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COLLEGE OF TECHNOLOGY EDUCATION, KUMASI

A FRAMEWORK FOR DEVELOPING ICT POLICY FOR TERTIARY INSTITUTIONS IN GHANA. THE CASE OF GHANA INSTITUTE OF LANGUAGES

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DECLARATION

STUDENT'S DECLARATION

I, Haruna Alhassan, hereby declare that this research work is the result of my own original research and that no part of it has been presented for another degree at this university or elsewhere, except for quotations and information from other sources, which have been duly acknowledged.

SIGNATURE:…… DATE:……

HARUNA ALHASSAN

SUPERVISOR'S DECLARATION

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

SIGNATURE:…… DATE:……

DR. KWAME ANSONG-GYIMAH

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DEDICATION

This research work is dedicated first to the Almighty God for his guidance and protection, and secondly to my lovely wife, Abida Mohammed Sani, for her relentless support when I had to burn mid-night oil gathering and compiling data.

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ABBREVIATION

GIL	Ghana Institute of Languages (GIL)
ICT	Information Communication Technology (ICT)
UNESCO	United Nations Educational, Scientific and Cultural Organization
MoE	Ministry of Education (MoE)
LAN	Local Area Network
WWW	World Wide Web
CD	Compact Disc
DVD	Digital Video Disc
EFA	Education for All
IT	Information Technology
MBL	Microcomputer-based laboratory
MTN	Mobile Telephone Network
TIGO	Transportable Integrated Geodetic Observatory
POD	Personal on Demand
NEPAD	New Partnership for Africa's Development
SPSS	Statistical Package of Social Science
LCD	Liquid Crystal Display

ABSTRACT

Information and communication technologies play an important role in reshaping education to respond to current and contemporary information society needs and to reduce the gaps that exist between socio-economic realities. The purpose of this study was to establish the framework for developing ICT policy for tertiary institutions in Ghana with reference to the Ghana Institute of Languages as a case study. This study was guided by the following specific objectives: to identify the benefits and challenges of developing the ICT policy for tertiary institutions in Ghana; to determine the ways in which the ICT policy could be integrated into the teaching and learning process by lecturers and students; and to determine the extent to which the implementation of the ICT policy for tertiary institutions can reach A survey research design method was used for this study. The study population consisted of 50 lecturers and students. A sample of 35 was drawn using a simple random sampling technique from the list. The data was collected by the use of a questionnaire. The study proves to be of immense benefit, although it may encounter challenges, which are a common phenomenon with most such programs. However, with the overwhelming advantages expected to be achieved, there is a need for tertiary educational institutions to embrace the concept no matter what may serve as an obstacle. Also, it would lead to online education, which would improve students' intake and give more access to both teachers and learners, thereby easing the pressures of the traditional face-to-face teaching and learning process. Furthermore, it was also concluded that the integration of the ICT policy framework should be on a pilot basis so that strengths and weaknesses would be identified and resolved before spreading to the other institutions. Additionally, capacity building should be established using the teachers who are considered cardinal points and the centre for the entire implementation of the policy

framework. The study recommended that in order to successfully integrate the ICT policy framework, there is a need to run the programme on a pilot basis in order to identify its strengths and weaknesses before generalization.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Irrefutably, education is an investment in human capital; empirical evidence based on endogenous growth models shows that human capital is a key determinant of economic growth (MoE, 2005). ICT (Information and Communication Technology) plays an important role in reshaping education to meet the needs of today's information society and to close socioeconomic gaps (United Nations Educational, Scientific, and Cultural Organization (UNESCO) 2009).Many of the productivity gains in the developed world economies over the past two decades could be attributed to a greater extent to the impact of ICT (MOE, 2005).

According to the Ministry of Education (MoE) Ghana (2011), information and communication technologies are commonly defined in education as a diverse set of technological tools and resources used to communicate, create, disseminate, store, and manage information. Information and communication technologies include computers, the internet, and broadcasting technologies like the radio, television, and mobile phones. In an educational context, ICT refers to various resources and tools presented on the computer that help link various learning communities together in new and different ways (MOE, 2011).

According to Homby (2004), ICTs are electronic technologies used for information storage and retrieval. Ayodele (2002) and Oluwarobi (2012) defined ICT as electronic-

based technology that is generally used to retrieve, store, process, and package information as well as provide access to knowledge. The development of micro-Computers, optical discs, the establishment of telecommunication networks, television, and the internet have assisted in broadening people's knowledge and facilitating effective communication. According to Ugwu and Oboegbulem (2011), ICTs in education encompass a great range of rapidly evolving technologies such as desktops, notebooks, digital cameras, local area networks (LAN), the internet and the World Wide Web (WWW), CD Roms, DVDs, and applications spread sheets, tutorials, simulations, electronic mail, digital libraries, computer mediated conferencing, video conferencing, and virtual reality. In effect, ICT has reduced the barriers that characterised interrelationship in terms of space, time, and learning activities. ICT tools for teaching and learning include computers, the Internet, PowerPoint, Television, Overhead Projectors, Cameras, Radio Cassettes, Video Tape, Audio Cassettes, Audio CDs, the World Wide Web (WWW), Telephones, etc. (Gannon, 2004).

Integrating ICT in teaching and learning is not a new concept in education. It is as old as other technologies, such as radio. The Ministry of Education (2011) defines ICT integration as the seamless incorporation of technology to support and enhance student engagement in meaningful learning and for the attainment of curriculum objectives. Integration of ICT into education is important in the learning and teaching process as it increases learners' motivation, makes students understand abstract concepts better, allows collaborative learning and provides the opportunity for learning through simulation (MoE, 2011).

The origins of computer-assisted instructions, where students learn from a programmed computer package, can be traced to the works of Skinner (2004) in his experiments with ICT teaching machines, which came as a result of dissatisfaction with traditional methods of learning, which were teacher-based and did not exploit the individual student potential. Skinner suggested that the experimental analysis of behaviour could be applied to the construction of a teaching machine. The ICT teaching machine would present a carefully sequenced set of ideas to a student and reinforce his or her responses to direct behavioural capabilities. Skinner's ideas led to the development of programmed learning materials (Skinner, 2004).

According to Grabe and Grabe (2007), some factors influence the likelihood that ICT will be integrated into schools, which include access to ICT facilities, teachers' expertise, ICT resourcing or cost, ICT leadership and general teaching. In teachers' ICT expertise, there is growing and widespread awareness that the pedagogical and technical expertise of the teacher is absolutely critical in teaching and learning (Grabe and Grabe, 2007). This has made governments in sub-Saharan Africa and elsewhere emphasise teacher development as the key to effectively implementing policy and curricular, using ICT to enhance teaching and teaching to raise educational standards. Information and communication technology integration is primarily an individualised approach to teaching which allows students to work independently, developing self-dependence, which encourages mastery of content, thus aiding mastery of learning sciences (Bell, 1986).

Effective introduction of an ICT framework policy into tertiary schools is also largely dependent upon the availability and accessibility of ICT resources, that is, hardware, software, and communication infrastructure (Liverpool, 2002). Therefore, if technology cannot be accessed, as in many educational institutions in sub-Saharan Africa, Ghana included, then its integration is likely to face challenges or progress slowly (Liverpool, 2002). However, Bransford and Brown (2000) noted in their study that the situation has been improving in the last few years. Schools are increasingly being equipped with computers for teaching, learning and administrative purposes; connectivity

The students are enthusiastic about using computers for learning despite the inadequate computers in the institutions (Bransford and Brown, 2000).

According to the United Nations Educational, Scientific, and Cultural Organization, (2009), under the right conditions, ICT with a well-defined framework can have a massive impact on the expansion of learning opportunities beyond cultural barriers, the confines of teaching institutions, and geographical barriers.Information and communication technologies are thus perceived to be critical for achieving education for all (EFA) goals by boosting the current rate of progress in developing countries so as to meet the demands of a rapidly evolving information society. The report further notes that ICT policy framework programmes can exist in developing countries to stimulate their use, although they may vary in scope, focus, budget, and complexity, with slow progress where the benefits cannot be measured and demonstrated in a sound way (UNESCO 2009).

Focusing on Ghana in particular, education is taken to be the cornerstone of economic and socio-political development. As Ayot and Patel (1992) observed, the fundamental goal of education is to prepare and equip the young to be happy and useful members of society. This goal can only be achieved through the provision of quality education. They further asserted that quality education will entail the development of the school subjects through professionally trained teachers who use appropriate audio-visual media and follow communication techniques that help impart maximum knowledge and skills to students. They noted further that teachers are required to improve and use instructional methods that lead the students to realize their full potential.

ICTs are electronic devices that receive, store, and disseminate information. Studies have revealed that students who learn in a technology-rich environment experience positive effects on their performance in all subject areas. Fagbamiye, (2007). In the same line of thought, Becta (2003) pointed out that ICT provides fast and accurate feedback to students and the speed of computation and graphing, thus freeing students to focus on strategies and interpretations. Despite the benefits of ICT devices for teaching and learning, their usage in senior high schools is still low as teachers and school management are yet to embrace and integrate ICT into instructional activities. That is why Onyejemezie (2001) maintained that the usefulness of educational technology devices depends on what the teacher makes out of them.

In Ghana, most tertiary institutions have no clearly defined policy framework for the use and integration of ICT, especially in the teaching and learning of languages. Moreover,

teachers are not able to integrate and use ICT in the teaching and learning of other subjects, especially in the teaching and learning of modern languages. Both teachers and students see it as a separate entity. Moreover, sadly, in Ghana, besides the unavailability of a proper ICT framework, its integration has not been considered central to the teaching and learning process. Hence, this study critically sought to establish a framework for developing an ICT policy for integration into tertiary institutions in Ghana.

1.2 Statement of the Problem

The successful integration of an ICT-designed policy framework into tertiary institutions warrants careful planning and depends largely on how well policymakers understand and appreciate the dynamics of such integration (Jhurree, 2005). The Ministry of Education has placed considerable emphasis on the importance of ICT integration in education, as evidenced by the promulgation of the National ICT strategy in 2006 following the approval of sessional paper number one in 2005 (Jhurree, 2005).

Furthermore, the vision of the Ministry of Education is to facilitate ICT as a universal tool for education and training at all levels and, in particular, to stimulate the ICT policy integration in education in various regions in the country. However, while other countries have reported up to 41% of ICT integration in teaching and learning, the proportion remains substantially low in Sub-Saharan Africa, including Ghana (Kasharda and Waema 2007). From the view point of Irura (2008), and with reference to the implementation of the ICT integration policy, there has not been a well-spelt out procedure to address uniformity in the pace of ICT integration and its adoption approach due to the various needs and disparities in tertiary education in Ghana (Irura, 2008). Moreover, there also

exists a wide research gap when it comes to a policy framework on ICT integration in tertiary education in Ghana. A study was therefore essential to develop a policy framework to establish clear guidelines for the integration of ICT in tertiary education.

1.3 Purpose of the Study

The main purpose of the study was to establish the framework for developing ICT policy for tertiary institutions in Ghana, with reference to the Ghana Institute of Languages as a case study.

1.4 Objectives of the Study

The specific objectives are as follows:

1. To identify the benefits and challenges of developing an ICT policy for tertiary institutions in Ghana.
2. To determine the ways in which the ICT policy could be integrated into the teaching and learning process by lecturers and students.
3. To examine the extent to which the implementation of the ICT policy affects tertiary institutions.

1.5 Research Questions

This study was guided by the following research questions:

1. What are the benefits and challenges of developing an ICT policy for tertiary institutions in Ghana?

2. In what ways can lecturers and students integrate the ICT policy into the teaching and learning process?
3. To what extent could the implementation of the ICT policy affect tertiary institutions?

