UNIVERSITY OF EDUCATION, WINNEBA

THE ACCESS AND EFFECTIVE USE OF INFORMATION TECHNOLOGY RESOURCES BY STUDENTS IN SENIOR HIGH SCHOOLS IN KUMASI METROPOLIS

MACDONALD SACKITEY

MASTER OF SCIENCE DISSERTATION

2022

UNIVERSITY OF EDUCATION, WINNEBA

THE ACCESS AND EFFECTIVE USE OF INFORMATION TECHNOLOGY RESOURCES BY STUDENTS IN SENIOR HIGH SCHOOLS IN KUMASI METROPOLIS

MACDONALD SACKITEY

A dissertation in the Department of Information Technology Education, Faculty of Applied Sciences and Mathematics Education, submitted to the School of Graduate Studies in partial fulfilment of the requirements for the award of the degree of Master of Science (Information Technology Education) in the University of Education, Winneba

MAY, 2022

DECLARATION

STUDENT'S DECLARATION

I, **Macdonald Sackitey**, declare that this dissertation, with the exception of quotations and references contained in published works which have all been identified and duly acknowledged, is entirely my own original work, and it has not been submitted, either in part or whole for another degree elsewhere.

SIGNATURE……...

DATE……...

SUPERVISOR'S DECLARATION

I hereby declare that the preparation and presentation of this work was supervised in accordance with the guidelines for supervision of dissertation as laid down by the University of Education, Winneba.

DR. FRANCIS OHENE BOATENG

SIGNATURE……...

DATE……...

DEDICATION

This project work is dedicated to my family for their love, encouragement and support.

ACKNOWLEDGEMENT

First and foremost, my thanks go to the Almighty God for giving me life and strength to complete this study. I also want to express my profound gratitude to my supervisor, Dr. Francis Ohene Boateng for his wonderful support to make this work a reality in spite of his busy schedules. My deepest appreciation goes to my brother Emmanuel Tetteh, my wife Benedicta Boateng Adu Afriyie and my entire family for their wonderful support in diverse ways.

Finally, my warmest appreciation goes my colleague Madam Christiana Darku for her tremendous support in making this a success.

TABLE OF CONTENTS

CONTENT **PAGE**

LIST OF TABLES

TABLE **PAGE**

LIST OF FIGURES

FIGURE **PAGE**

LIST OF ABBREVIATIONS

ANOVA	Analysis of Variance
ICT	Information and Communication Technology
PC	Personal Computer
PhD	Doctor of Philosophy

ABSTRACT

The use of technology has seen a widespread integration into our day-to-day life, where access to vast amounts of information is now available with ease. Today's generation of students have grown up with technology all around them in an ever-increasing manner. The effective use of ICT resources in teaching and learning in the second cycle of Ghanaian education is much less to be desired. The study was to analyze the availability, accessibility and user-ability of ICT resources by students of Senior High Schools in Ghana. The descriptive survey design with quantitative method was used in the study. The total population of the study was 6,692 SHS students, teachers and administrators. The study employed stratified, simple random and convenient sampling technique for selecting the sample size. The total sample of respondents was 180. The data collection instrument was questionnaire. The researcher used descriptive statistical tools to analyze data collected. The results revealed that students' access to ICT resources in schools continues to remain a challenge. The researcher concluded that there was significant impact of the availability of ICT resources and ICT policies on effective use of ICT. It was recommended among others those policy makers and school administrators must consider again the process and implementation of ICT integration into teaching and learning in Senior High Schools in Ghana.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Information and Communication Technologies currently makes tremendous changes in our modern society which influences all the aspects of our lives (Arkorful, Barfi, & Aboagye, 2021). The modern-day usage of these technologies has become a requirement for full participation in high-quality education opportunities for students (Jacob, Jegede, & Musa, 2020). Computers and other technologies usage in education provide students much opportunities and understanding in the teaching and learning process (Aslan & Zhu, 2018). Modern teaching and learning resources used by students and teachers are digital and has gone beyond solely learning from prescribed textbooks (Ameen, Adeniji, & Abdullahi, 2019). Students find it easier resorting to the internet for information than searching for information in books. Therefore, having access to the Internet has become a necessity (Gómez-García et al., 2020).

Information Technology forms an intricate part of today's society that is rapidly evolving and advancing on multitier levels (Newbill and Baum, 2013). The access to information is only a fingertip away for students since these technologies are readily available in the world (Nji & Idika, 2018). Integration of technology is important and necessary for a school to function effectively.

Computers and other technologies usage in education provide students much opportunities and understanding in the teaching and learning process (Alenezi, 2019). However, many teachers are reluctant to make the changes that incorporate technology into their instruction, and many students have not experienced effective technology integration in pursuing their education (Buabeng-Andoh, 2019). The use of technology

and technology-supported learning environments aids in increasing student engagement and motivation (Azar & Tan, 2020). Students enjoy learning via technological products such as visual media tools, smart boards, video games, mobile phones, optical readers, and remote controllers, mechanical and electronic toys etc. (Dzhurylo & Shparyk, 2019). Tablet PCs are amongst devices gaining popularity and related to information technologies on which the students can take notes easily, access internet, listen audios, watch and record videos, read eBooks and many other features (Shurtz, Halling, and McKay, 2011). Having multimedia contents, tablet PCs make it easier to all academic applications and exercises such as preparing lessons, home works, researches, scanning and designs (Gill, 2007). Aydemir, Karaman, and Taslibeyaz, (2016) assert that latest researches in the case of using tablet PC especially at science lessons and other abstract lessons, makes them enjoyable and understood easily, maintain the retention on learning and increase the attention to the lesson.

In spite of the global advancements in the span and availability of technology, majority of Senior High Schools in Ghana rarely maintain the same drive-in access to equipment, educator professional development, and onsite educational support (Lee & Spires, 2009). The modern-day teaching and learning resources used by students and teachers are transforming digitally and beyond solely learning from prescribed textbooks replacing chalkboards with interactive digital whiteboards, using students' own smart phones or other devices for learning during class time (Bati & Workneh, 2021). Students find it easier resorting to the Internet for information than searching for information in books (Bariu, 2020). Therefore, having access to the Internet has become a necessity.

Nonetheless, in Ghana students in the high schools are denied access to mobile devices even though a greater number of the students use them, which sometimes make it difficult for them to easily get access to information from the internet (Agyei & Agyei, 2019). This has resulted in reported incidents of students going on rampages in some schools in the country. Grimus and Ebner, (2016) states that there is no empirical research that has been conducted to ascertain the reason for disallowing students to use mobile or computing devices.

1.2 Statement of the Problem

A number of researches have been done on the use of Information and

Communication Technology in education (Agyei & Agyei, 2021; Yalley, 2022). Haddad and Draxler (2005) posited that ICT make valuable contribution to various aspects of education development and effective learning through expanding access, promoting efficiency, improving the quality of learning and enhancing the quality of teaching. According to Tinio (2003), appropriate use of ICT allows for collaborative learning where students interact with other students, teachers and experts regardless of where they are. Tedla and Makgato, (2012) revealed that the successful integration of ICT in teaching and learning largely depends on teacher competency and availability of ICT infrastructure. Government policies on the implementation of the use of Information and Communication Technology in our education sector make it mandatory for all Senior High Schools to have ICT laboratories (Bariham, Ondigi, & Mueni, 2019; Bariham, 2022). In spite of the above revelations and implementation, the effective use of ICT resources in teaching and learning in the second cycle of our education is much less to be desired (Mensah, Poku, & Quashigah, 2022).

The actual benefits on the use of modern technology are not fully gained in our educational settings in terms of the access and use of information communication technologies

(Amedeker, 2020). Empirically, there are limited studies done in Ghana concerning the availability, accessibility and user-ability of ICT resources by students of Senior High Schools in Ghana (Adarkwah, 2021; Mensah & Osman, 2022; Gunu, Nantomah, & Inusah, 2022). The researcher sought to find out some of the inhibiting factors that hinder the access and the effective use of information technology resources in the second cycle institutions in Ghana.

1.3 General objective

The purpose of the study was to analyze the availability, accessibility and user-ability of ICT resources by students of Senior High Schools in Ghana.

1.4 Specific Objectives

The specific objectives of this study include the following:

1. To determine the availability of ICT resources for use in enhancing teaching and learning.
2. To determine the extent to which teachers and students use ICT resources in enhancing teaching and learning.
3. To determine the effects of ICT policies on effective use of ICT by students.

