

UNIVERSITY FOR DEVELOPMENT STUDIES

KNOWLEDGE AND ATTITUDE OF TEACHERS TOWARDS ICT INTEGRATION IN
TEACHING AND LEARNING AND ACADEMIC PERFORMANCE OF PUPILS IN
THE SAGNARIGU MUNICIPALITY

ZAKARIA ZAKIA

2024



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BY

ZAKARIA ZAKIA

THESIS SUBMITTED TO THE DEPARTMENT OF EDUCATIONAL MANAGEMENT AND
POLICY STUDIES, UNIVERSITY FOR DEVELOPMENT STUDIES IN PARTIAL
FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTER OF
PHILOSOPHY DEGREE IN EDUCATIONAL MANAGEMENT AND PLANNING

JULY, 2024



DECLARATION

I hereby declare that this thesis is the result of my original work and that no part of it has been presented for another degree in this University or elsewhere:

Candidate



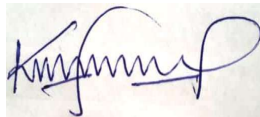
Signature..... Date: 17-03-2025

Name: ZAKARIA ZAKIA

Supervisor

I hereby declare that the preparation and presentation of the thesis was supervised following the guidelines on supervision of thesis laid down by the University for Development Studies.

Supervisor:



Signature..... Date: 17-03-2025

Name: DR. JAMES KWAME MAHAMA



ABSTRACT

Despite efforts such as the Ghana Information and Communication Technology (ICT) in Education Policy and teacher training programs, schools still face challenges in effectively using ICT to improve teaching and student performance. The present study examined the association between knowledge and attitudes of teachers on ICT and academic performance of students. Employing a quantitative cross-sectional survey design, the research analyzed data from 10 randomly selected schools, involving 309 teachers. Academic performance was assessed using 2022 Basic Education Certificate Examination (BECE) results as a proxy of students' academic performance. Data were collected through structured questionnaires. Multiple logistic regression was used to establish the association between the knowledge of teachers on ICT, their attitudes towards ICT and students' academic performance. Statistical significance was declared at $p\text{-value} < 0.05$. The majority of the respondents, 164 (53.1%) reported having good knowledge of ICT. About 27% of students from schools whose teachers have good attitude towards ICT had good academic performance compared to 14% of those from schools whose teachers have poor attitude towards ICT. Likewise, 29.9% of students from schools whose teachers had good knowledge on ICT had good academic performance compared to 14.9% of those from schools whose teachers had poor knowledge in ICT. The above observed differences were all statistically significant ($p < 0.05$). The results also revealed that students from schools whose teachers had higher levels of ICT knowledge ($OR = 5.20$, $CI = 2.32-10.86$, $p < 0.001$) were 5.2 times more likely to have good academic performance compared to those from schools whose teachers had poor knowledge on ICT. In order to enhance academic performance, it is prudent that the Ministry of Education prioritizes enhancing ICT knowledge among teachers and improving ICT infrastructure in schools.



ACKNOWLEDGEMENT

Thanks, belong to the Almighty God for guiding me through this project successfully. I also thank my supervisor, Dr. James Kwame Mahama, for his valuable comments and encouragement in the course of this work. My appreciation also goes to Prof Abdulai Abubakari for his mentorship and invaluable inputs and editing of my work.

With gratitude, I also appreciate the role of faculty members of the University for Development Studies (UDS), Tamale, your guidance and suggestions were useful.



DEDICATION

I dedicate this to my husband Prof Abdulai Abubakari and my children



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LIST OF ABBREVIATION

LI - Legislative Instrument

TAM - Technological Acceptance Model

NCCA - National Council for Curriculum and Assessment in Ireland

ICT - Information and communication technology

UNESCO – United Nations Educational, Scientific and Cultural Organization

GES – Ghana Education Service

GETFund – Ghana Education Trust Fund

IT – Information Technology



CHAPTER ONE

INTRODUCTION

1.1 Background

Globally, the 21st century has seen a rapid increase in technological revolution with educational institutions and homes spending substantial sums of money on computers, software, internet connections, and other technology for educational purposes (Soma et al., 2021). Information and Communication Technology is one of the most important technologies among the emerging technologies that play a crucial role in every sphere of human endeavour. It has seen a tremendous transformation over the years which makes teaching and learning easier and fun, and has changed the ways people live, learn, work, and play. Consequently, the internet has been an important tool to the present information society, and a world with no Internet is unimaginable (Adelakun et al., 2020).

According to UNESCO, Information and communication technology (ICT) is defined as a technological and engineering area that uses scientific and management techniques in information handling (Ratheeswari, 2018). Hence, it uses different technologies to capture, communicate, collect, analyse, store and distribute the information needed to perform a specific task faster (Bobillier Chaumon et al., 2014; Pedagoo, 2020). It is essential to note that the outbreak of the Covid-19 Pandemic forced several higher institutions of learning in developing countries to adopt digital technology for the learning process (Adelakun & Omolola, 2020). These modern technologies promise to transform the traditional classroom into a digital classroom aimed at giving learners a more enjoyable learning experience (Garavaglia et al., 2013; Haleem et al., 2022). The emergence of computers and their related technologies commonly known as Information and





Communication Technologies (ICT) into education usher's learners into the information era and promises to broaden learners' experiences (Mandoga, Matswetu, & Mhishi, 2013).

The Government of Ghana has formulated a national ICT policy and has spent a lot of resources to make ICT education accessible to all Ghanaian students across the country (Ministry of Education, 2013). This ICT policy is backed by legal and legislative instruments and aims at integrating ICT into the Ghanaian educational system. With this policy, educational institutions in Ghana are mandated by law to integrate ICT into their curricula and to ensure that all students have access to ICT resources in school (Ministry of Education, 2008). Schools are expected to plan and facilitate the use of computers and related technologies to help teaching and learning and other activities in education in different ways. For instance, using E-learning through offline and online or browser-based applications (Mahini, Forushan, & Haghani, 2012).

In Ghana, many Senior High Schools (SHSs) are embracing computerized systems but are failing to integrate computing in the normal day classroom teaching and learning process. Alesina (2010) posits that many educational institutions around the globe have made the efforts to computerize schools, but few have developed corresponding strategies to fully integrate its use as a pedagogical tool in the classroom. Meanwhile, if ICT is properly integrated into schools, it will have seen to have numerous positive impacts on school pupils' performance and well-being. Additionally, ICT resources, including software and hardware, increase the chance of teachers integrating technology into the curriculum to enhance their teaching and learning (Delgado et al., 2015). For example, Zheng et al. (2016) found that the use of one-on-one laptop programs brought about positive changes in teaching and learning, which would not have been accomplished without the infrastructure and technical support provided to teachers.



However, limited access to technology (insufficient computers, peripherals, and software) and lack of technical support are important barriers to ICT integration (Delgado et al. 2015). Digital technologies have brought modification to the nature and scope of education and led education systems globally to adopt strategies and policies for ICT integration. This led to concerns about the effectiveness of ICT-based teaching and learning, specifically in connection with the comprehension, modification, and architecture of educational systems in line with current technology trends. Questions about digitalization in classrooms were raised by the COVID-19 epidemic, which highlighted these difficulties and hastened the introduction of digital tools in education. For instance, a lot of schools demonstrated a lack of experience and below average digital capacity, which resulted in widening gaps, inequalities, and learning losses (Timotheou et., al. 2023; Bates, 2015). Such results have engendered the need for schools to learn and build upon the experience to enhance their digital capacity and preparedness, increase their digitalization levels, and achieve a successful digital transformation.

Nonetheless, teachers are presently ready to accept the changes already happening around the world. However, there has not been a clear national agenda or direction and no related national benchmarks to meet the requirements of ICT integration in teaching (Vergel de Dios, 2016). It is the intention of this study to evaluate and describe the teachers' knowledge and attitude and how these can affect the performance of students.

1.2 Problem Statement

Most of the ICT interventions in Sub-Saharan Africa in the recent past have often centered on creating ICT presence in schools. These programmes form the basis of the bulk of ICT development and practices in most Sub-Saharan countries even though educators' and students' access to ICT is still inadequate (Agyei, 2020). Commitments have been made by policy makers



concerning ICT to make teaching and learning easier (Barakabitze, 2019; Acquah-Doughan, 2015). For instance, in the Anamuah-Mensah Committee's Report (Government of Ghana, 2004) it was discovered that it is necessary for students in the senior high school system to be exposed to technology through the use of ICT starting from the junior high school and upward. The committee suggested that ICT needs to be fused or blended into the curriculum and should be employed in the teaching and learning process.

The introduction of ICT in the teaching process has the ability to enhance the quality of teaching and learning (Kashorda et al., 2007). According to Ghavifekr (2016), Serah (2014) and Hennessy (2010), opportunities for realizing the benefits of using ICT in education face a number of challenges in developing countries. Accessing ICT facilities for teaching and learning is a challenge facing in most African countries (AcquahDoughan, 2015).

Moreover, as part of the government's effort to improve the use of ICT by schools, Ghana ICT in Education Policy was formulated in November 2008. The policy intended to create the enabling environment for realizing the vision of transforming the country in the Information Technology age (Alhassan, 2014). The government of Ghana through the Ghana Education Service (GES) also partnered rLG to train teachers in ICT to enhance IT education in schools. The education officers and heads of schools were trained on the use of ICT for administrative functions. As a result, a laptops and other computers were given to schools and teachers to facilitate administration and teaching. These initiatives were to ensure that school children in Ghana have access to ICT, which offers them opportunities to develop general skills and also improve their knowledge of ICT technology. In addition, there were many interventions put in place to train teachers in ICT as well as to provide teachers with computers and laptops.



Meanwhile, observations made in some schools in the Sagnarigu Municipal do not give the impression of schools' preparedness in terms of access by pupils and teachers to ICT resources, use of IT in teaching, improving teachers' competence in using ICT to deliver lessons and administration. Besides, no research has been sighted at Sagnarigu Municipality which looked at teachers' preparedness for using ICT resources and how this can affect students' performance. Due to this, the present study is designed to examine how teachers' knowledge on ICT and attitude for the use of ICT resources affect academic performance of pupils in the Sagnarigu Municipality.

1.3 Objective of the Study

1.3.1 Main Objective

The main purpose of this study was to assess knowledge and attitude of teachers towards ICT in teaching and learning and academic performance of pupils in the sagnarigu municipality.

1.3.2 Specific Objective

- To investigate the knowledge level of teachers on ICT in the Sagnarigu Municipality.
- To assess the attitudes of teachers towards ICT use in teaching and learning in the Sagnarigu Municipality.
- To investigate the extent to which teachers' levels of self-efficacy influence the incorporation of IT in teaching-learning in the Sagnarigu Municipality.
- To determine the association between the level of knowledge and attitudes of teachers towards ICT and academic performance of pupils in the Sagnarigu Municipality.

1.4 Research Questions

- What is the knowledge level of teachers on ICT in the Sagnarigu Municipality?

- What are the attitudes of teachers on ICT usage in teaching and learning in the Sagnarigu Municipality?
- To what extent do teachers' self-efficacy influence the in cooperation of ICT in teaching and learning in the Sagnarigu Municipality?
- What is the relationship between teachers' knowledge and attitudes towards ICT and the academic performance of pupils in the Sagnarigu Municipality?

1.6 Hypothesis

Null hypothesis (H_0): There is no significant relationship between knowledge and attitude towards ICT in teaching and learning and the academic performance of pupils in the Sagnarigu Municipality.

Alternative hypothesis (H_1): There is a significant relationship between knowledge and attitude towards ICT in teaching and learning and the academic performance of pupils in the Sagnarigu Municipality.

1.7 Significance of the Study

Findings of the present study would serve as baseline data, which may be useful in formulating and shaping existing policies and strategies by GES, Ministry of Education, NGOs and other players in education to enhance IT education in Ghana. The study would enable heads of institutions, teachers, as well as circuit supervisors, on the usage of IT in management such as staff validation, records keeping and administration. The school management would use findings from the present study to ascertain if their teachers are ready and prepared to use IT in teaching and learning. Findings from the present study will enable the school management to come up with tailored strategies which can enhance the incorporation of ICT in their schools. The findings of the

present study may also benefit basic school teachers as it will help them understand the vital role, they play in incorporating IT in teaching. From the study findings and recommendations, they may embrace change, which may enhance IT integration in instruction.

1.8 Organisation of the Study

The present study has five chapters. Chapter one, which provides the background, which is an overview of existing literature on the topic, problem statement, significance, purpose, objectives, research questions to be answered, and delimitation of the study. Chapter two provided details of the empirical and theoretical underpinnings of the topic. Chapter three presents the methods employed to conduct the research. The section described the design, the population from whom the sample was taken, sample size, how the sampling was done, the instrument for data collection, the data collection procedure, the data analysis and consideration of esthetic issues. Chapter four consists of data analysis and discussion of results. Chapter five involves conclusions, summary and recommendation.



CHAPTER TWO

LITERATURE REVIEW

2.1 Overview

The literature review will cover three main areas, which include theoretical framework, empirical review, and conceptual framework.

2.2 Connectivism Theory of Teaching and Learning

Connectivism is a newly adopted theory of teaching and learning, which was first introduced by George Siemens in 2004 (Siemens, 2005). It was further expanded by a publication of Stephen Downes (Downes, 2008). This theory supports and acknowledges the digital age. It is established on the basis that acquisitions of knowledge and learning can be sought from diverse sources and experiences, including how to understand, navigate, and source for information further through digital means. This theory is strongly influenced by technology, teachers' knowledge on technological tools and their ability to use these tools to source updated and accurate information, and learners' ability to source for information through the use of these tools. In the classroom, there is a greater likelihood of students adopting technological tools and skills employed in teaching and learning by their teachers. This would help them to adopt good digital literacy habits to help navigate online educational resources to help answer their concerns.

2.3 Self-Determination Theory (SDT) of Academic Performance

Self-determination theory (SDT) of academic performance was introduced in the 1980s by psychologists Edward Deci and Richard Ryan. This theory adopts a multidimensional approach to motivation. It emphasizes that autonomous actions are initiated by personal volition and sense of choice while external and internal pressures regulate controlled actions. When teachers are intrinsically motivated to adopt ICT in teaching and learning, it automatically enhances students'



appreciation of the digital tools and the implications they would have on their academic performance. With significant implications for educational policies and practices in both in-person and online learning, SDT provides a theoretical foundation for motivation and well-being (Ryan & Deci, 2020). This concept distinguishes between autonomous and regulated motivation. An autonomously motivated person may feel in charge of their own life and have a sense of direction, in contrast to a controllably driven person. The concept takes into account the innate human propensity to seek happiness, health, development, and advancement in a social context. This theory posits that three basic psychological needs relatedness (feeling warm and connected), competence (feeling competent), and autonomy (feeling like they have options and a sense of ownership)—are what drive people to take action. An individual's autonomy, competence, and relatedness can all be supported in surroundings that provide high-quality motivation for more participation. When all three needs are satisfied, people can be strong and productive; if not, they could feel empty, alone, and helpless, thereby affecting teaching and learning.