1.6 Significance of the Study

The study is considered to be timely, relevant and required since there has not been much research on the framework for the development of ICT policy for tertiary institutions in Ghana, resulting in a wide research gap (Osei-Akoto, 2010). Also, there has not been any research study conducted in relation to the framework of development of ICT at the Ghana Institute of Languages. Hence, the study would be most beneficial to these categories and groups.

Academia

The study will be valuable to academia since future researchers and academic institutions, especially those of higher learning, can use the findings of this research to add to the knowledge of existing literature, serve as a source of reference and lay the basis for further research to be carried out.

Policy Makers

This study will help educational planners and policy makers understand the relevance of the educational ICT policy framework to enhance the integration of ICT at the tertiary institution level. Furthermore, the findings may be useful feedback to curriculum and

course content developers and designers on the kind of framework policy needed to aid in the successful integration of ICT at the tertiary level. Besides, the study may be helpful in formulating clear policy guidelines on the framework for integrating ICT policies at the tertiary level.

Practitioners

The practitioners in this context include lecturers, teachers, educational consultants, and ICT facilitators. Furthermore, the study's findings may be useful to educators, who can use the suggested measures to implement better ICT policy integration at their tertiary institution, benefiting all students.

1.7 Delimitation of the Study

The participants in this study were lecturers and students from the three selected Ghana Institute of Languages, namely, Accra, Kumasi, and Tamale.

The researcher would use at least three of Ghana's oldest Institute of languages running ICT programmes. The study was conducted at three selected Ghana Institute of Languages, namely, Accra, Kumasi, and Tamale.

1.8 Organization of the Study

The work was organised sequentially into five chapters. Chapter one deals with the introduction, the background to the study, problem statement, purpose of the study, objectives of the study, research questions, significance of the study, delimitation of the

study, and the organisation of the study. Chapter Two deals with the discussion and review of existing literature related to the concepts of research.

The third chapter describes the methodology adopted for the study, that is, research methodology, research design, sources of data, population and sampling, research instruments, data collection procedures, and analyses of data, and the second section is a profile of the research area. Chapter four focuses on the analysis of the data collected. Finally, chapter five concludes the case study by providing the findings, conclusions, and recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter considered and critically evaluated research and other literature related to the topic under study. This chapter discusses the theoretical review, empirical review, and conceptual framework, as well as other related sub-headings.

2.2 Theoretical Review

According to Defee, Williams, Randall, and Thomas (2010), good research should be theoretically grounded. Furthermore, the idea behind a theory is to clarify issues and to have guiding principles as well as direction for the explanation and interpretation of social phenomena (Otite and Ogionwo, 2000). The study was therefore guided by the Policy Implementation Process Theory and the Disposition of Implementers' Theory relevant to this study. They are discussed below.

2.2.1 Policy Implementation Process Theory

According to Van Meter and Van Horn (1975), policy implementation is about partnership and participation from many parties: internal and external, public and private work together, and hand-in-hand support of the goal through consensus from all policy actors. In other words, policy implementation is about comprehensive capacity building that involves multiple actors: individual capacity, organizations, and society (Eade, 1997) in driving the organisational change in the comprehensive conceptual framework (Sabatier and Mazmanian, 1980) both by reculturing and restructuring (Fullan, 2001).

For example, in Van Meter and Van Horn's treatise, it defines policy implementation as the result of a policy decision, followed by a commitment to financial support as part of the policy source. However, the most important thing is that the policy implementation will go nowhere if the goals and objectives of the strategic planning are not clearly stated (Pressman and Wildavsky, 1973).

2.2.1.1Van Meter and Van Horn's model of the policy implementation process

Van Meter and Van Horn present six variables to link policy and performance. However, these variables are fundamentally developed by two main variables: first, policy standards and objectives; and second, policy resources, which are then supported by the other four variables. In addition, the policy standards and objectives are supported or linked to the inter-organizational communication and enforcement activities, which are then connected to the disposition of implementers and also connected to the characteristics of the implementing agencies. In the meantime, the policy resource is linked to the support of economic, social, and political conditions. This economic, social, and political condition is next connected to the same variable as the disposition of implementers. But the fact is that each of these theories is basically inter-related to the other.

2.2.1.2 Policy Standard and Objectives

In terms of the function of the standard and objective, Van Meter and Van Horn define this as a framework, and the concept is to be carried out by all policy implementers. For instance, the aim of this function can be used as an instrument to measure the

performance of policy implementation. So it is suggested that the policy standards and objectives should be clearly and accurately stated, otherwise it will be impossible to carry out. In addition, the awareness of implementers towards the clarity and accuracy of the standards and objectives of the policy is considered very important (Van Meter and Van Horn, 1975).

Other than that, Pressman and Wildavsky (1973) argue that goals and objectives are the two things that determine the success or failure of the implementation process. To determine the standards and objectives of a policy decision, several points can be used to evaluate the performance of the policy, such as using the policy maker's statement as reflected in government documents, program regulations, and guidelines that state how the programs are being implemented.

2.2.1.3 Policy Resources

The resources in the policy may include funds and incentives in the program. Van Meter and Van Horn also note that federal incentives are considered the major contributor to the failure or success of policy implementation (Derthick, 1972).

2.2.1.4 Inter-Organizational Enforcement Activities

According to Van Meter and Van Horn (1975), communication among organisations is a complex process. If the source of communication gives a different, conflicting, and inconsistent interpretation of the standard and objectives, the policy implementers will have difficulty carrying out the policy. In this inter-organizational or intergovernmental

context, two types of enforcement are important: first, technical advice and assistance; and second, central and local authorities' influence used as follow-up activities. Some of the central or local authority influences are socialization, persuasion, and co-optation of state and local actors; achieving the influence of participation; requiring state or localities to draw up and elaborate on the plan for administration of a local or central program. Finally, the controlling aspects such as evaluation, monitoring, administrative and management reviews, audits, and other feedback mechanisms such as reports by non-governmental advisory committees or NGOs should be carried out (Van Meter and Van Horn, 1975).

2.2.1.5 The Characteristics of the Implementing Agencies (Organization)

At least two factors that organisations can observe when implementing a single public policy are proposed by Van Meter and Van Horn (1975). support among legislators and executives and the linkages between both formal and informal agencies. In other words, if there is no collaboration or partnership support from other capacities within society, organisations, and individuals (Eade, 1997), the development of the organisational programme will fail. Development is a holistic action that requires support from many sectors, including political, social, cultural, economic, language, education, law, and management (Hussin et al., 2005).

2.2.1.6 Economic, Social and Political Condition

According to Van Meter and Van Horn, the implementation of public policy must not be segregated from the national economic, social, and political context. Moreover, Van

Meter and Van Horn noted that before the stakeholders establish the policy, they should consider the aspects of economic resources, national socio-economic condition, public opinion and perception on the related policy issues in the field, elite politics' attitude and concern about the policy being implemented, and most of all, the support and participation from external sectors (private and public) (Van Meter and Horn, 1975).

2.2.2 Disposition of Implementers' Theory

The disposition of the implementers' theory enlightens the policy actors' perceptions and responses towards the policy implementation. This aspect involves policy actors' or practitioners' mindset, attitude, belief, behaviour, and perspective on the policy being implemented. Furthermore, this is also about awareness and how far policy actors are concerned about it. Van Meter and Van Horn divide this disposition into three parts: cognition (understanding of policy); direction of response, which includes acceptance, neutral, and rejection; and intensity or quality of response, which is heavily involved with the aspect of concern of policy implementers. Van Meter and Van Horn (1975) further explain that the more implementers accept the policy, the more positive or successful the adoption of the policy will be. Thus, this aspect of the intensity of implementers' responses and perspectives is quite urgent in supporting the policy implementation process, according to Van Meter and Van Horn (1975).

The foundation of disposition theory is derived from several old and popular psychological and social education thinkers, such as John Dewey, Combs, Vygotsky, and Piaget (Dewey, 1922; Combs et al., 1969; Vygotsky, 1962; Piaget, 1958). Dewey notes

disposition as something related to human habit connected with personal meaning, perspective, and perception of life that is not something readymade, but is a continuity action through a long activity called process (Dewey, 1893).

Grounded by the fundamental concepts above, other new thinkers and experts further add that disposition is something with regard to personal behavior, character, and perception (Wasicsko, Callahan, and Wirtz, 2004). More experts further describe that disposition involves three aspects: beliefs and attitudes, character, and reflection through personal "observable behaviours" (Burant et al., 2007). Meanwhile, Fullan (2001) regards personal disposition as the root and the radical thing for driving real change in an organization, also called "reculture". Clearly, disposition is a very close link with personal values, commitment, and personal ethics that impact on someone's behaviors characterized by mental, emotional, and spiritual aspects that also influence an individual's way of thinking (National Symposium, 2003).

Moreover, disposition also cannot be separated from knowledge and skills to measure teachers' performance in education (Bone and Griffin, 2009). Disposition, or what O'Day et al. (1995) noted as attitude, also becomes part of individual capacity building (Lusthaus et al., 1995; Eade, 1997; Morgan, 1998; UNDP, 2002; JICA, 2004; EuropAid, 2005; UNESCO, 2006).

2.2.2.2 Historical Background of Information and Communication Technology

The use of computers in education dates back to 1924, when Sidney Presley tried out the so-called "teaching machine" for revision and testing at Ohio University in the United States of America. However, the use of technology in education was generally slow until the coming of computers. Kavagi (2010). Integrating technology into curricula with the sole purpose of positively influencing the teaching and learning process has been evolving since 1980, when a number of countries around the world introduced computers into their educational systems (Wakhaya, 2010). This change was mainly as a result of hardware and software evolution, computer accessibility in educational settings, and popular instructional technology trends. Technology integration covers a wide range of topics, ranging from instruction on programming skills, self-directed drills, testing, instructional delivery, and Internet-based accessibility to information and ommunication. It has been argued by certain scholars that the use of new technologies in the classroom is essential for providing opportunities for students to acquire knowledge and skills that will enable them to function in an information age. Bingimlas, (2009) It is therefore evident, as Yelland (2001) argued, that traditional educational environments do not seem to equip the learner with adequate skills to be productive in their places of work in today's society. She asserts that organizations that do not integrate the use of new technologies into schools cannot claim to prepare learners for life in the modern technological age.

Pelgrum, (2006) notes that "computer education" started to become popular in educational policy making in the early 1980s when relatively cheap microcomputers became available to the consumer market. Pelgrum (2006) further observed that towards

the end of the 1980's, the term "computer" was replaced by "information technology" (IT), signifying a shift of focus from computing technology to the capacity to store and retrieve information. This was followed by the introduction of the term "information and communication technology" (ICT) around 1992, when email started to become available to the general public.

The world education forum in 2000 listed the harnessing of new information and communication technologies as one of the most important strategies to help achieve the education for all goal (MOE 2005). However, the Dakar framework for action cautioned that, to be effective, the new technologies should serve rather than drive the implementation of educational strategies.

2.3.1 Uses of ICT in Classroom Instruction

There are several roles that ICT can play in the teaching and learning process. First, ICT has great potential to enhance learner achievement. Bransford and colleagues. A number of theorists and scholars assert that the use of computers can make learners knowledgeable, reduce the amount of direct instruction given to them, and provide a learning environment where teachers can assist learners with special needs. In addition, the use of new technology will motivate the learners and hence develop a favourable attitude towards science subjects. Moreover, ICT is an umbrella term that includes any communication device or application, encompassing radio, television, cellular phones, computers, networks, hardware, software, and satellite systems, as well as the various services and applications associated with them, such as video conferencing and distance

learning. According to Collis and Moonen (2010), the focus of ICTs in this study is the use of the internet, software, multimedia resources, course management systems, and computer-based testing systems in education.

