UNIVERSITY OF EDUCATION, WINNEBA COLLEGE

OF TECHNOLOGY EDUCATION – KUMASI

SCHOOL OF GRADUATE STUDIES

INVESTIGATING COLLEGES OF EDUCATION TEACHERS' SELF-EFFICACY BELIEFS AND ACTUAL USE OF ICTs IN TEACHING IN THE KUMASI METROPOLIS

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DECLARATION

STUDENT'S DECLARATION

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

SIGNATURE:…….....…….

DATE:…….....…….…….

SUPERVISOR'S DECLARATION

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

NAME OF SUPERVISOR: PROF. FREDERICK KWAKU SARFO

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DATE:…….....….

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DEDICATION

This work is first and foremost dedicated to my Jehovah God for giving me strength, health, and wisdom in pursuance of this thesis .The work is also dedicated to my dearest husband, Mr. Emmanuel K.K Aklassu-Ganan and lovely children, Manuelito Kofi Akklassu-Ganan and AnnaMaria Kekeli Akklasu-Ganan.

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ABSTRACT

This study was conducted to investigate College of education teachers' self-efficacy beliefs in the use of ICTs in teaching, assess their actual use of ICTs in teaching and to examine the relationships between teachers' self-efficacy beliefs and their actual use of ICTs in teaching. The study further sought to find out how teachers' teaching experience affect their actual use of ICTs and their ICTs self-efficacy beliefs in teaching. Descriptive Survey, specifically the mixed method approach was used in the conduct of this study. Quantitative data were gathered through a structured questionnaire and qualitative data collected using an observation checklist. The Simple Random and Convenience sampling techniques were used in sampling out the respondents of the study from a population of 135.The questionnaire was administered to 115 teachers selected from three colleges of education in Ashanti Region. The observation was conducted on the selected thirteen (13) teachers to ascertain their actual use of ICTs. The data collected were analysed using frequencies counts, percentages, One- way Anova and correlational statistics. From the results of the study 44% of teachers agreed that they have SEB in using ICTs in teaching whilst 34% disagreed. In addition, majority (57%) of teachers disagreed to have SEB in the actual use of ICTs in teaching confirmed by the results from observation. The results also revealed that COE teachers who reported to have ICT SEB actually used it and those inconclusive of the response also related to their non-usage. Furthermore, according to the results there was no significant effect of teaching experience on self-efficacy beliefs of COE teachers. Based on these findings, it is recommended that GES should make ICT training an integral aspect in the training of teachers. Again 'GES should conduct periodic in-service training in ICTs for all COE teachers to boost their actual use of ICTs in teaching. Furthermore as part of the T-Tel program offered for COE teachers should effectively involve the use of ICTs in training activities especially for the more experienced teachers.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Globalisation and innovations in technology have led to an increased use of ICTs in all sectors of human endeavour with education being no exception. Uses of ICTS in education are widespread and are continually growing worldwide. It is generally believed that ICTs can empower teachers and learners, making significant contributions to learning and achievement (Meenashki, 2013).

To buttress this issue, Tinio (2002) indicates the importance of ICTs in education by stating that ICTs greatly facilitate the acquisition and absorption of knowledge, offering developing countries unprecedented opportunities to enhance educational systems, improve policy formulation and execution, and widen the range of opportunities for all.

According to Yusuf (2005), the field of education has been affected by ICTs, which have undoubtedly affected teaching, learning and research. Thus ICTs have the potential to accelerate, enrich, and deepen skills, to motivate and engage students, to help relate school experience to work practices, create economic viability for tomorrow's workers, as well as strengthening teaching and helping schools change (Davis & Tearle, 1999; Lemke & Coughlin, 1998; cited by Yusuf, 2005).

In Ghana, stakeholders and policy makers in education have realised the significant gains that ICTs provide in the field of education and have taken appropriate steps to ensure that the nation at large reaps the full benefits of this growing force. It is in this regard that the Government of Ghana commissioned the Ghana ICT for Accelerated Development Policy (ICT4AD) in 2003 and the Anamuah-Mensah Educational Reform in 2007. These policies sought to create the necessary enabling environment to facilitate the development of a viable knowledge-based ICT

industry to facilitate the production, manufacturing development and distribution of ICT products and services (ICT4AD, 2003).

Further, teacher education in the various teacher education institutions in Ghana are increasingly paying attention to the use of ICTs in teaching and learning. The government ICT connectivity project launched in 2010 covers the 38 Colleges of Education by providing them with computing infrastructure such as computers, printers, scanners, projectors and internet connectivity (Ghana News Agency, 2010).

ICTs have the potentials not only in ensuring effectiveness and efficiency in these two areas of teaching and learning; but also in enhancing the administrative duties (Kitschner and Davis, 2003). In view of this, Addy and Ofori-Boateng (2015) posited that ICTs are necessary to facilitate effective research and teaching in Ghanaian schools.

Notwithstanding the numerous benefits that could be derived from ICT integration in schools, several factors could be outlined as constraining the realisation of such benefits in teaching. According to Peeraer and Petegem (2000), factors enabling and constraining ICT applications are the same in both developed and developing economies although they differ in terms of importance.

According to Rogers (2003), several factors influencing the adoption and integration of ICT into teaching have been identified by researchers. Balanskat, Blamire & Kefalla (2007) identified the factors as teacher-level and school-level factors.