2.2 Empirical Review

This section includes relevant research on meaning of ICT Integration in Education, Policy on ICT Education in Ghana, Benefits of ICT Use in Education, the knowledge and attitudes of teachers and how that can affect the incorporation of IT in teaching and learning, the extent to which teachers' levels of self-efficacy influence the incorporation of IT in teaching-learning. It also examines the literature on how teachers' knowledge and utilization of IT could impact pupils' performance. The utilization of IT in teaching has become essential, because it presents opportunities for students to learn how to work in an information age. The investigation to identify barriers to ICT utilization in education may aid teachers in overcoming those barriers and support students in becoming successful technology adopters in the future. The availability of computers



per say does not improve ICT integration in education although, a step in the right direction. Granger, Morbey, Motherington, Owston & Wideman (2002) posited that successful implementation of ICT integration in education is a complex process, determined by pedagogical values, attitudes, curricular needs and physical infrastructures. Educators themselves assert that the integration of ICT into the classroom will significantly enhance learning experience (Sutherland, Robertson & John, 2004). The growth of ICT itself dictates that in order for students to adjust to modern society and the global economy, the way in which they are taught and what they are taught, requires adjustments to and around ICT (Watson, 1999). Balanskat, Blamire & Kefala (2006), however argue that although educators appear to acknowledge the value of ICT, difficulties continue to be encountered in adopting and integrating such technologies.

Educators thought that their lessons would stick with their students for the rest of their lives a generation ago. The schools of today have to train students for careers that are yet to be invented, technology that has not yet been generated, and issues that we have yet to discover the answers to because of the rapid changes in the economy and society. These technologies have not just become tools of learning, but networking and knowledge sharing, as well as innovation and entrepreneurship (Schleicher, 2019). Bajcsy (2002) said that computer technology can serve as an enabler in teaching and learning to help organize and provide structure for material to students, help students and teachers interact anytime and anywhere and facilitate and assist in the authentication and prioritization of Internet material, simulate, visualize, and interact with scientific structures, processes, and models and help in learning history and depicting future trends (Sharply, 2010).



Majority of ICT interventions in Sub-Saharan Africa in recent past have often centered on improving access in schools. These interventions form the basis of the bulk of ICT development and practices in most Sub-Saharan countries even though educators' and students' access to ICT is still limited (Agyei, 2020). Schools use a diverse set of ICT tools to communicate, create, disseminate, store, and manage information (Siraj-Blatchford & Siraj-Blatchford 2006) In some contexts, ICT has also become integral to the teaching-learning interaction, through such approaches as replacing chalkboards with interactive digital whiteboards, using students' own smartphones or other devices for learning during class time, and the "flipped classroom" model where students watch lectures at home on the computer and use classroom time for more interactive exercises. ICT use is bringing about rapid changes in society (Acquah-Doughan, 2015). The utilisation of ICT is impacting every part of life, in his opinion. At schools, the effects are becoming increasingly noticeable. ICT gives teachers and students greater flexibility to customize instruction to meet the needs of each learner, which explains why. Similarly, Tinio (2002) suggested that ICT potentials are expanding access and enhancing the quality and relevance of education. IT use is hailed as a potentially formidable enabling instrument for reforming and changing education (Acquah-Doughan, 2015). ICT is utilized to increase educational quality, increase accessibility to education, and make instruction and acquisition of an ongoing procedure that is tied to real life, according to Acquah-Doughan (2015). Hakkarainen et al. (2010), on the other hand, noted that ICT is a transformative instrument and that using it in the classroom is essential to preparing children for the information they will receive. With the use of ICT, education can move from a traditional teacher-centered approach to one that involves active student participation and is learner-centered (Voogt, 2008; Voogt & Pelgrum, 2005; Voogt, 2010). This



exposes the new, cutting-edge, and comprehensive constructivist method of teaching, in which the teacher's responsibility is to set up the classroom and allow pupils to take charge of their education.

Computer technologies and other aspects of digital culture have changed the ways people live, work, play, and learn, impacting the construction and distribution of knowledge and power around the world (Joyce, 2014). Graduates who are less familiar with digital culture are increasingly at a disadvantage in the national and global economy. Digital literacy, the skills of searching for, discerning, and producing information, as well as the critical use of new media for full participation in society, has thus become an important consideration for curriculum frameworks (Joyce, 2014).

The integration of ICT into the classroom is promoting digital knowledge in many nations. ICT for education is frequently used in Moodle, Zoom, Blackboard, and Google. For many people worldwide, the classroom is an essential part of their daily lives. Early in the 1990s, when microcomputers were widely accessible in the consumer sector, it gained popularity in education. It was anticipated that computers would raise educational standards and improve teaching and learning (Amanortsu et al., 2013). ICT has the enormous potential to support the growth process in the current economic and information system by facilitating the acquisition of pertinent life skills, as noted by Hennessy, Ruthven, and Rindley in 2005. According to the National Council for Curriculum and Assessment in Ireland (NCCA) (2004), technological proficiency is essential for advancements in employment, leisure, and education. They added, "People's lives are becoming more and more reliant on technology, and this trend is predicted to continue to the point where being technologically literate will be a necessary skill for people in their personal, professional, and social lives."



ICT is used for education as well as in education. In the view of Acquah-Doughan (2015), the use of ICT is making dynamic changes in society. According to him, ICT use is influencing all aspects of life. The influences are felt more and more at schools. This is so because ICT provide both students and teachers more opportunities in adapting learning and teaching to individual needs. In a similar vein, Tinio (2002) indicated that the potentials of ICT are increasing access and improving relevance and quality of education. The use of ICT is touted as a potential powerful enabling tool for educational change and reform (Acquah-Doughan, 2015). According to Acquah-Doughan (2015), ICT are used to expand access to education, strengthen the relevance of education and raise educational quality to make teaching and learning an active process connected to real life. In turn, Hakkarainen et al., (2010) observed that ICT is a transformational tool and its use in the school system is necessary to prepare students for the information society they will inherit. The implementation of ICT in education is to transform the teaching and learning process from the traditional instructional teacher-centered endeavor to a learner-centered approach with active participation of the learner (Voogt, 2008; Voogt et al., 2013). This brings to bear the evolving, modern and far-reaching constructivist pedagogy to effective teaching where the role of the facilitator is now to organize the classroom and facilitate lessons by giving students more opportunities and control over learning. Constructivism is based on the belief that learning occurs when students are actively involved in the process of knowledge construction upon their previous knowledge as opposed to passively receiving information. It is therefore paramount to make students the makers of meaning and knowledge. In the view of Voogt (2008), constructivism is based on the assumptions that knowledge is constructed from experience and learning is a personal interpretation of the real world, and learning is an active process in which meaning is developed on the basis of experience. The notion is that people learn better through the use of technology or



multimedia compositions than through traditional methods of teaching (Cheng, Cheng & Chen, 2012; Eady, 2013). Mishra and Koelher (2006) emphasizes that ICT can be used to support the content and pedagogic knowledge of the teacher for effective educational practices in the classroom. Research has shown that the absence of efficient ICT development policies in most African countries has widened the information gap between the developed and the developing countries in the world (UN, 2001). There are some factors that influence teachers use of ICT in teaching. The factors influencing the use of ICT in the teaching and learning process have been identified by researchers. Rogers (2003) mentioned technological characteristics or attributes as factors that influence teachers' decision to use ICT. In a similar vein Stockdill (2012) also revealed user characteristics, content characteristics, technological considerations and organisational capacity as factors influencing ICT integration into teaching and learning. According to Acquah-Doughan (2015), the teaching of social studies can be improved by the use of ICT to compose, document and present issues. Producing reports using ICT tools in social studies topics is greatly motivational for students (Duah, 2018). According to Duah (2018), students enjoy adding graphics photographs, pictures and other information about a topic to reports they write on social studies topics. A whole range of graphical information, including diagrams, photographs and other pictures is readily available on the internet for teachers to use in their teaching. The use of ICT in Ghanaian schools is generally increasing and growing. However, while there is a great deal of knowledge about how ICT are being used in high schools in developed countries, there is not much information on how ICT are being used by teachers and students in Ghanaian schools (Acquah-Doughan, 2015). There is also an assumption that there are wide gaps in the use of ICT between rural and urban high schools (Aduwa-Ogiegbaen & Iyamu, 2005).



Enormous advantages for educational systems would result from the successful integration of computers and related technology. Nonetheless, Ghana experiences numerous obstacles in the course of achieving such integration (Mubashir-Ahmed, 2009). It is indisputable that using ICT in education can raise people's standards of living through instruction and learning. Notably, all elementary schools require ICT services to operate effectively and efficiently, whether in wealthy or developing nations. This can be accomplished by providing and making ICT resources available to all schools. The state of basic education in Ghana's districts, towns, and urban areas is unknown, though. Therefore, it is essential to improve policy formulation and execution if all basic schools have ICT facilities to support IT education and teaching in rising districts like the Sagnarigu district in northern Ghana.

The use of Computers in the learning environment will assist schools in designing lessons that let learners build their own understanding and enhance problem-solving skills via directed inquiry, visualization, modeling, manipulation, and innovative thinking (Eickelmann & Vennemann, 2017). Teachers need to be ready to embrace the new paradigm in teaching and learning brought about by technology integration as change agents and learning facilitators in the classroom (AvidovUngar & Shamir-Iqbal, 2017). In summary, for the incorporation of technology in education to be achieved effectively, every participant involved in the endeavor has to work together and take part (Roblin et al., 2018; Hero, 2019). While there are benefits and potential for the incorporation of ICT in education, teachers' readiness and acceptance of the technology, as well as its application, appear to be developing slowly in relation to achieving the objectives of education. ICT integration into teaching and learning is a complicated process that requires planning if learning is to be more productive and meaningful. According to Ramirez-Montoya, Mena, and Rodriguez-Arroyo (2017), instructors' digital competency and preparedness to use ICT

in the classroom become recognized as critical elements that are essential to the development of practical educational expertise that improves students' learning. But instructors' use of ICT in the classroom also seemed to be a significant factor in the advancement of ICT integration in education.

For example, Condie and Munro (2007) showed that ICT can support pupils with additional or special educational needs, even though the interventions were relatively small scale and largely based on qualitative data, their findings revealed that the use of ICT in teaching enabled the development of communication, participation, and self-esteem. In the recent past, a meta-analysis (Baragash et al., 2022) showed in a particular study with 119 participants with different disabilities a significant overall effect size of AR on their functional skills acquisition. Koh's meta-analysis (2022) also revealed that pupils with intellectual and developmental disabilities enhanced their skills and performance when they used digital games in the lessons. Besides, evidence available shows that ICT increases and formalizes cooperative planning between teachers and cooperation with managers, which in turn has a positive impact on teaching practices (Balanskat et al., 2006).

According to Wei et al., (2015), Malaysian educators are largely in favor of using ICT in the classroom. Teachers must embrace technology use in the classroom and use innovative ways to incorporate 21st-century skills to ensure that the introduction of technology in the classroom is successful (Pultoo et al., 2020). Educators further perceived ICT readiness as a component of digital competency that addressed attitudes or beliefs. Per Instefjord and Munthe (2017), conventional ideas of the subject matter—specifically, how prepared one feels—have an impact on instructors' attitudes and readiness to use ICT in the classroom. Furthermore, Rokenes and Krumsvik (2016) discovered a strong correlation between teachers' preparation and the use of electronic devices in the classroom. ICT serves as an enabler, providing educators and learners

with a variety of options to promote dialogue and engagement (Pultoo et al., 2020). The use of Computers in the learning environment will assist schools in designing lessons that let learners build their own understanding and enhance problem-solving skills via directed inquiry, visualization, modeling, manipulation, and innovative thinking (Eickelmann & Vennemann, 2017). Teachers need to be ready to embrace the new paradigm in teaching and learning brought about by technology integration as change agents and learning facilitators in the classroom (AvidovUngar & Shamir-Iqbal, 2017). In summary, for the incorporation of technology in education to be achieved effectively, every participant involved in the endeavor have to work together and take part (Roblin et al., 2018; Hero, 2019). While there are benefits and potential for the incorporation of ICT in education, teachers' readiness and acceptance of the technology, as well as its application, appear to be developing slowly in relation to achieving the objectives of education.

2.4 ICT Integration in Education

In recent decades, ICT has become a transformative force in education, changing the way knowledge is disseminated and acquired. The integration of ICT in education has a rich history that dates to the mid-20th century when early computer-assisted instruction programs laid the foundation (Baako & Abroampa 2023). Over the years, the discovery of personal computers, the internet revolution, and the evolution of mobile technologies have accelerated this integration, culminating in the 21st century's varied and interconnected digital learning environment (Voogt et al., 2013). The integration of ICT in education has modified teaching and learning processes, presenting new opportunities to improve educational experiences and outcomes (Curran et al., 2015). As technology advances, the attention on the use of ICT in education has increased among researchers, policymakers, and educators worldwide (Al-Mamary, 2020). Understanding

the global research trends and directions in ICT integration in education is crucial for identifying the progress made in this field and guiding future research and practice.

2.5 Policy on ICT Education in Ghana

The government of Ghana is committed to the transformation of the agro-based economy of Ghana into an information-rich and knowledge-based economy and society using the tools of Information and Communication Technology (ICT). The government of Ghana has acknowledged the need for ICT training and education in the schools, colleges and Universities and the improvement of the education system as a whole. The integration of ICT into education will lead to the creation of new options for learners and teachers to engage in new ways of information acquisition and analysis; ICT will improve access to education and the quality of education delivery on an equitable basis. The government is therefore committed to a comprehensive programme of rapid development and utilization of ICT within the education sector to modify the educational system and thereby improve the lives of our people (Ministry of Education 2013). The government desires that through the development of ICT, in education, the culture and practice of traditional memory-based learning will be transformed to an education that stimulates thinking and creativity necessary to meet the challenges of the twenty-first Century (C21). Given the magnitude of the task ahead, the government enjoins both the public and private sector to join hands to ensure that our children receive high quality teaching and learning (Ministry of Education, 2006).