The applications of ICTs are categorised into three groups as represented in Table 1.0 below, which consist of learning resources, instructional organisation of learning, and communication. The applications of ICT in learning resources include educational software, distributed resources via the internet and video resources. Educational software is not only a learning resource for students but also a tool for instructional organisations of learning. Examples of physics education software include Physics Pro, Crocodile Physics, and Andrés Physics. Rich learning resources distributed via the internet and video resources are also considered important. The next category, which is instructional organisation of learning, contains software and technology tools for supporting lectures, course management systems, and computer-based testing systems. More so, educational software and technology equipment are needed to assist in face-to-face lectures. The tools supporting lectures in class comprise LCD projectors, computers, speakers, over-head projectors, and so on. Another application of ICT in the instructional organisation of learning is course management systems, for instance, DOKEOS, Moodle, and WebCT. Course management systems are sometimes called learning management systems, e-learning systems, content management systems, or learning support systems. Third, computer-based testing systems such as Maplesoft T.A. and Hot Potatoes are applied in the instructional organisation of learning. The table below further elaborates on the various learning resources and their respective categories and ICT tools.

Furthermore, he argues that when ICT is well utilised in the teaching and learning process, it would be one of the best mediums to promote communication. Imperatively, the use of ICTs in this domain consists of e-mail systems and websites that offer variable communication options and software systems for text-based chat and other forms of communication.

Table 2.1: Categories of ICTs Application

Categories	The applications of ICTs
Learning resources	• Educational software • Distributed resources via the internet • Video resources
Instructional organisation of learning	• Software and technology tools supporting face-to-face lectures • Course management system • Computer-based testing system
Communication	• E-mail system • Websites offering communication options for the direct sending for e-mail and forms of structured communication • Software system for text-based chat

Source: Collis & Moonen(2001).

Nevertheless, in its broadest meaning, ICT embraces many forms of technology, and as mentioned earlier, one of the limitations of this research is that it only explores ICT in terms of the internet, software, multimedia resources, course management systems, and computer-based testing systems. The applications of ICT are categorised into three groups relating to three vital factors of the education process, which include learning, teaching, and communicating. For instance, student-student and student-teacher communication.

2.5 Integrating ICT in the Teaching and Learning

Integrating ICT in teaching at the tertiary level embraces the functions of planning and preparation of suitable learning activities and their execution in the classroom (Newton, 2009). There should be a wide range of ICT frameworks that lecturers could use in planning for lessons and actual classroom instructions. These include the use of software, CD-ROMs, the Internet, DVD players, television and radio, and image capture devices that include still and video cameras and video recorders, among others. Steve and Keith (2009).

Furthermore, any lecturer wishing to integrate ICT teaching into the curriculum should consider the relevance of the policy to the curriculum and its technological impact. Indeed, ICT policy integration should be used in delivering lectures. From the view point of Driver et al. (2007), this puts the learner at the centre of the teaching-learning process. Therefore, using the ICT framework provokes them to think and come up with solutions to problems. Mental alertness and active participation are key elements in this mode of

learning and are widely accepted to underpin effective lecturing (Newton, 2009). The most important aspect, yet one that has received less attention from both researchers and lecturers, is the incorporation of ICT into the lecture room instructional process. For many years, ICT in education has been used as an object of study or as an aspect of a discipline or profession. Hence, focus should now be shifted to using ICT in the lecture room as a medium of instruction (Plomp et al., 2006).

2.5.2 Microcomputer Based Laboratory (MBL)

A microcomputer-based laboratory (MBL) involves the use of a microcomputer as a laboratory tool to collect and analyse data. Students utilise a microcomputer and accompanying probes to collect, record, and draw graphs. Different probes, interfacing boxes, and software are needed in order to use the microcomputer as a tool to collect laboratory data that includes temperature, motion, force, pH, sound, light, and pressure.

Linn et al. (2006) suggest that microcomputers used as laboratory tools may offer a fundamentally new way of aiding students' conception of new concepts. Moreover, the use of the ICT policy framework by tertiary institutions also allows for a new dimension in lecturer-student interaction (Tinker & Papert, 2009). It also provides opportunities for asking and refining questions, making predictions, designing plans or experiments, collecting and analysing data, debating ideas, communicating ideas and findings with others, drawing conclusions, and asking new questions. In addition, the use of the microcomputer as an ICT tool may strengthen students' problem-solving skills (Linn et al., 2006).

According to Mokros and Tinker (2007), students using "Probeware" have an unprecedented power to explore, measure, and learn from the environment. An important outcome of using the ICT policy framework may be that students spend less time gathering and more time interpreting and evaluating the data, allowing for more activities central to critical thinking, problem solving, and self-monitoring skills. Hence, students are more willing to replicate, evaluate, and improve the experiment. It also has instructional advantages that include environmental simplicity, fast feedback, more direct experience, student control and interest, and ease of data transformation. Bentillo et al. (2009).

2.5.3 Web-based Approach

This approach makes use of the Internet and web-based resources. The Internet is a rich resource where both lecturers and learners can get up-to-date information on science concepts. The lecturer can even assign students to visit websites, search for knowledge and answer some questions. Balbin, (2011). Beyond the classroom, lecturers and teachers can communicate via email or chat. Students can interact online with their lecturers or other students from other schools or countries. To facilitate the use of the web-based approach, the institution should have the required infrastructure such as computers and Internet service providers such as MTN, TIGO, and others. In the absence of a computer, the lecturers and students can still access the Internet through tablets and mobile phones, which are now cheap and affordable. Mobile phones are yet to be exploited fully by lecturers for learning purposes. Indubitably, research studies on the use of mobile phones for a range of different teaching and learning processes have been carried out worldwide.

Ekanayake (2009) argues that due to a wide range of attributes such as spontaneous, personal, informal, contextual, portable, and pervasive and functions such as talk, text, still camera, video, radio, and the Internet, mobile phones could add a completely new dimension to the teaching and learning process (MoE, Singapore, 2008). However, schools could buy some smart phones or tablets that could be used solely for learning purposes.

2.5.4 Use of Television and Radio

These ICTs have been "used widely" as educational tools since the 1920s (radio) and the 1950s (TV). With the coming of computers and the Internet, it is possible to listen to live and recorded radio as well as watch TV programs. Transmitting recorded radio and TV programmes over the Internet is referred to as "Personal On Demand" (POD) broadcasting. This technique has a unique feature in that programmes can be saved and then downloaded for later listening. During the era of the Presidential special initiative in Ghana, a programme of such status was run on Ghana television. The computer makes it possible for the lecturers to earmark specific programmes according to subject, topics, and date, among others. Kavagi (2010). There are three general approaches to the use of radio and TV in education (UNESCO, 2007).

a) Direct Class Lecturing

This approach involves using broadcast programming as a substitute for a lecture on a temporary basis. 20–30 minute direct lectures and assignments are provided via radio or TV to the lecture hall on a daily basis. The lectures are developed around specific

learning objectives at particular levels of the subject. The aim is to improve the quality of lectures and to act as a regular, structured aid to lectures.

b) School Broadcasting

This involves the provision of broadcast programming—not to substitute the lectures but, rather, to enrich traditional methods of instruction, particularly where resources would not otherwise be available. Often deployed with print materials, cassettes, and CD-ROMS, school broadcasting is geared toward completing a curricula developed for a range of subject area lecturers who then decide how they will integrate the materials into their lectures. This is the approach adopted by schools, where lessons are broadcast to schools through radio, and lecturers decide how and when to integrate them into their lectures.

c) General Educational Programming

General educational programming involves providing non-formal educational opportunities for all types of learners across communities, national or international stations. This programming could include news and documentary programmes, quiz shows, educational cartoons, and so on. Examples that use this approach are the children's "education" television show Sesame Street, the television channels National Geographic and Discovery, the radio programme Voice of America, and the Farm Radio Forum, which began in Canada in the 1940s. As reported by research studies, there are benefits to using ICT in science teaching and learning. Using ICT in science education exposes the teacher to more pedagogical resources. For example, the use of the Internet

allows learners to search for up-to-date information rather than rely on being given facts by their teachers or reading textbooks, some of which may be outdated. According to Knelleher (2010), while ICT cannot replace traditional classroom teaching, it can foster a deeper understanding of science concepts and provide new and authentic teaching and learning activities that can motivate students. ICT encourages communication and collaboration in scientific research activities. According to Gillespie (2006), new technologies can be used in science education to enable learners to collect information and interact with resources such as videos and images to encourage communication and collaboration. According to Maithya and Ndebu (2011), there are a number of factors that influence the use of ICT in teaching and learning. These factors are either institutional or teacher-related.

2.5.5 Lecturer Related Factors

Lecturer related factors determine, to a great extent, the success of computer projects in education (Kavagi, 2010). Teachers play a very important role in the teaching and learning process. They must be able to prepare young people for a knowledge society in which the competence to use ICT to access information is very important. Samah and colleagues (2009). According to the literature reviewed, there are a number of lecturer-related factors that influence the use of ICT.

They include:

a) Lecturers Experience

Some research findings show that lecturers' adoption of new technology is influenced by age. Studies conducted by Roberts et al. (2006) revealed that lecturers who were educated

20 years ago were trained by people who themselves were trained before the arrival of computers in educational institutions, and therefore, such teachers were unlikely to use ICT in their classrooms. However, a study carried out by Albirini (2006) found that age did not significantly influence lecturers' attitudes towards the use of ICT. These two contrasting findings call for further research on the age factor as a predictor of the lecturers' use of ICT.

b) Lecturers ICT Experience

Several studies show that lecturers who are inexperienced in using ICT most likely avoid using it for fear of failure. According to Balanskat et al. (2006) and Bingimlas (2009), limitations in teachers' ICT knowledge make them feel anxious about using ICT and they are not confident in using it. This is in line with the findings of a study by Becta (2004), who found that many physics teachers who do not consider themselves proficient in using ICT feel anxious about using it in front of a class of students who may know more than they do.

c) Lecturers Competence in ICT Use

Since lecturers are key to the success of ICT integration in education, they must be equipped with basic ICT skills to meet their individual administration and lecturing requirements. In addition, for effective ICT integration, lecturers have to undergo ICT-based pedagogical training so as to ensure the effective use of technology in both teaching and learning the subject (MoE, Singapore, 2008).

Again, research studies in Australia found that lecturers who lacked knowledge and skills to use computers were not enthusiastic about integrating ICT into learning, as opined by Newhouse, (2002). Research conducted in developing countries also revealed that a lack of technological knowhow is the main obstacle to the acceptance and adoption of new technology by lecturers for instruction. Further, studies conducted in Bungoma by Wanjala et al. (2011) confirmed that, indeed, to adopt any educational technology effectively, lecturers must feel confident in its operation and have the ability to use it for instruction.