On the teacher level, there are numerous factors that influence teachers' use of ICTs. Teachers' feelings, knowledge and attitudes influence their use of ICT in teaching. Research has shown that teachers' attitudes towards technology influence their acceptance of the usefulness of technology and its integration into teaching (Huang & Liaw, 2005). If teachers' attitudes are

positive toward the use of educational technology, then they can easily provide useful insight about the adoption and integration of ICT into teaching and learning processes. Bingimlas (2009) outlined the teacher-level barriers or factors as; lack of teacher confidence, lack of teacher competence and teachers' negative attitudes and resistance to change.

The school related factors according to Buabeng-Andoh (2012) are support, funding, training and facilities that influence teachers' adoption and integration of technologies into their classrooms. Teachers' professional development is a key factor to successful integration of computers into classroom teaching. ICT – related training programmes develop teachers' competencies in computer use (Bauer & Kenton, 2005; Franklin, 2007), influencing teachers' attitudes towards computers and assisting teachers reorganise the task of technology and how new technology tools are significant in student learning (Plair, 2008).

1.2 Problem Statement

As a result of the urgent need for ICT integration in teaching, a number of countries worldwide are acknowledging the need to rapidly integrate ICTs in teaching and learning (ICT4AD, 2003). Due to this, individual teachers are expected to use ICT and act as change agents in their teaching for successful technology integration in schools. (Zhao, Tan & Mishra, 2001).

Although evidence suggest that teachers want to teach well and are open-minded about infusing technology into their teaching (Zhao & Frank, 2004), it is important to understand the factors that drive teachers' use of technology for teaching and instructional purposes.

Further research has confirmed that many factors influences teacher use of technology in broader sense arises from the external environments where the teacher works. (Zhao and Frank, 2004; Teo, 2008). However, Ertmer (2005) also contended that while the external factors affecting

technology use, such as funding ,availability and access of infrastructures, have improved, personal factors such as teachers' competence and beliefs are yet to be resolved. This calls for more studies to be conducted with particular regards to personal factors that influence ICTs usage such as self-efficacy beliefs.

In Ghana, very few studies have been conducted which report self-efficacy beliefs as one among other factors to positively or negatively influence successful ICTs integration in teaching (Caesar & Teye, 2012; Obiri-Yeboah, Owusu-Kwarteng & Kyere-Djan, 2013). The available research that exists mainly focused on the external factors that influence ICTs usage such as availability, access, infrastructure and funding (Sarfo, 2005; Adams, 2002; Buabeng-Andoh, 2012). Personal factors such as teacher competence, attitudes and self-efficacy beliefs have not been adequately investigated.

Although environmental barriers had been documented as posing significant obstacles to achieving technology integration, underlying internal barriers were thought to pose the greater challenges (Dexter & Anderson, 2002; Ertmer 1999; Newhouse, 2001; Zhao, Pugh, Sheldon & Byers, 2002). This presents a significant knowledge gap in the area of personal factors influencing ICTs usage which requires more studies to be conducted to fill. Against this backdrop, the current study seeks to assess the self-efficacy beliefs and actual use of ICTs in teaching among teachers at the colleges of education in the Kumasi metropolis in Ghana.

1.3 Objectives of the Study

The main objectives are:

1. To identify College of Education teachers' self-efficacy beliefs level in the use of ICTs in teaching.
2. To assess College of Education teachers' actual use of ICTs in teaching.

3. To examine the relationship between College of Education teachers' self-efficacy beliefs and actual use of ICTs in teaching.
4. To find out how College of Education teachers' teaching experience affect their ICTs self-efficacy beliefs in teaching.

1.4 Research Questions

The following research questions were formulated to guide the study:

1. What are the Colleges of Education teachers' ICTs self-efficacy beliefs in teaching?
2. What is the level of ICTs actual use in teaching among college of education teachers?
3. To what extent do ICTs self-efficacy beliefs of teachers at the Colleges of Education relate to their actual use in teaching?
4. To what extent does Colleges of Education teachers' teaching experience affect their ICTs self-efficacy beliefs in teaching?

1.5 Significance of the Study

This study will enable teachers and students assess their confidence levels in the use of ICTs in teaching. In doing this teachers of the Colleges of Education will develop or improve their self-efficacy belief levels in the use of ICTs in teaching. Furthermore, it will raise the awareness of teachers to understand and appreciate the need for the integration of ICTs in teaching at the various Colleges of Education. That notwithstanding, the study will contribute to literature on ICTs in education in the context of Ghana.

1.6 Delimitations of the Study

Basically many factors that influence ICTs integration occur from the external environment where teachers work. These external factors have previously been improved to a greater extent

whereas personal factors such as self-efficacy beliefs affecting ICT use in teaching is yet to be commented. The scope of this study therefore centres on ICTs self-efficacy beliefs of teachers in colleges of education and how it translates to their actual use of such. The study was confined to Colleges of Education in the Kumasi Metropolis. For reasons of time constraints, supervisory roles and finances, the researcher could not cover all the schools in the Ashanti Region. This would have been impractical considering the time frame given to the researcher for the conduct of this study. It should be noted however that, considering the fact that all the colleges of education in the region had similar characteristics, the findings of this study could be reasonably generalised to apply to other schools in the region and the country as a whole.