The ICT policy statement of the Ministry on ICT is an epitomized version of the ultimate goal to transform the educational system. It is designed to provide a picture guide of the process of the deployment and exploitation of ICT within the framework of the national ICT division. The Ministry of Education and its agencies such as Ghana Education Service at the Regional and District levels are responsible for the administration and implementation of the provision and the



delivery of education and training at all levels within the education system of Ghana. They also have a responsibility to systematically promote the development of all approved and recognized competing individuals, groups and nations as well as providing realization and pleasure and improve on the health and general well-being of Ghanaians.

2.7 Information and Communication Technology in Teaching

Information and Communication Technology in Teaching, the British Educational Communications and Technology Agency (BECTA, 2004) in its definition defined information and communication technology (ICT) as a technique people use to share, distribute and gather information and to communicate through computers and computer networks. Yunus (2007) described ICT as a complex, varied set of goods, applications and services used for producing, distributing, processing, transforming information (including) telecoms, TV and radio broadcasting, hardware and software, computer services and electronic media. Adeleke (2005) and Agba, Kigongo-Bukenya and Nyemba (2004) viewed ICT as a cluster of associated technologies defined by their functional usage in information access and communication. ICT could be viewed as a set of activities which is facilitated by electronic means. It could also mean the processing, transmission and display of information via electronic means. The various kinds of ICT products available and having relevance to education, such as teleconferencing, email, audio conferencing, television lessons, radio broadcasts, interactive radio counselling, interactive voice response system, audiocassettes and CD ROMs and many others have been used in education for different purposes (Sharma, 2003; Sanyal, 2011; Bhattacharya & Sharma, 2007). ICT as tools within the school environment include use for school administration and management, teaching and learning of ICT related skills for enhancing the presentation of classroom work, teaching/learning tasks and





problem-solving skills, stimulating creativity and imagination (Pennington, 2016). Availability and use of ICT to teachers in schools will determine the role that ICT play in the classroom. Murdock and Desberg (2014) observed that teachers can use ICT tools to share and have access to information to support students learning. Candau (2013) reveal that access to ICT tools for teaching can ignite students' thoughts and eventually move them towards a better learning experience. The integration of ICT tools in teaching can motivate teachers and students in their teaching and learning respectively. The use of ICT can help to improve and develop the quality of education by providing curricular support in difficult subject areas (Acquah-Doughan, 2015). To achieve this, teachers need to be involved in collaborative projects and development of intervention change strategies, which would include teaching partnerships with ICT as a tool for teaching. According to Zhao and Cziko (2011) three conditions are necessary for teachers to introduce ICT into their classrooms: Teachers should believe in the effectiveness of technology, Teachers should believe that the use of technology will not cause any disturbances, and Teachers should believe that they have control over technology.. Cowie, et al. (2008) found that teachers and students experience have been improved when working using ICT tools. UNESCO (2007) is of the view that adopting ICT into the educational systems has the potential of increasing the quality of education delivery as well as facilitating greater access to information and services by marginalized groups and communities. Therefore, when used effectively, ICTs could: Make education easier, cheaper to access and free of the limitation of distance. Result in better academic performance due to changes in teaching and learning. Studies have also demonstrated that ICT use in teaching and learning can result in effective literacy gains. There is empirical evidence that students, who are having difficulties with reading, can be motivated and engaged through the use of ICT (Lynch, Fawcett & Nicolson 2010; O Murchú, 2010; Segers & Verhoeven, 2002).



Information and Communication Technology is one of the foremost technologies among the modern technologies that serve an important role in every aspect of human endeavor. It has seen a tremendous improvement over the years which makes teaching and learning friendly and more pleasant, and has enhanced the ways people live, learn, work, and play. Consequently, the internet has been an important tool to the present information society, and a world with no internet is unimaginable (Adelakun et al., 2020). Ghana like many other countries in the world believes that ICT can play a significant role in preparing individuals in school for the job market and ensuring social, political, and economic development in the country (Peprah, 2016; Abdallah et al., 2021). Therefore, developing countries have the responsibility not to only provide computers for schools, but also to cultivate a culture of acceptance amongst the end user of these tools. Unless teachers cultivate positive attitudes towards the technology, they may simply ignore them. Cuban (2001) indicates that technology will always play a major role in the 21st century and more than ninety percent of jobs created now will require advanced technological training. He further explains that for students in this generation to compete for future jobs, they must acquire adaptive skills in the use of information and communication technology. Information and Communication Technology (ICT) can be a diverse set of technological tools and resources used to communicate, and to create, disseminate, store, and manage information (Victoria, 2002).

Nonetheless, a lot of nations, particularly those that are part of the developing nations, deal with similar issues and challenges related to ICT in education. According to Chai et al., (2011), instructors' readiness and usage of ICT for information transmission is more frequent and greater in comparison to the previously indicated encouraging advantages. Barriers include difficulty in utilization, reluctance to modify and its acceptability, shortage of training and time, and lack of

technical support, which were made clear by the inclusion of ICT. Furthermore, Rolands (2010) found that teachers' willingness to incorporate technology into the classroom was lowered by an increased time commitment, a lack of support, a lack of suggestions, adverse conditions at work, and uncompensated labor. As a result, Turel and Johnson's (2012) research showed that technical issues may potentially provide significant obstacles for educators. These issues involve breakdowns of equipment, viral attacks, and inadequate connectivity. Although electronic devices may develop society, particularly in education, there are obstacles and challenges for teachers. More attention needs to be paid to acceptability and readiness in order to properly integrate ICT into the teaching-learning process. The coronavirus illness of 2019 (COVID-19), which is affecting more countries globally, has altered society, particularly in the field of education. In the Philippines, the Department of Education (DepEd) urges educators to make the most of ICT in the classroom in order to protect students from virus threats and to further their education.

2.9 Importance of ICT in Education

Educational institutions can use specific websites to make learning resources available online all the time. Some schools do not even require students to be physically present at all times. Virtual classrooms have been successful due to improved internet accessibility. The significant barriers of time and distance are rendered almost redundant in such virtual classrooms. However, the benefits of ICT use in the classroom depend on the extent of ICT integration in education (Condic, Munro, Seagraves & Kenesson, 2007). Dawes (2001) asserts that new technologies could support education across the entire curriculum, providing innovative opportunities for effective communication. ICT in education has undoubted potential, to be influential in changing teaching methodologies. Condie and Munro (2007) conclude that the use of ICT has had positive effects in

a number of subjects, as well as being constructive in assisting students that are marginalized as a result of personal or familial issues.

According to Adelakun, Najeem Olawale, Omolola, Samuel A., & Adebola, Matthew Saint. (2022), Benefits of Information and Communication Technology to Students It is worthy of note that the use of ICT gives students a better understanding and enhances their retention capability by using different information technology tools such as videos, graphics, animation, etc. in a complete and entertaining way.

2.10 Knowledge Level of Teachers on ICT

The integration of (ICT) in education has become a significant focus for educational researchers, policymakers, and practitioners. As ICT continues to evolve, understanding teachers' knowledge levels regarding its use is crucial for effective technology integration in the classroom. This review synthesizes recent literature on teachers' ICT knowledge, exploring factors influencing their proficiency, the impact of their knowledge on teaching practices, and emerging trends. Recent studies indicate a growing awareness among teachers about the benefits of ICT in education.

Teachers acknowledge the potential of technology to enhance student engagement and learning outcomes (Tondeur et al., 2017). However, there is notable variability in teachers' proficiency levels, which can significantly impact their ability to effectively integrate ICT into their teaching practices. Factors such as prior experience with technology, age, and individual attitudes towards ICT play a role in these discrepancies (Higgins & Moseley, 2018). Professional development programs are pivotal in bridging the gap between teachers' ICT knowledge and its practical application. Research highlights that teachers who engage in ongoing training and professional development tend to exhibit higher levels of ICT competence and confidence (Ertmer &



Ottenbreit-Leftwich, 2016). Such programs often focus on not only technical skills but also pedagogical strategies for integrating ICT into lessons.

Access to effective training and support is a major determinant of teachers' ICT knowledge. Studies have shown that teachers with access to quality training and technical support are more proficient in using ICT tools (Wang et al., 2020). Conversely, limited training opportunities and inadequate support can hinder teachers' ability to utilize ICT effectively. The availability of technological resources within schools also influences teachers' ICT knowledge. Schools equipped with modern ICT infrastructure enable teachers to experiment with and adopt new technologies more readily. Research indicates that resource-rich environments foster better integration of technology in teaching (Wang et al., 2020).

Teachers with advanced ICT knowledge often employ a diverse range of digital tools to enhance instructional methods. These tools include interactive whiteboards, educational software, and online resources, which can facilitate more interactive and engaging learning experiences (Mouza et al., 2016). Studies suggest that such integration can lead to improved student outcomes and greater engagement. Despite their knowledge, teachers frequently encounter challenges in integrating ICT into their classrooms. Common barriers include technical issues, lack of time for preparation and implementation, and resistance to change (Liu et al., 2019). Addressing these challenges requires a multifaceted approach involving technical support, time management strategies, and fostering a positive attitude towards technology.

The rapid advancement of emerging technologies, such as artificial intelligence and virtual reality, has introduced new opportunities and challenges for teachers. Recent research indicates that while these technologies hold promise for enhancing education, teachers' knowledge about them is still



developing (Johnson et al., 2021). This highlights the need for targeted professional development to keep pace with technological innovations.

The COVID-19 pandemic has accelerated the adoption of remote learning tools, significantly impacting teachers' ICT knowledge. Many teachers have had to quickly adapt to online teaching platforms, leading to a notable increase in ICT skills out of necessity (Zhang et al., 2022). The pandemic has underscored the importance of flexibility and adaptability in teachers' ICT competencies.

Teachers' knowledge of ICT is a critical factor influencing the effective integration of technology in education. While awareness of ICT's benefits is widespread, proficiency levels vary significantly among teachers. Professional development, access to resources, and ongoing support are essential for enhancing ICT knowledge and usage. Emerging technologies and the impact of recent global events, such as the COVID-19 pandemic, further emphasize the need for continuous learning and adaptation in the field of educational technology.

2.10.1 Teacher's Attitudes towards ICT Integration in Teaching-Learning

The use of IT as a teaching tool is perceived to have beneficial effects on teaching and learning, although, in developing countries, many schools are ill-prepared in terms of IT facilities and teachers' competencies in using IT. For example, a study conducted by Ndibalema (2014) shows that although educators were in favor of using ICT as a teaching tool, they were not proficient at incorporating it into their lessons. Besides, Mustafina (2016) looked at how the views of teachers affected the use of computers in a secondary school in Kazakhstan and discovered that instructors' positive attitudes about ICT in the classroom are largely a result of the benefits that technology provides, like distance learning and content visualization





2.11 Teachers' Teaching Experience and ICT Integration in Teaching-Learning

Teachers' perspectives toward the use of ICT in the classroom are mostly unknown, even though the government is dedicated to ensuring that ICT is integrated into primary school instruction by supplying teachers with ICT devices. To guarantee that ICT is effectively integrated into the basic schools' curriculum, it is imperative to look into teachers' knowledge and attitudes regarding the technology. Literature on the relationship between teachers' experience and the use of ICT in teaching is conflicting. For instance, a study conducted in Malaysia by Researchers Kamaruddin, Abdullah, Idris, and Nawi (2017) demonstrated that teachers' ICT integration is still at a low level. They further demonstrate that most experienced teachers regularly use ICT for personal purposes rather than for classroom instruction.

2.12 The Self-Confidence of Teachers and their use of ICT in Teaching and Learning.

Self-confidence is an important determinant in determining the use of new technology such as ICT in cooperation in to teaching as demonstrated by several studies. For example, the study by Robertson and Al-Zahrani (2012) which examined ICT integration and self-efficacy in Saudi Arabia show that participants' opinions of their own efficacy as university lecturers rise with computer experience. These results suggest that improving pre-service teachers' access to, training in, and experience with computers and ICTs will help to improve their self-efficacy, motivation, and computer habits (Robertson and Al-Zahrani 2012). Besides, another study by Roussos, Yotsidi, and Tountopoulou (2015) investigated self-efficacy and trainee teachers' intentions to include ICT use into their teaching practice and they observed that trainee teachers with poor self-efficacy on ICT poorly utilized ICT in teaching. Moreover, in Mongolia a study to establish the correlations between two forms of education, teacher training activities and practical ICT experience at the school level, and three types of perceived self-efficacy (confidence, competency, and satisfaction),

by Yamamoto and Yamaguchi (2016) concluded that among teacher training activities, the perception of the impact of in-school ICT trainings had the highest association with ICT use.

2.13 Conceptual Framework

A conceptual framework will be developed to show the relationship between the dependent variables and independent variables of the study.