2.5.6 Perceptions and attitude of Lecturers in using ICT for Lectures

The role and importance of attitudes and beliefs in education is a very well-documented area in educational research. This is also true when it comes to studying the relationship between attitudes and the usage (or lack of usage) of ICT in education. Ertmer, (2006) and Jegede, (2008). As revealed by a number of studies, a lecturer's attitude determines the extent of ICT use in the teaching and learning process. According to Gakuu (as cited in Maithya, 2011), how people perceive and react to technologies is far more important than technical obstacles in influencing ICT implementation and use. Watson (2008), an Australian researcher, argues that integrating new technologies into educational settings and, for that matter, physics requires change and different teachers who will handle the change differently. Drent Meelissen (2007) conducted a study on the use of ICT by teachers in classroom instruction in the Netherlands and found that a positive ICT attitude has a direct positive influence on the innovative use of ICT by the teacher. Educational theorists and researchers have alluded to the fact that the physics teacher's attitude is an

important factor in the adoption of new technologies in classroom instruction. Koohang (2009)

It has also been argued that the attitude towards ICT in the teaching and learning process does not only affect lecturers' use of computers in the classroom but also their likelihood of benefiting from training. Kluever and colleagues (2004). In addition, Tay (2012) asserts that teachers have very often been identified as one of the most significant resources in the integration of technology into schools, but they could also be one of the main barriers. The teacher's attitude, knowledge, and skills in the use of computers for the purpose of teaching and learning have a considerable impact on the outcomes to be achieved. However, a study conducted in Ghana to establish the relationship between teachers' perception and ICT integration in teaching and learning brought to the fore contradicting results. The study revealed that teachers' perceptions with regard to the use of ICT were positive and low, but not statistically significant. Buabeng (2012) This revelation casts doubt on other findings which have reported that teachers' actual ICT use is related to their perceptions. Keengwe & Onchwari, (2008); Lau & Sim, (2008).

This finding, on the other hand, is in agreement with Eugene (2006), who explored the effect of teachers' beliefs and attitudes towards the use of ICT in classrooms. The study revealed that there was an inconsistency between teachers' beliefs and their actual use of technology in the classroom. Teachers' beliefs and teaching practises were found to not match. The inconsistency between teachers' actual use of ICT and perceptions can be attributed to the inadequate supply of computers.

2.5.7 Institutional Factors

a) Time

Studies carried out by various scholars indicate that the availability of time determines the use of ICT integration. Becta, (2004). According to Kozma et al. (2004), the lack of time available in lecturers' own schedules for planning is a major factor influencing ICT integration in lecturing. Further, a study carried out in Saudi Arabia showed that time is an important factor affecting the application of new technologies in education since lecturers work from about 7.00 a.m. to 2.00 p.m. and have on average 18 credits per week (Alwani, 2005). Both lecturers and students have little time to work on integrating ICT.

b) Access to ICT Facilities

Access to ICT facilities is an important factor that could influence lecturers' use of ICT in conducting lectures. Various research studies show that barriers related to accessibility to new technologies for teachers are widely spread and differ from country to country. A study conducted in Europe found that lack of access is the largest barrier to using ICT. Lecturers gave reasons such as: lack of computers and related hardware; lack of appropriate software; slow Internet (empirical as cited in Bingimlas, 2009). Further, a study carried out at the Ghana Teachers' Colleges of Education revealed that most lecturers lacked ICT skills but many had difficulties integrating ICT into the teaching of their subjects. The lecturers cited a lack of sufficient internet facilities for this scenario. Ndebu and Maithya (2011) and Keiyoro (2010) conducted a case study involving Cyber and NEPAD E-schools on factors influencing ICT integration in teaching in general as well as the curriculum. According to his findings, there was no point in spending time

and effort on equipping teachers with the necessary skills to integrate ICT into their teaching if schools did not have computer labs and other ICT resources to put those skills into practice with learners.

c) Technical Support

Good technical support, both in the classroom and throughout the school, will assist teachers in overcoming the barriers that prevent them from using ICT. Lewis (2003), as cited in Bingimlas (2009). According to Sicilia (2005), technical problems were found to be a major barrier for teachers. Waiting for a website to load because of a slow Internet connection, failing to connect to the Internet, malfunctioning computers and printers, and old and slow computers are examples of such technical issues. These barriers affect the smooth delivery of lessons or the natural flow of classroom activities. Gomes (2005) argues that ICT integration in teaching needs a technician, and if one is not available, a lack of technical support can be an obstacle.

d) Management Support

Successful integration of ICT into teaching and learning depends to a large extent on the support given by the school management to the teachers and students. It plays a significant role in the adoption of technology as part of the school culture, which in turn influences people's perceptions. As cited in Maithya and Ndebu (2011), William et al. argue that culture developed within an institution can act as a barrier to change. This is further supported by Gakuu (2006), who cites organisational culture as playing a key role in implementing change in an organization. According to Kara (2008), management of

ICT should involve continuously reviewing and putting in place the most appropriate ways of exploiting ICT, as well as acquiring and utilising new ICT required by an organization. Institutional management should also ensure that staff capacity is increased, that ICT usage in the institution is monitored, and that the effectiveness of ICT usage is ensured.

e) School ICT Policy

The GES formulated a number of policy recommendations aimed at having a coordinated approach to ICT integration in education (MoEST, 2006). Educational institutions are expected to make their ICT policies based on these recommendations. School policies are intended to guide the integration of ICT into teaching and learning by articulating the expected characteristics and experiences and how they will be used to enhance the use of ICT in the teaching and learning process. The ICT policy further influences the school culture, which is an important aspect of ICT integration. According to Dawson and Rakes (2003), school policies play a significant role in promoting ICT integration in teaching and learning. School ICT policy entails the development of a shared vision concerning how ICT is to be used for teaching and learning and putting in place systems to support the same.

2.6 Availability of ICT Infrastructure in Public Senior High Schools

ICT availability and utilisation in education According to Ngwu (2014), they are not adequately available in schools. This therefore implies that, even though teachers are adequately trained and willing to impart the knowledge, the lack of technological

equipment and facilities is an impediment. According to Adedeji (2011), the same research revealed a low degree of utilisation of ICT resources and related technologies in the schools under study. He suggested and recommended the provision of funds for the procurement and maintenance of ICT resources, at the same time ensuring the existence of functional computer laboratories, consistent power supplies in schools, and the provision of in-house training for teachers so that they keep in touch with the developments in ICT and related technologies. In their research paper titled, "Availability and utilisation of ICT tools for effective instructional delivery in tertiary institutions in Cross River State, Nigeria," it came to light that the availability of ICT tools for effective instructional delivery is relatively low, except for laptops, multimedia projectors, and internet facilities.

They went on to argue that this affects the quality of students produced by these institutions. They, however, recommended that ICT tools should be available in institutions of learning. Teachers should make an effort to acquire these tools since they are an integral part of instruction delivery. The government should also come up with appropriate ICT policies and training programmes for teachers. Adedeji (2011) suggested that governments should invest in the provision of ICT resources to schools for training because the findings of his research revealed that most ICTs available in schools were being utilised for administrative purposes. Research conducted by Kiptalam and Rodrigues (2011) revealed that the use of ICT and related technologies is still at an early stage of development and implementation. They noted that while the pace was slow in other instances, in some there was a faster absorption rate, to the extent that some schools

developed electronic content for their teaching and learning. Such material is available on CDs and DVDs. Samuel and Bakar (2006) revealed in their research paper titled, "The Utilization and Integration of ICT Tools in Promoting English Language Teaching and Learning: Reflections from English Option Teachers in Kuala Langat District, Malaysia" that they are insufficient.

2.7 Frequency of ICT Use in Teaching and Learning

Changes in Instructional Methods in Science Education According to Osborn and Hennesy (2003), science curricula have changed over the past few decades in line with the new aims of science education and will continue to do so. Teaching science has progressed through three sequential phases. The first phase was characterised by "chalk and talk" and still resists the incursion of the learner-centered interactive phase. The latter espouses constructivist theories of learning and has been the subject of qualitative research by many educationists (Miles, 2010). The third phase, which is referred to as scientific literacy, is concerned with the social purposes of science curricula and literacy awareness that view students as citizens of tomorrow's world. Scientific literacy emphasises lifelong learning and assists learners to interrogate the crucial relationship between, on one hand, the world of science and scientists and, on the other hand, society; it extends narrative pedagogy, which is a universal human faculty. It focuses on environmental aspects of science learning and recognises that human values are a powerful component in citizens' essential participation in socio-scientific issues. In the spirit of the Internet, knowledge is passed on across communities of learners rather than being dished out like a commodity. As a result of these changes, teachers have to shift

from traditional modes of teaching to modern ones that incorporate ICT as a means of profitably.

2.8 Factors Hindering ICT Utilization in the Teaching of Physics in Schools

Mungai (2010), a teacher by profession, identified the following as factors that are hindering the utilisation of ICTs in his country: Lack of qualified teachers since the few they have are overwhelmed; lack of electricity, which is a common problem in most African countries; inadequate computers; breakdown of the computers; higher prices for the procurement of ICT resources; burglary; computer phobia by both administrators and teachers; obsolete computers; and increased moral degradation, that is, abuse of such facilities as the internet by people who watch inappropriate material, cyberbullying and other anti-social behaviors. Langat (2015) identified barriers hindering implementation of ICTs as shortage of infrastructure and resources, shortage of teachers, lack of a clear digital curriculum, political factors, poor timing and poor planning, high cost of implementation, communication barriers, corruption, moral issues, and high crime rates. These researchers made recommendations that would improve utilisation as follows: all stakeholders need assessment analysis; the establishment of proper communication channels; professional development of teachers and technicians; the establishment of digital curricula; and the creation of partnerships in education. Mahmood et al. (2014) attributed the lack of ICT utilisation in the teaching of physics in schools to a number of factors. Firstly, they highlighted a lack of exposure and expertise on the part of physics teachers who are computer illiterate against modern students who are quick to self-educate and highly computer literate. The second aspect is the forcing of teachers to use

technology in the classroom without giving them ample time to learn, acquire, and apply the technology appropriately.

Another factor identified was a lack of confidence amongst teachers, which is again attributed to a lack of professional training. According to Afshari et al. (2009), there are manipulative and non-manipulative school and teacher factors that affect the utilisation of ICTs. Non-manipulative factors are those that cannot be influenced by the school, which include such factors as age, teacher experience, and computer experience of the teacher, government policy, and the availability of external support for the school. Manipulative factors refer to those the school can influence, which include such factors as teachers' attitudes towards ICT skills and knowledge, the school's commitment towards implementation and use of ICT in teaching. Kivuli (2013) identified a lack of all stakeholders' awareness of the importance of technology in teaching as a hindrance factor. These include teachers, parents, students, and the community at large. He also mentioned the lack of ICT resources in schools and encouraged local software developers to work with schools in developing software ideal for training. Lack of professional development of principals and lecturers in schools was also cited. Teachers need to be encouraged to use ICT in schools, and a lack of time to integrate ICT into the existing curriculum was also cited as a contributing factor. According to Mingaine (2013), factors that affect ICT utilisation in schools include the availability of electricity, the cost of ICT infrastructure, school leadership, and the availability of teacher skills.

2.9 Conceptual Framework

According to Kalaba (2014), a conceptual framework displays the complete research by classifying and stressing the elements, patterns, and relationships that exist between and among the study concepts. A conceptual framework is defined as an interconnected set of ideas (theories) about how a particular phenomenon functions or is related to its parts (Svinicki, 2010). The main purpose of the conceptual framework is to clarify concepts and relationships among the variables in the study, provide a context for interpreting the study findings, and explain observations. It illustrates the framework for developing ICT policy for tertiary institutions in Ghana. ICT policy will be the independent variable conceptualised by the benefits and challenges, opportunities and recommendations. Tertiary institutions will be the dependent variable in this study and have been conceptualized by universities, polytechnics, and colleges of education (Nassazi, 2013).