1.5 Research Questions

The study is based on the following research questions:

1. How availabilities in information and communication technology resource are used in senior high schools?
2. To what extent do teachers and students use information technology resources to enhance teaching and learning?
3. How do ICT policies affect technology used among SHS students?

1.6 Significance of the Study

ICTs have the potential to play a powerful role in enhancing teaching and learning in schools and preparing students to acquire skills, knowledge and competencies to enable them compete in the emerging global 'knowledge' economy. Data and information obtained in this study would hopefully be used to provide various education stakeholders with information that ICT integration in schools help improve the quality of education in Ghana. The findings could also be used by educational authorities to formulate policies and strategies that can be used to enhance the academic standards in our schools. The study will also make possible recommendation towards increasing the use of ICTs in our educational settings to enhance effective teaching and learning processes.

1.7 Limitations of the Study

The use of ICT in teaching and learning is considered to be very crucial and therefore little time for the respondents to respond to the questionnaire would make the findings absolute as a result of the corona virus pandemic which has brought academic work to a halt. Headmasters, teachers and students may be given responses that seemed not to

depict the actual phenomena in the study in the sense that most of the schools are not fully utilizing the full use of technologies in enhancing both teaching and learning. It is also not possible to fully relate improvement in teaching and learning on only the use of ICT as other factors might also influence better outcomes of teaching and learning in schools.

1.8 Delimitations of the Study

The study is conducted in Senior high schools within the Kumasi Metropolis. The scope of the study was delimited to schools that had at least twenty computers and other resources and in some way using for instructional purposes.

1.9 Organization of the Study

The study is structured into five chapters. Chapter one presents a general introduction and background to the study, problem statement, purpose of the study, objectives of the study, research questions, significance, limitations, delimitations, definition of significant terms and the organization of the study. Chapter two covers literature reviews on access and use of ICT resources in teaching and learning in secondary schools, the theoretical background in use of ICT in teaching and learning and the conceptual framework of ICT use in secondary schools. Chapter three describes the research methodology to be used. This included the research design, population of the study, sample and sampling procedure and data analysis techniques. Chapter four focused on data analysis, interpretation and discussion of findings. Chapter five covers the summary, research findings, discussions, conclusions and recommendations of the study.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Introduction

This chapter discusses various literatures on the access and effective use of information and communication technology in teaching and learning in the education settings. Theoretical and conceptual frameworks of the study and other related reviews that provide a framework of understanding about this study.

2.2 Theoretical Framework of the Study

This study is informed by the Technology Adoption Model (TAM) which is an information systems theory that models how users come to accept and use a technology. The model suggests that when users are presented with a new technology, a number of factors influence their decision about how and when they will use it.

Technology Adoption Model (TAM) was developed by Davis, Bagozzi, and Warshaw (1989).

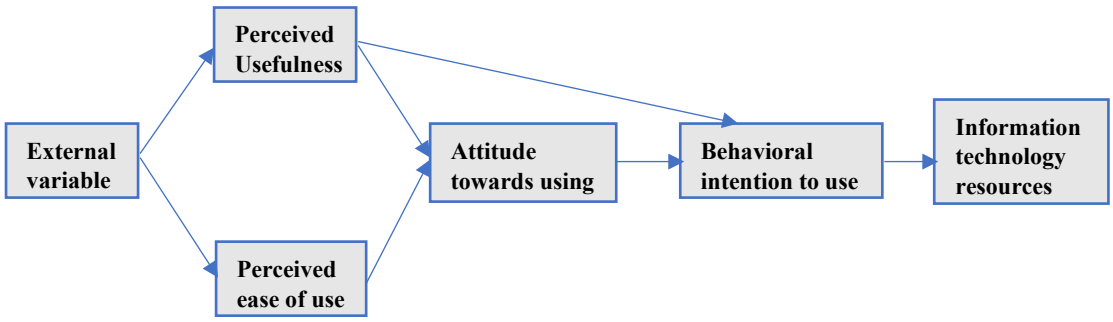

Figure 1: Technology Acceptance Model

In the above model, there are two determinants: perceived ease of use and perceived usefulness. Perceived usefulness is the degree to which an individual believes that using a particular information system or information technology would enhance performance.

Perceived ease of use is the degree to which one believes that using a particular information system or information technology would be free of effort. Perceived ease of use and perceived usefulness positively affect the attitudes towards the use of a technology or system; and further, positively affect the individuals' intentions to use and the acceptance of the information system. In addition, perceived ease of use positively affects the perceived usefulness, and both of perceived ease of use and perceived usefulness are influenced by external variable. The information technology resources are the end-point where we want everyone to be able to do with technology, so we have to form Behavioral Intention, which is a factor that leads people to use the technology. The behavioral intention is influenced by the attitude which is the general impression of the technology being used (Davis, 1989).

2.3 Conceptual Framework of ICT Integration in Teaching and Learning

The conceptual framework of the study is illustrated in Figure 2.

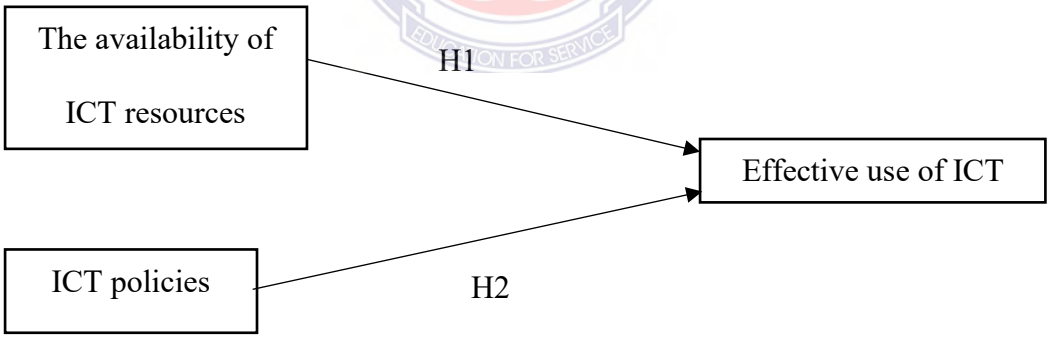

Figure 2: Conceptual Framework

H1: The availability of ICT Resources has a positive effective use of ICT

H2: ICT policies have positive effect on Effective use of ICT.

Jean Piaget theory of constructivism asserts that a child who actively experiments in activities form more active connections and is better able to "inter-coordinate" or integrate their experiences into their daily lives (Piaget, 1955).

As technology becomes more integrated with daily life, educators must take a modern view on the utilization of technology to support inter-connected learning. This view holds that technology gives the students flexibility and the ability to be adaptable in numerous scenarios and within different subject areas. Technology can be used within many pedagogical approaches (Ford & Lott, 2011). Though integrating technology is difficult and sometimes intimidating, the modern teacher who embraces the concept of change will find that the very thing (technology) that may be intimidating will open many opportunities for learners that would not otherwise be accessible (Ford & Lott, 2011). People who agree with Piaget's assertions believe that profound nature of learning comes more from active participation than passive participation (Egbert, 2015). This can come in a variety of forms, from hands-on activities to authentic and practical real-world scenarios (Gensburg & Herman, 2009).

Egbert, (2015) also states that "…real world Constructivist learning situations are more motivating to students through practical application of knowledge" It is also important to note that constructivism actively supports the notion of differentiation, or active support that allows all levels of learners to fully participate. Through a technology-centered curriculum, teachers can utilize technology to differentiate and accommodate classroom environments to allow students to learn. When technology is used properly, it supports constructivist learning and provides different opportunities for students with or without documented learning disabilities to learn. The research cited here suggest that students of today are surrounded by more technology than ever before, and the current pedagogical methods that are being used by teachers does not necessarily match the level students are expecting in their schools.

It is also understood that the use of technology helps students feel more self-confident, thereby increasing motivation and the eagerness to learn (Heafner, 2004).

2.4 Perspectives on Use of Technology in Education

All students (from elementary through high school) need greater exposure to a plethora of technologies in the classroom, but many schools may not be meeting this need (Bolkan, 2013). Many students are found to have the capability to use technology, as well as the access to do so at home, and many of those utilize it for educational purposes (Ehrlich, Sporte, & Sebring, 2013). It was found that those in positions of authority at the schools are responsible for setting expectations for technology use. However, there is an inconsistency regarding how much technology is actually used for instruction. The variation in student and teacher use in the different schools.