1.7 Limitations of the Study

A number of challenges were encountered during the data collection for the study which had the potential of affecting the validity of the research findings. Some of the teachers were a bit reluctant to provide certain kinds of information based on their own personal reasons. The researcher had to reassure them of the purpose of the study and that the data would not be reported in any way that will reveal their identity. With the reassurance, the respondents were at ease and provided all the information that were needed. Further, it was difficult for the researcher in reaching most of the teachers selected from the private colleges of education who were employed on part-time basis.

1.8 Operational Definitions of Key Terms

Self-Efficacy Beliefs: A belief in one's ability and effectiveness in performing a specific task.

ICTs: ICTs (information and communications technologies) is a generic term that includes any communication device or application, such as radio, television, cellular phones, personal digital assistants (PDAs), computer and network hardware and software, internet, satellite systems and

so on, together with the various services and applications associated with them, such as videoconferencing and distance learning.

ICTs Integration: involves the use of digital technology and communication tools in education to search, write, analyze, present and communicate information in the teaching and learning process.

Teachers: A teacher refers to any individual who takes up the profession of facilitating the teaching and learning process especially in a school or institution.

College of Education: Previously known as teacher training colleges, is a tertiary institution which specialises in giving instruction and training to students on knowledge, attitudes, behaviours and skills they require to become professional teachers.

Teaching: Teaching is defined as an interactive process, primarily involving classroom talk, which takes place between teacher and pupil and occurs during certain definable activities

Instructional Resource: refers to all things teachers are likely to find useful in their teaching. These could be a collection of books, reference materials, maps, diagrams, newspaper cuttings and anything of value to the teaching process.

1.9 Organisation of the Study

This thesis is organized into chapters as follows: Chapter one focused on the introductory aspects of the research topic, it gave a general introduction to the research. This chapter is made up of the following, the background of the study, the statement of the problem, purpose of the study, the objectives of the study, the significance of the study, the research questions, the scope of the study, and the limitation of the study. Chapter Two which presents the literature review dwells on the related literature on the theme of ICTs self-efficacy beliefs and their actual use in teaching. The study considered theoretical literature available on the subject matter. Chapter Three deals with methodology of the research. That is the research design and

approach the researcher adopted in carrying out the research. This chapter includes the sources of the data, primary and or secondary, the sampling techniques used and the reasons for employing such techniques. Chapter Four is concerned with the presentation of the research data gathered and the analysis conducted. In Chapter Five, a discussion on the analysed data is presented together with the findings of the study. Chapter Six presents the findings, Summaries, Suggestions, Conclusion and Recommendations. This chapter deals with presentation of findings, making conclusions from the findings of the study and its implication. In addition, it considers recommendations and suggestions based on the findings of the study.

1.10 Summary

The use of ICTs as instructional tools by teachers to enhance their practice and improve students' performance has been underscored by literature. Research evidence suggests that ICTs can be presented as the single most versatile instructional resource which has the ability to be used to appeal to a wide range of teaching and learning styles of teachers and students respectively. Notwithstanding the numerous benefits that could be derived from ICTs integration in schools, several factors could be outlined as constraining the realisation of such benefits in teaching. These factors have been identified as teacher-level factors and school-level factors. In Ghana, the available research that mainly focused on the external factors that influence ICTs usage such as availability, access, infrastructure and funding. In this regards, it is appropriate to investigate into the personal level factors such as perception of teachers about their ICTs self-efficacy beliefs and their actual use in the classroom.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The current study was conducted to assess the ICTs self-efficacy beliefs of teachers and their actual use in teaching. In this chapter, the literature related to the subject matter of the study is discussed. Areas to be considered include: teaching and Learning Resources, Classification of Instructional Resources, Importance of Instructional Resources, ICTs as Teaching and Learning Resources, PowerPoint Presentations as an ICT Tool, PDAs as ICT Tools, Importance of PDAs in teaching and learning, Importance of ICTs in Teaching and Learning and the Use of Instructional Media/Materials to Address Students' Interest. Also discussed under this section include the Barriers to the Successful Integration of ICT in Teaching and Learning, ICTs and Teacher Education, The use of ICTs in Teaching, Self-Efficacy Beliefs and ICTs and Teacher Education.

2.2 Teaching and Learning Resources

The term teaching and learning resources and instructional resources or materials have been used interchangeably by different authors. Bishop (1985) refers to teaching and learning resources as all things teachers are likely to find useful in their teaching. These could be a collection of books, reference materials, maps, diagrams, newspaper cuttings and anything of value to the teacher. Sarfo, (2010) views instructional resources as the materials and substantial resources that an educator might use to implement instruction and facilitate students' achievement of instructional objectives. This may include traditional materials such as chalkboard, printed materials, display boards, charts slides, overhead projector, real objects, videos, computers etc.

Instructional resources which are educational inputs are very vital. They play a key role in the process of teaching and learning. According to Travers (1973), a modern education programme is impossible without appropriate teaching and learning materials. Use of text books for example is unavoidable if effective teaching and learning has to take place. Dale (1970) posits that learning is a process in which the concrete and the abstract interact. He, therefore asserted that teaching and learning resources which include ICTs ought to be used in the teaching and learning process.

2.3 Classification of Instructional Resources

Instructional resources have been classified variously by different authors as seen below; Travers (1973) as quoted by Kinyua (2007) groups teaching/learning resources as follows:

i. Non projected materials: these include books, photographs, drawings, charts, maps, chalkboards, flannel boards etc.
ii. Projected materials: these include slides, filmstrips, overload transparencies, motion pictures.
iii. Audio materials: lectures, audio tapes, compressed speech, radio, telephone, television and others.
iv. Real and three dimensional materials; models, globes, sculptures, demonstration, field trips, resource persons.