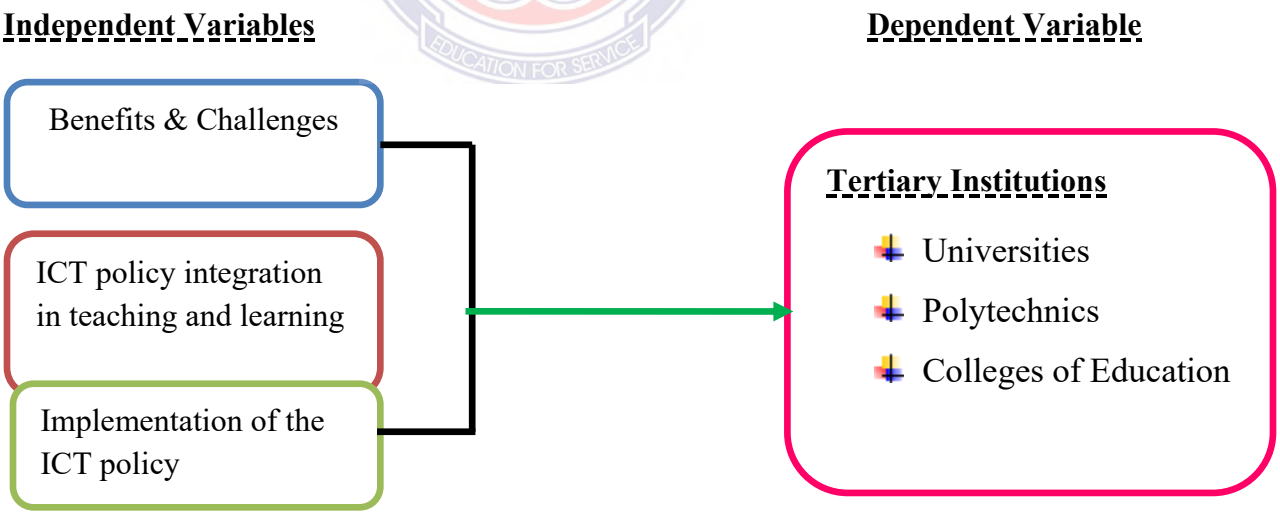


Figure 2.1: Conceptual Framework

Source: Researcher (2021)

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

The chapter emphases were on the research methodology, with detailed explanations of the methodology adopted for the study. It was organized under the following sub-headings: research design, target population, sample size and sampling procedure, research instrument, validity, reliability, data collection procedure, and data analysis.

3.2 Research Design

The choice of the research methodology was guided by the research question, objective, the focus of the study, the purpose of the study, the extent of existing knowledge, amount of time, and other resources that were available. According to Cooper and Shinder (2007), the research design constitutes the blueprint for the collection, measurement, and analysis of data. It is the arrangement of conditions for collecting and analysing the data that was essential to the study. It also assisted the researcher in the process of collecting and analysing data. The study adopted a cross-sectional case study strategy. It indicated the extent to which an obtained interpretation could be generalised to different situations. The study employed qualitative methods. Qualitative research has been defined by Malhotra and Birks (2006) as "an unstructured, primarily exploratory design based on small samples, intended to provide insight and understanding." This, they postulate, is made up of various methods that can be flexibly applied in order to allow respondents to "reflect upon and express their views or observe their behaviour". Such an approach aims at determining underlying motives and desires through the use of in-depth interviews

(Kothari, 2004) and is most important in the behavioural sciences in discovering underlying motives of human behaviour (Saunders et al., 2007). Arguments by Malhotra and Birks (2006) and MacDonald and Headlam (2008) suggest that qualitative research's effort is to increase understanding of the essential motives and drives for actions and establish how people interpret their experiences and the world around them, generating ideas and/or hypotheses. Research designs fall into three categories: descriptive, explanatory, and exploratory (Saunders, Lewis, & Thornhill, 2000).

Exploratory research design is defined as an attempt to understand more about the nature of a situation that is less known. Descriptive research design is defined as an attempt to explain additional information about a topic. In addition, it can be used to describe the characteristics of a population (Malhotra, 2007). Explanatory research design is also defined as an attempt to connect ideas and understand causes and effects, thus explaining what is going on. The study employed a descriptive design. It helps to satisfy the interest of the researcher and also gives proper understanding. It also provides the background for more constructive educational research.

3.3 Population

According to Kothari (2012), a researcher has to have a specific population as his research population target upon which he bases all his inferences regarding the validity of what he/she is researching. The population of a study is the collection of all possible individuals, objects, or measurements of interest (Mason et al., 2007). "Population" refers to the total number of people living in a particular geographical area (Saunders et al.,

2000). A population group is the subject on which measurements are obtained; it is the entity of study (Cooper & Schindler, 2010).

The study used the Ghana Institute of Languages due to the researcher's familiarity with it and its easy accessibility. The researcher also has background knowledge in the field of study. The target population for the study is lecturers and students of the Ghana Institute of Languages, number 50.

3.4 Sample Size and Sampling Procedure

The sample is a good representation of the entire population. According to Punch (2010), one cannot study everyone and everywhere. Rajasekar et al. (2013) defined sample size as the number of sample units or units of analysis. Establishing a sample is known as sample size. Therefore, there is a need for a sample to be selected since the entire population could not be used for the study. With reference to the population, 50 respondents were selected from the Ghana Institute of Languages. Sampling is selecting elements from a population from which a researcher may draw conclusions about the whole population.

A sampling technique was used to determine the sample size since the entire population could not be used for the study. The researcher deemed it important to use the random sample technique as the study needed to reach out to people with knowledge of the research area, hence the thirty-five (35) lecturers and students of the Ghana Institute of Languages were used for the study. Mugenda & Mugenda (2009) argue for a representative sample size of at least 10% and 30% of the population, respectively. In this

study, the sample size of 35 is higher than the greater of the two percentages, which is 15 (i.e., 30% of 50). The random sample techniques helped the researcher in collecting the data because they were considered a fair way of selecting samples from a given population and it was also an easy method of assembling data.

3.5 Data Collection Tools

Data collection techniques are one of the most important aspects of any research. A questionnaire was the main data collection tool used for the study. The use of the questionnaire helps to reach a large number of people. The questionnaire comprised Likert-type questions, multiple-choice and closed-ended questions. The scale contained a 5-option Likert scale with responses that ranged from "strongly agree" (1) to "strongly disagree" (5). The scale is a type of ordinal scale scoring system that allows most researchers to turn responses into quantifiable data. The questionnaire was divided into four sections: Section A: Respondent demographic profile; Section B: The advantages and disadvantages of developing an ICT policy; Section C: ICT policy integration into the teaching and learning process; and Section D: ICT policy implementation.

The main instrument for data collection was questionnaires with structured questions. Structured questions allow for uniformity of responses to questions. The questionnaire is a fast way of obtaining data as compared to other instruments (Mugenda & Mugenda, 1999). Questionnaires gave the researcher comprehensive data on a wide range of factors. Questionnaires allow greater uniformity in the way questions are asked, ensuring greater compatibility in the responses. It is a printed self-report that captures information through

the written response of the respondent. It was used to collect demographic data and data on research objectives. The use of the questionnaire gave respondents the liberty to answer the questions at their own time of convenience. However, respondents who required further explanation were guided in completing the questionnaires. Also, in order to pique interest and encourage the participation of respondents, the questionnaires were very simple and short.

3.6 Validity and Reliability

3.6.1 Validity

According to Mugenda & Mugenda (1999), validity is the extent to which a measuring instrument provides adequate coverage of the topic under study. The validity of the questionnaires was determined using content validity. Kung'u (2015) affirms that content validity is the extent to which the measurement device provides adequate coverage of the investigative questions. The recommendations from the experts were used to improve the data collection instruments. Data validity played an important role in the generalisation of the gathered data to reflect the true characteristics of the study problem. The researcher presented the research instruments to experts in the Information Technology Department at the University of Education, Winneba, and Kumasi Kwadaso Municipal Assembly to evaluate their content and construct validity and suitability.

3.6.2 Reliability

According to Healy and Perry (2000), reliability is the extent to which results are consistent over time and an accurate representation of the total population under study.

Cronbach's Alpha was used as a measure of reliability and consistency. "Cronbach's Alpha is a reliability coefficient that indicates how well items in a set are positively correlated (Revelle & McDonald, 2006).

3.7 Data Collection

According to Saunders, Lewis, and Thornhill (2009), data is defined as raw facts, opinions, and statistics that have been collected together and recorded in order to be analysed and meanings made out of them. The researcher booked appointments with the respondents to visit and administer the questionnaires. The researcher personally administered the instruments to all the respondents, who were given 3 days to complete all the items adequately, after which the researcher collected the filled-in questionnaires. The data for this study was collected within a period of one month.

3.8 Data Analysis Techniques

According to Johnson and Christensen (2004), data analysis is the process of generating value from raw data. Data analysis is the process of bringing order, structure, and meaning to the mass of information collected (Lind et al., 2005). The data collected in this study was coded and tested for completeness and then analysed using descriptive and inferential statistics using the Statistical Package of Social Science (SPSS) and Microsoft Excel, and presented using tables, charts, and graphs.

The questionnaires were entered into the SPSS software programme and Microsoft Excel. The data was checked for completeness, and all corrections were made.

3.9 Ethical Considerations

In this study, issues relating to the ethical conduct of research, such as confidentiality, informed consent, privacy, and anonymity, were upheld. According to Neuman (2007), ethics has to do with concerns, dilemmas, and conflicts that arise over the proper way to conduct research. Research ethics help in defining what is or is not legitimate to do, or what a "moral" research procedure involves. "Ethics refers to the norms or standards of behaviour that guide moral choices about our behaviour and our relationships with others (Saunders et al., 2009). The researcher subjected the study to four (4) main ethical instruments, and the first one was the consent form (see Appendix ii). The consent form stated that it was a letter that requested permission from the selected public institutions to allow respondents to contribute to the data collection. Secondly, since the study used simple random sampling, the researcher asked respondents whether they were willing to partake in the data collection process. Thirdly, this further complied with the rights of the respondents. Additionally, the ethical issue focused on protecting the identity of the respondents, and lastly, the ethical issue considered their information as a form of confidentiality. According to Malhotra and Birks (2007), ethical issues spring forth, especially when there are minor conflicts and misunderstandings between the researcher and respondents.

CHAPTER FOUR

DATA ANALYSIS AND RESULTS

4.1 Introduction

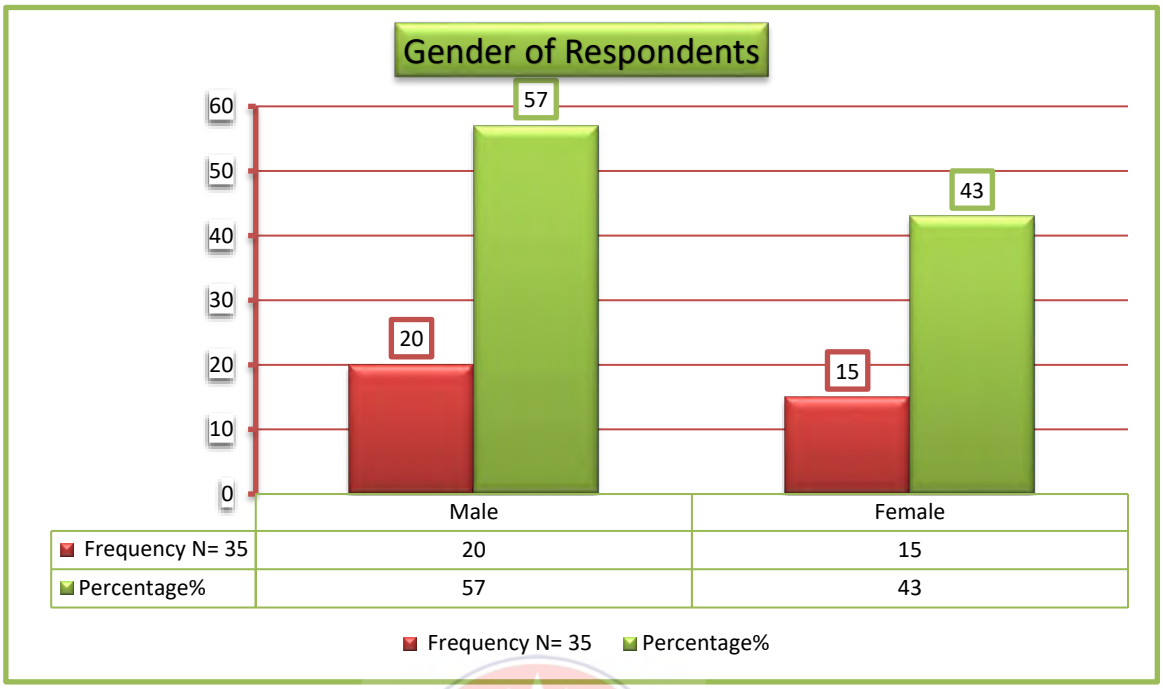
The chapter focuses on the presentation and analysis of data. The chapter presents the findings of the data analysis conducted for the study.