2.5 Perceptions of Technology in Daily Life

School authorities and teachers will agree that a ringing cell phone disrupts academic performance, but the practices regarding cell phones range from outright banning of electronic devices to much more relaxed policies. Most teachers believe that electronic devices are unnecessary for the students to have in the classroom, whereas students see technology as an integral, day-to-day life item and essential for safety

(Thomas, O'Bannon, and Bolton, 2013). Some teachers continue to lecture students in a manner that may not engage learners and this continues to make students believe that a classroom that is disconnected from the so-called 'real world' is artificial and fake (Baker, Lusk, and Neuhauser, 2012). PowerPoint software allows a teacher to present information in a visual manner (Goodin, 2012). From the cell phones that sit in our pocket, to the car we drive to work, and the machine that makes our coffee in the morning, it is safe to say that technology is a part of everyday life whether it is a

conscious decision to use it or not (Egbert, 2015). It would be counterintuitive for a teacher to utilize outdated techniques designed during a time when there was no technology in the classroom if the average student is utilizing technology on a day-today basis. A paradigm shift in modern pedagogy must occur if teachers are to more fully integrate technology into classroom instruction. Teachers will have more approaches to engage students in learning activities through a technology-based learning environment. Student perspectives on school-based learning will change and students may be motivated in the classroom and achieve at higher levels.

2.6 The Concept of ICT Integration in Education

According to (Pelgrum, 2001), towards the end of 1980's, the term 'computers' was replaced by IT (Information Communication Technology). This indicated as shift of focus from computing technology to computers enhanced ability to store and retrieve information. This was followed by the introduction of the term 'ICT' around 1992, when e-mail started to become available to the general public. The concept of Information Communication Technology consists of three words. Information refers to any communication or representation of knowledge such as facts, data or opinion in any medium. Communication is an integral part of human existence. It refers to the process of transferring information from a sender to a receiver with the use of a medium in which the Communication Information is understood by both. Technology is the practical form of scientific knowledge or the science of application of knowledge. Therefore, Information Communication Technology (ICTs) are commonly defined in education as 'a diverse set of technological tools and resources used to communicate, create, disseminate, store and manage information' (Blurton, 2000). These technologies include computers, the internet, broadcasting technologies

(Radio and Television), and (Mobile) telephony.

2.6.1 Integration of ICT

The current generations of students are growing up in a world where technology is an inevitable key component of daily life (Ito, et al., 2008). According to (Newbill & Baum, 2013), the way the world works is being revolutionized by technology, schools must be charged with preparing their students to meet the future needs (Ritzhaupt, Dawson, & Cavanaugh, 2012). Therefore, technology integration become the driving force in education (Dougherty, 2012) (Lowther, Inan, Strahl, & Ross, 2008). Present research reported implementing computer technology at the classroom level remained topmost priority of educational administrators (Crook, 2012), (Kurt,2013). Educational administrators recognize the evolution of technological integration as a logical step toward educational reform (Berrett, Murphy, and Sullivan, 2012) because students are now born into our currently and rapidly advancing digital world. Researchers have reported low levels of technology integration and irregular intervals with integration (Gumbo, Makgato, and Müller, 2012; Ritzhaupt, Dawson, and Cavanaugh, 2012).

A school may possess adequate technology installations, but merely having technological tools available does not necessarily result in effective technological integration. (Fletcher, 2014), (Herlihy, 2011) and (Morgan, 2011) implied that technology integration is a teaching method and process, it is not a curriculum or computer skills. Integration is more than providing devices or teaching the latest software program (Cauley, Aiken, and Whitney, 2009). Genuine technology integration requires making the technology practically invisible while creating visible impact (Sawchuk, 2010) on student performance and productivity. Integration of

technology into current curriculum can reform established practices as a means to developing students' 21st century learning skills (Partnership for 21st Century Skills, 2011).

2.7 Effects of ICT on Students' Academic Performance

Effective use of information and communication technology in education has a great impact on teaching and learning and some of these can be seen under the following:

2.7.1. ICT and Student Performance

When considering the effects of ICT in education, there tends to be a focus on whether and to what extend ICT can raise student performance. According to research conducted by the British Educational Communication and Technology Agency (Becta, 2000), there is evidence of a statistically positive association between ICT and higher achievement and computer-based education positively affect students' achievement when compared to traditional classroom instruction.

2.7.2. Individual Learner Interactivity

Underwood, (2006) opined that cognitive approach on teacher-learner integration suggest that the learning process can be enhanced through the use of ICT. For effective use of ICT in instruction, the pedagogical practices used by teachers will need to change from teacher based to learner based Furthermore due to the interactive nature of ICT, it is well situated for creative learning approach in which experimentation and critical thinking are emphasized World Bank, (2004)

2.7.3. Engage Students by Motivation

A study conducted in United Kingdom by impaCT2, (2000) on student attainments revealed that there is a positive effect on behavior, motivation, communication and process scales when ICT is used in teaching and learning. This view is further stressed by the e-learning Nordic, (2006) which places a solid emphasis on ICT influence on student's motivation, engagement and creativity. Furthermore, ICT is realized as increasing student's self-confidence and enthusiasm by making school work more entertaining, considered as fun and not a regular education and therefore students enhance their learning capacity. This is most often linked to a shift in the attitude of students and greater involvement in learning activities.

2.7.4. Increasing Learner Independence

ICT enhances diversity programs tailor-made to individual student's needs. In other words, ICT offers teachers the chance to deliver numerous learning tasks within the same teaching space for the benefit of the individual student's e learning Nordic study, (2006). It further explained that students assume greater responsibility for their own learning when they use ICT to work more independently and effectively.

2.7.5. Enhancing Efficiency and Effectiveness of Education Administration New technologies can help improve the quality of administrative activities and process including human resource management, student registration and monitoring student's achievements in assessment tests Mugenda, (2006).

2.8 Availability of ICT Resources and Student's Learning

The availability of ICT resources plays a major role in provision of quality teaching and learning. It is a known fact that an effective teaching and learning stimulate intellectual curiosity and offer a sense of enjoyment that will move the students from the passive role of recipient of information to active role of builder of knowledge (Oki, 2007). Ezinwa and Azuka, (2004) asserts that no educational system can rise above the quality of its teachers. This is more critical at Colleges of Education where teachers who teach our children for lifelong learning are trained. Therefore, schools have to be equipped with necessary ICT in order to provide the next generations with the needed tools and resources for access and use to attain the expected skills. For teachers and their students, the availability of modern computers, peripherals, networking and resources within an increasingly diverse range of technologies is an essential part of learning and teaching in the 21st century. ICT constitutes an input in the student learning process that should help produce better learning output. The availability of ICT resources can enhance learning by making education less dependent on differing teacher quality and by making education available at home throughout the day (Mbwesa, 2002).

According to (Swidish National Agency for school improvement, 2008), ICT provide a positive impact on learning and student performance when it becomes an integrated element in the classroom and teaching. Bonnet (1997) argues that the availability of visual digital technology (such as animation, simulation and moving images) involves students and reinforces conceptual understanding. ICT use also encourages development from a teacher-focused or teacher-led model to a more student-focused model in which students work together, make their own decisions and take active role in learning. Davis, (2006) asserts that increased availability of ICT is especially useful

for students who suffer from learning disabilities since ICT use allows teachers to prepare suitable tasks for individual needs and each individual more effectively. However, authors like (Cox, 1999) believe that allowing certain students to use computers distracts them from focusing on the task at hand. Central to the argument of availability are the issues of whether or not the teachers and students have ample and convenient access to computers and their accessories let alone the software that is necessitated in the context of their day-to-day research, collaboration, teaching and student evaluation (Fabry & Higgs, 1997)Furthermore, students and teachers should have confidence in these facilities, which is in turn reliant on the facilities‟ reliability or degree to which the teachers and students are sure that they will have access to them at all expected times and utilize them predictably to the benefit of their academic work, an issue on which consensus is enormous as is clear from ICT in education scholars like (Russell, Bebell, Dwyer, and O"Connor, 2003), (Pelgrum, 2001) and (Mumtaz, 2006).

Effective integration of ICT in schools would call for a whole institution to be networked to ensure access to multimedia and learning- rich resources via the school's Intranet and the Internet wherever students and teachers are, in or out of school. The computer labs and classroom computers need to be sufficient in number to allow ready access by students and staff in most subjects across the school. A wide range of peripheral and remote working devices, including video-conferencing, is provided and integrated into the curriculum. Despite the above desired situation, most Institutions in Africa face barriers to effective integration of ICT in the teaching and learning process; limited infrastructure in terms of satisfactory physical conditions of laboratories and the subsequent accessibility of the resources (ICT) to the learners (Singh, 1999).