The conceptual framework below (figure 1) defines how the attitudes, experiences, and self-efficacy levels of teachers influence the outcomes and the incorporation of IT into the educational process. According to the conceptual framework, teachers who possess a positive attitude towards IT, skillful in IT and with high level of self-efficacy will be able to use IT to prepare and present instructional materials, access e content using internet and other educational reference materials, use appropriate education software in the classroom, create technology-enhanced learning activities for students, email parents and other teachers, and maintain electronic student attendance register and performance records. As a result, there will be quality instruction, increased access to education, effective delivery of curriculum, high academic performance among learners, enhanced creativity and critical thinking of pupils, low repeating rates among pupils, quality learning, improved pupils' information literacy skill, improved learners' autonomy, increased engagement with parents, innovative and pupil-centered learning environments in primary schools. In all, this will improve the academic performance of the students



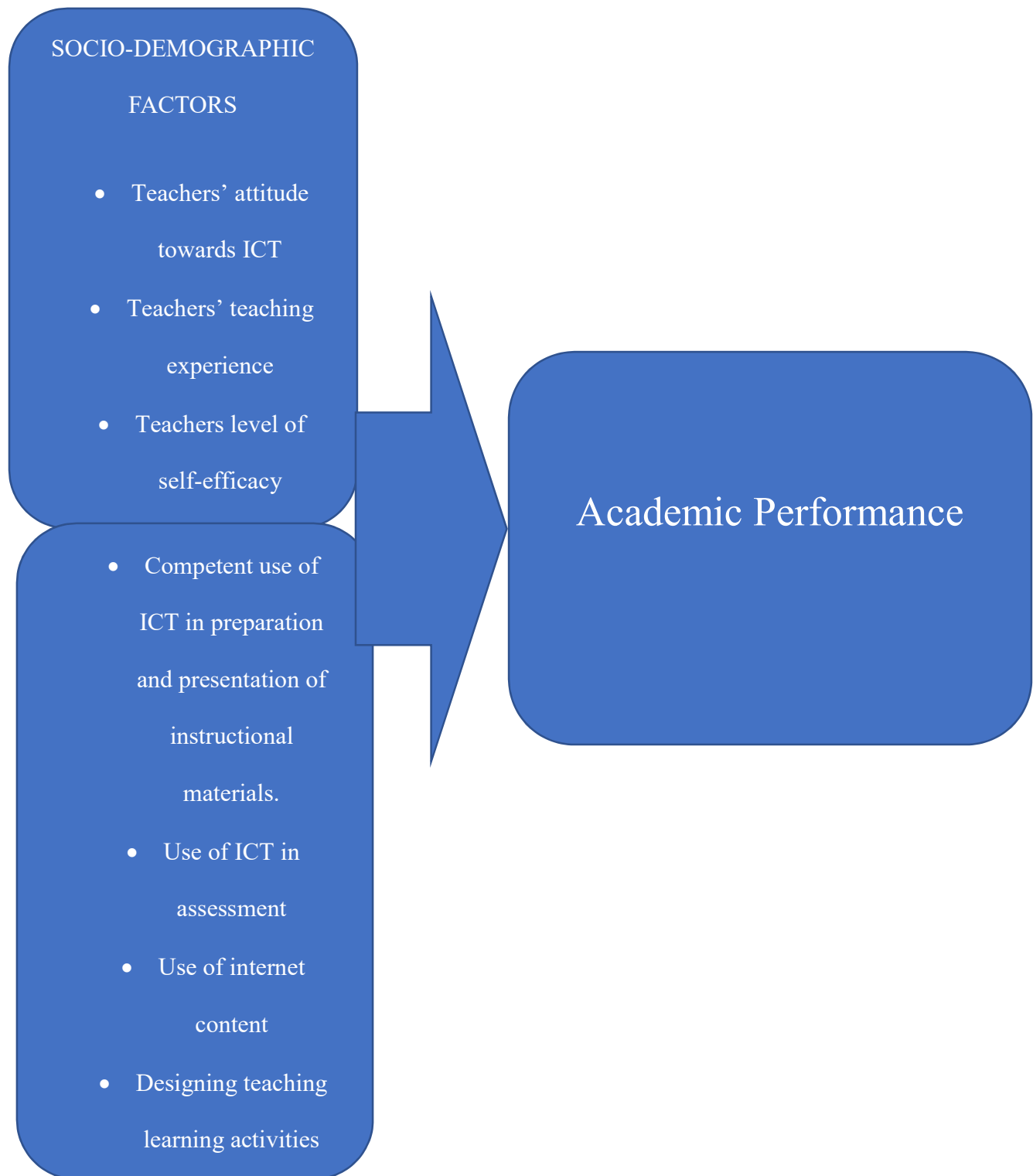


Figure 1: Conceptual Framework

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Overview

The processes and procedures, which were followed to carry out this study, constitute the research methodology (Kusi, 2012). This entails the research philosophy, approach and design that provides direction of the study. It also includes the study population, sampling procedure, research instrument, data collection and analysis.

3.2 Study Area

The present study was conducted in the Sagnarigu Municipal. The municipality was carved from Tamale and inaugurated at their various locations simultaneously on the 28th June, 2012 by Legislative Instrument (LI) 2066. The Municipality lies between latitudes 9°16' and 9° 34' North and longitudes 0° 36' and 0° 57' West with its Administrative capital Sagnarigu and covers a total land size of 200.4km². The Municipality shares boundaries with the Savelugu Municipal to the north, Tamale Metropolis to the south, Tolon District to the west, and Kumbungu District to the northwest. The population of Sagnarigu Municipality in Ghana in 2021 was 341,711, according to the 2021 population and housing census. This included 170,199 males and 171,512 females. The schools that took part in the study included Sagnarigu model, Bishop R/C, Jisonayilli, Kamina Barack, Katariga M/A, Kalpohini kamariya, Nmanayili Ulumdinayat, Gumani Hassani, Dimala AME Zion, Namandu Aziiziya islamic

3.3 Study Design

The study will employ cross-sectional survey design to guide the conduct of the study because it will enable the researcher to determine the exposure and outcome at the same time. In all, the





design will enable the researcher to get a cross section of the situation (schools' preparedness towards IT education). The data will be generated using a survey in the form of a questionnaire. Research designs are procedures for collecting, analyzing, interpreting, and reporting data in research studies which guide the methods decisions that researchers must make during their studies and set the logic by which they make interpretations at the end of their studies (Morse & Niehaus, 2009). The design refers to the overall structure or plan of the study (Singleton & Straits, 2010). Szapkiw (2012) also indicated that research design guides decisions that the researcher needs to make about how to go about research. The design used for the quantitative study was the cross-sectional survey using structured questionnaires to collect the data. According to Scheuren (2004), the term survey mostly represents a process of collecting information from a section of individuals. The basic idea of a survey is to measure variables by asking questions and examining the relationships among the measures (Singleton & Straits, 2010).

3.4. Theoretical Framework

The Technological Acceptance Model (TAM) developed by Davis (1988) will be used as the main theory to guide the study. Regarding this paradigm, perceived usefulness and ease of use are the two primary elements that influence an information system's acceptability. The Model states that the attitude of an individual towards using a system and his or her sense of its usefulness both influence his/her behavior intention, which in turn predicts how the system is used. Further, the theory states that an individual's use of a system is not solely dependent on his attitude, but also by the potential effects it could exert on his performance. Thus, even if an employee is not in favor of an information system, there is a good chance he is going to utilize it if he believes it would help him function better at work. Furthermore, how the individual perceives



the usefulness and perceived ease of use are directly linked, according to the hypothesis. The user-friendly system will be more beneficial to him when two systems have identical features. The aspects that will direct this study include people's attitudes about using a system, perceived utility, and perceived ease of use. If educators believe that ICT is user-friendly and meets what they need or their students' needs, they are more inclined to employ it. Teachers' actions designed to incorporate IT into the educational process will be determined by their attitude toward its use. According to this study, teachers' preparedness for the implementation of IT in public primary schools might be improved if they have a favorable attitude toward using technology and if they think that incorporating it could result in high-quality instruction and success for pupils.

3.3.1 Study Approach

The study used mainly a quantitative approach. According to Kuranchie (2021), quantitative studies mainly provide numerical measurements of facts or data on specific constructs. The quantitative approach enabled the researcher to gather data from a large group of people using a structured instrument. It will help to generalise the findings that will be obtained from the study. Data was collected essentially at one point in time from a sample or cross section of respondents chosen to represent the target population in a cross-sectional survey (Singleton & Straits, 2010), and it examined the relationship between variables of interest as they exist in a defined population at a single point in time or over a short period. However, quantitative data does not provide an in-depth description of the experience of the respondents (ACAPS, 2012).

3.3.2 Research Philosophical Paradigm

This study will employ a positivist research paradigm to objectively investigate the relationship between teachers' ICT knowledge/attitudes and pupils' academic performance in Sagnarigu Municipality. Building on Kelly and Cordeiro's (2020) conceptualization of positivism as a



framework for empirical observation, this approach enables systematic measurement of variables through standardized instruments while acknowledging positivist refinements about potential researcher biases. The paradigm aligns with the study's goal of identifying measurable patterns through quantitative data collection methods like structured surveys and academic performance metrics, allowing statistical analysis of correlations between ICT integration variables and learning outcomes.

Within this framework, the researcher maintains methodological detachment through predefined hypotheses and controlled operationalization of key constructs like "ICT competence" and "academic achievement". Quantitative tools will be prioritized to collect numerical data on teachers' digital literacy levels, frequency of ICT usage in lessons, and pupils' standardized test scores, ensuring replicability and generalizability of findings. However, recognizing post positivist critiques about absolute objectivity, the study incorporates triangulation through multiple data sources (teacher surveys, pupil assessments, and classroom observation checklists) to enhance validity. This blended approach adheres to positivism's emphasis on hypothesis testing through deductive reasoning¹, while adopting post-positivism's guarded realism about the interpretative nature of social phenomena.

The paradigm's axiomatic commitment to value-neutral inquiry positions the researcher as an external analyst using statistical software to identify predictive relationships rather than subjective interpretations. This methodology particularly suits the study's focus on quantifying how specific ICT training interventions might causally influence pedagogical effectiveness and subsequent academic performance, consistent with positivism's application in evidence-based educational research.

3.4 Study Population

The study targeted teachers of the Junior High School schools, including head teachers of the selected schools in Sagnarigu Municipality. The schools are put in circuits of 11. Total number of primary schools in the district is 143 and that of Junior High Schools is 82. Therefore, the district has a total number of 225 schools. The total number of students in the junior high is 16,401 in the district. This number comprises males (8080) and females (8321). The district also has a total population of trained teachers of 1,155 and that of untrained teachers of 31

3.5 Sample Size Determination

In all, 210 teachers were used to carry out the study. However, head teachers were automatic participants. Since the number of teachers in the district is huge, a sample size for the study was estimated using Yamen's formula. $n = N / (1 + N * e^2)$ Where N=total population of teachers in Junior High Schools in the district (1186); e= is the degree of precision (5%) at a 95% confidence interval. Eventually a minimum sample size of 210 was obtained, which was increased to 309 in order to cater for nonresponses/spoil/incomplete questionnaire and to enhance the power of the study.

3.6 Sampling Techniques

Out of 86 schools, 42 schools were randomly selected for this study. Simple random sampling was used to select 5 teachers each from the 42 schools. A piece of paper was used to write the names of the schools from 01 to 86 in a container. Two people were made to choose either Yes for the picked-out school or No for the left-out school. In the selection of the teachers and the heads of the schools, Simple random sampling technique was used. Teachers' attendance chart was used in the selection process. In the chart, teacher's names were written and numbered based on the total number of teachers in the school. A piece of paper was then used to write the names of the teachers from 01 up to total number in each school and also indicating Yes or No at the same time on each

name. Two people were made to pick out a piece of paper one by one, either Yes or No paper. Those who picked “yes” were included in the study and those who picked “no” were excluded from the study.

3.7 Research Instrument

Given the tenets of quantitative research, the data collection was done using a structured questionnaire. The questionnaire was categorized into five sections or parts. The first part of the questionnaire was used to generate socio-demographic characteristics of the participants while the second part was used to generate data on the teachers’ ICT knowledge and skills. The third part covered the availability of ICT resources in the basic schools, the fourth part generated data on challenges that the teachers encounter in the use of ICT in the teaching and administration of JHS schools, while the fifth part contained a checklist that catalogued ICT resources available in the schools and academic performance of students.

3.8 Study Variables

3.8.1 Dependent Variable

Academic Performance of Students: Academic performance in this study was assessed using students' results in the Basic Education Certificate Examination (BECE) for the year 2022 as a proxy of students’ performance as it was the only standardized measurement available. This evaluation focused on the overall performance of schools in the examination, particularly concerning the number of subjects that students passed. The 2022 BECE results summary captured individual schools and the percentage of students who passed individual subjects in individual schools. The assessment criterion was based on the school's ability to pass in six subjects, including the core subjects. Schools were categorized according to their performance in these subjects. Specifically, schools that achieved a passed rate of 50% or above in the six subjects were assigned



a score of 1. This score indicated satisfactory academic performance. Conversely, schools that did not reach the 50% pass rate were assigned a score of 0, signifying poor performance. This binary scoring system facilitated a clear distinction between schools based on their academic success, providing a straightforward measure to analyze the relationship between academic performance and various factors related to teachers and information and communication technology (ICT) in those schools. The secondary data collected for each school, reflecting the performance of students in these critical subjects, served as a foundation for evaluating how different variables might influence academic outcomes.

3.8.2 Independent Variable

The independent variables of the study included socio-demographic factors, knowledge level of teachers on ICT, attitudes towards ICT Usage, availability and access to ICT, and self-efficacy in ICT

3.8.3 Knowledge level of teachers on ICT

In assessing knowledge level of teachers on ICT, a 13-item questionnaire was used to assess participants' knowledge on ICT. These questions include: do you know computers and its functions, can you create teaching aids with the computer, can you install software on the computer, among other questions. A correct response was given a score of 1 whereas a wrong response attracted a score of 0. The total score was computed, and study participants who had a score of 6.5 (mean score) or less were categorized under 'poor knowledge on ICT'. However, study participants who accumulated a total score greater than 6.5 were categorized under 'good knowledge on ICT'.

3.8.4 Attitudes towards ICT Usage



Attitudes of study participants regarding the use of ICT in teaching and learning were assessed using a structured questionnaire. A 13-item questionnaire was used to assess participants' attitudes on ICT. These questions include: I think using a computer in class wastes much time, using technology in teaching language is not necessary, I know that computer usage can help me learn more things, among other questions. Likert scale comprising of 'disagree', 'disagree', 'not sure', 'agree', and 'totally agree' was used. For every positive response, a score of 1 was given whereas 0 score was given to every negative response. The total score was computed, and study participants who had a score of 6.5 (mean score) or less were categorized under 'poor attitude'. However, study participants who accumulated a total score greater than 6.5 were categorized under 'good attitude'.

3.8.5 Validity and Reliability

This study prioritized methodological rigor through a multi-phase validation and reliability assurance process, beginning with content validity assessments and culminating in statistical verification. Content validity—the degree to which the research instruments comprehensively captured the study's core constructs of ICT knowledge, pedagogical attitudes, and academic performance—was established via iterative expert reviews. A preliminary instrument draft underwent scrutiny by a peer researcher, the study's academic supervisor, and an external expert in educational administration specializing in ICT integration. These reviewers evaluated item clarity, relevance to research objectives, and potential biases, using criteria aligned with Best and Kahn's (2016) framework for survey design validation. Their feedback led to revisions in question phrasing, elimination of ambiguous terminology (e.g., refining "ICT usage frequency" into measurable weekly usage hours), and alignment of performance metrics with Ghana Education Service's standardized assessment rubrics.



Following content refinements, the instrument was pilot-tested with 30 teachers and 60 pupils from two non-participating schools in the neighboring Tolon District, selected for demographic similarity to the target population. The pilot phase assessed both reliability—the consistency of measurement—and practical feasibility, with particular attention to respondents’ interpretation of and time required for completion. Cronbach’s alpha analysis of internal consistency yielded a coefficient of 0.83 for the teacher competency scale and 0.79 for the attitude assessment module, exceeding the 0.70 threshold recommended by Taber (2018) for social science research. This statistical reliability was further strengthened by computing item-total correlations, which identified and removed two questions with coefficients below 0.30, thereby enhancing the instrument’s discriminative power.