4.2 Demographic profile of the Respondents

The demographic profile provides information about the population structure and helps create a mental picture of the subgroups that exist in the overall population. Researchers obtain demographic information from the study subjects to understand sample characteristics and to determine if samples are representative of the populations of interest (Kirton, 2000). Although demographic variables cannot be manipulated, researchers can explain relationships between them and dependent variables. In this study, the researcher established the respondent's characteristics by establishing their gender, age, marital status, and years of experience.

4.2.1 Gender Distribution of the Respondents

The study seeks to establish how the sample population was distributed by gender and to enable cross-tabulation of responses in this light.



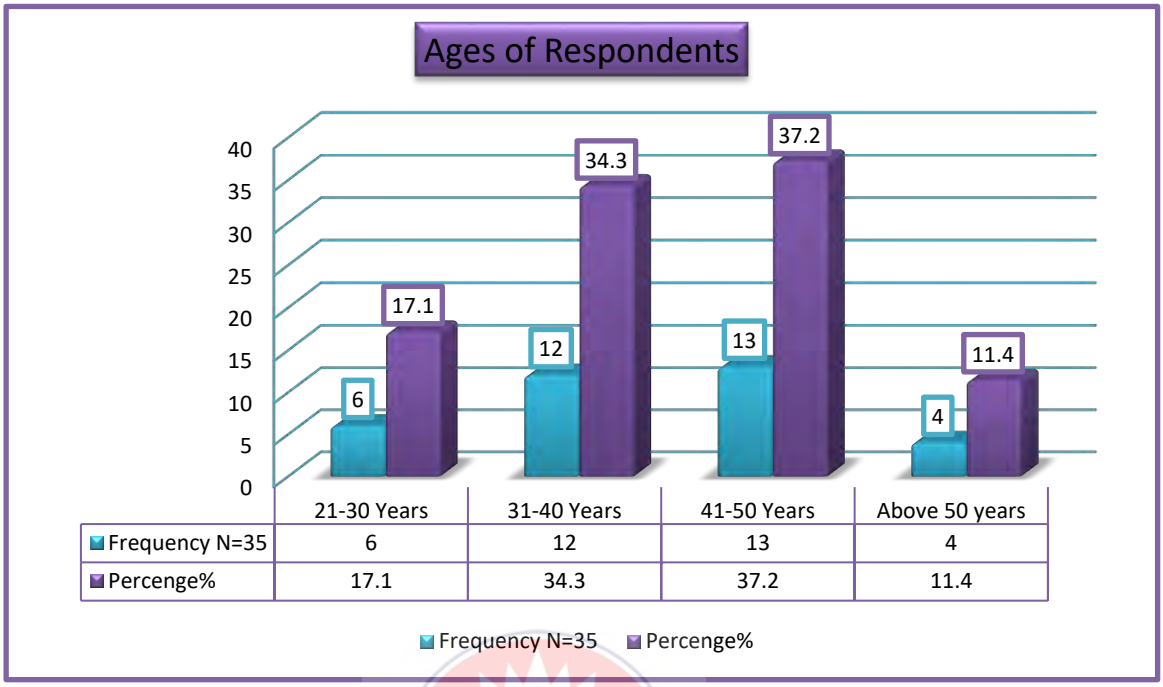
Source: Field Survey (2021)

Figure 4.1: Pie Chart on Gender of the Respondents

From Figure 4.1, it is revealed that 20 respondents, which represents 57%, were males. Additionally, 15 respondents, which represents 43% of the respondents, were females. It can be deduced that the majority of the respondents were males.

4.2.2 Ages of Respondents

As part of the demographic data collection, the ages of respondents were sought.



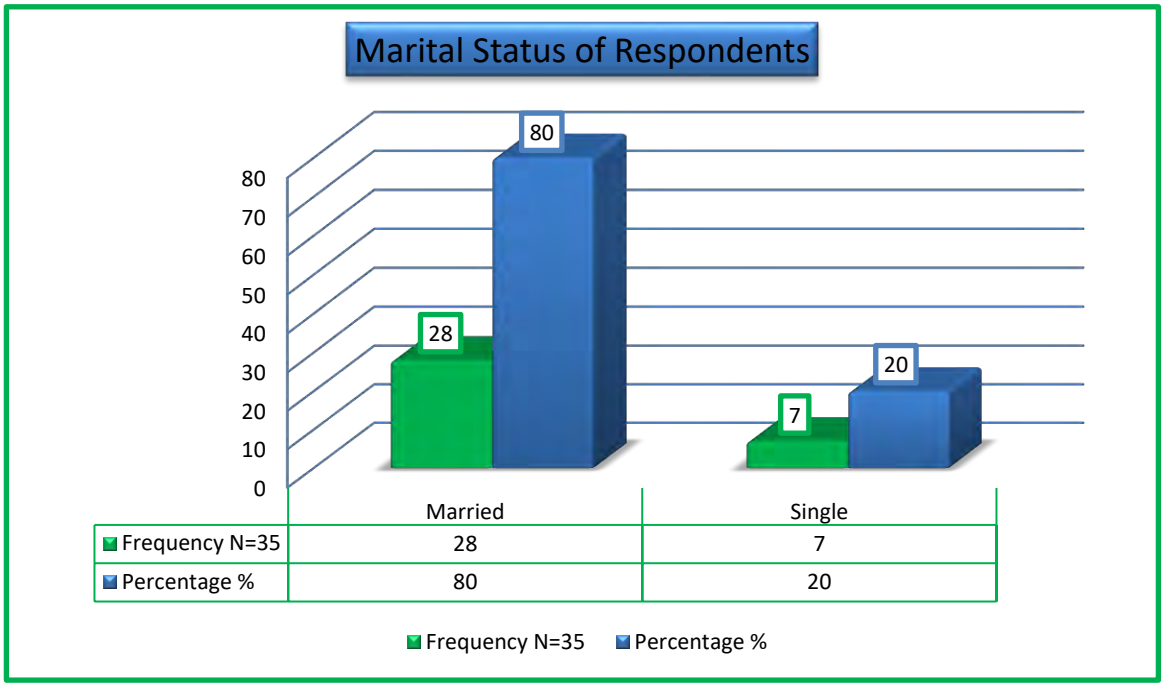
Source: Field survey (2021)

Figure 4.2: Ages of Respondents

From Figure 4.2, it is observed that 6 respondents, which is 17.1%, were within the 21–30 year range. Similarly, 12 respondents, which represents 34.3%, were in the 31–40 age range. Also, the 41–50 age group had 13 respondents, or 37.2%, whereas only 4 respondents, or 11.4%, were over 50 years of age. It became clear that the majority of the respondents were between the ages of 41 and 50 years old.

4.2.3 Marital Status of Respondents.

The marital status of all respondents selected for the study was checked as part of the demography for the study. The chart in figure 4.3 indicates the values for the data obtained.



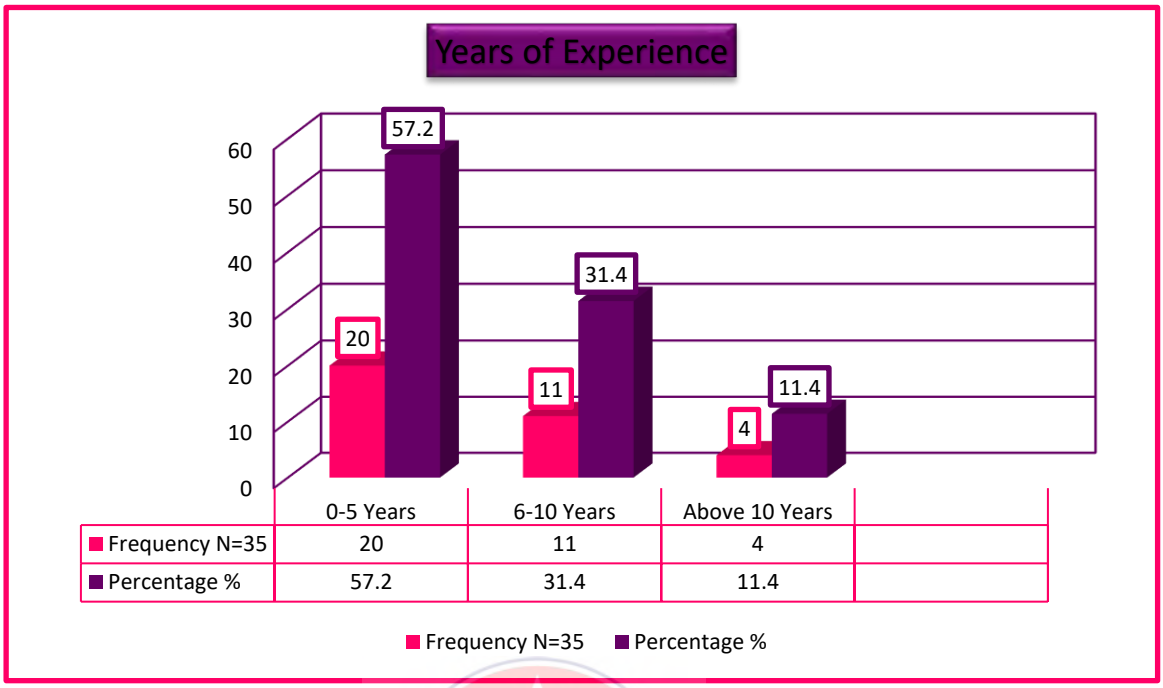
Source: Field survey (2021)

Figure 4.3 Marital Status of Respondents

It is observed from Figure 4.3 that the married respondents were represented with a frequency of 28 and a percentage of 80%. However, 7 respondents, which represented 20%, were single. This implies that the majority of the respondents selected for the study were married.

4.2.4 Years of Experience

The length of time spent at the current institution also formed part of the data collected for the study. Figure 4.4 gives the illustration and analysis.



Source: Field survey (2021)

Figure 4.4: Respondents Years of Experience

From Figure 4.4, it is observed that 20 respondents, which also represented 57.2%, had been at the selected institution for 0–5 years. Conversely, 11 respondents, which represents 31.4%, had been with the institution for the past 6–10 years, whereas four respondents, which is 11.4%, had been with the institution for over 10 years. It can be concluded that most of the selected respondents have been with the institution for 0–5 years.