H1: The availability of ICT Resources has a positive effect on effective use of ICT

2.9 ICT Policies Implementation in Ghana

Ghana's ICT for accelerated development (ict4ad 2003) policy main mission is for the realization of the vision to transform Ghana into an information-rich, knowledge based and technology-driven high-income economy and society. This is to modernize Ghana's educational system using ICTs to improve and expand access to education, training and research resources and facilities, as well as to improve the quality of education and training and make the educational system responsive to the needs and requirements of the economy and society with specific reference to the development of the information and knowledge-based economy and society. According to (Ministry of Education Ghana, 2018) Information Communications Technology will be used as a pedagogical tool for the implementation of the National Curriculum Change and Sustainable Development and partly in line with the ICT policy framework of the Ministry of Education.

The development and integration of persuasive features in ICT tools used in the classroom to enhance teaching and learning will be vital if Ghana is to succeed in producing more quality products from its schools. The Ghana ICT in Education Strategic Implementation Plan 2011-2015 provides the Education Sector with strategic direction on ICT integration to enable improved access, equity for all and provision of quality educational opportunities.

Through efficient integration of ICT in the Education System, the Strategic Implementation Plan also aims to support the Government of Ghana's intentions to use ICT as a tool for economic growth and development. The ICT Standards act as a

roadmap for making effective use of ICT in Ghana's schools and classrooms for the digital age, discovering new ways to learn on the journey to meaningful, effective education (Ministry of Education Ghana, 2018).

H2: ICT policies have positive effects on Effective s of ICT

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter deals with the systematic procedures in gathering information for the study. The methodology includes Research design, Population and Sampling techniques, Data collection Instruments, Data collection Procedures and Data analysis.

3.2 Research Design

The descriptive survey design was used in order to gain insights into the availability and use of ICT resources in Ghanaian high schools as well as the effects of ICT policies on effective use of ICT by students in Ghana. It involves the use of questionnaire.

3.3 Population of the Study

Three Senior High Schools in the Kumasi Metropolis were selected namely: Opoku Ware School, Asanteman Senior High School and Kumasi Girl High School. These include School Administrators, Teachers and students of the above institutions. The total population of the study was 6,692 SHS students, teachers and administrators. Out of the total population 6,390 were students while 306 of the remaining were teachers and administrators at the selected senior high schools.

3.4 Sampled Population of the Study

Sampling makes it possible to draw valid inferences or generalizations on the basis of careful observation of variables with a relatively small proportion of the population. The choice of the schools is based on facilities and resources they have as grade one schools in the region. The study employed stratified, simple random and convenient

sampling strategies. Stratified sampling was used to identify the stratum in the population among SHS students. The researcher identified students from each SHS as the relevant stratum and their actual representation in the population. The population of each stratum was 2130 students (Opoku Ware School - 2130 students; Asanteman Senior High School - 2130 students and Kumasi Girl High School - 2130 students). Stratified sampling was used to ensure equal representation in an event where one or more strata in the population had a low incidence relative to the other strata. After using stratified sampling technique, simple random sampling was used for it to be representative. Simple random sampling is a type of probability sampling in which the researcher randomly selects a subset of participants from a population. Simple random sampling was used to acquire the appropriate number of students' representative in the study. 50 students from each stratum were equally sampled randomly for the sample size.

As a result, the students represented the widest variety of perspective on the effect of ICT and learning in the school. The study used simple random sampling because it removes all hints of bias or at least it should. Because individuals who make up the subset of the larger group are chosen at random, each individual in the large population set has the same probability of being selected. After getting the sample size of students at the selected SHS, convenient sampling technique was used to select the teachers and administrators at the selected SHS in the study. Convenient sampling was used to identify the teachers and administrators that formed part of the study.

This was because the teachers and administrators were relatively few in number.
Convenience sampling is beneficial when time is a constraint as it is a simple method and takes minimal effort. The three schools have a population totaling over six thousand students and over 200 teachers. Each individual has the same probability of being

chosen to be a part of a sample. From the sample area of study, there were150 students drawn from the schools. In addition, 9 administrators and 21 teachers. Thus, total sample of respondents was 180. The number of respondents sampled is depicted in the table 1 below.

Table 1: Sampled Population of various Schools

Name of School	Number Sampled
Opoku ware School	60
Asanteman High School	60
Kumasi Girl High School	60

Table 2: Sample Population of Respondents

Category of respondents	Number Sampled
Students	150
Teachers	21
Administrators	9

3.5 Research Instruments

In order to analyze the use of ICT in enhancing teaching and learning, data were collected using three sets of questionnaires and observation schedule. The three sets of questionnaires include; students' questionnaire, teachers' questionnaire and Headmaster or Headmistress' questionnaire. The questionnaires attempt, to answer the research questions developed by the researcher. Data for the research was generated directly from the field and collected through self-administered questionnaires.

The questionnaire was basically related to the research questions and the topic. Closed-ended questions were used which help in obtaining more complete data. The questionnaire was preferred because it gave clear and specific responses and enable the

respondent to express themselves freely. Items used for the closed-ended questionnaire were designed to measure the research questions (see Appendix A). The items used for measurement were self-designed items (see Appendix A).

3.6 Reliability of Instruments

According to (Mugenda & Mugenda, 2003), reliability is a measure of the degree to which the instrument yields consistent results or data after repeated trials. Ambiguous questions can lead to different interpretations by the participants to the same questionnaire therefore the questionnaire was critically examined to avoid any ambiguity. The reliability of the questions in the questionnaire was tested using a Cronbach's Alpha. The Cronbach's Alpha of the reliability test was .780 which was above .700.

3.7 Data Analysis Technique

The researcher used descriptive statistical tools to analyze data collected. The data gathered was analyzed using tables, frequencies, percentages, mean and standard deviation to present data. The information on each statistical table was drawn from the responses gathered and analyzed and some converted into graphs to establish relationship between data for interpretation and description.

3.8 Ethical Considerations

A letter was written to heads of the various institutions involved to seek for permission to conduct the research. They were made to understand the purpose of the research, the method to use and the possible outcomes. Consents were also sought from the respondents before they started responding to the questionnaires. Participants were

informed of their rights to voluntary participate or to stop or had the right to withdraw from the process at any point at any point in time without their data being collected. Assurance of anonymity and confidentiality will be given and maintained at all times. No personal information about the participants will be collected. The data collected for this study will not be linked to the participants in any way.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

This chapter deals with the analysis of data collected through the use of questionnaire administered. It discusses the findings on the availability of information and communication technologies resources used in senior high schools. The extent to which information technology resources are used to enhance teaching and learning and finally the effects of ICT policies on effective use of ICT by students. Data gathered were analyzed using tables, frequencies and percentages. Presentations of findings were arranged based of the research questions.

4.2 Response Rate

The responds rate was high and achieved through the support and cooperation from respondents. This is depicted in the table 3.

Table 3: Response Rate

Respondents	Questions Administered	Questions Returned	Percentages (%)
Administration	9	9	100%
Teachers	21	21	100%
Students	150	150	100%

4.3 Demographic Information of Respondents

This section deals with demographical information of respondents; administrators, teachers and students at the secondary schools. Respondence were asked their gender, age and qualification. Results of respondents are depicted in table 4 below

Table 4: Demographic Information of Respondents

Demographic Information of Administrators			
Attributes	**Category**	**Count**	**Percentage**
Gender	male	7	78%
	Female	2	22%
	Total	**9**	**100%**
Age	40 and below	-	-
	41 – 45 years	1	11.1%
	46 – 50 years	4	44.4%
	Above 50years	4	44.4%
	Total	**9**	**100%**
Professional Qualifications	Bachelor's Degree	3	33.3%
	Master's Degree	5	55.5%
	PhD	1	11.1%
	Total	**9**	**100%**
Demographic Information of Teachers			
Gender	Male	12	57.1%
	Female	9	42.9%
	Total	**21**	**100%**
Age	27 -30 years	2	9.5%
	31-35years	4	19%
	36-40years	6	28.6%
	41-45years	5	23.8%
	46 and above	4	19%
	Total	**21**	**100%**
Qualification	Bachelor's Degree	13	61.9%
	Master's Degree	8	38.1%
	Total	**21**	**100%**
Demographic information of Students			
Gender	Male	86	57.3%
	Female	64	42%
	Total	**21**	**100%**
Age	13 – 15 years	15	10%
	16 – 19 years	112	74.7%
	20years and above	23	15.3%
	Total	**150**	**100%**

Table 4 shows that majority of administrators were males, representing 78% whereas 32% represent females. Majority of the respondents fall between the ages of 46 and above representing 88.8% and 11.1% between the age bracket of 41 and 46. In terms of qualification, greater number of respondents representing 55.5% hold master's degree. 33.3% have bachelor's degree while 11.1% has PhD.