3.9 Data Collection Procedure

Before the data collection, an introductory letter was obtained from the Head of Department, which enabled the researcher to seek consent from the Sagnarigu Municipal director of education and heads of schools selected for the survey. The director informed the head teachers of the basic schools to permit me to undertake the research in the schools. In the various selected schools, the researcher introduced herself to participants, disclosed to them why they were selected and the relevance of the research. Consent was sought from the participants and rapport was created for a fruitful exercise. The processes involved in the exercise and what was expected from them were thoroughly explained to them.

Due to the dispersed nature of the district, two trained assistants helped in the data collection. They were trained on data collection techniques, human relations and data handling before the administration of the instrument. The data collection lasted for one week. The questionnaire was administered to the participants through personal contact by the researcher and the assistants.

Besides, secondary data on the performance of the selected schools in BECE examination of the was obtained from the Municipal directorate of education for analysis.

3.10 Data Analysis

Before the analysis of the data that was collected, the questionnaires were checked for consistency and accuracy and completeness. The data was analyzed using the STATA version 14. Both descriptive and inferential statistics (frequencies and percentages, mean and standard, and chi-square) were generated. Chi square analysis was used to establish association between knowledge and access to IT resources, utilization as well as academic performance. A binary logistic regression model was used to determine the relationship between teachers' ICT knowledge and academic performance. Declaration of statistical significance was done at p-value <0.05.

3.11 Ethical Issues

In the conduct of the study, all efforts and attempts were made to observe high ethical standards acceptable in scientific inquiries. The issues of privacy, voluntary participation, confidentiality, and anonymity were given a priority. In the first place, formal consent was sought from the District Director of Education of the Sagnarigu district and all the head teachers who were participants before the data gathering will commence. Also, the participants were assured of the confidentiality of the data that will be provided.



CHAPTER FOUR

RESULTS

4.1 Introduction

Chapter four (4) is a presentation of findings on the current study based on the predetermined objectives of the study spelt out in the first chapter of this document. A total of three hundred and nine (309) teachers were surveyed. Findings of the study are presented in a manner to facilitate easy understanding and comprehension. This includes frequencies, percentages, means, standard deviation, graphs and tables. Confidence level was set at $p < 0.05$ for all bivariate and multivariate analysis.

4.2 Socio-Demographic Characteristics of Teachers

Table 4.1 is a presentation of socio-demographic characteristics of teachers who participated in the survey. A total of three hundred and nine (309) respondents were surveyed. Mean age of respondents is 33.6 ± 5.3 years, with a minimum age of 20 years and a maximum age of 50 years. Most respondents 131 (42.4%) were within the age category 30-34 years whereas comparatively few respondents 4 (1.3%) were within the ages 20-24 years. In terms of sex, the majority of respondents 194 (62.8%) were males, and 115 (37.2%) were reported to be females. Furthermore, a majority of respondents 185 (59.9%) were Bachelor's degree holders, 188 (60.8%) reported to have spent three years or more in their current teaching position, and 182 (58.9%) taught subjects other than general science and mathematics. Notwithstanding, most respondents 139 (45.0%) had taught for five years or less in the teaching profession, whereas comparatively few teachers (4.5%) had spent twenty-one years or more in the profession. In terms of the type of school, almost all schools surveyed (98.1%) were mixed, whereas only 1.9% were found to be girls' schools.



Table 4.1: Socio-Demographic Characteristics of Respondents

Variables	Frequency (N=309)	Percentage
Age [years] Mean=33.6 ± 5.3		
20 – 24	4	1.3
25 – 29	60	19.4
30 – 34	131	42.4
35 – 39	77	24.9
≥ 40	37	12.0
Sex		
Female	115	37.2
Male	194	62.8
Level of education		
Teacher's certificate A	3	1.0
Diploma	103	33.3
Bachelor	185	59.9
Masters	18	5.8
Subject area of teaching		
General science	48	15.5
Mathematics	79	25.6
Others	182	58.9
Duration of teaching profession (years)		
0-5	139	45.0
6-10	65	21.0
11-15	64	20.7
16-20	27	8.7
≥ 21	14	4.5
Duration of teaching in current position (years)		
< 1	40	12.9
1-2	81	26.2
≥ 3	188	60.8
Type of school		
Girls	6	1.9
Mixed	303	98.1

*Subject area of teaching (others)= Creative arts and design, home science, physical education, Information communication technology, social studies, Ghanaian language, etc.



4.3 Knowledge Level of Teachers on ICT

Figure 4.1 and Table 4.2 illustrate knowledge levels and other related factors regarding knowledge of respondents on ICT|. Findings show that the majority 164 (53.1%) of respondents reported having good knowledge on ICT, whereas 145 respondents representing 46.9% reported poor knowledge level (Figure 4.1).

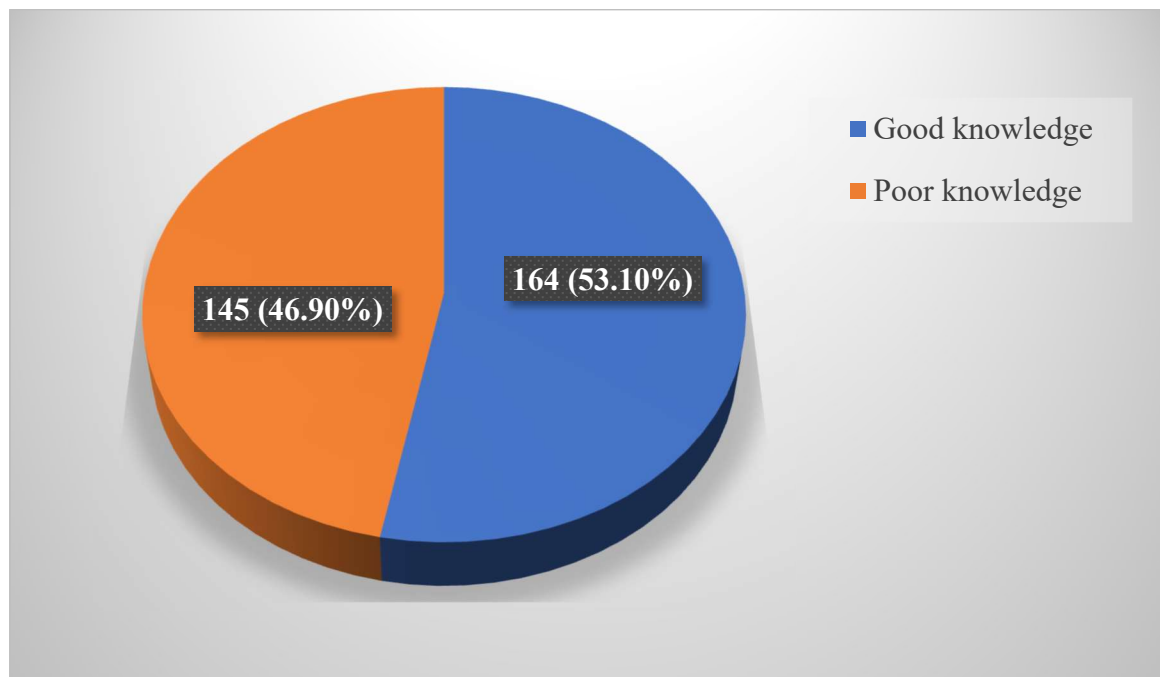


Figure 4.1: Knowledge Levels of Respondents on ICT

In terms of other factors on ICT knowledge of respondents represented in Table 4.2, most teachers 108 (35.0%) never used a computer at school. However, approximately three-quarters (75.0%) of respondents ever used ICT to teach or prepare their TLM. Majority of respondents 210 (68.0%) mentioned that they utilize ICT for their interest, whereas comparatively few respondents (15.2%) use ICT for developing digital content for learner use. In terms of ways respondents use ICT with students to complete curriculum activities, more than half of the respondents use ‘word processor’

(55.7%), ‘presentation software’ (50.2%), ‘spreadsheets’ (51.8%), and the ‘internet’ (55.3%). More so, most respondents 106 (34.3%) use television for teaching and learning purposes.

For self-efficacy and confidence in using ICT among respondents, majority of them (97.7%, 90.9%, 78.0%, and 82.5%) reported they feel confident using computer with support from others, feel confident in the use of computer without support from others, feel confident to use computer to teach students, and felt confident to use computer to help colleagues respectively. When respondents were asked whether they had received IT training, most of them 140 (45.3%) reported to have received training on computer literacy (Table 4.2).



Table 4.2: Other Related factors on Knowledge of Respondents on ICT

Variables	Frequency (N=309)	Percentage
Frequency of computer use at school		
Never	108	35.0
At least once a week	65	21.0
At least once a month	53	17.2
On most days	83	26.9
Ever used ICT to teach or to prepare TLM		
No	78	25.2
Yes	231	74.8
Purposes of ICT use		
Personal use	210	68.0
School administration	56	18.1
Recording marks using spreadsheet	80	25.9
Typing exam papers	112	36.3
Finding information and resources on the internet	153	49.5
Accessing resources using online databases	57	18.5
Developing teaching resources	73	23.6
Developing digital content for learner use	47	15.2
Ways of ICT use with students in completing curriculum activities		
Word processor	172	55.7
Spreadsheet	149	48.2
Presentation software	155	50.2
Spreadsheet	160	51.8
Subject specific software	66	21.4
Teaching IT subjects	108	35.0
Using the internet	171	55.3
Use of other computer applications	119	38.5
I do not use ICT with students	45	14.6
Use of following technology for teaching and learning purposes		
Television	106	34.3
Radio	35	11.3
Digital cameras	40	12.9
Digital projectors	60	19.4
Feel confident to use computer with support from someone		
No	7	2.3
Yes	302	97.7
Feel confident to use computer without support from someone		
No	28	9.1
Yes	281	90.9
Feel confident to use computer to teach students		
No	68	22.0



Feel confident to use computer to help colleagues		
No	54	17.5
Yes	255	82.5
Received IT training on the following		
School administration	40	12.9
Computer literacy	140	45.3
Using subject-specific software	50	16.2
Radio resources	75	24.3
Teaching ICT as a subject	63	20.4
Using and using resources from the internet	130	42.1
Designing lessons or projects that integrate ICT	80	25.9
Providing technical support in the school	39	12.6

4.4 Attitudes of Teachers on ICT Usage in Teaching and Learning

Figure 4.2 is a presentation on attitudes of respondents towards the use of ICT in the field of teaching and learning. Results from the study indicate that out of three hundred and nine teachers surveyed, the majority of them, 175 (56.6%) reported poor attitude towards ICT use, whereas 134 (43.4%) reported to have good attitude towards ICT use in the field of teaching and learning.

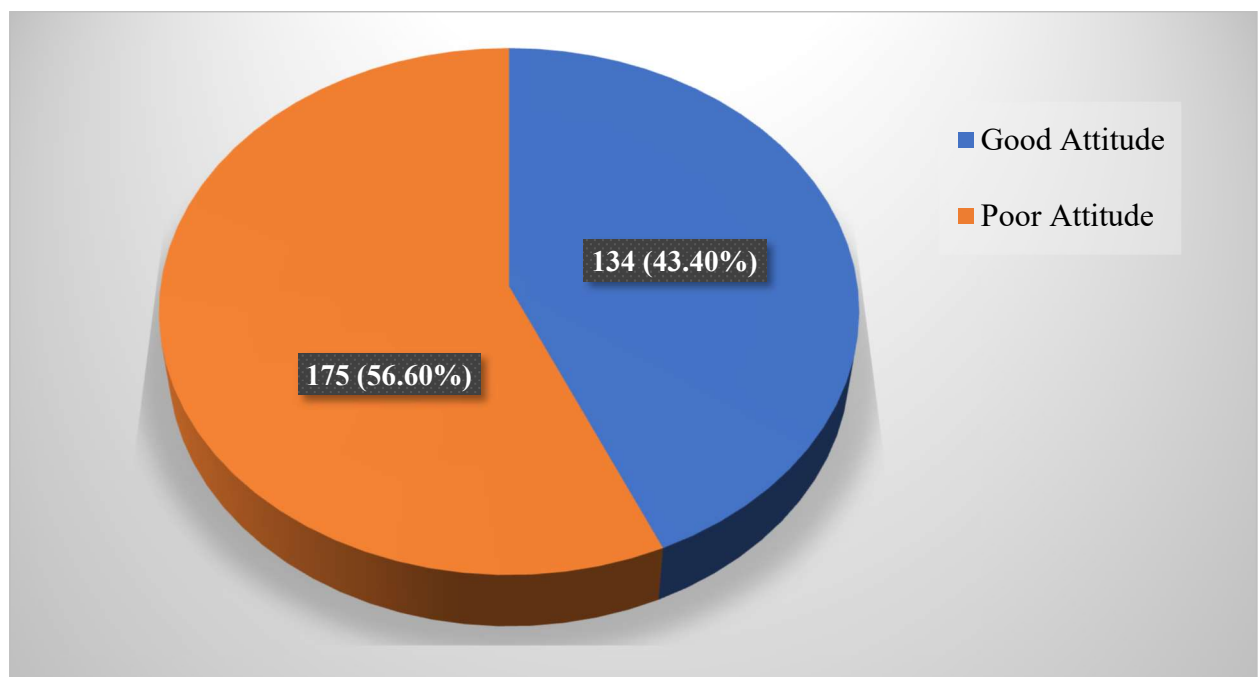


Figure 4.2: Attitude of Respondents on ICT usage in Teaching and Learning

4.5 Availability and Access to ICT

Overall, only 33.7% of the teachers in this study had access to ICT facilities compared to 66.3% as illustrated in figure 4.3

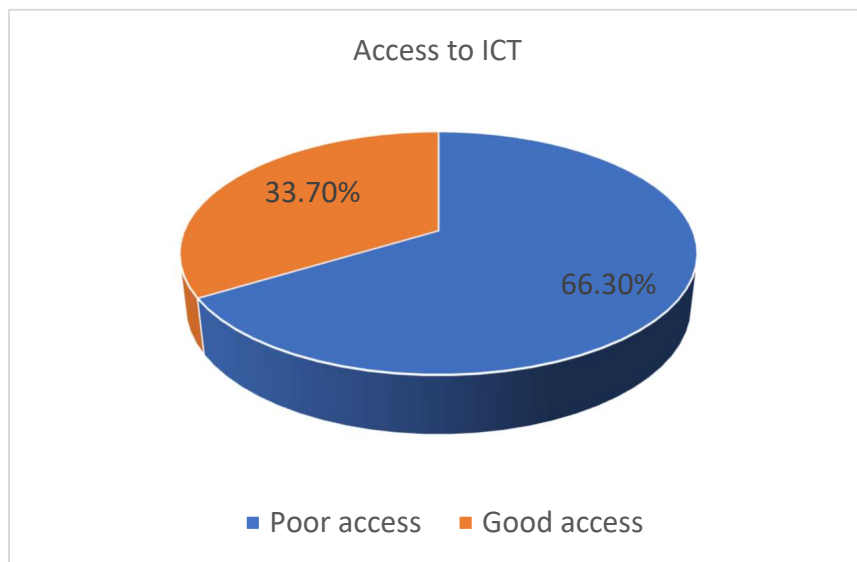


Figure 4.3: Access to ICT Facilities.

