5	**98(100%)**
MsPowerPoint	30	30	70	70	**100(100%)**	29	29.6	69	70.4	**98(100%)**
MsAccess	22	22	78	78	**100(100%)**	37	37.8	61	62.2	**98(100%)**
Search Engines (Google, Ask.com, Yahoo)	86	86	14	14	**100(100%)**	87	88.8	11	11.2	**98(100%)**

Source: Fieldwork (2018)

From Table 4.12, the researcher observed that students of Nungua SHS and Presbyterian SHS, Teshie mostly used Microsoft Word and Search Engines as compared to the other applications. In Nungua SHS, 83(83%) and 86(86%) respondents often used Microsoft Word and Search Engines respectively while 90(91.8%) and 87(88.8%) students from Presbyterian SHS, Teshie also often used Microsoft Word and Search Engines respectively. There was therefore a clear

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indication that students in both schools often used Microsoft Word and Search Engines often as compared to other applications and programmes.

4.5.3 LEVEL OF FAMILIARITY OF SOME SELECTED COMPUTER APPLICATIONS AND PROGRAMMES

Table 4. 13 Level of familiarity

Programme	Nungua SHS – Teachers										
	Programmes often used										
	Excellent		Good		Average		Poor		Very Poor		Total
	F	%	F	%	F	%	F	%	F	%	
MsWord	18	26.1	23	33.3	12	17.4	5	7.2	11	15.9	**69(100%)**
MsExcel	2	2.9	25	36.2	20	29	11	15.9	11	15.9	**69(100%)**
MsPowerPoint	6	8.7	16	23.2	18	26.1	12	17.4	17	24.6	**69(100%)**
Search Engines (Google, Ask.com, Yahoo)	12	17.4	31	44.9	8	11.6	2	2.9	16	23.2	**69(100%)**
MsAccess	-	-	20	29	10	14.5	15	21.7	24	34.8	**69(100%)**

Source: Fieldwork (2018)

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Table 4. 14 Level of familiarity

Programme	Presbyterian SHS, Teshie – Teachers										
	Programmes often used										
	Excellent		Good		Average		Poor		Very Poor		Total
	F	%	F	%	F	%	F	%	F	%	
MsWord	21	36.8	27	47.4	6	10.5	3	5.3	-	-	**57(100%)**
MsExcel	9	15.8	24	42.1	18	31.6	6	10.5	-	-	**57(100%)**
MsPowerPoint	18	31.6	12	21.1	18	31.6	9	15.8	-	-	**57(100%)**
Search Engines (Google, Ask.com, Yahoo)	33	57.9	18	31.6	3	5.3	3	5.3	-	-	**57(100%)**
MsAccess	6	10.5	12	21.1	21	36.8	18	31.6	-	-	**57(100%)**

Source: Fieldwork (2018)

Tables 4.13 and 4.14 indicates that 18(26.1%) and 23(33.3%) teacher respondents of Nungua SHS were "Excellent" and "Good" respectively in the use of Microsoft Word application and at Presbyterian SHS, Teshie, 21(36.8%) and 27(47.4%) teacher respondents were "Excellent" and "Good" respectively in the use of Microsoft Word application. These therefore depict that

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teachers in both schools were proficient in using Microsoft Word. Again, 12(17.4%) and 31(44.9%) teachers of Nungua SHS were "Excellent" and "Good" respectively in the use of Search Engines while at Presbyterian SHS, Teshie, 33(57.9%) and 18(31.6%) teacher respondents were "Excellent" and "Good" respectively in the use Search Engines. This indicates that teachers from both schools were either –Excellent" or "Good" as compared to the other applications and programmes.

Table 4. 15 Level of familiarity

Programme	**Nungua SHS – Students**										
	Programmes often used										
	Excellent		**Good**		**Average**		**Poor**		**Very Poor**		**Total**
	F	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	
MsWord	39	39	39	39	17	17	1	1	4	4	**100(100%)**
MsExcel	20	20	54	54	18	18	4	4	4	4	**100(100%)**
MsPowerPoint	10	10	36	36	31	31	14	14	9	9	**100(100%)**
Search Engines (Google, Ask.com, Yahoo)	64	64	27	27	5	5	-	-	4	4	**100(100%)**
MsAccess	7	7	32	32	35	35	18	18	8	8	**100(100%)**

Source: Fieldwork (2018)

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Table 4. 16 Level of familiarity

Programme	Presbyterian SHS, Teshie – Students										
	Programmes often used										
	Excellent		Good		Average		Poor		Very Poor		Total
	F	%	F	%	F	%	F	%	F	%	
MsWord	33	33.7	43	43.9	19	19.4	1	1	2	2	**98(100%)**
MsExcel	23	21.4	46	46.9	26	26.5	3	3.1	2	2	**96(100%)**
MsPowerPoint	6	6.1	30	30.6	44	44.9	14	14.3	4	4.1	**98(100%)**
Search Engines (Google, Ask.com, Yahoo)	62	63.3	21	21.4	11	11.2	2	2	2	2	**98(100%)**
MsAccess	9	9.2	22	22.4	28	28.6	28	28.6	11	11.2	**98(100%)**

Source: Fieldwork (2018)

In the same vein, students from Nungua SHS and Presbyterian SHS, Teshie were more familiar using Microsoft Word, Microsoft PowerPoint and Search Engines as compared to Microsoft Access and Microsoft Excel and this is evident in Table 4.15 and 4.16 An indication from Table 4.15 and 4.16, proved that 39(39%) out of 100 students and 39(39%) Students from Nungua SHS were "Excellent" and "Good" in the use of Microsoft Word respectively. At Presbyterian SHS, Teshie, the situation was not different. From table 4.16, 33(33.7%) out of 98 students were "Excellent" while 43(43.9%) were "Good" in the use of Microsoft Word. Also, majority of the students from both schools were familiar with the use of Search Engines and this was represented by 64(64%) of the student respondents who chose "Excellent" while 27(27%) chose

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"Good" and 63(63.3%) chose "Excellent" while 21(21.4%) chose "Good" for Nungua SHS and Presbyterian SHS, Teshie respectively.