This indicates that the schools are run by administrators with professional qualifications.

Majority of the teachers were also in their early 40 years and below. Results of the study imply that teachers differ in their age groups. Lakkala and Lehitinen, (2001) point out that the youngest group of teachers has increased desire to the use of ICT than the oldest group.

Teachers academic and professional qualification were also looked at. Majority of the teachers hold Bachelor's degree representing 61% and 38.1% have masters' degree implying that when ICT resources are made available, they will be able to use them to enhance teaching and learning.

Table 4 also shows a greater number of respondents were males representing 57.3% whiles females constituted 42.7%. Majority of the students in the schools are young and eagerly ready to the use of ICT resources in the schools to build up their knowledge and skills and improve to improve learning.

4.4 The Availability of Information and Communication Technology Resources used in Senior High Schools

Responders were presented with questionnaires to indicate the availability of I C T resources in the school and rate the use of the resources. The findings were displayed in the table 5 below.

Table 5: ICT Resources Available in Schools

ICT Resources	Available (%)	In use (%)
Internet facilities	58%	34%
Computer	80%	54%
Mobile phone	64%	32%
Projector	74%	48%
Television set	73%	40%
Printer	63%	36%
Photocopier	66%	47%

The table 5 indicates ICT resources available in the schools and is in use. Respondents indicated the availability of the various ICT resources in the schools and the ratings of the use of the available resources.

4.5 The Extent to which Teachers and Students Use ICT Resources to Enhancing Teaching and Learning

Responders were asked to indicate how frequent teachers and students are able to access and use the ICT resources. Teachers were asked to indicate the extent to which they make use of ICT resource in the school. Their findings were tabulated in table 6.

Table 6: Teachers Use of ICT Resource

ICT Resources	A (%)	O (%)	S (%)	N (%)
Internet	52.4	26.6	19	-
Computers	42.9	33.3	23.8	-
Projectors	33.3	38.1	26.6	-

Scale: A= Always O = Often S=Sometimes N = Never

Table 6 indicates that majority teachers representing 42.9% frequently use computers in their work to enhance teaching and learning. Teachers were asked to indicate how frequent they utilize internet in their teaching. Internet is the most used, representing 52.4%. The internet is used to for research and other purposes which enabled teachers prepare and deliver effectively to enhance teaching and learning. Teachers indicated projectors were used in their lesson presentations. Data from table showed teachers often use projectors in their lesson delivery. 38.1% often use projector whiles 33.3% always use projectors in presentation.

Table 7: Students Use of ICT Resource

ICT Resources	A (%)	O (%)	S (%)	N (%)
Internet	-	12	79.3	8.7
Computers	-	44.7	55.3	-

Scale: A= Always O = Often S=Sometimes N = Never

Table 7 indicates that 55.3% of students were rarely engaged by their teachers to use computers. Computers were only accessibly when students had practical ICT lessons. 44% of students were often engaged by teachers in the use of computers. This result is in agreement with Ritzhaupt, Dawson and Cavanaugh, (2012) that having technological resources available does not necessarily result in effective integration and use. Students also indicated their use of internet in their teaching and learning. The findings show students lack of access to internet and were unable to effectively use the internet in schools. Maturity of students (79.3%) rarely use internet in school. The availability of modern computers, peripherals, networking and resources within an increasingly diverse range of technologies is an essential part of learning and teaching in the 21st century. Access to internet enhances learning by making education less

dependent on the teacher and by making education available not necessary in the classroom (Mbwesa, 2002). In looking at the effective use of ICT in our second cycle school and the positive impact ICT play in teaching and learning in schools, there were some challenges.

The researcher looked at factors that hinder the effective utilization of the ICT resources available in the schools. Respondents were asked to indicate challenges.

The results are displayed in Table 8.

Table 8: Factors Hindering the Effective Use ICT Resources in Schools

ICT Resources	Frequency	Percentage (%)
Lack of access to ICT resources	65	36.1%
Poor quality ICT infrastructure	46	25.6%
Lack of technical support	17	9.4%
Limited internet connectivity	52	28.9%
Total	**180**	**100%**

From the Table 8 access to the available ICT resources was a major challenge. 36.1% of respondents indicated they found it difficult to always get access when the need arises and this was a result of high population ratio of the schools. 28.9% also indicated that limited internet connectivity is a major challenge and this is due to the poor quality of ICT infrastructure which constituted 25.6% of respondents' response.

4.6 The Effects of ICT Policies on Effective Use of ICT by Students in Senior High Schools

It is against school rules for students to use mobile devices such mobile phones, iPads, laptops etc. in schools. Students believed the usage of such devices in school would be beneficial to their teaching and learning. At some schools, for instance, students' hand over these devices to their teachers or house masters and mistresses when they report to school and are only allowed to use for a good reason. The lack of clarity on what is acceptable and when it is appropriate to use the mobile devices was said to cause a lot of confusion and anxiety among the students and teachers. The researcher used questionnaires to find the effects on the policies regarding students' use of these mobile technologies in the schools and its effects of teaching and learning. This was as a result of limited access to computers and internet since majority of students possessed mobile phone but not allowed to use. The use of technologies increases opportunities for learning, particularly for students who find learning on a tablet more personal and easily accessible than being chained to a desktop (Vali, 2015).

Table 9: Effects of No Usage of Mobile Devices by Students in Schools.

Effects of Un Accessibility of ICT Resources by Students	SA (%)	A (%)	U	D (%)	SD (%)
Limited access to information	61.3	26	4	8.7	-
Lack of motivation in teaching and learning process	21.3	58	8.7	12	-

Scale: SA= Strongly Agree A= Agree U= Undecided D= Disagree SD= Strongly Disagree

Table 9 shows that students have a very positive attitude towards information technology. Majority of respondents (61.3%) strongly agreed, while (26%) respondents

agreed that denial of access to mobile devices limited their access to information since they are unable to easily access ICT resources in school. A total of (58%) and (21.3%) agreed and strongly agreed respectively affirm Nordic's (2006) view that students are motivated when they use ICT resources. Students are demotivated when denied access to mobile technologies.

4.7 Hypothesis Testing

The hypothesis was tested based on the effect of the availability of ICT resources on the effective use of ICT and the effect of ICT policies on the effective use of ICT.

4.7.1 The Effect of the Availability of ICT Resources on the Effective Use of ICT

The R value in Table 10 is .356[a] which means that the relationship between the availability of ICT resources and the effective use of ICT is weak but positive. The R Square of the model summary illustration is .127 which means the significant impact of the availability of ICT resources account for only 12.7% of the contribution of factors that influence the effective use of ICT. Hence, the model fit the study. The Std. Error of the Estimate between the variables is .820 which is the average error for the model fit. How small the Std. Error of the Estimate is means that the model is good. The F Change for the model is 38.348which is significant and it means that the R-squared does not equal to zero. Hence, the relationship between the availability of ICT resources and the model is statistically significant. Moreover, the p-value in Table 11 is .000[b] which is less than .01. This evidence that the regression model fits the data better than the model with no independent variables. The degree of freedom (149 – df1) is 148 which refers to the maximum number of logically independent values and have the freedom to vary in data sample without breaking any constraints.

In Table 12, the availability of ICT resources showed a positive relation with the effective use of ICT (B = .356, t = 6.193).