Table 4.3 illustrates findings on availability and access to ICT among study respondents. About half of the respondents, 165 (53.4%) had access to a computer at school. Majority of respondents 100 (58.3%) did not have desktop computer available in their school, most respondents 154 (49.8%) had and used portable laptop or notebook in their school, majority of respondents (69.6%, 73.1%, 72.5%, 66.7%, 79.6%, 83.2%, 79.6%, 80.9%, 82.5%, and 73.8%) did not have internet connection, printer, and USB stick, interactive whiteboard, tablet PC, scanner, CD/DVD reader-writer, video recorder, digital camera, and radio respectively, available at their school. Moreover, a majority of respondents (72.2% and 56.0%) had a smartphone and television respectively available in their school and used it. In terms of ICT policy at school, only 95 (30.7%) respondents reported their schools had an ICT policy in place, 102 (33.0%) reported their school had an ICT



laboratory, and 59 (19.1%) reported their school had no internet connection. Notwithstanding, the majority of respondents 233 (75.4%) worked in schools connected to a power source.

Table 4.3: Availability and Access to ICT among Respondents

Characteristics	frequency (N=309)	Percentage
Access level		
Poor access	205	66.3
Good access	104	33.7
Access to computer at home		
No	34	11.0
Yes	275	89.0
Access to computer at school		
No	144	46.6
Yes	165	53.4
Availability of desktop computer at school		
No	100	58.3
Yes, and I use it	89	28.8
Yes, but I do not use it	40	12.9
Availability of portable laptop or notebook at school		
No	123	39.8
Yes, and I use it	154	49.8
Yes, but I do not use it	32	10.4
Availability of internet connection at school		
No	215	69.6
Yes, and I use it	85	27.5
Yes, but I do not use it	9	2.9
Availability of printer at school		
No	226	73.1
Yes, and I use it	39	12.6
Yes, but I do not use it	44	14.2
Availability of USB stick at school		
No	224	72.5
Yes, and I use it	69	22.3
Yes, but I do not use it	16	5.2
Availability of interactive whiteboard at school		
No	206	66.7
Yes, and I use it	77	24.9
Yes, but I do not use it	26	8.4
Availability of tablet PC at school		





No	246	79.6
Yes, and I use it	35	11.3
Yes, but I do not use it	28	9.1
Availability of smartphone at school		
No	71	23.0
Yes, and I use it	223	72.2
Yes, but I do not use it	15	4.9
Availability of scanner at school		
No	257	83.2
Yes, and I use it	18	5.8
Yes, but I do not use it	34	11.0
Availability of CD/DVD reader-writer at school		
No	246	79.6
Yes, and I use it	36	11.7
Yes, but I do not use it	27	8.7
Availability of video recorder at school		
No	250	80.9
Yes, and I use it	43	13.9
Yes, but I do not use it	16	5.2
Availability of digital camera at school		
No	255	82.5
Yes, and I use it	33	10.7
Yes, but I do not use it	21	6.8
Availability of radio at school		
No	228	73.8
Yes, and I use it	55	17.8
Yes, but I do not use it	26	8.4
Availability of television at school		
No	108	35.0
Yes, and I use it	173	56.0
Yes, but I do not use it	28	9.1
School has ICT policy		
No	214	69.3
Yes	95	30.7
School has computer laboratory		
No	207	67.0
Yes	102	33.0
School is connected to power		
No	76	24.6
Yes	233	75.4
School is connected to internet		
No	250	80.9
Yes	59	19.1

4.6 Extent to Which Teachers' Levels of Self-Efficacy Influence the Incorporation of IT in Teaching and Learning

Overall, the greater proportion of the respondents (83.2%) in the present study had high self-efficacy in ICT compared to 16.8% who had low self-efficacy (Fig 4.4).

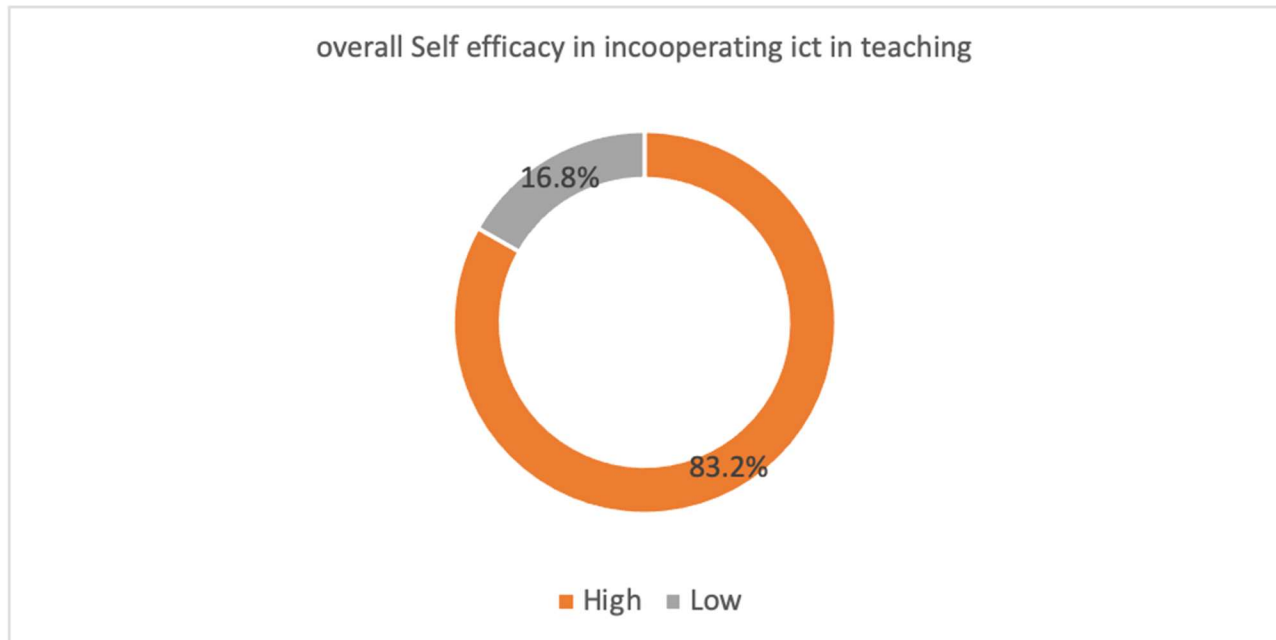


Figure 4.4: Teachers Self-Efficacy in Incooperating ICT in Teaching

Table 4.4 is a bivariate (Chi-square test) analysis on the extent to which teachers' level of self-efficacy influences the incorporation of IT in teaching and learning. Results shows that the use of word processor ($p < 0.001$), use of spreadsheet ($p = 0.002$), use of presentation software ($p = 0.002$), use of internet ($p < 0.001$), and the use of other computer applications in learning ($p = 0.012$) were identified to be associated with self-efficacy of respondents in IT.

Table 4.4: Bivariate Analysis on Association Between Self-Efficacy in IT and its Influence in Teaching and Learning

Variables	Self-efficacy		P-value
	High	Low	
Use of word processor in teaching and learning			
Yes	159(61.9)	13(25.0)	<0.001
No	98(38.1)	39(75.0)	
overall	157(83.2)	16.8)	
Use of spreadsheet in teaching and learning			
Yes	134(52.1)	15(28.9)	0.002
No	123(47.9)	37(71.2)	
Use of presentation software in teaching and learning			
Yes	139(54.1)	16(30.8)	0.002
No	118(45.9)	36(69.2)	
Use subject specific software in teaching and learning			
Yes	60(23.4)	6(11.5)	0.058
No	197(76.7)	46(88.5)	
Use of internet in teaching and learning			
Yes	154(59.9)	17(32.7)	<0.001
No	103(40.1)	35(67.3)	
Use of other computer applications in teaching and learning			
Yes	107(41.6)	12(23.1)	0.012
No	150(58.4)	40(76.9)	
I do not use ICT with students in teaching and learning			
Yes	34(13.2)	11(21.2)	0.140
No	223(86.8)	41(78.9)	

4.7 Teacher Related Characteristics Influencing Academic Performance of Their Students

Table 4.5 is bivariate analysis on teacher-related factors influencing academic performance (Basic Education Certificate Examination) of their students. Factors such as; duration of teaching profession ($p= 0.001$), attitude of teachers towards ICT use in teaching and learning ($p= 0.009$), knowledge of teachers on ICT ($p< 0.001$), and access of teachers to ICT ($p= 0.014$) were identified



to be associated with academic performance of students. For example, 26.9% of students from schools whose teachers have good attitude towards ICT had good academic performance compared to 14.0% of those from schools whose teachers have poor attitude towards ICT. Likewise, 29.9% of students from schools whose teachers had good knowledge on ICT had good academic performance compared to 14.9% of those from schools whose teachers had poor knowledge in ICT. Besides, 27.9% of students from schools with good access to ICT resources had good academic performance compared to 16.1% of those from schools with poor access to ICT resources. The above observed differences were all statistically significant ($p < 0.05$).

Multiple logistic regression analysis indicates that, teachers who reported good knowledge on ICT were more likely ($OR = 5.20$, $CI = 2.32-10.86$, $p < 0.001$) to have their students reporting good academic performance compared to teachers who had poor knowledge on ICT (Table 4.6). In terms of attitude, teachers who had positive attitude towards the use of ICT in teaching and learning were more likely ($OR = 1.92$, $CI = 1.03-3.57$, $p < 0.039$) to have their students reporting good academic performance compared to teachers who had poor attitude regarding the use of ICT in teaching and learning (Table 4.6).

Table 4.5: Association Between Teacher-Related Characteristics and Academic Performance of Students

Variables	Frequency (N=309)	Academic Performance		Square value X ²	P-value
		Poor	Good		
Age [years]					
20 – 24	4	4 (100.0)	0 (0.0)	1.8417	0.765
25 – 29	60	50 (83.3)	10 (16.7)		
30 – 34	131	102 (77.9)	29 (22.1)		
35 – 39	77	61 (79.2)	16 (20.8)		
≥ 40	37	30 (81.1)	7 (18.9)		



Sex					
Female	115	98 (85.2)	17 (14.8)	3.1864	0.074
Male	194	49 (76.8)	45 (23.2)		
Level of education					
Teacher's certificate A	3	2 (66.7)	1 (33.3)	1.3751	0.711
Diploma	103	83 (80.6)	20 (19.4)		
Bachelor	185	46 (78.9)	39 (21.1)		
Masters	18	16 (88.9)	2 (11.1)		
Subject area of teaching					
General science	48	41 (85.4)	7 (14.6)	1.0786	0.583
Mathematics	79	62 (78.5)	17 (21.5)		
Others	182	44 (79.1)	38 (20.9)		
Duration of teaching profession (years)					
0-5	131	108 (82.4)	23 (17.6)	19.6071	0.001
6-10	65	56 (86.2)	9 (13.9)		
11-15	60	51 (85.0)	9 (15.0)		
16-20	39	21 (53.9)	18 (46.2)		
≥ 21	14	11 (78.6)	3 (21.4)		
Duration of teaching in current position (years)					
< 1	40	30 (75.0)	10 (25.0)	0.8961	0.639
1-2	81	64 (79.0)	17 (21.0)		
≥ 3	188	53 (81.4)	35 (18.6)		
Type of school					
Girls	6	5 (100.0)	0 (0.0)	1.5359	F= 0.604
Mixed	303	41 (79.5)	52 (20.5)		
Knowledge on ICT					
Poor	145	32 (91.0)	13 (9.0)	20.9843	<0.001
Good	164	15 (70.1)	49 (29.9)		
Attitude towards ICT use in teaching and learning					
Poor	175	49 (85.1)	26 (14.9)	6.8233	0.009
Good	134	98 (73.1)	36 (26.9)		
Self-efficacy					
Low	52	41 (78.9)	11 (1.2)	0.0462	0.830
High	257	106 (80.2)	51 (19.8)		
Access to ICT					
Poor	205	72 (83.9)	33 (16.1)	5.9768	0.014
Good	104	75 (72.1)	29 (27.9)		



Teacher-Related Determinants of Academic Performance

The results also revealed that students from schools whose teachers had higher levels of ICT knowledge (OR=5.20, CI=2.32-10.86, $p<0.001$) were 5.2 times more likely to have good academic performance compared to those from schools whose teachers had poor knowledge on ICT. Likewise, students from schools whose teachers had positive attitudes towards ICT (OR=1.92, CI=1.03-3.57, $p<0.039$) were 92% more likely to have good academic performance compared to those from schools whose teachers had poor attitude towards ICT. Also, students from schools with teachers who were 16-20 years in the teaching profession were 3.29 times more likely to have good academic performance (OR=3.29, CI=1.39-7.77, $p=0.007$) compared to those from schools with teachers who were less than 16 but greater than 20 years in the teaching profession (Table 4.6).

Table 4.6: ICT Related Factors Influencing Academic Performance of Students

Variable	Is Ratio (OR)	fidence Interval (CI)	P-value
Duration of teaching profession (years)			
0-5 (Ref)			
6-10	0.60	0.25-1.43	0.250
11-15	0.82	0.34-1.96	0.655
16-20	3.29	1.39-7.77	0.007
≥ 21	1.83	0.42-7.89	0.415
Knowledge on ICT			
Poor (Ref)			
Good	5.20	2.32-10.86	<0.001
Attitude towards ICT use in teaching and learning			
Poor (Ref)			
Good	1.92	1.03-3.57	0.039
Availability and access to ICT resources			
Poor Ref)			
Good	0.91	0.45-1.80	0.772

CHAPTER FIVE

DISCUSSION

5.1 Overview

This section explores existing studies that conform or refute findings in the current study. Results of the study are further explained to give insights into the relationships of findings with other investigations based on the predetermined objectives in chapter one.