4.6 AVAILABILITY OF ICT FACILITIES

The first objective of the study sought to inquire whether ICT facilities were at the disposal of students and teachers of both schools under the study. Under this section, the researcher also sought to find out if there were computer laboratories in the schools under the study.

4.6.1 POSSESSION OF A PERSONAL COMPUTER

In the study, the researcher sought to find out if respondents in the various schools owned a computers since personal ownership can enhance the effective integration of ICT into teaching and learning. In Nungua SHS, 50(72.5%) of the teacher respondents said "Yes" when asked if they owned a computer while 43(43%) of the students also said "Yes". This meant that majority of the teachers in Nungua SHS had computers for personal use while the students fell in the minority category. Also at Presbyterian SHS, Teshie, the situation was no different. 54(94.7%) of the teacher respondents said "Yes" when asked if they owned a computer while 35(35.7%) of the students also said "Yes". It can be assumed that students are not working to earn an income hence their inability of purchase or own computers.

4.6.2 AVAILABILITY OF ICT LABORATORY

To be able to use ICT for teaching and learning purposes, there is a need for the establishing of ICT laboratory to enhance the integration of ICT into teaching and learning. The researcher further probed if both schools had ICT laboratories. All teacher respondents in both schools said "Yes" when asked if their schools had ICT laboratories. With student respondents, 100(100%) in

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Nungua SHS affirmed the availability of an ICT lab while in Presbyterian SHS, Teshie, 97(99%) affirmed to the availability of an ICT lab. This is indicated in Table 4.17 below. It was therefore concluded that both schools had an ICT laboratory.

Table 4. 17 Availability of ICT Laboratory

Availability of Computer laboratory	**Students**				**Teachers**			
	Nungua SHS		**PSHS, Teshie**		**Nungua SHS**		**PSHS, Teshie**	
	F	%	F	%	F	%	F	%
Yes	100	100	97	99	69	100	57	100
No	100	100	1	1	-	-	-	-
Total	**100**	**100**	**98**	**100**	**69**	**100**	**57**	**100**

Source: Fieldwork (2018)

4.6.3 PURPOSE OF ICT LABORATORY

The researcher observed that majority of the respondents in both schools indicated that the ICT laboratory was meant to teach ICT related subjects. At Nungua SHS, 60(87%) teachers and 96(96%) students disclosed that the ICT laboratory was meant to teach ICT subjects. 51(51%) of the students also added that the ICT laboratory enabled them to browse and do their research. At the Presbyterian SHS, Teshie, the situation was the same. 54(94.7%) teachers and 88(89.8%) students also indicated that the ICT laboratory was meant to teach ICT subjects. Again, 60(61.2%) of the students added that the ICT laboratory enabled them to browse and do their research.

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4.6.4 AVAILABILITY AND ACCESS TO THE INTERNET

When respondents of both schools were asked if the computers in the laboratory were connected to the internet, 60(87%) of the teachers from Nungua SHS responded positively, while 74(74%) of the students also affirmed the availability of internet connected to the computers. At Presbyterian SHS, Teshie also, 45(78.9%) of the teacher respondents confirmed to the availability of internet connectivity and this was supported by 93(94.9%) students.

On the issue of access to the internet, majority of the respondents stated that they did have access "Sometimes". In Nungua SHS, 36(52.2%) of the teachers and 44(44%) of the students affirmed that they "Sometimes" had access to the internet. In Presbyterian SHS, Teshie, 28(49.1%) of the teachers and 44(44.9%) of the students also affirmed to the assertion made by their teachers that they "Sometimes" had access to the internet. This meant that the flow of internet was not constant in both schools.

4.6.5 AVAILABILITY OF ENOUGH COMPUTERS FOR TEACHERS AND STUDENTS

Table 4. 18 Availability of Enough Computers for teachers and students

Availability of enough computers	**Students**				**Teachers**			
	Nungua SHS		**PSHS, Teshie**		**Nungua SHS**		**PSHS, Teshie**	
	F	%	F	%	F	%	F	%
Yes	30	30	53	54.1	13	18.8	33	59.9
No	70	70	45	45.9	56	81.2	24	40.1
Total	**100**	**100**	**98**	**100**	**69**	**100**	**57**	**100**

Source: Fieldwork (2018)

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With the availability of a computer laboratory, the researcher again sought to find out if there were enough computers to serve both teachers and students. From Table 4.18 above, teachers from Nungua SHS indicated that there were not enough computers for them to use. 56(81.2%) of the teachers indicated that there were not enough computers available to them. This was quite different from teacher respondents from Presbyterian SHS, Teshie. Out of 57 teachers, 33(57.9%) confirmed that there were enough computers for teachers to use. On the part of students, 70(70%) from Nungua SHS again indicated that there were not enough computers available to them while at Presbyterian SHS, Teshie, 43(54.1%) of the students said there were enough computers for them to use. From Table 4.1, it was observed that there were not enough computers in Nungua SHS as compared to Presbyterian SHS, Teshie.