Table 10: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.356[a]	.127	.124	.820	.127	38.348	1	148	.000

a. Predictors: (Constant), availability of ICT resources

Table 11: ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	25.815	1	25.815	38.348	.000[b]
	Residual	177.722	148	.673		
	Total	203.538	149			

a. Dependent Variable: effective use of ICT

b. Predictors: (Constant), availability of ICT resources

Table 12: Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.769	.252		10.993	.000
	availability of ICT resources	.360	.058	.356	6.193	.000

a. Dependent Variable: effective use of ICT

4.7.2 The Effect of ICT Policies on the Effective Use of ICT

The R value in Table 13 is .124[a] which means that the relationship between ICT policies and the effective use of ICT is weak but positive. The R Square of the model summary illustration is .015 which means the significant impact of ICT policies account for only 1.5% of the contribution of factors that influence the effective use of ICT. Hence, the model fit the study. The Std. Error of the Estimate between the variables is 1.777 which is the average error for the model fit. How small the Std. Error of the Estimate is means that the model is good. The F Change for the model is 4.102which is significant and it means that the R-squared does not equal to zero. Hence, the relationship between ICT policies and the model is statistically significant. Moreover, the p-value in Table 20 is .044[b] which is less than .05. This evidence that the regression model fits the data better than the model with no independent variables. The degree of freedom (149 – df1) is 148 which refers to the maximum number of logically independent values and have the freedom to vary in data sample without breaking any constraints. In Table 15, ICT policies showed a positive relation with the effective use of ICT (*B* = .124, t = 2.025).

Table 13: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1		.124[a]	.015	.012	1.777	.015	4.102	1	148	.044

a. Predictors: (Constant), ICT policies

Table 14: ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	12.955	1	12.955	4.102	.044[b]
	Residual	830.629	148	3.158		
	Total	843.585	149			

a. Dependent Variable: effective use of ICT

b. Predictors: (Constant), ICT policies

Table 15: Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.124	.546		3.890	.000
	ICT policies	.255	.126	.124	2.025	.044

a. Dependent Variable: effective use of ICT

4.8 Discussion of Findings

Findings were discussed based on the effect of the availability of ICT resources on the effective use of ICT and the effect of ICT policies on the effective use of ICT.

4.8.1 The Effect of the Availability of ICT Resources on the Effective Use of ICT

The relationship between the availability of ICT resources and the effective use of ICT was weak but positive. There was a significant impact of the availability of ICT resources for only 12.7% of the contribution of factors that influence the effective use

of ICT. Similar observation was made by Egbert (2015). Therefore, the model fit the study. The relationship between the availability of ICT resources and the model was statistically significant. The regression model fits the data better than the model with no independent variables. The availability of ICT resources showed a positive relation with the effective use of ICT. Related can be found in an article by Thomas,

O'Bannon, and Bolton (2013).

4.8.2 The Effect of ICT Policies on the Effective Use of ICT

The relationship between ICT policies and the effective use of ICT was weak but positive. Similar observation was made by Newbill & Baum (2013). There was significant impact of ICT policies for only 1.5% of the contribution of factors that influence the effective use of ICT. Therefore, the model fit the study. The relationship between ICT policies and the model was statistically significant. This was in similitude to the report of Fletcher (2014). The regression model fits the data better than the model with no independent variables. ICT policies showed a positive relation with the effective use of ICT.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter gives summary of the study, discusses the findings of the study and presents conclusions, recommendations and suggestions for further research.

5.2 Summary

The purpose of the study was to access the availability the use of Information Communication Technology resources in teaching and learning in senior high schools in Ghana and also looked at the effects of policies regarding the use of ICT resources in the schools. The research aimed at bringing to into focus the effective use of available ICT resources and examine the effects of policies on the use these technologies and their impact on education. Data were collected using questionnaires and interviews for respondents. The questionnaire is an instrument used to collect basic descriptive information from large samples. The target population of the study constituted 180 respondents. The target population for the study consisted 150 students, 21teachers and 9 Administrators from the selected schools. Findings of this study revealed from the data collected show that even though senior high schools have ICT resources they are not adequate to meet the high demands as a result of growing population of the schools. Students do not have ample time to use these resources. Upgrade of infrastructure and network connectivity must also be looked at properly. Again, there is no clarity on the use of mobile devices in the senior high schools. Punishment for those who flout on school rules on such devices differ from schools to schools. The Ministry of education and the Ghana Education Service must come out with clear policy guidelines for the

use of mobile devices to enhance teaching and learning. The relationship between the availability of ICT resources and the effective use of ICT was weak but positive. There was a significant impact of the availability of ICT resources for only 12.7% of the contribution of factors that influence the effective use of ICT. The relationship between the availability of ICT resources and the model was statistically significant. The availability of ICT resources showed a positive relation with the effective use of ICT. The relationship between ICT policies and the effective use of ICT was weak but positive. There was a significant impact of ICT policies for only 1.5% of the contribution of factors that influence the effective use of ICT. The relationship between ICT policies and the model was statistically significant. ICT policies showed a positive relation with the effective use of ICT.

5.3 Conclusion

Integration of ICT resources into our education system is a development that cut across the world because it is believed that ICT has an essential impact on teaching and learning. Therefore, Educational Institutions are witnessing a paradigm shift brought about by the use of ICT that others have even started seeing ICT as an indispensable tool in the teaching and learning process. Proper implementation of ICT in our schools gives positive impact on education and therefore every effort should be made for proper implementation of ICT in our schools. There was a significant impact of the availability of ICT resources on the effective use of ICT. The availability of ICT resources showed a positive relation with the effective use of ICT. There was a significant impact of ICT policies on the effective use of ICT. ICT policies showed a positive relation with the effective use of ICT.

5.4 Practical Contribution

Three goals of this study are related to evaluating how senior high school students in Kumasi metropolis access and effectively use information technology resources. Our findings have a wide range of teaching and learning applications. Without a doubt, learning and teaching are crucial to the advancement of student education. The responsible use of ICT must be prioritized in teaching and learning as a separate component of education. The three study objectives are all expressed as precise goals. Therefore, when addressing student teachers' competence, teaching and learning needs to commit to each of them uniquely.

This is true of both on-campus teacher education and the preparation of student teachers during field experiences. Teaching and learning must also incorporate the proper use of ICT into a variety of seminars, courses, and activities during the entire course of study. This cannot be left to the efforts of a single faculty member. Further explanation of how to comprehend the subject matter of teachers' expertise is also required. Although it may be about in-depth information, the most important thing is to provide pupils a better grasp of how digitalization contributes to social growth, democratic understanding, and socialization (Engen, 2019). Through tailored courses that emphasize these various facets of the appropriate use of ICT, teaching and learning must prepare teachers and students.

In order to involve them in discussing the issue with students in their professional practice, as well as to better equip them to cope with the many subjects in their own studies. In placement schools, mentors must give teachers and students the chance to advance their knowledge of the subject, to facilitate privacy and copyright training

opportunities, and to best prepare them for handling any cyberbullying or online harassment that kids may experience.

5.5 Theoretical Contribution

Policy makers must be aware and take action in order to establish a comprehensive and long-lasting emphasis on the ethical or proper use of ICT in teaching and learning. For continued success, competence, including appropriate ICT use, is crucial. However, policy makers must be educated and take action in order to ensure a systematic and long-lasting emphasis on the safe use of ICT in teaching and learning. As ICTs are increasingly used and exposed in all facets of teachers' professional practice, rules and reforms should emphasize the responsible use of ICT. Competence, including the responsible use of ICT, is still important for teaching and learning. Research is required to understand what responsible ICT use means beyond privacy, copyright, bullying, and harassment concerns, as well as how it manifests in various teacher education programs and in various national contexts.

5.6 Recommendations

From the findings of the study, it is recommended that;

1. There should be upgrade of ICT infrastructures in senior high schools
2. Teachers should also be provided with adequate technological resources, technical support and administrative support to encourage them successfully use ICT in teaching and learning.
3. Students should be involved in using ICT in learning activities such as doing assignments and searching the internet for learning resources because it is

believed that ICT can enhance teacher and student interaction and also tends to increase students learning motivations.

4. There must be a more regulating policy in ensuring proper use of mobile devices in schools if ICT resources are not adequate to cater for the needs of every student.

5.7 Suggestions for Further Research

The study recommends the following suggestions for further study: -

I. Relevant strategies for using ICT to improve teaching and learning in secondary school.

II. The role of the school in organizing, structuring and guiding the process of ICT implementation in schools.

REFERENCES

Adarkwah, M. A. (2021). I'm not against online teaching, but what about us? ICT in Ghana post Covid-19. *Educatio n and Information Technologies*, *26*(2), 16651685.

Agyei, E. D., & Agyei, D. D. (2019). Feasibility of ICT use in teaching physics in the senior high schools in Ghana. *International Journal of Education, Learning and Development*, *7*(8), 26-41.