Sarfo, (2010) categorized instructional media according to their roles and function in instruction. The type of media objects used, such as a Primary (real objects), secondary (pictures, models etc) and tertiary objects (computer, television etc.), the viewpoint of the system used, such as: human-based, print-based, visual-based, audiovisual-based and computer-based systems. The classification can also be based on the functions that the media

performs, such as: Non-projected visuals, projected visuals, audio, motion, computer human-based and media for distance learning.

2.4 ICTs as Teaching and Learning Resources

Information and communication technology (ICT) is a force that has changed many aspects of the way we live. It is playing a big role in many disciplines like medicine, tourism, travel, business, law, banking, engineering and architecture. Thus, rapid growth and improvement in ICT have led to the diffusion of technology in education (Gulbahar & Guven, 2008).

Educational systems around the world are becoming increasingly pressured to apply the new ICT tools to their curriculum to provide students with the knowledge and skills that they need in the 21st century (Hue & Ab Jalil, 2013). Their use is also underlined by many scholars as a necessity for improving quality in teaching and learning. Over the past decades, governments and education systems around the world have regarded the use of information and communications technologies as an important issue for improving the effectiveness of teaching and learning (Plump et al., 2009). Sahin-Kizil (2011) also reviewed that use of ICT for educational purposes yield positive outcomes on the part of the students such as increased motivation, active learning, providing efficient resources and better access to information. Moreover, Wang and Woo (2007) reviewed that technology has great potential to increase learners' motivation, link learners to various information sources, support collaborative learning, and allow teachers more time for facilitation in classrooms. Integrating ICT into teaching and learning has therefore become a great concern for many educators.

The new digital ICT is not a single technology but a combination of hardware, software, multimedia, and delivery systems. Today, ICT in education encompasses a great range of

rapidly evolving technologies such as desktop, notebook, and handheld computers, digital cameras, local area networking, Bluetooth, the Internet, cloud computing, the World Wide Web, streaming, and DVDs; and applications such as word processors, spreadsheets, tutorials, simulations, email, digital libraries, computer-mediated conferencing, videoconferencing, virtual environment, simulator, emulator etc. It is important to mention that the use of newer ICT is being integrated with use of older technologies, enabling the existing resources and services to be of continuous use.

ICT is changing the processes of teaching and learning by adding elements of vitality to learning environments including virtual environments. New technologies make it possible for complicated collaborative activities of teaching and learning by dividing it in space and time, with seamless connectivity between them. Due to its capability to offer anytime and anywhere, access to remote learning resources, ICT is a potentially powerful tool for offering educational opportunities, both to previously underserved constituencies including persons with disabilities, as well as all others who for reasons of cost or because of time constraints are unable to register for on campus programs (Mishra, et al., 2006).

In the views of Jonassen, (1988) and Wu *et al.,* (2005), Using a computer as a primary medium could be the most unique application of computer technology for teaching and learning purposes especially with regard to mobile learning, cyber schooling and distance education'. Most educational policy-makers, educational administrators and educationalists believe that integrating ICT in teaching is an excellent means of achieving the modern aims of education. According to Sarfo (2010:86), Computer in Teaching and Learning contributes the following:

- Time Saving
- Learner Control (individualization)

- Reinforcement due to quick feedback.
- Private Learning
- Special Needs: Computer can accommodate special needs of students in diverse ways and instruction proceeds at the appropriate pace.
- Visual Appeal: Colour, music and animated graphics realism to content.
- Record Keeping
- Information Management
- Consistency
- Effective and Efficient effectiveness implies improved learners achievement and efficiency implies achieving objectives with less time or low cost
- Communication Precision
- Customized Learning

2.5 Importance of ICTs in Teaching and Learning

Several studies argue that the use of new technologies in the classroom is essential for providing opportunities for students to learn to operate in an information age. It is evident, as Yelland (2001) argued, that traditional educational environments do not seem to be suitable for preparing learners to function or be productive in the workplaces of today's society. She claimed that organisations that do not incorporate the use of new technologies in schools cannot seriously claim to prepare their students for life in the twenty-first century. This argument is supported by Grimus (2000), who pointed out that "by teaching ICT skills in primary schools the pupils are prepared to face future developments based on proper understanding" (p. 362).

Similarly, Bransford *et al.,* (2000) reported that "what is now known about learning provides important guidelines for uses of technology that can help students and teachers develop the

competencies needed for the twenty-first century" (p. 206). ICT can play various roles in learning and teaching processes. According to Bransford *et al*., (2000), several studies have reviewed the literature on ICT and learning and have concluded that it has great potential to enhance student achievement and teacher learning. Wong *et al.*, (2006) point out that technology can play a part in supporting face-to-face teaching and learning in the classroom. Many researchers and theorists assert that the use of computers can help students to become knowledgeable, reduce the amount of direct instruction given to them, and give teachers an opportunity to help those students with particular needs (Iding, Crosby, & Speitel, 2002; Shamatha, Peressini, & Meymaris 2004; Romeo, 2006).

While new technologies can help teachers enhance their pedagogical practice, they can also assist students in their learning. According to Grabe and Grabe (2007), technologies can play a role in student skills, motivation, and knowledge. They claim that ICT can be used to present information to students and help them complete learning tasks.