4.3 The Benefits of the Framework for Developing ICT Policy

As part of the study, the views of respondents in relation to the questionnaire were sought on the benefit of a framework in developing ICT policy. All questions are rated on the Likert scale. On the

Table 4:1 The Benefits of the Framework for Developing ICT Policy

Statement		SA 1	A 2	N 3	D 4	SD 5	T
(i) It gives a clear-cut road map that enhances students' ICT knowledge.	F	22	10	0	2	1	35
	%	62.9	28.6	0	5.7	2.8	100
(ii) It provides access to both local and international knowledge networks and shared educational resources.	F	24	8	1	1	1	35
	%	68.7	22.9	2.8	2.8	2.8	100
(iii) It enables the undertaking of a comprehensive assessment and analysis of the current ICT situation (e-readiness) of educational institutions.	F	16	13	1	3	2	35
	%	45.7	13.7	2.8	8.5	5.7	100
(iv) It helps in the acquisition, development, and implementation of suitable ICT for use in tertiary institutions.	F	20	11	0	3	1	35
	%	57.2	31.4	0	8.6	2.8	100
(v) An ICT framework policy helps to develop and support tertiary institutional level technology planning.	F	25	6	1	2	1	35
	%	71.4	17.4	2.8	5.7	2.8	100

Source: Field Survey (2021)

From table 4.1, respondents were required to express their views in relation to the benefits of developing ICT policy in terms of the various related statements. Hence, on the statement that one benefit of the framework for developing ICT policy is that it gives a clear-cut road map that enhances students' ICT knowledge, as many as 22 (62.9%) respondents strongly agreed, 10 (28.6%) disagreed, and no one was neutral. Again, as many as 2 (5.7%) strongly disagreed, and only 1 (2.8%) of the respondents disagreed.

Moreover, on the statement that it provides access to both local and international knowledge networks and shared educational resources, as many as 24 (68.7%) strongly agreed, 8 (22.9%) agreed, 1 (2.8%) was neutral, 1 (2.8%) strongly disagreed, and 1

(2.8%) also disagreed. Additionally, to the statement that: it enables the undertaking of a comprehensive assessment and analysis of the current ICT situation (e-readiness) of educational institutions, 16 (45.7%) strongly agreed, 13 (57.1%) agreed, 1 (2.8%) was neutral, 3 (8.5%) strongly disagreed, and 2 (5.7%) agreed.

Furthermore, on the statement that it helps in the acquisition, development and implementation of suitable ICT for use in tertiary institutions, 20 (57.2%) strongly agreed, 11 (31/4%) agreed, and no one was neutral. However, 3 (8/6%) strongly disagreed, and 1 (2.8%) disagreed. Nonetheless, on the statement that an ICT framework helps to develop and support tertiary institutional level technology planning, 25 (71.4%) strongly agreed, 6 (17.4%) agreed, 1 (2.8%) was neutral, 2 (5.7%) strongly disagreed, and 1 (2.8%) agreed.

4.3.1 The challenges of developing ICT policy

In lieu of the study objectives, respondents were required to select and give their opinions on the various statements in table 4.2. Their statements were analysed in connection with their options using the Likert Scale, as it was used for their expressed views in all the tables and data analysed in this chapter.

Table 4.2: The Challenges of Developing ICT Policy

Statement		SA 1	A 2	N 3	D 4	SD 5	T
(i) Inadequate legal infrastructure and related institutional infrastructure to support ICT development and application	F	26	7	0	1	1	35
	%	74.3	20	0	2.8	2.8	100
(ii) Inadequate regulatory capacity, especially in the face of the convergence of growing networks and services,	F	19	14	1	0	1	35
	%	54.2	40	2.8	0	2.8	100
(iii) There is a lack of specific and effective legislative instruments addressing privacy and security.	F	15	10	1	4	5	35
	%	42.9	28.6	2.8	11.4	14.3	100
(iv) Need for research in ICT in Education related legal and regulatory issues.	F	29	4	1	1	1	35
	%	82.9	11.4	2.8	2.8	2.8	100
(v) Maintenance and technical support	F	25	8	0	I	1	35
	%	74.3	22.9	0	2.8	2.8	100
(vi) Lack of legislation on e-rates (education rates).	F	14	12	3	4	2	35
	%	40	34.3	8.5	11.4	5.7	100
(vii) Establish an enabling legal framework, aligned with Ghana's constitutional provisions and consistent with regional and global best practices.	F	17	15	1	1	1	35
	%	48.6	42.9	2.8	2.8	2.8	100

Source: Field Survey (2021)

From table 4.2, on the statement that there is an inadequate legal framework and related institutional infrastructure to support ICT development and application as part of the challenges in developing ICT policy, 26 (74.3%) strongly agreed, 7 (20.0%) agreed, 0 (0.0%) were neutral, 1 (2.8%) strongly disagreed, and 1 (2.8%) also disagreed. Also, on the statement that another challenge is inadequate regulatory capacity, especially in the face of growing networks and services convergence, 19 (54.2%) strongly agreed, 14

(40.0%) agreed, 1 (2.8%) was neutral, 0 (0.0%) strongly disagreed, and 1 (2.8%) also disagreed.

A salient statement is that the lack of specific and effective legislative instruments on privacy and security poses a challenge. 15 (42.9%) strongly agreed, 10 (40.0%) agreed, 1 (2.8%) was neutral, 4 (11.4%) strongly disagreed, and 5 (14.3%) also disagreed. Moreover, on the statement that the need for research in ICT in education-related legal and regulatory issues is a challenge, 29 (82.9%) strongly agreed, 4 (11.4%) agreed, 1 (2.8%) was neutral, 1 (2.5%) strongly disagreed, and 1 (2.8%) also disagreed.

Similarly, on the issue of maintenance and technical support, 25 (74.3%) strongly agreed, 8 (22.9%) agreed, 0 (0.0%) were neutral, 1 (2.8%) strongly disagreed, and 1 (2.8%) also disagreed. However, on the lack of legislation on e-rates (education rates) as a challenge, 14 (40.0%) strongly agreed, 12 (34.3%) agreed, 3 (8.5%) were neutral, 4 (11.4%) strongly disagreed, and 2 (5.7%) also disagreed. Finally, in terms of the establishment of an enabling legal framework, aligned with Ghana's constitutional provisions and consistent with regional and global best practices, 17 (48.6%) strongly agreed, 15 (42.9%) agreed, 1 (2.8%) was neutral, 1 (2.5%) strongly disagreed, and 1 (2.8%) also disagreed.

4.2: The integration of ICT policy in the teaching and learning process

As part of what the study hoped to achieve, the selected respondents were expected to express their views on given statements in relation to the integration of ICT policy into the teaching and learning process.

Table 4.3:The Integration of ICT Policy in Teaching and Learning Process

Statement		SA 1	A 2	N 3	D 4	SD 5	T
(i) Develop a national coordinated strategy for on-going professional development.	F	22	8	2	1	2	35
	%	62.9	22.9	5.7	2.8	5.7	100
(ii) promote the use of electronic and distance education and virtual learning systems to complement and supplement face-to-face, campus-based education and training systems.	F	30	3	0	1	1	35
	%	85.7	8.6	0	2.8	2.8	100
(iii) Identify some selected teacher training colleges to provide ICT in educational training (applications plus technology integration skills).	F	31	3	0	1	0	35
	%	88.6	8.6	0	2.8	0	100
(iv) Equip and re-tool teacher training colleges and institutions to prepare teachers in the integration of ICT in the curriculum.	F	27	5	0	2	1	35
	%	77.1	14.3	0	5.7	2.8	100
(v) Promote basic training in ICT skills for teachers in all schools and tertiary institutions.	F	33	2	0	0	0	35
	%	94.3	5.7	0	0	0	100
(vi) Train ICT coordinators and ICT laboratory technicians / assistants in all educational institutions.	F	31	3	0	0	1	35
	%	88.6	8.6	0	0	2.8	100

Source: Field Survey (2021)

According to table 4.3, the integration of ICT policy into the teaching and learning process, on the statement that there is a need to develop a national coordinated strategy for on-going professional development, 22 (62.9%) strongly agreed, 8 (22.9%) agreed, 2 (5.7%) were neutral, 1 (2.8%) strongly disagreed, and 2 (5.7%) also disagreed. Further, on the issue that the integration of ICT policy into the teaching and learning process promotes the use of electronic and distance education and virtual learning systems to complement and supplement face-to-face campus-based educational and training

systems, 30 (85.7%) strongly agreed, 8 (22.29%) agreed, 0 (0.0%) were neutral, 1 (2.8%) strongly disagreed, and 1 (2.8%) also disagreed. Again, to the statement, "Identify some selected teacher training colleges to provide ICT in education training (applications plus technology integration skills," 31 (88.6%) strongly agreed, 3 (8.6%) agreed, 0 (0%) was neutral, 1 (2.8%) strongly disagreed, and 0 (0%) also disagreed.

Additionally, the statement that the integration equips and re-tools teacher training colleges and institutions to prepare teachers for the integration of ICT in the curriculum, 27 (77.5%) strongly agreed, 5 (14.3%) agreed, 0 (0.0%) was neutral, 2 (5.7%) strongly disagreed, and 1 (2.8%) also disagreed. To the statement that integration would promote basic ICT skills training for teachers in all tertiary institutions, 33 (94.3%) agreed, 2 (5.7%) agreed, 0 (0.0%) were neutral, 0 (0.0%) strongly disagreed, and 0 (0.0%) disagreed. Conversely, to the statement "Train ICT coordinators and ICT laboratory technicians/assistants in all educational institutions," 31 (88.6%) strongly agreed, 3 (8.6%) agreed, 0 (0%) were neutral, 0 (0%) strongly disagreed, and 1 (2.8%) also disagreed.

4.3: The implementations of the ICT policy affect tertiary institutions

The study also demanded respondents' views in relation to the implementation of the ICT policy and how it affects tertiary institutions. Table 4.4 gives the analysis of the data.

Table 4.4: The Implementation of the ICT Policy affect tertiary institutions

Statement		SA 1	A 2	N 3	D 4	SD 5	T
(i) The need for urgent provision of enabling environment for efficient implementation of ICT within the sector generally.	F	23	7	1	3	1	35
	%	65.7	19.6	2.8	8.4	2.8	100
(ii) Efficient capacity of teachers who are seen as a central figure in the entire programme	F	14	13	3	4	1	35
	%	39.2	36.4	8.4	11.2	2.8	100
(iii) Higher priority should be placed on those training to be teachers.	F	26	7	1	1	1	35
	%	74.2	19.6	2.8	2.8	2.8	100
(iv) Early provision of facilities to courses that demand ICT facilities	F	23	10	0	1	1	35
	%	64.4	28	0	2.8	2.8	100

Source: Field Survey (2021)

According to table 4.4 of the statements, there is an urgent need for the provision of an enabling environment for the efficient implementation of ICT in the sector as a whole. 23 (65.7%) strongly agreed, 7 (20.0%) agreed, 1 (2.8%) was neutral, 3 (8.6%) strongly disagreed, and 1 (2.8%) also disagreed. Likewise, on the efficient capacity of teachers who are seen as the central figures in the entire programme, 14 (40.0%) strongly agreed, 13 (37.1%) agreed, 3 (8.6%) were neutral, 4 (11.4%) strongly disagreed, and 1 (2.8%) also disagreed. Furthermore, according to the statement, higher priority should be placed on those trained to be teachers. 25 (74.2%) strongly agreed, 7 (20.0%) agreed, 1 (2.8%) was neutral, 1 (2.8%) strongly disagreed, and 1 (2.8%) disagreed. Lastly, on the statement that early provision of facilities to courses that demand ICT facilities, 23 (65.7%) strongly agreed, 10 (28.6%) agreed, 0 (0.0%) were neutral, 1 (2.8%) strongly disagreed, and 1 (2.8%) also disagreed.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

The chapter focused on the conclusion and recommendation of data. This was based on the research topic which focuses on the framework for developing ICT policy for tertiary institutions in Ghana, with reference to the Ghana Institute of Languages as a case study. Furthermore, the chapter attempted to explain the conclusions drawn from the data analysis results, and relevant recommendations were made.