Agyei, E. D., & Agyei, D. D. (2021). Promoting Interactive Teaching with ICT: Features of Intervention for the Realities in the Ghanaian Physics Senior High School Classroom. *International Journal of Interactive Mobile Technologies*, *15*(19).

Alenezi, A. (2019). Effectiveness of educational technology applications in Saudi Arabian secondary schools. *Journal of Informatics and Mathematical Sciences*, *11*(2), 221-233.

Amedeker, M. K. (2020). Changing educational policies: Implications for ICT Integration in Science Instruction and performance of students in Ghanaian senior high schools. *Educational Technologies*, 72-78.

Ameen, K. S., Adeniji, S. M., & Abdullahi, K. (2019). Teachers' and students' level of utilization of ICT tools for teaching and learning mathematics in Ilorin, Nigeria. *African Journal of Educational Studies in Mathematics and Sciences*, *15*(1), 51-59.

Arkorful, V., Barfi, K. A., & Aboagye, I. K. (2021). Integration of information and communication technology in teaching: Initial perspectives of senior high school teachers in Ghana. *Education and Information Technologies*, *26*(4), 3771-3787.

Aslan, A., & Zhu, C. (2018). Starting teachers' integration of ICT into their teaching practices in the lower secondary schools in Turkey. *Educational Sciences: Theory & Practice*, *18*(1).

Aydemir, M., Karaman, S., & Taslibeyaz, E. (2016). An analysis of research trends in articles on video usage in medical education. *Educ Inf Technol*. Retrieved March 22, 2020, from https://doi.org/10.1007/s10639-015-9461-x.

Azar, A. S., & Tan, N. H. I. (2020). The application of ICT techs (mobile-assisted language learning, gamification, and virtual reality) in teaching English for secondary school students in Malaysia during covid-19 pandemic. *Universal Journal of Educational Research*, *8*(11C), 55-63.

Baker, W. M., Lusk, E. J., & Neuhauser, K. L. (2012). On the use of cell phones and other electronic devices in the classroom: Evidence from a survey of faculty and students. *Journal of Education for Business* (87), 275–289. doi:10.1080/08832323.2011.622814.

Bariham, I. (2022). Senior High School Teachers' and Students' Perception about the Integration of Online Learning and Its Impact on Their Application of Technology in Teaching and Learning of Social Studies in Northern Region, Ghana. *Social Education Research*, 161-174.

Bariham, I., Ondigi, S., & Mueni, N. (2019). Senior high schools' students' perception of computer-aided instruction in North East Region of Ghana. *Int. J. Adv. Res*, *6*(8), 40-47.

Bariu, T. N. (2020). Status of ICT infrastructure used in teaching and learning in secondary schools in Meru County, Kenya. *European Journal of Interactive Multimedia and Education*, *1*(1), e02002.

Bati, T. B., & Workneh, A. W. (2021). Evaluating integrated use of information technologies in secondary schools of Ethiopia using design-reality gap analysis: A school-level study. *The electronic journal of information systems in developing countries*, *87*(1), e12148.

Becta (2000). The Becta Review 2006: Ev*idence on the progress of ICT in education;* UK. Retrieved from http://becta.org.uk/corporate/publications/documents/theBectareview2

Berrett, B., Murphy, J., & Sullivan, J. (2012). Technology integration in schools. *Administrator insights and reflections. Qualitative Report*, 200-221. Retrieved 03 01, 2020, from http://files.eric.ed.gov/fulltext/EJ973041.pdf.

Blurton, C. (2000). *New direction of ICT use in education.*

Bolkan, J. (2013). *Schools not meeting students' technology needs.* The Journal. Retrieved February 21, 2020, from http://thejournal.com

Buabeng-Andoh, C. (2019). Factors that influence teachers' pedagogical use of ICT in secondary schools: A case of Ghana. *Contemporary educational technology*, *10*(3), 272-288.

Cauley, F. G., Aiken, K. D., & Whitney, L. K. (2009). Technologies across our curriculum: A study of technology integration in the classroom. *Journal of Education for Business*, 114-118.

Cox, M. J. (1999). *Motivating pupils through the use of ICT.* Retrieved 03 11, 2020, from http://www.leeds.ac.uk/educol/documents/00001329.htm

Crook, C. (2012). The "digital native" in context: Tensions associated with importing web 2.0 practices into the school setting. *Oxford Review of Education*. Retrieved 03 09, 2020, from https://www.tandfonline.com/doi/abs/10.1080/03054985.2011.577946

Davis, F. (1989). *Perceived usefulness, perceived ease of use, and user acceptance of information technology.* JSTOR.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). *User Acceptance of Computer Technology: A Comparison of Two Theoretical Models.* Online. Retrieved from https://doi.org/10.1287/mnsc.35.8.982.

Davis, F., & Bagozzi, R. (1989). *User Acceptance of computer Technology.*

Davis, F., & Bagozzi, R. (1989). *User Acceptance of Computer Technology: A Comparison of Two Theoretical Models.*

Davis, N. (2006). International contrasts of information Technology in teacher education: multiple perspectives on change. *Journal of information Technology for Teacher Education, 9*. Retrieved 01 09, 2020, from https://www.tandfonline.com/doi/abs/10.1080/14759390400200083

Dougherty, K. J. (2012). *Transforming teaching and learning through the virtual classroom.* Retrieved 12/12/2019, from http://doi.org/EJ998781.

Dzhurylo, A. P., & Shparyk, O. M. (2019). ICT competence for secondary school teachers and students in the context of education informatization: global experience and challenges for Ukraine. *Інформаційні технології і засоби навчання*, (70, № 2), 43-58.

Egbert, J. (2015). *Supporting learning with technology: Essentials of classroom practice.* UpperSaddle River, NJ: Prentice Hall.

Ehrlich, S. B., Sporte, S. E., & Sebring, P. (2013). *The use of technology in Chicago public schools 2011: Perspectives from students, teachers, and principals.* University of Chicago, Consortium on Chicago School Research. Retrieved February 23, 2020, from https://consortium.uchicago.edu/sites/default/files/publications/Technology%2

0Report%202013_0.pdf

Ezinwa, B., & Azuka, E. B. (2004). *ICT in Education, Information and Communication Technology in Teacher Education: a planning guide.* Nigeria.

Fabry, D., & Higgs, J. (1997). *Barriers to the effective use of technology in education. Journal of Educational Computing.*

Fletcher, G. H. (2014). Tech Directors' role in the common core. *The Journal*, 21-24. Retrieved 02 12, 2020, from http://www.thejournal.com/

Ford, K., & Lott, L. (2011). *The impact of technology on constructivist pedagogies.* Retrieved March 14, 2020, from https://sites.google.com/a/boisestate.edu/edtechtheories/the-impact-oftechnologyon-1

Franciosi, S. J. (2012). Transformational leadership for education in a digital culture. *Digital Culture & Education*, 235-247. Retrieved from http://www.digitalcultureandeducation.com/uncategorized/dce_4001_franciosi/

Gensburg, R., & Herman, B. (2009). *An analysis of the theory of constructivism as it relates to pre-service and in-service teachers and technology.* Retrieved from https://sites.google.com/a/boisestate.edu/edtechtheories/an-analysis-of-thetheory-ofconstructivism-

Gill, T. G. (2007). Using the tablet PC for instruction. *Decision Sciences Journal of Innovative Education, 5*(1), 183-190.

Gómez-García, M., Hossein-Mohand, H., Trujillo-Torres, J. M., Hossein-Mohand, H., & Aznar-Díaz, I. (2020). Technological factors that influence the mathematics performance of secondary school students. *Mathematics*, *8*(11), 1935.

Goodin, L. M. (2012). Incorporating technology into the instruction of social studies (Master'sresearch project, Saint Xavier University). *ERIC database. (ED531350)*.

Grimus, M., & Ebner, M. (2016). Learning and Teaching with Mobile Devices: An Approach in Higher Secondary Education in Ghana. *Human-Computer Interaction: Concepts, Methodologies, Tools, and Applications*, 16.

Gumbo, M., Makgato, M., & Müller, H. (2012). The impact of in-service technology training programs on technology teachers. *Journal of Technology Studies*, 23-33. Retrieved from http://scholar.lib.vt.edu/ejournals/JOTS/v38/v38n1/pdf/gumbo.pdf

Gunu, M., Nantomah, I., & Inusah, F. (2022). Assessing Information and Communication Technology (ICT) Integration into the Curriculum of Ghanaian Pre-Tertiary Schools: A Case Study of Sagnerigu Municipality. *International Journal of Education and Development using Information and Communication Technology*, *18*(1), 253-263.