According to Becta (2004), five factors influence the likelihood that good ICT learning opportunities will develop in schools: ICT resourcing, ICT leadership, ICT teaching, school leadership, and general teaching. Becta (2004) also indicated that the success of the integration of new technology into education varies from curriculum to curriculum, place to place, and class to class, depending on the ways in which it is applied. In science education, there are some areas where ICT has been shown to have a positive impact. The next section discusses this in more detail.

Uses of ICTs in teaching

Teachers integrate ICTs for teaching in different ways. Some use technology for mainly presentation purposes while others allow students to use a full range of technology resources. It is possible that teachers' use ICTs for instructional purposes is influenced by their beliefs about teaching and learning. As such, a teacher who believes that students learn content best through teacher-led instruction will be less inclined to encourage students to explore an ICT tools for learning. This view was supported by previous research that found teachers' beliefs to have an influence on the way they teach their classrooms, interacted with students, and how they act in the classroom (Hannafin & Savenye, 1993). The strategies employed by teachers to integrate technology in the classroom were examined by Tubin (2006) who found that teachers use technology in two ways. One way is to use technology to attain the same traditional goals under the same conditions, without significant changes to the classroom activities. The second way if to use technology to expand classroom boundaries, connect students to real-world events, and guide students to become independent learners. These two ways of using technology for teaching was supported by Brawner and Allen (2006) who asked 462 students teachers how they had used technology during their internship. The authors found that the responses could be grouped according to Type 1 (drill and practice) and Type 2 (user-centred) uses of technology (Maddux, et al., 1997). Research has found a positive relationship between teachers' beliefs and uses of technology. For example, Becker (2000) found that teachers who hold constructivist beliefs about teaching are more aligned to the Type II application of computers. A study on student teachers' beliefs about teaching and learning and technology use found a positive and strong correlation between a belief in constructivist teaching and constructivist (or user-centered)use of technology (Teo, Chai, Hung, & Lee, 2008).

2.7 Barriers to the Successful Integration of ICT in Teaching and Learning

The act of integrating ICT into teaching and learning is a complex process and one that may encounter a number of difficulties. These difficulties are known as "barriers" (Shoepp, 2005). A barrier is defined as "any condition that makes it difficult to make progress or to achieve an objective".

2.7.1 Classification of ICT Barriers

Different categories have been used by researchers and educators to classify barriers to teacher use of ICT in science classrooms. Several studies have divided the barriers into two categories: extrinsic and intrinsic barriers. However, what they meant by extrinsic and intrinsic differed. In one study, Ertmer (1999) referred to extrinsic barriers as first-order and cited access, time, support, resources and training and intrinsic barriers as second-order and cited attitudes, beliefs, practices and resistance; whereas, Hendren (2000), as cited in Al-Alwani, (2005) saw extrinsic barriers as pertaining to organisations rather than individuals and intrinsic barriers as pertaining to teachers, administrators, and individuals.

Another classification found in the literature is teacher-level barriers versus school-level barriers. Becta (2004) grouped the barriers according to whether they relate to the individual (teacher-level barriers), such as lack of time, lack of confidence, and resistance to change, or to the institution (school-level barriers), such as lack of effective training in solving technical problems and lack of access to resources. Similarly, Balanskat *et al.,* (2006) divided them into micro level barriers, including those related to teachers' attitudes and approach to ICT, and meso level barriers, including those related to the institutional context. The latter added a third category called macro level (system-level barriers), including those related to the wider educational framework. Another perspective presents the obstacles as pertaining to two kinds

of conditions: material and nonmaterial (Pelgrum, 2001). The material conditions may be the insufficient number of computers or copies of software. The non-material obstacles include teachers' insufficient ICT knowledge and skills, lack of confidence, the difficulty of integrating ICT in instruction, and insufficient teacher time. Some of these studies look at the barriers at teacher, institution, or system level.

2.7.2 Teacher – Level Barriers

Lack of teacher confidence: Several researchers indicate that one barrier that prevents teachers from using ICT in their teaching is lack of confidence. Dawes (2001) sees this as a contextual factor which can act as a barrier. According to Becta (2004), much of the research proposes that this is a major barrier to the uptake of ICT by teachers in the classroom. In Becta's survey of practitioners (2004), the issue of lack of confidence was the area that attracted most responses from those that took part.

Some studies have investigated the reasons for teachers' lack of confidence with the use of ICT. For example, Beggs (2000) asserted that teachers' "fear of failure" caused a lack of confidence. On the other hand, Balanskat et al. (2006) found that limitations in teachers' ICT knowledge makes them feel anxious about using ICT in the classroom and thus not confident to use it in their teaching. Similarly, Becta (2004) concluded their study with the statement: "many teachers who do not consider themselves to be well skilled in using ICT feel anxious about using it in front of a class of children who perhaps know more than they do" (p. 7). In Becta's survey (2004), many of the teacher respondents who identified their lack of confidence as a barrier reported being particularly afraid of entering the classroom with limited knowledge in the area of ICT with their students knowing that this was the case. It was argued that lack of confidence and experience with technology influence teachers' motivation to use ICT in the classroom (Cox, Preston & Cox, 1999b; Osborne & Hennessy, 2003; Balanskat et al., 2006).

On the other hand, teachers who confidently use technologies in their classrooms understand the usefulness of ICT. Cox, Preston, and Cox (1999a) found that teachers who have confidence in using ICT identify that technologies are helpful in their teaching and personal work and they need to extend their use further in the future.