5.2 Knowledge Level of Teachers on ICT

According to the findings of the current study, more than half (63.4%) of teachers who were surveyed reported a good knowledge level on ICT. This finding is consistent with the studies of Ramadass & Shah (2022) who also reported that more than half (70%) of Malaysian teachers had good/excellent knowledge on ICT. This included knowledge on graphic application, knowledge on word processors, knowledge on spreadsheets, among others. In contrast, a study by Akaadom & Gorni (2023) found very low knowledge level ($M=1.57$, $SD=.90$) on ICT among Ghanaian teachers. The differences in knowledge levels among teachers could be a result of differences in exposure to ICT. Teachers who are more exposed to ICT, especially those who use a computer to perform both personal and teaching duties, such as writing of lesson notes, are at an advantageous point to have good knowledge regarding ICT. The widespread use of Information and Communication Technology (ICT) could influence all spheres of life, especially in the field of education (Tezci, 2015). That is, nations across the world view ICT as potential tools for change and innovation in education. Teachers are required to have developed understanding and knowledge of how to use ICT in their field of practice, to incorporate ICT into their practice to support teaching and learning (Akaadom & Gorni, 2023).





Although several factors such as inadequate access to ICT equipment, lack of technological skills and ineffective software mitigate against knowledge on ICT (Cruz & Rajan, 2022), the impact of knowledge of teachers on ICT is huge. The use of ICT knowledge in teaching and learning enables teachers create 21st-century learning that has competence and credibility to conduct an effective and efficient teaching and learning platform (Ramadass & Shah, 2022), allowing students to compete on a global stage.

The findings of the study indicate that a slight majority of respondents (53.1%) report having good knowledge of ICT, while 46.9% report poor knowledge levels. This bifurcation highlights a common issue in educational settings where there is a significant divide in ICT competency among educators. Previous studies, such as those by Tondeur et al. (2012) and Drent & Meelissen (2008), have documented similar findings, where a considerable proportion of teachers lack adequate ICT skills despite the increasing integration of technology in educational environments. The implication here is a need for targeted professional development programs to bridge this gap and enhance overall ICT competency. Despite the disparity in ICT knowledge, the usage patterns of ICT in educational settings are encouraging. The data shows that 75% of respondents have used ICT to teach or prepare Teaching and Learning Materials (TLM). This aligns with findings from Law et al. (2008), who emphasized the role of ICT in enhancing pedagogical practices. However, it is concerning that 35% of teachers have never used a computer at school, pointing to potential infrastructural or access issues that need addressing.

The utilization of ICT in teaching and learning, as indicated by 75% of respondents using ICT to teach or prepare TLM, is promising. This aligns with Law et al. (2008), who found that ICT can significantly enhance teaching methodologies and student engagement when integrated effectively. However, the finding that 35% of teachers have never used a computer at school is



concerning. This suggests potential barriers such as insufficient infrastructure, lack of access to devices, or inadequate institutional support. Schools need to ensure that all teachers have access to necessary technological tools and support to integrate ICT into their teaching practices. The findings also reveal that a majority (68%) use ICT for personal interest, while only 15.2% use it to develop digital content for learners. This indicates a need to shift focus from personal use to educational applications of ICT. According to the TPACK framework (Koehler & Mishra, 2005), effective technology integration requires teachers to develop a deep understanding of how to use digital tools to enhance learning experiences. Professional development should, therefore, include training on how to create and utilize digital content effectively.

The usage of specific ICT tools such as word processors (55.7%), presentation software (50.2%), spreadsheets (51.8%), and the internet (55.3%) shows a balanced approach to integrating various digital tools in teaching. This comprehensive use of different ICT tools is crucial for developing a diverse set of digital competencies among students. Webb & Cox (2004) emphasize that varied use of ICT tools in education can lead to more effective teaching and learning outcomes. Teachers should be encouraged and supported to explore and integrate a wide range of digital tools to cater to different learning styles and needs.

High levels of self-efficacy in using ICT among respondents are a positive indicator. With the majority feeling confident using computers with and without support, for teaching, and in helping colleagues, this self-efficacy is likely to translate into more effective ICT integration in classrooms. Bandura's (1997) self-efficacy theory suggests that individuals who believe in their abilities are more likely to embrace and effectively use new technologies. Therefore, fostering a supportive environment where teachers can build their confidence through training and peer support is essential. The finding that 45.3% of respondents have received training on computer literacy is a



step in the right direction, but it also highlights the need for more extensive and continuous professional development. Research by Yildirim (2007) underscores the importance of ongoing professional development in sustaining ICT competency among teachers. Schools and educational institutions should prioritize continuous, comprehensive ICT training programs that cover not only basic skills but also advanced techniques for integrating technology into the curriculum.

The fact that a significant majority (68%) use ICT for personal interest and only 15.2% for developing digital content for learners suggests a need to shift the focus from personal to pedagogical use of ICT. As research by Koehler & Mishra (2005) on Technological Pedagogical Content Knowledge (TPACK) suggests, effective integration of ICT in teaching requires educators not only to use technology but to apply it in ways that enhance learning outcomes. The usage of specific ICT tools such as word processors (55.7%), presentation software (50.2%), spreadsheets (51.8%), and the internet (55.3%) is quite balanced and reflects a comprehensive approach to integrating various digital tools in teaching. This diverse usage is critical as it indicates that teachers are leveraging multiple aspects of ICT to facilitate learning, a practice supported by research from Webb & Cox (2004), which emphasizes the importance of varied ICT tool usage for effective teaching.

Self-efficacy in using ICT among respondents is notably high, with the majority expressing confidence in using computers with and without support, for teaching, and in assisting colleagues. This high level of confidence is a positive indicator as it correlates with better ICT integration in teaching, as highlighted by Bandura's (1997) self-efficacy theory. Teachers who feel confident are more likely to experiment with and effectively utilize ICT tools, leading to enhanced educational outcomes. The data shows that 45.3% of respondents have received training on computer literacy, which is crucial but indicates room for improvement. Research consistently shows that continuous



professional development is vital for sustaining ICT competency among educators (Yildirim, 2007). Therefore, there is a need for ongoing, comprehensive ICT training programs that are accessible to all teachers.

The findings of this study highlight critical insights into the current state of ICT knowledge and utilization among educators. While there are promising trends in the use of ICT tools and high levels of self-efficacy, the significant proportion of teachers lacking basic ICT knowledge and training underscores the need for targeted interventions. Addressing these gaps through professional development, improved access to technology, and fostering a culture of continuous learning and adaptation will be essential in leveraging ICT for enhanced educational outcomes. These findings contribute to the broader discourse on ICT in education and provide a foundation for future research and policy-making aimed at bridging the digital divide in educational settings.

5.3 Attitudes of Teachers on ICT Usage in Teaching and Learning

The attitude of teachers regarding the use of ICT in the learning and teaching process can be a determinant factor to their level of interest in the use of ICT tools (Ikwuka et al., 2020). Results from the current study show approximately 43% of teachers reported a good attitude towards the use of ICT. This finding is a phenomenal indicator for future potential in the integration of ICT in the teaching and learning process. Notwithstanding, this finding is consistent with the studies of Cvetković et al. (2022) who found that, more than half of teachers from Republic of Serbia reported good attitude regarding ICT usage in teaching and learning. Another study by Beri & Sharma (2019) among teachers from State of Haryana in India found that, teacher-educators exhibited positive attitude towards integrating ICT in teacher education process. However, Chauhan & Sharma (2023) found male teachers' level of attitude towards ICT to be neutral, whereas female teachers reported a favorable attitude towards ICT. Even though evidence suggests good attitude



towards the usage of ICT in teaching and learning, there is a need to critically look at some inherent factors mitigating against the proportion of teachers who exhibit poor attitude. The current study's findings on attitude level among teachers is a positive indicator for the use or integration of ICT in teaching and learning. That is, teachers' technological competence as well as their positive attitudes is a necessary prerequisite for maximizing the quality of ICT in schools. This will foster the advancement of IT in the academic field.

These findings necessitate a thorough analysis, especially when contrasted with existing literature on the subject. The results of this study align with and diverge from various other research findings in notable ways. Numerous studies have highlighted a global trend towards the increasing integration of ICT in education. For example, a study by Hennessy et al. (2010) found that in many developed countries, the majority of teachers possess a positive attitude towards the use of ICT, driven by strong institutional support and professional development opportunities. The contrast in this study's findings could be attributed to differences in infrastructure, resources, and training.

In developing countries, attitudes towards ICT in education often vary significantly. Research by Pelgrum (2001) and Tondeur et al. (2008) in various African and Asian contexts indicates that teachers frequently exhibit apprehension and negative attitudes towards ICT. This is often due to factors such as limited access to technology, inadequate training, and a lack of institutional support. The current study's findings resonate with these challenges, suggesting that similar barriers might be influencing the attitudes of teachers in the surveyed region. The positive attitudes towards ICT found in this study among 43.4% of teachers may reflect the impact of professional development initiatives. Studies by Inan and Lowther (2010) emphasize that continuous professional development and hands-on training significantly enhance teachers' attitudes towards ICT. This correlation suggests that those with positive attitudes might have had more exposure to such



opportunities compared to their counterparts. There is a substantial body of evidence supporting the positive impact of ICT on teaching effectiveness and student outcomes. Research by Ertmer and Ottenbreit-Leftwich (2010) points out that teachers who perceive the benefits of ICT in enhancing student engagement and learning outcomes are more likely to adopt positive attitudes. The divergence in attitudes in this study could be reflective of varied experiences and perceived benefits of ICT among the teachers. Several factors may contribute to the poor attitudes observed among the majority of the teachers in this study. Limited access to ICT resources and infrastructure can significantly hinder teachers' ability to integrate technology into their teaching practices. This is consistent with findings from studies by Bingimlas (2009), which identified access as a critical barrier. Insufficient training and lack of ongoing support are major deterrents to positive attitudes towards ICT.

Teachers who feel inadequately prepared to use technology are less likely to develop positive attitudes, as noted in studies by Hew and Brush (2007). Teachers' perceptions of the relevance and effectiveness of ICT in improving teaching and learning can also influence their attitudes. Those who do not see a clear benefit are less inclined to adopt positive attitudes, as suggested by Mumtaz (2000). The broader cultural and institutional environment can either support or inhibit positive attitudes towards ICT. Supportive leadership, a culture of innovation, and institutional policies that prioritize ICT integration are crucial, as highlighted by Zhao and Frank (2003). The findings of this study underscore the complexity of attitudes towards ICT in education. While a significant proportion of teachers exhibit poor attitudes, a notable minority demonstrate positive perceptions, likely influenced by better training and access to resources. Addressing the barriers identified in this study through targeted interventions can help in transforming these attitudes, ultimately leading to more effective integration of ICT in teaching and learning. The comparative analysis

with existing literature further highlights the need for context-specific strategies to enhance the adoption of ICT in education.

5.4 Extent to Which Teachers' Levels of Self-Efficacy Influence the Incorporation of IT in Teaching and Learning

Findings from the study indicate that the majority of teachers reported high self-efficacy in IT, with self-efficacy influencing the extent of usage of word processor, spreadsheet, presentation software, internet, and other computer applications in teaching and learning. This finding is consistent with the studies of Arhin et al. (2022) who found that the majority of Ghanaian teachers have a high level of self-efficacy in information technology. Abosede et al. (2024) also reported that the level of Nigerian teachers' self-efficacy in the use of ICT for teaching is at the average level. This could be interpreted that teachers in Ghana are more exposed to information technology, thereby influencing their self-efficacy as compared to teachers in Nigeria.

A substantial majority of respondents reported high self-efficacy in IT, while a smaller group indicated low self-efficacy. This distribution reflects a generally positive perception of IT capabilities among the surveyed teachers, which is a promising sign for the potential integration of IT in educational practices. The findings show a significant association between self-efficacy and the use of word processors. Teachers with high self-efficacy were much more likely to use word processors in their teaching (61.9%) compared to those with low self-efficacy (25.0%). This finding is consistent with previous studies, such as those by Bandura (1997), which highlight the crucial role of self-efficacy in the adoption of technology. High self-efficacy boosts teachers' confidence in their ability to use word processing tools, which are fundamental for preparing teaching materials and assignments. Similarly, the use of spreadsheets was significantly associated



with self-efficacy, with 52.1% of high self-efficacy teachers using them compared to 28.9% of their low self-efficacy counterparts. Spreadsheets are essential for managing and analyzing data, and teachers confident in their IT skills are more likely to utilize these tools to enhance their teaching effectiveness and efficiency.

The use of presentation software also showed a significant correlation with self-efficacy. High self-efficacy teachers were more inclined to use presentation software (54.1%) than those with low self-efficacy (30.8%). This aligns with the findings of Tschannen-Moran and Hoy (2001), who emphasized that teachers with higher self-efficacy are more likely to engage with a variety of digital tools to make their teaching more interactive and engaging. Internet use in teaching demonstrated a strong association with self-efficacy ($p < 0.001$), with 59.9% of high self-efficacy teachers using the internet for instructional purposes compared to 32.7% of low self-efficacy teachers. This significant difference underscores the importance of self-efficacy in enabling teachers to incorporate online resources into their teaching, thereby enriching the learning experience with up-to-date information and interactive content. The use of other computer applications in teaching also revealed a significant association with self-efficacy ($p = 0.012$), with 41.6% of high self-efficacy teachers utilizing these applications compared to 23.1% of those with low self-efficacy. This indicates that teachers confident in their IT skills are more likely to explore and integrate a diverse range of digital tools into their teaching practices, thereby enhancing their instructional methods. However, the use of subject-specific software did not show a statistically significant association with self-efficacy ($p = 0.058$). This suggests that other factors, such as availability of subject-specific software, relevance to the curriculum, and specific training on these tools, might play a more critical role in their adoption. Additionally, the overall reluctance to use ICT with students did not significantly differ between high and low self-efficacy groups ($p = 0.140$),



indicating that barriers other than self-efficacy, such as infrastructural issues, lack of training, and resistance to change, may impact the integration of ICT in teaching.

High self-efficacy reported in the study gives teacher study participants the upper hand in the integration of IT in their daily teaching and learning career. This makes teaching and learning easier, and also exposes students to the IT world.