Heafner, T. (2004). Using technology to motivate students to learn social studies. *Contemporary Issues in Technology and Teacher Education* (4), 42–53. Retrieved March 08, 2020, from http://www.citejournal.org

Herlihy, D. (2011). iPads in education: A classroom learning tool or hub? *Special Education Technology Practice*, 15-18. Retrieved March 13, 2020, from http://www.setp.net

Ito, M., Horst, H., Bittani, M., Boyd, D., Herr-Stephenson, B., Lange, P., & Tripp, L. (2008). *Living and learning with new media: Summary of findings from the Digital youth project.* Retrieved 03 22, 2020, from http://digitalyouth.ischool.berkeley.edu/files/report/digitalyouth-WhitePaper.pdf

Jacob, O. N., Jegede, D., & Musa, A. (2020). Administration of Information Communication Technology (ICT) in Nigerian secondary schools: Challenges and the ways forward. *Electronic Research Journal of Engineering, Computer and Applied Sciences*, *2*, 50-63.

Jung, I. S. (2005). A comparative study on the cost-effectiveness of three approaches to ICT teacher training: Application cases worldwide. *Journal of Education Technology and science*, 94-101.

Kurt, S. (2013). Creating technology-enriched classrooms: Implementational challenges in Turkish education. *Learning, Media and Technology*, 1-17.

Lee, J., & Spires, H. (2009). What students think about technology and academic engagement in school: Implications for middle grades teaching and learning. 61-81. Retrieved 03 10, 2020, from http://www.editlib.org/p/27007

Lowther, D. L., Inan, F. A., Strahl, D. L., & Ross, S. M. (2008). *Does technology integration "work" when key barriers are removed? Educational Media.*

Mbwesa, J. (2002). *The influence of Information and Communication Technology on learning.* University of Nairobi, Kenya. Nairobi: Researchgate.net. Retrieved 03 12, 2020, from https://www.researchgate.net/publication/318851582

Mensah, B., Poku, A. A., & Quashigah, A. Y. (2022). Technology integration into the teaching and learning of geography in senior high schools in Ghana: A TPACK assessment. *Social Education Research*, 80-90.

Mensah, E. G., & Osman, S. (2022). Senior High Schools Teachers' Perception of Integrating ICT into Social Studies Lessons in the New Juaben Municipality. *Social Education Research*, 112-132.

Ministry of Education Ghana. (2018). *National Pretertiary education curriculum framework.* Accra: NCCA. Retrieved April 16, 2020, from https://nacca.gov.gh/wp-content/uploads/2019/04/National-Pre-tertiary-Education-Curriculum-Framework-final.pdf

Morgan, L. (2011). Understanding the digital divide: A closer examination of the application of web 2.0 technologies by undergraduate students. *The International Journal of Learning*, 343-350. Retrieved from https://opus.lib.uts.edu.au/research/handle/10453/17210.

Mumtaz, S. (2006). Factors affecting teachers' use of information and communications technology, 319-342. Retrieved 02 19, 2020, from https://doi.org/10.1080/14759390000200096.

National Communications Authority NCA. (2014). *Statistics of internet usage.* Accra: NCA. Retrieved march 12, 2020, from www.nca.org.gh/73/34/News

Newbill, P., & Baum, L. (2013). *Design Creativity. Learning & Leading with Technology.* Retrieved 02 10, 2020, from http://www.learningandleadingdigital.

Nji, I. A., & Idika, E. O. (2018). Utilization of ICT in teaching and learning of Economics in secondary schools in Nsukka Education Zone. *International Journal of Economics Education Research*, *1*(1), 43-57.

Oki, O. (2007). *Information and communication Technology.* Nsukka: Excellent Publisher.

Pelgrum, W. J. (2001). Obstacles to the integration of ICT in education: results from a worldwide educational assessment. *Computer and Education*, pp. 163-178. Retrieved 03 20, 2020, from https://doi.org/10.1016/S0360-1315(01)00045-8

Piaget, J. (1955). *The construction of reality in the child.* London, United Kingdom:

Routledge.

Project Tomorrow. (2012). Personalizing the classroom experience: Teachers, Librarians and Administrators connect the dots with digital learning. *Project Tomorrow: Speak Up*, 1-11. Retrieved 03 17, 2020, from www.tomorrow.org/speakup

Ritzhaupt, A. D., Dawson, K., & Cavanaugh, C. (2012). An investigation of factors influencing student use of technology. *Journal of Educational Computing Research*, 229-254.

Russell, M., Bebell, D., Dwyer, L., & O"Connor, K. (2003). Exam*inig teacher technology use implications for preservice and in-service teacher preparation.* 287-310. Retrieved 03 14, 2020, from https://journals.sagepub.com/doi/abs/10.1177/0022487103255985

Sawchuk, S. (2010). Proof lacking on success of staff development. *Education Week*. Retrieved from http://www.edweek.org/ew/articles/2010/11/10/11pd_research.h30.html

Shurtz, S., Halling, T. D., & McKay, B. (2011). Assessing user preferences to circulate iPads in an academic medical library. *Journal of Electronic Resources in Medical Libraries, 8*(4), 311-324.

Singh, R. P. (1999). Challenges of tomorrow: profile of future teacher education.

Swidish National Agency for school improvement. (2008). *Teacher ICT knowledge needs.* Retrieved 02 16, 2020, from https://www.oecd.org/sweden/45046846.pdf

Thomas, K. M., O'Bannon, B. W., & Bolton, N. (2013). Cell phones in the classroom: Teachers 'perspectives of inclusion, benefits, and barriers. *Computers in The Schools*, 395-308. doi:10.1080/07380569.2013.844637

Underwood, J. (2006). *ICT Test Bed Evaluation-Evaluation of the ICT Test Bed Project UK.* Nottingham: Nottingham Trent University. Retrieved from http://www.evaluation.icttestbed.org.uk/about

Vali, R. (2015). *Five ways mobile technology is transforming education*. Retrieved November 29, 2020, from https://www.techradar.com/news/mobilecomputing/tablets/five-ways-mobile-technology-is-transforming-education1282557.

Yalley, C. E. (2022). A tracer study on challenges affecting the use of ICT in pretertiary school administration in Ghana: Administrators' perspective. *Cogent Education*, *9*(1), 2062893.

APPENDIX A

REQUEST TO FILL THE QUESTIONNAIRE FOR RESEARCH PURPOSE

Dear Respondent,

You have been chosen as a respondent in the above titled survey which is being undertaken as part of an educational research in partial fulfillment of the Master of Science Information Technology Education of the University of Education, Winneba Kumasi Campus on the assessment of access and effective use of information technology resources by students in Senior High Schools in Ghana. Your assistance and cooperation in filling this questionnaire will ensure success of the study. Kindly feel free to answer the questions. The responses will be for academic purposes only and will be treated with utmost confidentiality.

INSTRUCTION: Please tick [√] the most appropriate answer to the following questions.

1. Please indicate your gender

   Male [ ] Female [ ]

2. Select your age bracket

   Below 15years [ ] 16 – 19years [ ] 20 – 26 years [ ]

   27 – 30 years [ ] 31 – 35 years [ ] 36 – 40 years [ ]

   41 – 45 years [ ] 46 and above [ ]

3. Status in the school

   Student [ ] Teacher [ ] Administrator [ ]

4. Highest Academic Qualification

   WASSCE [ ] Diploma [ ] Bachelor Degree [ ]
   Master's Degree [ ] PhD [ ]

5. Indicate the available resources in the school and whether in use or not

ICT Resources	**Available**	**Not Available**	**In use**	**Not In Use**
Internet facilities				
Computer				
Mobile phone				
Projector				
Television set				
Printer				
Photocopier				

6. Use the scale below to rate the use of available resources in the school

Scale: A= Always O = Often S=Sometimes N = Never

ICT Resources	**A**	**O**	**S**	**N**
Internet facilities				
Computer				
Mobile phone				
Projector				
Television set				
Printer				
Photocopier				

7. How do you agree or disagree with the following statements on students' use of mobile devices in the school?

Scale: SA=Strongly Agree A= Agree U= Undecided D=Disagree SD= Strongly Disagree

Ban on use of mobile devices by students	SA	A	U	D	SD
Limited access to information					-
Lack of motivation in teaching and learning process					-

End

Thank you for your time.