4.6.6 ACCESS TO THE COMPUTER LABORATORY BY STUDENTS AND TEACHERS

For ICT integration into teaching and learning to be successful, access to computer laboratories in the various Senior High Schools in Ghana is very paramount. Critically examining the various responses, there was a clear indication that a high percentage of students from the Nungua SHS and Presbyterian SHS, Teshie had access to the computer laboratory only when they had ICT lessons. This is represented by 93(93%) students out of 100 from Nungua SHS and 93(94.9%) out of 98 students from Presbyterian SHS, Teshie. The responses also demonstrate that 55(79.7%) of teachers from Nungua SHS had access to the computer laboratory during break times which was also affirmed by teachers from Presbyterian SHS, Teshie and this was indicated by 35(61.4%) out of 57 teacher respondents. It can therefore be concluded that students from both schools had access to the computer laboratory during ICT lessons while their teachers had access during lunch break.

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4.6.7 SYSTEM MAINTENANCE

Table 4. 19 System Maintenance

System Maintenance	Students				Teachers			
	Nungua SHS		PSHS, Teshie		Nungua SHS		PSHS, Teshie	
	F	%	F	%	F	%	F	%
Yes	25	25	30	30.6	18	26.1	17	29.8
No	18	18	22	22.4	12	17.4	3	5.3
Not Aware	57	57	46	46.9	39	56.5	37	64.9
Total	**100**	**100**	**98**	**100**	**69**	**100**	**57**	**100**

Source: Fieldwork (2018)

For every ICT integrated environment, the need for a constant and smooth operation of computer systems and their related technologies is predominant. For this to be ensured, there is the need for constant systems maintenance and this cannot be overlooked. The researcher sought to find out if Nungua SHS and Presbyterian SHS conducted regular system maintenance to ensure a constant and smooth running of the computers and other related technologies. From Table 4.19, the researcher observed that majority of both teacher and student respondents responded that they were not aware if there were any systems maintenance or not. From the Table above, 39(56.5%) and 37(64.9%) of teachers from Nungua SHS and Presbyterian SHS, Teshie respectively indicated that they were not aware if there were any systems maintenance or not. The situation was the same when students were inquired about system maintenance. With students from Nungua SHS, 57(57%) out of 100 mentioned that they unaware of any

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maintenance and their counterparts students from Presbyterian SHS, Teshie also affirmed with a representation of 46(46.9%) out of 98 student respondents.

4.6.8 ICT FOR TEACHING AND LEARNING PURPOSES

The researcher again embarked upon the study to find out the extent to which teachers and students in the two Senior High Schools incorporate ICT into their teaching and learning. Respondents were asked questions relating to their use of ICT for teaching and learning. The researcher asked respondents if they used ICT for teaching and learning purposes and how often they used it.

From Table 4.20, majority of teacher respondents from both schools responded in the negative when asked if they used ICT for teaching purposes. From the Table, 42(60.9%) of the teachers from Nungua SHS said "No" while in Presbyterian SHS, Teshie, 30(52.6%) also supported the answers given. Again, when students of both schools were asked questions on the use of ICT for teaching, 91(91%) students from Nungua SHS affirmed the use of ICT for teaching and this was also confirmed by students at Presbyterian SHS, Teshie where 91(92.9%) of them agreed to the use of ICT for learning.

It can therefore be concluded that most teachers in both schools did not use ICT for teaching purposes whiles the students in same schools did.

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Table 4. 20 ICT for Teaching and Learning Purposes

ICT for teaching and learning	Students				Teachers			
	Nungua SHS		PSHS, Teshie		Nungua SHS		PSHS, Teshie	
	F	%	F	%	F	%	F	%
Yes	91	91	91	92.9	27	39.1	27	47.4
No	9	9	7	7.1	42	60.9	30	52.6
Total	100	100	98	100	69	100	57	100

Source: Fieldwork (2018)

4.6.9 FREQUENCY OF ICT USE FOR TEACHING AND LEARNING

Varied responses were given by the various respondents from both schools about the frequency of the use of ICT for teaching and learning. From Table 4.20, there is a clear indication that majority of the teachers from both schools did not use ICT for teaching hence their choice of responding affected the frequency of the use of ICT for teaching and learning. From Table 4.21, there was a clear indication that most of the teachers who used ICT for teaching purposes in both schools used ICT for teaching "a few times in the term". This was represented by 12(44.4%) out of 27 teachers in both schools who responded that they used ICT for teaching, the same representation for both schools. The responses for students in both schools were different as compared to their teachers. From Table 4.21, majority of students who used ICT for learning purposes from Nungua SHS disclosed that they used ICT "Everyday" when asked how often they used the computer or ICT for learning purposes. From Table 4.21, 24(26.4%) out of 91 students who used ICT for learning purposes revealed that they used ICT everyday while 23(25.3%) of

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them used ICT only for their assignments. The situation was quite opposite when the researcher inquired from students in Presbyterian SHS, Teshie. From Table 4.20, 31(34.1%) out of 91 students disclosed that they used ICT only for assignment purposes while 29(31.9%) of them used computers every day.

It is therefore a clear indication that students used computers and their related technologies when they have been given assignments and assignments in most Senior High Schools are on daily basis.