Lack of teacher competence: Another barrier, which is directly related to teacher confidence, is teachers' competence in integrating ICT into pedagogical practice (Becta, 2004). In Australian research, Newhouse (2002) found that many teachers lacked the knowledge and skills to use computers and were not enthusiastic about the changes and integration of supplementary learning associated with bringing computers into their teaching practices.

Current research has shown that the level of this barrier differs from country to country. In the developing countries, research reported that teachers' lack of technological competence is a main barrier to their acceptance and adoption of ICT (Pelgrum, 2001; Al-Oteawi, 2002). In Syria, for example, teachers' lack of technological competence has been cited as the main barrier (Albirini, 2006). Likewise, in Saudi Arabia, a lack of ICT skills is a serious obstacle to the integration of technologies into science education (Al-Alwani, 2005; Almohaissin, 2006). Empirica (2006) produced a report on the use of ICT in European schools. The data used for the report came from the Head Teachers and Classroom Teachers Survey carried out in 27 European countries. The findings show that teachers who do not use computers in classrooms claim that "lack of skills" are a constraining factor preventing teachers from using ICT for teaching.

Another worldwide survey conducted by Pelgrum (2001), of nationally representative samples of schools from 26 countries, found that teachers' lack of knowledge and skills is a serious obstacle to using ICT in primary and secondary schools. The results of a study conducted by Balanskat et al. (2006) have shown that "in Denmark ... many teachers still chose not to use

ICT and media in teaching situations because of their lack of ICT skills rather than for pedagogical/didactics reasons" while "in the Netherlands ... teachers' ICT knowledge and skills is [sic] not regarded any more as the main barrier to ICT use" (p. 50). Hence, lack of teacher competence may be one of the strong barriers to the integration of technologies into education. It may also be one of the factors involved in resistance to change.

Resistance to change & negative attitudes: Much research into the barriers to the integration of ICT into education found that teachers' attitudes and an inherent resistance to change were a significant barrier (Cox et al., 1999a; Watson, 1999; Earle, 2002; Becta, 2004; Gomes, 2005; Schoepp, 2005). From his/her analysis of the questionnaires, Gomes (2005) found that science teachers' resistance to change concerning the use of new strategies is an obstacle to ICT integration in science teaching. At a broader level, Becta (2004) argued that resistance to change is an important barrier to teachers' use of new technologies in education.

Watson, (1999) argued that integrating the new technologies into educational settings requires change and different teachers will handle this change differently. According to him, considering different teachers' attitudes to change is important because teachers' beliefs influence what they do in classrooms. Becta (2004) claims that one key area of teachers' attitudes towards the use of technologies is their understanding of how these technologies will benefit their teaching and their students' learning. Schoepp's study (2005) found that, although teachers felt that there was more than enough technology available, they did not believe that they were being supported, guided, or rewarded in the integration of technology into their teaching. According to Empirica (2006), teachers who are not using new technology such as computers in the classroom are still of the opinion that the use of ICT has no benefits or unclear benefits.

Resistance to change seems not to be a barrier itself; instead, it is an indication that something is wrong. In other words, there are reasons why resistance to change occurs. According to Earle (2002), the change from a present level to a desired level of performance is facilitated by driving (encouraging) forces such as the power of new developments, rapid availability, creativity, Internet access, or ease of communication, while it is delayed by resisting (discouraging) forces such as lack of technical support, teacher expertise, or time for planning. In their study, Cox et al. (1999) found that teachers are unlikely to use new technologies in their teaching if they see no need to change their professional practice. They showed that teachers who resist change are not rejecting the need for change but lack the necessary education in accepting the changes and are given insufficient long-term opportunities to make sense of the new technologies for themselves.

Obviously, not all communities have this barrier. In Europe, for example, Korte and Hüsing (2007) state that only very few teachers can be regarded as fundamentally opposing the use of ICT in the classroom. Only a fifth of European teachers believe that using computers in class does not have significant learning benefits for pupils (Korte & Hüsing, 2007).

2.7.3 School – Level Barriers

Lack of time: Several recent studies indicate that many teachers have competence and confidence in using computers in the classroom, but they still make little use of technologies because they do not have enough time. A significant number of researchers identified time limitations and the difficulty in scheduling enough computer time for classes as a barrier to teachers' use of ICT in their teaching (Al- Alwani, 2005; Becta, 2004; Beggs, 2000; Schoepp, 2005; Sicilia, 2005). According to Sicilia (2005), the most common challenge reported by all

the teachers was the lack of time they had to plan technology lessons, explore the different Internet sites, or look at various aspects of educational software.

Becta's study (2004) found that the problem of lack of time exists for teachers in many aspects of their work as it affects their ability to complete tasks, with some of the participant teachers specifically stating which aspects of ICT require more time. These include the time needed to locate Internet advice, prepare lessons, explore and practise using the technology, deal with technical problems, and receive adequate training.

Recent studies show that lack of time is an important factor affecting the application of new technologies in science education (Al-Alwani, 2005). According to Al-Alwani (2005), lack of time is a barrier affecting the application of ICT in Saudi Arabia because of busy schedules. He indicated that because Saudi teachers work from about 7.00 a.m. until 2.00 p.m. and the average number of class sessions taught by science teachers is 18 per week, both teachers and students have a limited number of hours during the day to work on integrating ICT into science education. Similarly, in Canada, Sicilia (2005) concluded that teachers take much more time to design projects that include the use of new ICT than to prepare traditional lessons. Teachers interviewed by Sicilia (2005) commented that "the constraints of different class schedule [sic] contributed to the lack of time they spent together to work on planning classroom activities" (p. 41). Supporting this finding, the most significant constraint on use quoted by 86–88% of primary and secondary science teachers surveyed by Dillon, Osborne, Fairbrother, and Kurina (2000) was lack of time (as cited in Osborne & Hennessy, 2003). Gomes (2005) concluded that one of the main reasons that science teachers do not use ICT in the classroom is lack of the time necessary to accomplish plans.