5.5 Teacher Related Characteristics Influencing Academic Performance of Their Students

The finding that teachers with sixteen to twenty years of experience are more likely to have students with good academic performance aligns with the literature that highlights the positive impact of teacher experience on student achievement. For instance, Rockoff (2004) found that teaching experience positively affects student test scores, particularly in the early years of teaching. Similarly, Harris and Sass (2011) demonstrated that teacher productivity improves significantly with experience, particularly within the first few years. However, other studies have shown diminishing returns to experience beyond a certain point. Hanushek, Kain, and Rivkin (2005) argue that the positive impact of experience plateaus after a few years. This discrepancy could be due to differences in educational contexts or the specific measures of student performance used in various studies. In contexts where continuous professional development is emphasized, the positive impact of experience might be sustained longer, explaining the stronger correlation found in this study.

The significant association between teachers' ICT knowledge and student academic performance corroborates the findings of previous research that underscores the importance of digital literacy among teachers. For example, Tondeur et al. (2012) highlighted that teachers' ICT competencies are critical for the effective integration of technology in education, which in turn enhances student





learning outcomes. This is consistent with our findings and suggests that equipping teachers with ICT skills is crucial for improving academic performance. In contrast, some studies, like those by Livingstone (2012), suggest that mere ICT competence is not sufficient. These studies argue that the pedagogical integration of ICT, supported by a clear educational vision and ongoing support, is essential. The discrepancy may stem from different levels of ICT infrastructure and support across various educational systems. In systems with robust ICT support, teachers' knowledge might translate more directly into improved student outcomes.

The positive correlation between teachers' attitudes towards ICT and student performance is in line with findings from Sang et al. (2010), who reported that teachers' positive attitudes towards ICT significantly influence their willingness to integrate technology into their teaching practices, leading to better student engagement and performance. This finding reinforces the notion that attitudinal factors are critical in the adoption of ICT in education. Contrastingly, Pelgrum (2001) found that despite positive attitudes, practical barriers such as lack of access, insufficient training, and time constraints often impede effective ICT integration. This contrast could be due to the specific context of our study, where access and training might be relatively better managed, thus allowing positive attitudes to have a more pronounced impact on student outcomes.

The association between access to ICT and academic performance aligns with findings from Hennessy, Ruthven, and Brindley (2005), who noted that adequate access to ICT resources is a prerequisite for effective integration and improved student learning outcomes. This supports the idea that without proper access, even well-trained and positively inclined teachers may struggle to use technology effectively. However, some studies, like those by Warschauer (2007), suggest that access alone is insufficient without accompanying support and training. The discrepancy here may be due to variations in the quality of access and the comprehensiveness of support systems. In

environments where access is coupled with robust support and training, the impact on student performance is more likely to be positive.

The findings of this study are largely consistent with existing literature but highlight some important nuances. The positive impact of teaching experience, ICT knowledge, and attitudes towards ICT on student performance is well-supported, but the degree to which these factors influence outcomes can vary based on contextual factors such as infrastructure, support, and ongoing professional development. Discrepancies between our findings and other studies underscore the importance of a holistic approach to ICT integration in education, which includes not just access and training but also sustained support and a conducive policy environment. This comprehensive approach is essential for maximizing the positive impact of teacher-related factors on student academic performance.



CHAPTER SIX

CONCLUSION AND RECOMMENDATION

6.1 Summary of Key Findings

A total of three hundred and nine (309) teachers were surveyed. Mean age of respondents is 33.6 ± 5.3 years, with a minimum age of 20 years and a maximum age of 50 years. Findings show that the majority of 164 (53.1%) respondents reported having good knowledge on ICT, whereas 145 respondents representing 46.9% reported poor knowledge level. Most teachers 108 (35.0%) never used a computer at school. However, approximately three-quarters (75.0%) of respondents ever used ICT to teach or prepare their TLM. Majority of respondents 210 (68.0%) mentioned that, they utilize ICT for their interest, whereas comparatively few other respondents 47 (15.2%) use ICT for developing digital content for learner use. In terms of ways respondents use ICT with students to complete curriculum activities, more than half of the respondents use 'word processor' (55.7%), 'presentation software' (50.2%), 'spreadsheets' (51.8%), and the 'internet' (55.3%). More so, most respondents 106 (34.3%) use television for teaching and learning purposes.

For self-efficacy and confidence in using ICT among respondents, majority of them (97.7%, 90.9%, 78.0%, and 82.5%) reported to feel confident to use computer with support from others, felt confident in the use of computer without support from others, felt confident to use computer to teach students, and felt confident to use computer to help colleagues respectively. majority of respondents (69.6%, 73.1%, 72.5%, 66.7%, 79.6%, 83.2%, 79.6%, 80.9%, 82.5%, and 73.8%) did not have internet connection, printer, and USB stick, interactive whiteboard, tablet PC, scanner, CD/DVD reader-writer, video recorder, digital camera, and radio respectively available at their school. Moreover, majority of respondents (72.2% and 56.0%) had smartphone and television



available in their school and used it. In terms of ICT policy at school, only 95 (30.7%) respondents reported their schools had an ICT policy in place, 102 (33.0%) reported their school had an ICT laboratory, and 59 (19.1%) reported their school had no internet connection.

Teachers' level of self-efficacy influences the incorporation of IT in teaching and learning. Results shows that majority of respondents 257 (83.2%) had high self-efficacy in IT whereas 52 (16.8%) reported low self-efficacy. The use of word processor ($p<0.001$), use of spreadsheet ($p=0.002$), use of presentation software ($p=0.002$), use of internet ($p<0.001$), and the use of other computer applications in learning ($p=0.012$) were identified to be associated with self-efficacy of respondents in IT

Teachers who had spent sixteen to twenty years in the teaching profession were more likely to have their students reporting good academic performance compared to teachers who had spent five years or less in the teaching profession. Teachers who reported good knowledge on ICT were more likely ($OR=5.20$, $CI=2.32-10.86$, $p<0.001$) to have their students reporting good academic performance compared to teachers who had poor knowledge on ICT (Table 4.6). In terms of attitude, teachers who had positive attitude towards the use of ICT in teaching and learning were more likely ($OR=1.92$, $CI=1.03-3.57$, $p<0.039$) to have their students reporting good academic performance compared to teachers who had poor attitude regarding the use of ICT in teaching and learning

6.2 Conclusion

The study on school preparedness towards ICT and its effects on academic performance in the Sagnarigu Municipality provides valuable insights into the current state of ICT integration in





education. The research reveals that while a significant proportion of teachers possess a good level of ICT knowledge and exhibit positive attitudes towards its use, there remain notable gaps in ICT competency and access among educators. This divide underscores the necessity for targeted professional development programs and improved infrastructure to support effective ICT integration in teaching practices. The findings suggest that teachers with higher self-efficacy in ICT are more likely to utilize various digital tools, such as word processors, spreadsheets, and presentation software, in their teaching. This confidence positively influences their ability to enhance instructional methods and student engagement. However, the study also highlights a concerning proportion of teachers with limited ICT experience and negative attitudes, which could impede the full potential of technology in education. The study indicates that teacher experience, ICT knowledge, and attitudes play a crucial role in shaping student academic performance. Teachers with extensive experience and positive dispositions towards ICT integration tend to have a more favorable impact on student outcomes. Nevertheless, the effectiveness of these factors is contingent upon adequate support, resources, and continuous professional development. The study emphasizes the need for a comprehensive approach to ICT integration in education, addressing both the technological and pedagogical aspects. To bridge the existing gaps and foster an environment conducive to effective ICT use, it is essential to prioritize improvements in infrastructure, enhance training programs, and support teachers in adopting innovative educational technologies. The insights gained from this research provide a foundation for future initiatives aimed at optimizing ICT's role in enhancing educational outcomes in the Sagnarigu Municipality and similar contexts.

6.3 Recommendation

Based on the findings of this study, the following recommendations are proposed to enhance school preparedness towards ICT and its effects on academic performance in the Sagnarigu Municipality:

1. The Ghana Education Service (GES) should strengthen and expand comprehensive ICT training programs for teachers. These programs should be designed to address varying levels of ICT proficiency and include both foundational and advanced training. Continuous professional development opportunities should be provided to ensure that teachers stay updated with the latest technological advancements and pedagogical strategies.
2. The Ministry of Education should prioritize the improvement of ICT infrastructure in schools. This includes the provision of adequate hardware and software resources, reliable internet access, and technical support.
3. The GETFund should be utilized to support ICT initiatives in schools, including the acquisition of modern educational technology and the development of digital content. Funding should also be directed towards creating and maintaining ICT labs and resources that are essential for effective technology integration in teaching and learning.
4. The Ministry of Education, in collaboration with the GES, should develop and implement policies that encourage the integration of ICT into the curriculum. These policies should outline clear guidelines for the use of technology in classrooms, support innovative teaching practices, and provide a framework for assessing the impact of ICT on educational outcomes.
5. The GES and Ministry of Education should work together to create a supportive environment for ICT use in education. This includes establishing mentorship programs where experienced educators can guide their peers in effective ICT integration, as well as creating a culture that values and supports technological innovation in teaching.



6. Headteachers, in collaboration with school management committees (SMC), should ensure that ICT tools provided are effectively put to efficient utilization. This includes providing access of ICT tools to both students and teachers. This effort would help to acknowledge the adoption of technology in teaching and learning, thereby influencing the academic performance.



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Appendix

ICT in Education: Teacher Survey

My name is Zakaria Zakia, an Mphil student from the University for Development Studies. This research is purely for academic purpose intended to aid me to complete my studies. I would be grateful if you could kindly respond to all questions below. Responses to these questions will be treated confidential. Please do not write your name or that of your school on this questionnaire.

Please cross [x] where appropriate or fill in the required information in the space provided.

Thank you.

Part	A:	Personal	Information
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1) What is your gender?

Male ()

Female ()

2) What is your age?

3) What is your highest academic qualification?





1) Teacher's cert A

2) Diploma

3) Bachelor

4) Masters

5) Others specify.....

4) What is your subject area?

1) General Science

2) Mathematics

3) General arts

4) Others specify.....

5) How long have you been in the teaching?

1) 0-5

2) 6-10

3) 11-15

4) 16-20

5) 21 and above

6) How long have you taught in your current position?

1) <1 year

2) 1-2 years

3) >3 years

7) What is your school set up?

1) Boys

2) Girls

3) Mixed

Part B: Utilization of ICT in schools

How often do you use computers at school?

1) on most days

2) at least once a week

3) at least once a month

4) Never

B2) Have you ever used any ICT (Information Communication Technology) to teach or to prepare TLM?

1) Yes

2) No

B3) For which of the following purposes do you use ICT – either at school or using your personal computer at home?



(select all that apply with an X)

- 1) Personal use ()
- 2) school administration ()
- 3) recording marks using a spreadsheet ()
- 4) typing exam papers ()
- 5) finding information and resources on the Internet ()
- 6) accessing resources using online databases ()
- 7) developing teaching resources ()
- 8) developing digital content for learner use ()
- 9) none of the above ()

B4) In which of the following ways do you use ICTs with learners whilst completing curriculum activities?

(select all that apply with an X)

This is based on a likert scale where 1=SD (Strongly D), 2=D (Agree), 3=N (Neutral)

ents						
word processor in teaching and Learning						
spreadsheet in T and L						
the word processor						
presentation software						
the spreadsheet						
subject specific software						
ng IT Subjects						
the internet						
other applications not listed above						
ot use ICT with my learners						

B5) Do you use any of the following technologies for teaching and learning purposes? (select all that apply with an X)

- 1) Television
- 2) Radio
- 3) digital cameras
- 4) data projectors
- 5) none of the above

Part C: Teachers ICT knowledge and skills

My knowledge of computers and its functions					
I can use my own computer					
I can install software on my own					
I can find teaching aids from the internet					
I can use the computer to prepare lesson plans					
I can create teaching aids with the computer					
I can prepare notes for my students with the Internet					
I can ask questions for my students from the Internet					
I can use the computer in my classroom					
I can look for the latest additional information through the Internet					
I can use the Internet in the computer lab with my students					
I can teach my students on how to find information on the Internet					
I can use the Internet for my personal use					

Part D: Self-efficacy and confidence in using ICT

Do you feel confident to use a computer if....	1. Yes	2. No
Someone is there to support you		
You are on your own		
You feel confident to use a computer to teach students		
You feel confident to use a computer to help colleagues		

D3) Have you received ICT-related training covering the following topics? *(select all that apply with an X)*

- 1) schools' administration ()
- 2) computer literacy ()
- 3) using subject specific software ()
- 4) use of television/radio resources ()
- 5) teaching ICT as a subject ()
- 6) finding and using resources from the Internet ()
- 7) planning lessons or projects that integrate ICT ()
- 8) providing technical support in the school ()



9) none of the above

()

Part E: Attitude towards ICT

How do you feel about technology

1=totally disagree, 2=Disagree, 3=not sure 4=agree 5 totally agree

ents					
y using technology					
l using technology when I can					
using computer in class to teach waste much time					
y that computer usage can help me learn more things					
uter intimidate and threatens me					
ers should know how to use technology in class					
be a better learner if I know how to use technology properly					
very confident when it comes to working with technology at home, School/ class and everywhere I find myself					
to learn more about using technology at home, school					
ve I can improve my teaching skills with the benefits of technology					
technology in teaching language is not necessary					
technology in teaching language is not necessary					
ology breaks down too often to be very much use					

Part F: Availability and access to ICT in school

F1) Do you have access to a computer at home?

1) Yes

2) No

F2) Do you have access to a computer at school

1) Yes

2) No

F3) Is any of these devices available for you to use at school?

	1. Yes, and I use it	2) Yes, but I do not use it	3) No
op computer			
le laptop or notebook			
et connection			
memory) stick			



ctive whiteboard PC phone er VD reader-writer recorder camera sion			
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F4) Does your school have the following?

Response categories	3. Yes	4. No
l has an ICT policy		
l has computer laboratories		
l is connected to power		
l is connected to the Internet		

Part G: ICT Integration in schools

Response category					
a computer as a tool for demonstration working with presentations, I have made myself (eg power point)					
a computer as a tool for demonstration working with existing presentations, or those someone has made for me					
a computer as a tool to teach new subject knowledge, i.e. the pupils acquire knowledge directly from the computer					
educational software with my students for learning subject knowledge through drill and practice					
urage pupils in class to search for relevant information on the Internet					
ny students to undertake tasks or follow up class work at home on the computer					
ny students to consider the implications and opportunities of computer					
chool has clearly articulated the vision and mission of using ICT integration					
chool vision of ICT integration motivates teachers to use ICT					

integration effectively in their teaching					
tegration has been perceived as an important factor in maintaining the school's competitive advantage					
hool encourages autonomy and teamwork to enhance ICT use among the teaching staff					
chool gives flexibility for teacher to adapt ICT integration in the classroom					