Table 4. 21 Frequency of ICT use for teaching and learning

ICT for teaching or learning	**Students**				**Teachers**			
	Nungua SHS		**PSHS, Teshie**		**Nungua SHS**		**PSHS, Teshie**	
	F	%	F	%	F	%	F	%
Everyday	24	26.4	29	31.9	5	18.5	9	33.3
Once a week	18	19.8	26	28.6	7	25.9	-	-
Once a month	4	4.4	1	1.1	2	7.4	-	-
A few times in the term	22	24.2	4	4.4	12	44.4	12	44.4
Only for assignments	23	25.3	31	34.1	1	3.7	6	22.2
Total	91	100	91	100	27	100	27	100

Source: Fieldwork (2018)

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4.6.10 SCHOOL ASSIGNMENTS INVOLVING THE USE OF ICT

The researcher further sought to find out if teachers of both schools gave out assignments to students which involved the use of ICT. From the responses, 62.3%(43) and 73.7%(42) of teachers from Nungua SHS and Presbyterian SHS respectively said "Yes" when asked if they gave out assignments to their students which involved the use of ICT.

In order to also know the extent of ICT usage in learning, the researcher again inquired from student respondents if their school assignments involved the use of ICT. In Nungua SHS, 74%(74) of the students confirmed the involvement of ICT in their school assignments while 84.7%(83) of students from Presbyterian SHS, Teshie also agreed that their assignments involved the use of ICT.

4.6.11 INTERNET TO ACCESS INFORMATION IN RELATION OF SUBJECT TAUGHT OR STUDIED

For an effective integration of ICT into teaching and learning, there is the need for both teachers and students to use the internet to access information related to their areas of teaching and learning. Apart from school assignments involving the use of ICT, the study sought to find out whether teachers and students used the internet to access information that related to the subjects they taught and studied respectively. The findings from the research indicated that majority of teachers from both Senior High Schools "Sometimes" used the internet to access information in their related fields of teaching. In Nungua SHS, 47(68.1%) of the teachers indicated that they "Sometimes" used the internet to access information concerning the subjects they taught while in Presbyterian SHS, Teshie, 39(68.4%) of the teachers affirmed to the claims made by their teaching counterparts in Nungua SHS.

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This assertion was no different from students from both schools under study. In Nungua SHS, 63(63%) students affirmed that they "Sometimes" used the internet to access information relating to their subject of study while 58(59.2%) students of Presbyterian SHS, Teshie also indicated so.

4.7 CHALLENGES RELATED WITH THE USE OF ICT FOR TEACHING AND LEARNING

As stated in the fifth objective of the study, the researcher sought to find out the challenges that students and teachers of Nungua SHS and Presbyterian SHS, Teshie faced in their bid to use ICT for teaching and learning.

4.7.1 PROBLEMS RELATED WITH THE USE OF ICT

Commenting on the problems related to the use of ICT for teaching and learning, most of the students and teachers of Nungua SHS and Presbyterian SHS, Teshie cited "System breakdown" as the challenges they faced with the use of ICT for teaching and learning. This is represented by 77(77%) out of 100 students and 44(63.8%) out of 69 teachers drawn from Nungua Senior High School while in Presbyterian Senior High School, Teshie, 82(83.7%) out of 98 students and 48(84.2%) out of 57 teachers affirmed the assertion that their major challenge with the use of ICT for teaching and learning was system breakdown. Teacher and student respondents of both schools also indicated that lack of maintenance of the ICT‘s was another challenge related with the use of ICT for teaching and learning. The researcher therefore concluded that system breakdown which was a major factor associated with the use of ICT was as a result of lack of regular system maintenance.

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4.8 COMMENTS AND SUGGESTIONS

The researcher as part of the study sought to get the views of teacher and student respondents on the use of ICT for teaching and learning. Due to this, respondents were asked to give comments and suggestions on the use of ICT for teaching and learning. From the perspective of teachers of both schools, there was a clear indication that ICT training programmes were focused on teachers who taught ICT as a subject hence other subject teachers did not get the opportunity to be trained. They suggested that ICT trainings organized by the school or the Education Directorate should be open to all teachers. Also with student respondents of both schools, they suggested that the time allocated for the use of ICT facilities was not enough hence the need for the authorities of both schools to extend the period or hours of students‘ engagement with ICT.

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CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

The chapter presents a summary of the major findings of the study in line with the objectives stated in the study. It also includes the conclusion and recommendations based on the discovery of the study to address the deficiencies identified in the use of ICT in teaching and learning in senior high schools in Ghana.

5.2 SUMMARY OF FINDINGS

The study focused on the utilization of ICT in teaching and learning in senior high schools in Ghana in order to determine whether Information and Communication Technologies are being used in the educational process in the schools under study. The summary of the findings have been presented according to the themes in the questionnaires which covered the objectives of the study.

5.2.1 COMPUTER KNOWLEDGE

The study discovered that majority of the teachers and students from the two schools under study were computer literate. The study also established that both students and teachers rated their computer knowledge as being "Good". The study further revealed that teacher respondents acquired their ICT skills through professional training while adding that their training took place during their period of training to become professional teachers. Furthermore, majority of the teacher respondents added that there had not been any ICT training organized by the Directorate of Education to either enable them be abreast with the changing demands that come with ICT integration into education.