Lack of effective training: The barrier most frequently referred to in the literature is lack of effective training (Albirini, 2006; Balanskat et al., 2006; Beggs, 2000; Özden, 2007; Schoepp, 2005; Sicilia, 2005; Toprakci, 2006). One finding of Pelgrum's (2001) study was that there were not enough training opportunities for teachers in the use of ICTs in a classroom environment. Similarly, Beggs (2000) found that one of the top three barriers to teachers' use of ICT in teaching students was the lack of training. Recent research in Turkey found that the main problem with the implementation of new ICT in science was the insufficient amount of in-service training programs for science teachers (Özden, 2007), and Toprakci (2006) concluded that limited teacher training in the use of ICT in Turkish schools is an obstacle.

According to Becta (2004), the issue of training is certainly complex because it is important to consider several components to ensure the effectiveness of the training. These were time for training, pedagogical training, skills training, and an ICT use in initial teacher training. Correspondingly, recent research by Gomes (2005) relating to science education concluded that lack of training in digital literacy, lack of pedagogic and didactic training in how to use ICT in the classroom, and lack of training concerning the use of technologies in science specific areas were obstacles to using new technologies in classroom practice. Some of the Saudi Arabian studies reported similar reasons for failures in using educational technologies: the weakness of teacher training in the use of computers, the use of a "delivery" teaching style instead of investment in modern technology (Alhamd, Alotaibi, Motwaly, & Zyadah, 2004), as well as the shortage of teachers who are qualified to use the technology confidently (Sager, 2002).

Providing pedagogical training for teachers, rather than simply training them to use ICT tools, is an important issue (Becta, 2004). Cox et al. (1999a) argue that if teachers are to be convinced

of the value of using ICT in their teaching, their training should focus on the pedagogical issues. The results of the research by Cox et al. (1999a) showed that after teachers had attended professional development courses in ICT they still did not know how to use ICT in their classrooms; instead they just knew how to run a computer and set up a printer. They explained that this is because the courses only focused on teachers acquiring basic ICT skills and did not often teach teachers how to develop the pedagogical aspects of ICT. In line with the research by Cox et al. (1999a), Balanskat et al. (2006) indicated that inappropriate teacher training is not helping teachers to use ICT in their classrooms and in preparing lessons. They assert that this is because training programmes do not focus on teachers' pedagogical practices in relation to ICT but on the development of ICT skills.

However, beside the need for pedagogical training, according to Becta (2004), it is still necessary to train teachers in specific ICT skills. Schoepp (2005) claims that when new technologies need to be integrated in the classroom, teachers have to be trained in the use of these particular ICTs. According to Newhouse (2002), some initial training is needed for teachers to develop appropriate skills, knowledge, and attitudes regarding the effective use of computers to support learning by their students. He argued that this also requires continuing provision of professional development to maintain appropriate skills and knowledge.

Fundamentally, when there are new tools and approaches to teaching, teacher training is essential (Osborne & Hennessy, 2003) if they are to integrate these into their teaching. However, according to Balanskat et al. (2006), inadequate or inappropriate training leads to teachers being neither sufficiently prepared nor sufficiently confident to carry out full integration of ICT in the classroom. Newhouse (2002) states that "teachers need to not only be

computer literate but they also need to develop skills in integrating computer use into their teaching/learning programmes" (p. 45).

According to Newhouse (2002), teachers need training in technology education (focusing on the study of technologies themselves) and educational technology (support for teaching in the classroom). Similarity, Sicilia (2005) found that teachers want to learn how to use new technologies in their classrooms but the lack of opportunities for professional development obstructed them from integrating technology in certain subjects such as science or maths. Other problematic issues related to professional development in ICT are that training courses are not differentiated to meet the specific learning needs of teachers and the sessions are not regularly updated (Balanskat *et al*., 2006).

Pre-service teacher education can also play a significant role in providing opportunities for experimentation with ICT before using it in classroom teaching (Albirini, 2006). Lack of ICT focus in initial teacher education is a barrier to teachers' use of what is available in the classroom during teaching practice (Becta, 2004). Where training is ineffective, teachers may not be able access to ICT resources.

Lack of accessibility: Several research studies indicate that lack of access to resources, including home access, is another complex barrier that discourages teachers from integrating new technologies into education and particularly into science education as the following discussion illustrates.

The various research studies indicated several reasons for the lack of access to technologies occurred. In Sicilia's study (2005), teachers complained about how difficult it was to always

have access to computers. The author gave reasons like "computers had to be booked in advance and the teachers would forget to do so, or they could not book them for several periods in a row when they wanted to work on several projects with the students" (p. 50). In other words, a teacher would have no access to ICT materials because most of these were shared with other teachers. According to Becta (2004), the inaccessibility of ICT resources is not always merely due to the non-availability of the hardware and software or other ICT materials within the school. It may be the result of one of a number of factors such as poor organisation of resources, poor quality hardware, inappropriate software, or lack of personal access for teachers (Becta, 2004).