5.2 Summary of Findings

From the demographic data of the respondents, it can be gathered that the majority of the respondents selected for the study were males when it comes to the gender of respondents. Again, in relation to the ages of respondents, the age bracket with the highest frequency is the 41–50 age bracket, with a value of 13. The least frequent of all is the over-50 age range, with a frequency of only 4. Conversely, in terms of marital status, most of the selected respondents were married. The frequency value is 28, which is 80%. Similarly, in terms of work experience. Moreover, the majority of the respondents have been at their current job within the 0–5 year range. In a nutshell, the demographic data reveals the acquisition of credible data.

Furthermore, the summary of findings in line with the objectives is as follows:

To the objective of developing the ICT policy for tertiary institutions in Ghana, the following statements were given to solicit respondents' views: It gives a clear-cut road

map that enhances students' ICT knowledge. It provides access to both local and international knowledge networks and shared educational resources. It enables the undertaking of a comprehensive assessment and analysis of the current ICT situation (e-readiness) of educational institutions. It helps in the acquisition, development, and implementation of suitable ICT for use in tertiary institutions. An ICT framework policy helps to develop and support tertiary institutional level technology planning. For each statement, the majority of the respondents strongly agreed.

Furthermore, on the challenges of the framework for developing ICT policy, the following statements were strongly agreed upon by the majority of respondents: The inadequate legal framework and related institutional infrastructure to support ICT development and application as part of the framework for developing ICT policy; the inadequate regulatory capacity, especially in the face of convergence of growing networks and services; the lack of specific and effective legislative instruments on privacy and security; the need for research in ICT in education-related legal and regulatory issues; the issue of maintenance and technical support; the lack of legislation on e-rates (education rates); and the establishment of an enabling legal framework, aligned with Ghana's constitutional provisions and consistent with regional and global best practices; Moreover, in terms of ICT policy integration into the teaching and learning process, The following statements were outlined for respondents to express their views: the need to develop a national coordinated strategy for on-going professional development; the issue that the integration of ICT policy into the teaching and learning process promotes the use of electronic and online education as well as virtual learning

systems to complement and supplement face-to-face campus-based education and training systems; the identification of some selected teacher training colleges to provide ICT in education training in terms of applications plus technology integration skills; the integration that equips and re-tools teacher training colleges and institutions to prepare teachers in the integration of ICT in the curriculum; the integration that promotes basic training in ICT skills for teachers in all tertiary institutions; as well as the training of ICT coordinators and ICT laboratory technicians or assistants in all educational institutions also had A majority of the respondents strongly agree with all the statements.

Again, the implementation of the ICT policy for tertiary institutions can reach these Statements were given to respondents for ratings. The need for urgent provision of an enabling environment for efficient implementation of ICTs within the sector generally, the efficient capacity of teachers, who are seen as a central figure in the entire programme, the higher priority that should be placed on those training to be teachers, and the early provision of facilities to courses that demand ICT facilities, had the majority of respondents strongly agree with all the statements.

5.3 Conclusion

It was concluded that in terms of both the benefits and challenges for the development of the ICT policy for tertiary institutions in Ghana, the study proved to be of immense benefit, although it may encounter challenges, which is a common phenomenon with most such programs. In particular, the challenge of ICT infrastructure and the training of ardent personnel in tertiary institutions as well as colleges of education should be a priority.

In terms of ICT policy integration into the teaching and learning process by lecturers and students, it was concluded that a national strategy should be developed. This implied the integration of electronic and virtual systems of learning. It was concluded that it would lead to online education, which would improve students' intake, give more access to both teachers and learners, and ease the pressures of the traditional face-to-face teaching and learning process. Furthermore, it was also concluded that the integration of the ICT policy framework should be on a pilot basis so that strengths and weaknesses would be identified and resolved before spreading to the other institutions.

It was concluded that as part of the ICT policy framework for tertiary institutions, an enabling environment should be created to enable the implementation of the ICT policy framework in tertiary educational institutions. Additionally, capacity building should be established using the teachers who are considered the cardinal point and the centre for the entire implementation of the policy framework. Nonetheless, for the entire implementation process to be successful, there should be early provision of facilities for courses that demand the use of ICT facilities.

5.4 Recommendations

Based on the research findings and the conclusions drawn from the study objectives, the following recommendations were made:

Undeniably, in this era of global ICT advancement in all facets of life, there is an urgent need for careful deliberation to ascertain the numerous benefits of a proper and well-defined ICT policy framework that would enhance the teaching and learning process,

especially at the tertiary level. This would elevate education to global trends and contemporary technological knowledge, which are now required in the world of tertiary education. However, with the overwhelming advantages expected to be achieved, there is a need for tertiary educational institutions to embrace the concept no matter what may serve as an obstacle.

Conversely, it is recommended that in order to successfully integrate the ICT policy framework, there is a need to run the programme on a pilot basis in order to identify its strengths and weaknesses before generalization. Moreover, on the issue of infrastructure and ICT tools usage, it was realised that it is inadequate and, as such, there is a need for the institutions to be well-equipped with ICT tools for a better implementation of the ICT policy framework.

5.5 Suggestions for Further Study

This study has contributed to the body of knowledge and paved the way for future research. Hence, the study suggests that further research be conducted on the framework for the development of ICT policy for primary or basic education in Ghana.

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APPENDIX

APPENDIX A

UNIVERSITY OF EDUCATION, WINNEBA –KUMASI CAMPUS

Questionnaire

This research aims to determine the framework for developing ICT policies for tertiary institutions in Ghana with reference to the Ghana Institute of Languages in selected regions such as Accra, Kumasi, and Tamale.

I would be very pleased if you could spare some time and complete this questionnaire. The information provided will be used for academic purposes only and will be confidential. Thank you.

The questionnaire is divided into four sections: A to D. Please complete each section according to the given instructions. Do not write your name or the name of your school to ensure complete confidentiality. Kindly respond to all the questions.

In all questions, please tick [] only unless otherwise indicated.

SECTION A: Demographic profile of the Respondents

1. What is your gender? Male { } Female { }

2. What is your age group?

a) 21-30 years { } b) 31-40 years { } c) 41-50 years { } d) 51-60 years { }

3. Marital status?

Married { } Single { } Divorced { } Widow/Widower { }

4. What is your highest qualification?

a) Bachelor Degree { } b) Master's Degree { } c) PhD { }

5. What is your level in the college?

Level 200 Level 300

SECTION B: The benefits and challenges for developing ICT policy

6. The statements below relate to identifying the benefits of the framework for developing ICT policy. Supplied also are the five options corresponding to these statements on a five-point Likert scale where SA = strongly agree, A = agree, N = neutral/undecided, D = disagree, SD = strongly disagree.

Tick in the box the appropriate response.

The benefits of the framework for developing ICT policy	5 (SA)	4 (A)	3 (U)	2 (D)	1 (SD)
(i) It enhances students ICT knowledge					
(ii) Provides access for students to international knowledge networks and shared educational resources					
(iii) Undertakes a comprehensive assessment and analysis of the current ICT situation (e-readiness) of all Educational Institutions					
(iv) Acquire, develop and implement					

suitable ICT policy for use in the tertiary institutions.					
(iv) Develop and support tertiary institutional level technology planning.					

1. The following statements are about identifying the challenges to developing ICT policy. Supplied also are the five options corresponding to these statements on a five-point Likert scale where SA = strongly agree, A = agree, N = neutral/undecided, D = disagree, SD = strongly disagree.

Tick in the box the appropriate response.

The challenges of the framework for developing ICT policy	5 (SA)	4 (A)	3 (U)	2 (D)	1 (SD)
(i) Inadequate legal framework and related institutional infrastructure to support ICT development and application					
(ii) Inadequate regulatory capacity, especially in the face of convergence of growing networks and services.					
(iii) Lack of specific and effective legislative instruments on privacy and security.					

(iv) Need for research in ICT in education related legal and regulatory issues.					
(v) Lack of legislation on e-rates (education rates).					
(vi) Maintenance and technical support					
Establish an enabling legal framework aligned with Ghana's constitutional provisions, and consistent with regional and global best practices.					

SECTION C: ICT policy integrated in teaching and learning process

7. The statements below relate to identifying opportunities that exist in the Ghanaian market. Supplied also are the five options corresponding to these statements on a five-point Likert scale where SA = strongly agree, A = agree, N = neutral/undecided, D = disagree, SD = strongly disagree.

Tick in the box the appropriate response.

ICT policy integrated in teaching and learning process	5 (SA)	4 (A)	3 (U)	2 (D)	1 (SD)
(i) Develop a national coordinated strategy for on-going professional development.					
(ii) Promote the use of electronic and distance education and virtual learning systems to complement and supplement face-to-face campus based education and training systems.					
(iii) Identify select teacher training colleges to provide ICT in education training (applications plus technology integration skills).					
(iv) Equip and re-tool teacher training					

colleges and institutions to prepare teachers in the integration of ICT in the curriculum.					
(v) Promote basic training in ICTs skills for teachers in all schools and tertiary institutions.					
(vi) Train ICT co-coordinators and laboratory technicians / assistants in all educational institutions.					

SECTION D: Implementation of the ICT policyaffect tertiary institutions

8. The statements below relate to the implementation of the ICT policy and affect tertiary institutions. Supplied also are the five options corresponding to these statements on a five-point Likert scale where SA = strongly agree, A = agree, N = neutral/undecided, D = disagree, SD = strongly disagree.

Tick in the box the appropriate response.

Implementation of the ICT policy	5 (SA)	4 (A)	3 (U)	2 (D)	1 (SD)
(i) The need for urgent provisionof enabling environment for efficiently integrationof ICTs within the sector generally.					
(ii) Efficient capacity of teachers who are seen as a central figure in the entire programme					
(iii) Higher priority should be placed on those training to be teachers.					
(iv) Early provision of facilities to courses that demand ICT facilities					

APPENDIX B

CONSENT FORM

Dear respondent/participant,

Your decision to participate in this study is much appreciated. In this form, there is an outline of the objectives of the study. There is also a description of your involvement (i.e., roles and rights) as a participant. The study is a partial fulfilment of the Master of Science in Information Technology Education at the University of Education, Winneba.

The main objective of this study is to establish the framework for developing ICT policies for tertiary institutions in Ghana, with reference to the Ghana Institute of Languages as a case study. The study sought to achieve these objectives: to identify the benefits and challenges of developing the ICT policy for tertiary institutions in Ghana; to determine the ways in which the ICT policy could be integrated into the teaching and learning process by lecturers and students; and to determine the extent to which the implementation of the ICT policy affects tertiary institutions.

Any information you provide will be used to write a dissertation in which suggestions will be made on the framework for developing ICT policy for tertiary institutions. Your responses will thus be useful for academic purposes. Your participation in this study is voluntary. That is to say, you have the right to withdraw from participating at any point of the study, without giving any explanation to anybody. You are also assured of the anonymity of the information you will provide.

I confirm that I have read the consent form or it has been read to me in a language that I understand, and I understand the purpose of the study, and have had the opportunity to ask questions that were answered to my satisfaction. I understand that I am free to

withdraw from this study at any time without an explanation to anybody because I understand my participation is voluntary. I agree that the information I provide can be used for academic purposes, but my identity should be anonymous.

……	……	……
Name of participant	Date	Sign/thumbprint

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