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5.2.2 PERCEPTION OF TEACHERS AND STUDENTS ON THE USE OF ICT FOR TEACHING AND LEARNING

The findings of the study affirmed that both teachers and students of Nungua senior high school and Presbyterian senior high school, Teshie, demonstrated positive perceptions about the use of ICT for teaching and learning. Teachers in both schools also disclosed that using technology-based teaching improves their pedagogical skills even though they practiced more of the traditional approach of teaching than the use of ICT. The study again discovered that majority of the students from the two schools under study preferred using ICT for learning and added that it enhances collaboration with their mates.

5.2.3 AWARENESS AND USAGE OF SOME SELECTED COMPUTER APPLICATIONS AND PROGRAMMES

The researcher found out that majority of the teachers in both schools often used Microsoft Word which is a word processing application as well as Search engines. With these two applications, majority of the teacher respondents were either excellent or good in the use of the application. Majority of the students on the other hand often used Search engines, Microsoft Word and Microsoft Excel applications. They also rated their knowledge in usage as excellent and good. The other applications stated under the study such as Microsoft Excel, Microsoft Power Point and Microsoft Access were found to be known but not used and their knowledge in usage was average, poor or very poor.

5.2.4 AVAILABILITY OF ICT FACILITIES

For teachers and students to be able to use ICT in education, there is the need to make the facilities and resources that accommodate technology-based teaching and learning available. The study revealed that most of the teachers owned personal computers while majority of their students did not own personal computers. The findings also revealed that both schools under study had computer laboratories. The findings in this section also indicated that the purpose of

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the computer laboratories in both schools was for teaching Information and Communication Technology as a subject and not as an aid or tool to assist other subject teachers to teach their subjects. The study again found out that both schools under study had their computers in the laboratory connected to the internet but did not always have access to internet connectivity. The respondents in the study indicated that access to internet services was not always available to them.

The study again revealed that in Nungua senior high school, there were not enough computers for both teachers and students to use and on the other hand, that could not be said about the respondents from Presbyterian senior high school, Teshie. From the respondents, there was a clear indication that Presbyterian senior high school, Teshie had enough computers for both teachers and students to use for teaching and learning. The study also demonstrated that most of the student respondents in both schools had access to the computer laboratories in their respective schools during ICT lessons. Teacher respondents on the other hand had access to the computer laboratories during lunch breaks.

It can therefore be concluded from the findings that there are not enough computers in the computer laboratories for teachers and students to use in Nungua senior high school while in Presbyterian senior high school, Teshie, the situation was different. In providing maintenance of computers and their related technologies, majority of the respondents in both schools indicated that they were unaware if the school provided frequent system maintenance or not.

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5.2.5 ICT FOR TEACHING AND LEARNING

The study again revealed that most of the student respondents from both schools indicated that they used ICTs and its related technology for their learning. Majority of them also stressed that they used ICTs everyday while others indicated that they used ICT only when they had been given assignments to complete from school. In the case of teachers from both schools, majority of the respondents revealed that they did not use ICT for their teaching activities. The minority who used ICT for teaching activities also revealed that they often used ICT for their teaching activities a few times in the term. There is therefore a clear indication that most student respondents from the study used ICT for learning activities while their teachers did not.

The findings of the study again revealed that majority of the educators in both schools gave out assignments that involved the use of ICT to students. Student respondents also affirmed that their assignments involved the use of ICT and therefore used ICTs to complete them. With the utilization of the internet to access information relating to the subject being taught and studied, both teacher and student respondents from the schools under study indicated that they sometimes used the internet to access information concerning their subject areas.

5.2.6 CHALLENGES RELATED WITH THE USE OF ICT FOR TEACHING AND LEARNING.

The findings of the study revealed that both student and teacher respondents faced some challenges when using ICT for teaching and learning. Both respondents of the two schools disclosed that power fluctuations, virus attacks, system breakdown, lack of system maintenance, obsolete computers among others were the challenges they faced when using ICT for teaching and learning. Furthermore, most of the respondents pointed out that system breakdown which was as a result of lack of maintenance was the major challenge faced with the use of ICTs in education. Some student respondents also indicated that they had access to the computers during

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ICT lessons but their challenge was with access to internet facilities. Internet access could not be guaranteed as indicated by some students in both schools. Some respondents from Presbyterian senior high school, Teshie, also indicated that the main reason for the systems breakdown was as a result of the sea breeze since the school is located close to the sea.

Notwithstanding all these challenges, both schools under the study were still eager to integrate ICT into their teaching and learning hence the need to focus on the needs of the various schools to enable adequate solutions to address those challenges.

5.3 CONCLUSION

To conclude the study, there is the need to integrate ICT into the educational process in various senior high schools in Ghana especially, Nungua senior high school and Presbyterian senior high school, Teshie, since the integration has the potential of improving the teaching and academic performance of teachers and students respectively. The use of ICT for teaching and learning in senior high schools in Ghana is a key step to promoting innovations which has the potential of revolutionizing the quality of subject teaching and learning. The absence of a coherent ICT educational policy however is a major blockage to the smooth integration of ICT into teaching and learning. Amenyo (2003) cautions that any endeavor to present a well-meaning ICT policy in an indiscriminate and context-independent way would not help in managing it. The current trends in the various senior high schools indicate that, the current educational system is not well equipped to keep up with the ICT revolution that is ongoing.

Majority of the teachers and students from both schools did have sufficient knowledge and skills ICT to integrate ICT into teaching and learning. The lack of adequate ICT infrastructure,

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obsolete computers, system breakdown and a host of other problems were found to be a hindrance associated with the use of ICT for teaching and learning. Teacher and student respondents of both schools had a positive perception towards the use of ICT for teaching and learning, however, though many teachers in both schools were computer literate, ICT integration was low. This demonstrats that, with the requisite skills, training and motivation as well as available infrastructure, teachers will not hesitate to integrate ICT into their teaching which will then be inculcated into the students as well.

5.4 RECOMMENDATIONS

For Nungua senior high school and Presbyterian senior high school, Teshie to effectively utilize ICT to revolutionize the educational process as this study proposes, there will be the need to make a number of recommendations that will improve the use of ICT in teaching and learning in senior high schools. The following recommendations were therefore made for the smooth implementation of ICT into teaching and learning.

5.4.1 PROVISION OF ICT FACILITIES AND SUPPORT SERVICES

For the effective integration of ICT into teaching and learning, there is the need to have functional gadgets and ICT related equipment to enable smooth operation and integration. The major problem that hinders the effective integration of ICT into teaching and learning is the unavailability of ICT infrastructure (Sutherland et al., 2004). There is therefore the need for various Heads of senior high schools to have the required infrastructure and their relevant technologies that support ICT integrated teaching and learning. The provision of enough computers, projectors, functional air-conditioning systems and other related technologies will

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enable teachers and students effectively use ICT for teaching and learning. Head teachers of the two institutions under the study can appeal to the old students to financially assist the schools so as to make provisions for more computers and their related accessories and also replace obsolete ones. Sutherland, Armstrong, Barnes, Brawn, Breeze, Gall, &Wishart (2004), again noted that the lack requisite skills deter teachers and students from use ICT resources therefore there is the need to have teaching support staffs made available to help teachers whose knowledge in the use of ICTs are not up to expectation. Technical support and skills are necessary for the integration of ICT into teaching and learning in senior high schools (Stensaker, Maassen, Borgan, Oftebro, & Karseth, 2007).

5.4.2 ACCESS TO INTERNET SERVICES

The internet is considered as one of the most powerful tools that links several individuals when it comes to information and resource sharing. Without the internet, Information and Communication Technologies will not be complete and this will hamper the collaboration among teachers and students. From the study, provision of internet services was considered as a major challenge associated with the use of ICT for teaching and learning. The Ministry of Education in Ghana and the Ghana Education Service should therefore partner with network service providers and telecommunication network agents to get services either for free or at a reduced rate. Also, the available bandwidth should be streamlined to avoid unnecessary wastage by students and teachers especially on social media or entertainment purposes.

5.4.3 ICT TRAINING AND UPGRADE OF TEACHING PRACTICES

From the findings, the study revealed that there was inadequate ICT training organized for teachers in senior high schools. ICT keeps on revolutionizing, hence the need for planned and continuous programmes and training geared towards the sustainability of teachers‘ technological know-how. The rapid development in ICT and information sharing has made it necessary for the

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ICT Directorate under the Ghana Education Service to organize periodic training programmes to keep teachers abreast with latest technologies to enhance their teaching skills. It is only when teachers are computer literate and well-resourced that they can integrate ICT into their teaching for students to partake. There should also be the need for the Ghana Education Service to recruit more IT personnel to assist teachers to integrate ICT into teaching and learning. Students should also be open-minded in their approach to ICT integration into teaching and learning. Training institutions meant for senior high school teachers should also inculcate the use of ICTs to train teachers to enable them to be familiar with the technologies before going to the classrooms.

5.4.4 REGULAR SYSTEM MAINTENANCE

Regular system maintenance of computers and their related technologies will go a long way to ensure that the systems run smoothly as well as reduce the risk of breaking down. There should also be the need for an in-house technical expert to carry out ICT maintenance task. As pointed out by Qablan, Abuloum & Al-Ruz (2009), there is the need to train computer laboratory supervisors to resolve the various technical problems as well as overcoming them.

5.4.5 DEVELOPMENT OF EDUCATIONAL ICT POLICY

The senior high school educational system currently does not have any coherent ICT policy structure in place to guide in the effective integration of ICT into educating and learning in the various senior high schools in Ghana. The inadequate policy frameworks for ICT implementation in second cycle institutions shows that senior high schools in Ghana are not equipped to keep up with the ICT revolution that is taking place. However, educational policy makers of senior high schools still have the chance to take advantage of the technological advancement that is becoming more widely accessible and implement policies that will sustain the integration of ICT into educating and learning. A well-established policy on the integration of ICT into teaching and learning in senior high schools will be a guide for various Heads of

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senior high schools to implement. In the long term, the Ministry of Education in Ghana should review the policy directive on education in general to be able to accommodate ICT integration into teaching and learning to improve the use of ICTs in senior high schools in the country.

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APPENDICES

APPENDIX I

UNIVERSITY OF GHANA
DEPARTMENT OF INFORMATION STUDIES
SCHOOL OF INFORMATION AND COMMUNICATION STUDIES

June 4, 2018

Ref. No.:.....

The Head
Presbyterian Senior High School
P. O. Box 294
Teshie

Dear Sir/Madam,

INTRODUCTORY LETTER

I write to introduce to you Mr. Richard Boni, a Master of Arts student of the Department of Information Studies, University of Ghana, Legon.

He is researching on the topic **"The Use of ICT for Teaching and Learning ".**

Please assist him with the necessary information that he will need to undertake the research.

Thank you.

Yours faithfully,

Dr. Emmanuel Adjei
Head of Department

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APPENDIX II

UNIVERSITY OF GHANA
DEPARTMENT OF INFORMATION STUDIES
SCHOOL OF INFORMATION AND COMMUNICATION STUDIES

June 4, 2018

Ref. No.:.....

The Head
Nungua Senior High School
P. O. Box NG 66
Nungua

Dear Sir/Madam,

INTRODUCTORY LETTER

I write to introduce to you Mr. Richard Boni, a Master of Arts student of the Department of Information Studies, University of Ghana, Legon.

He is researching on the topic **"The Use of ICT for Teaching and Learning ".**

Please assist him with the necessary information that he will need to undertake the research.

Thank you.

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APPENDIX III

Questionnaire for Teachers

UNIVERSITY OF GHANA, LEGON

DEPARTMENT OF INFORMATION STUDIES

Questionnaire on "The use of ICT for teaching and learning in senior high schools in Ghana: A study of Nungua Senior High School and Presbyterian Senior High School, Teshie"

Dear Sir/Madam,

I am investigating the use of ICT for teaching and learning in senior high schools in order to write my dissertation for a Master's Degree. I will entreat you to spare some time by completing the questions to help me achieve this objective. All responses will be treated with confidentiality.

Thank you in advance.

Richard K. Boni

(MA Information Studies)

Please answer the questions by ticking or providing an appropriate answer.

BACKGROUND INFORMATION:

1. School a. Nungua Snr. High Sch. [ ] b. Presbyterian Snr. High Sch. Teshie [ ]
2. Gender a. Male [ ] b. Female [ ]
3. Your age: a. 30 years and below b. 31 – 40 years c. 41- 50 years
   d. 51 years and above

COMPUTER KNOWLEDGE

4. Are you computer literate? a. Yes [ ] b. No [ ]
5. If yes, how would you rate your computer knowledge?

   a. Basic [ ] b. Somehow good [ ] c. Good [ ] d. Very good [ ]

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6. How did you acquire your ICT skills?
   a. Self-trained [ ] b. Through friends [ ] c. Workshop [ ]
   d. Professional ICT training [ ] e. Self-trained and workshops [ ]
   f. Other……
7. Has there been any ICT training organized by the ICT Directorate?
   a. Yes [ ] b. No [ ]
8. If yes, have you ever participated?
   a. Sometimes [ ] b. In all the modules [ ] c. Never [ ]

PERCEPTION OF TEACHERS

9. What are teachers' perceptions on the application of ICT in teaching?

Perception On The Application Of ICT In Teaching	Strongly Agree	Agree	Strongly Disagree	Disagree
a. Using ICT to teach is time consuming				
b. Internet use can improve your teaching				
c. ICT should be integrated into teaching				
d. Other teachers have given negative comment about using ICT for teaching				
e. I prefer using the internet to prepare my lesson than to use the library or handbook				
f. Students give negative feedback on ICT supported teaching				
g. I teach perfectly well without computers				
h. ICT can enhance collaboration among students and teachers				
i. It is difficult to integrate ICT into my teaching				

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AWARENESS AND USAGE OF SOME SELECTED COMPUTER APPLICATIONS AND PROGRAMS

10. Computer programmes often used (Please tick as many as you can)

    a. Microsoft Word [ ] b. Microsoft Excel [ ] c. Microsoft Powerpoint [ ]
    d. Search engines (Google, Bing, Ask.com, Yahoo) [ ] e. Microsoft Access [ ]
    h. Other……..

11. How good are you with using the following computer applications?

APPLICATIONS	EXCELLENT	GOOD	AVERAGE	POOR	VERY POOR
a. Microsoft Word					
b. Microsoft Excel					
c. Microsoft Powerpoint					
d. Search engines (Google, Bing, Ask.com, Yahoo)					
e. Microsoft Access					

AVAILABILITY OF ICT FACILITIES

12. Do you have a computer of your own? a. Yes [ ] b. No [ ]
13. Do you have a computer lab in your school?
    a. Yes [ ] b. No [ ] c. Not aware [ ]
14. If yes, what purpose does it serve? (Tick as many as you can)
    a. Teaching ICT[ ] b. Teaching other Subjects [ ] b. Browsing and Research [ ] c. Not aware [ ]
15. Are the computers connected to the internet? a. Yes [ ] b. No [ ]
16. If yes, is there access to the internet always?
    a. Yes [ ] b. No [ ] c. Sometimes [ ] d. Not aware [ ]
17. Are there enough computers in the computer lab for all teachers?
    a. Yes [ ] b. No [ ]
18. How often do you get access to the computer lab? (Please tick as many as you can)
    a. During ICT lessons [ ] b. During break times [ ] c. During close of school [ ]
    d. During other lessons [ ] e. All the time [ ] f. Not at all [ ]
19. Does your school provide frequent system maintenance?
    a. Yes [ ] b. No [ ] c. Not aware [ ]

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ICT FOR TEACHING

20. Do you use ICT for teaching purposes?
    a. Yes [ ] b. No [ ]
21. If yes, how often to do you use ICT/computer for teaching purposes?
    a. Everyday [ ] b. Once a week [ ] c. Once a month [ ]
    d. A few times in the term [ ] e. Only for assignment [ ]
22. Do the assignments you give out to student involve the use of ICT?
    a. Yes [ ] b. No [ ]
23. Do you use the internet to access information concerning your subject?
    a. Always [ ] b. Sometimes [ ] c. Never [ ]

CHALLENGES RELATED WITH THE USE OF ICT.

24. What are some of the problems you face when using ICT? (Please tick as many as you can)
    a. Power fluctuation [ ] b. Virus attack [ ] c. System breakdown [ ]
    d. Lack of maintenance [ ] e. Obsolete (Old) computers [ ]
    d.Other……

25. Please write any comments or suggestions you have about the use of ICT for teaching and learning.
    ……
    ……
    ……
    ……

THANK YOU FOR PARTICIPATION

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APPENDIX IV

Questionnaire for Students

UNIVERSITY OF GHANA, LEGON

DEPARTMENT OF INFORMATION STUDIES

Questionnaire on "The use of ICT for teaching and learning in senior high schools in Ghana: A study of Nungua Senior High School and Presbyterian Senior High School, Teshie"

Dear student,

I am investigating the use of ICT for teaching and learning in senior high schools in order to write my dissertation for a Master's Degree. I will entreat you to spare some time by completing the questions to help me achieve this objective. All responses will be treated with confidentiality.

Thank you in advance.

Richard K. Boni

(MA Information Studies)

Please answer the questions by ticking or providing an appropriate answer.

BACKGROUND INFORMATION:

1. School a. Nungua Snr. High Sch. [ ] b. Presbyterian Snr. High Sch. Teshie [ ]
2. Gender a. Male [ ] b. Female [ ]
3. Form a. One [ ] b. Two [ ]
4. Course a. General Arts [ ] b. Visual Arts [ ] c. Home Economics [ ]
   d. Business [ ] e. Science [ ]

COMPUTER KNOWLEDGE

5. Did you have any computer knowledge before enrolling to the school?

   a. Yes [ ] b. [ ]

6. If yes, how would you rate your computer knowledge?

   a. Basic [ ] b. Somehow good [ ] c. Good [ ] d. Very good [ ]

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PERCEPTION OF STUDENTS

7. What are students' perceptions on the application of ICT in learning?

Perception On The Application Of ICT In Learning	Strongly Agree	Agree	Strongly Disagree	Disagree
a. Using ICT to learn is time consuming				
b. Internet use can improve your learning				
c. ICT should be integrated into learning				
d. All my teachers are very competent in using ICT for teaching				
e. I prefer using the internet to do my assignment than to use the library				
f. ICT tends to increase students' learning motivation				
g. ICT can enhance students' language and writing skills (e.g. grammar, spelling, punctuation, etc)				
h. ICT can enhance collaboration among students and teachers				

AWARENESS AND USAGE OF SOME SELECTED COMPUTER APPLICATIONS AND PROGRAMS

8. Computer programmes often used (Please tick as many as you can)

a. Microsoft Word [ ] b. Microsoft Excel [ ] c. Microsoft Powerpoint [ ]
d. Search engines (Google, Bing, Ask.com, Yahoo) [ ] e. Microsoft Access [ ]
h. Other……

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9. How good are you with using the following computer applications?

APPLICATIONS	EXCELLENT	GOOD	AVERAGE	POOR	VERY POOR
a. Microsoft Word					
b. Microsoft Excel					
c. Microsoft Powerpoint					
d. Search engines (Google, Bing, Ask.com, Yahoo)					
e. Microsoft Access					

10. If yes, how often to do you use ICT/computer for learning purposes?
    a. Everyday [ ] b. Once a week [ ] c. Once a month [ ]
    d. A few times in the term [ ] e. Only for assignment [ ]

AVAILABILITY OF ICT FACILITIES

11. Do you have a computer of your own? a. Yes [ ] b. No [ ]
12. Do you have a computer lab in your school?
    a. Yes [ ] b. No [ ] c. Not aware [ ]
13. If yes, what purpose does it serve? (Tick as many as you can)
    a. Teaching ICT[ ] b. Teaching other Subjects [ ] b. Browsing and Research [ ] c. Not aware [ ]
14. Are the computers connected to the internet? a. Yes [ ] b. No [ ]
15. If yes, is there access to the internet always?
    a. Yes [ ] b. No [ ] c. Sometimes [ ] d. Not aware [ ]
16. Are there enough computers in your computer lab for all students?
    a. Yes [ ] b. No [ ]
17. How often do you get access to the computer lab? (Please tick as many as you can)
    a. During ICT lessons [ ] b. During break times [ ] c. During close of school [ ]
    d. During other lessons [ ] e. All the time [ ] f. Not at all [ ]
18. Does your school provide frequent system maintenance?
    a. Yes [ ] b. No [ ] c. Not aware [ ]

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ICT FOR LEARNING

19. Do you use ICT for learning purposes?
    a. Yes [ ] b. No [ ]
20. Do your teachers use any of the above facilities during teaching?
    a. Some of them [ ] b. All of them [ ] c. None of them [ ]
21. Do you use the internet to access information concerning any subject you study?

    a. Yes [ ] b. No [ ]

22. Does your school assignment involve the use of ICT?
    a. Yes [ ] b. No [ ]

CHALLENGES RELATED WITH THE USE OF ICT.

23. What are some of the problems you face when using ICT? (Please tick as many as you can)
    a. Power fluctuation [ ] b. Virus attack [ ] c. System breakdown [ ]
    d. Lack of maintenance [ ] e. Obsolete (Old) computers
    d.Other……

24. Please write any comments or suggestions you have about the use of ICT for teaching and learning.
    ……
    ……
    ……
    ……
    ……

THANK YOU FOR PARTICIPATION