The barriers related to the accessibility of new technologies for teachers are widespread and differ from country to country. Empirica's (2006) European study found that lack of access is the largest barrier and that different barriers to using ICT in teaching were reported by teachers, for example a lack of computers and a lack of adequate material. Similarly, Korte and Hüsing (2007) found that in European schools there are some infrastructure barriers such as broadband access not yet being available. They concluded that one third of European schools still do not have broadband Internet access.

Pelgrum (2001) explored practitioners' views from 26 countries on what were the main obstacles to the implementation of ICT in schools. He concluded that four of the top ten barriers were related to the accessibility of ICT. These barriers were insufficient numbers of computers, insufficient peripherals, insufficient numbers of copies of software, and insufficient simultaneous Internet access. Toprakci (2006) found that low numbers of computers, oldness or slowness of ICT systems, and scarcity of educational software in the school were barriers to the successful implementation of ICT into science education in Turkish schools. Similarly, Al-

Alwani (2005) found that having no access to the Internet during the school day and lack of hardware were impeding technology integration in Saudi schools. Recent research on Syrian schools indicated that insufficient computer resources were one of the greatest impediments to technology integration in the classroom (Albirini, 2006).

Basically, there are several barriers associated with the lack of access to ICT. In his research, Gomes (2005) found a lack of appropriate infrastructure and a lack of appropriate material resources to be barriers. However, overcoming such hardware barriers does not, in itself, ensure ICT will be used successfully. According to Balanskat et al. (2006), the accessibility of ICT resources does not guarantee its successful implementation in teaching, and this is not merely because of the lack of ICT infrastructure but also because of other barriers such as lack of high quality hardware, suitable educational software, and access to ICT resources.

Newhouse (2002) asserts that poor choices of hardware and software and a lack of consideration of what is suitable for classroom teaching are problems facing many teachers. Similarly, Cox et al. (1999a) found that the majority of teachers agreed that insufficient ICT resources in the school and insufficient time to review software prevent teachers using ICT. According to Osborne and Hennessy (2003), the limitations on access to hardware and software resources influenced teachers' motivation to use ICT in the classroom.

Lack of technical support. Without both good technical support in the classroom and whole-school resources, teachers cannot be expected to overcome the barriers preventing them from using ICT (Lewis, 2003). Pelgrum (2001) found that in the view of primary and secondary teachers, one of the top barriers to ICT use in education was lack of technical assistance.

In Sicilia's study (2005), technical problems were found to be a major barrier for teachers. These technical barriers included waiting for websites to open, failing to connect to the Internet, printers not printing, malfunctioning computers, and teachers having to work on old computers. "Technical barriers impeded the smooth delivery of the lesson or the natural flow of the classroom activity" (Sicilia, 2005, p. 43).

Korte and Hüsing (2007) argued that ICT support or maintenance contracts in schools help teachers to use ICT in teaching without losing time through having to fix software and hardware problems. The Becta (2004) report stated that "if there is a lack of technical support available in a school, then it is likely that technical maintenance will not be carried out regularly, resulting in a higher risk of technical breakdowns" (p. 16). Many of the respondents to Becta's survey (2004) indicated that technical faults might discourage them from using ICT in their teaching because of the fear of equipment breaking down during a lesson.

In science teaching, several studies indicated that lack of technical support is a main barrier to using technologies. According to Gomes (2005), ICT integration in science teaching needs a technician and if one is not available the lack of technical support can be an obstacle. In Turkey, Toprakci (2006) found that the lack of technical support was one of two significant barriers to the integration of ICT into science education in schools and might be considered "serious". In Saudi Arabia, science teachers would agree to introduce computers into science teaching, except that they believe they will encounter problems such as technical service or hardware problems (Almohaissin, 2006). Sicilia (2005) argued that whatever kind of technical support and access teaching staff have and whether they have twenty years of experience or are novices to the profession, technical problems generate barriers to the smooth delivery of science lessons by teachers.

Although lack of technical support can prevent teachers from successfully integrating ICT into education, recent research indicates that in some countries (such as the United Kingdom, the Netherlands, Latvia, Malta and the Czech Republic), schools have recognised the importance of technical support to assist teachers to use ICT in the classroom (Korte and Hüsing, 2007).

In general, several studies have identified a range of the following or similar factors as widespread barriers: lack of computers, lack of quality software, lack of time, technical problems, teachers' attitudes towards computers, poor funding, lack of teacher confidence, resistance to change, poor administrative support, lack of computer skills, poor fit with the curriculum, lack of incentives, scheduling difficulties, poor training opportunities, and lack of skills in how to integrate ICT in education.

2.8 ICTs and Teacher Education

Teacher training is a necessary precondition for assimilating the conceptual changes related to teaching and for integrating ICT in schools (Kay, 2006). A significant educational change can take place only following a transformation in the beliefs and perceptions of teacher educators, since their influence on future teachers is crucial. It is up to teacher educators to lead and implement change by adopting pedagogical innovation and applying it (Cochran-Smith, 2005; Fullan, 2001).

The framework for implementation of ICTs (Information and Communication Technology) in Teachers' Colleges originates from Ghanaian Educational policy, ICT for Accelerated Development (ICT4AD, 2003). It clearly expects "that the introduction of ICT into schools should cover teaching of ICT skills to all students, preparing students for the ICT professions and enhancing teaching and learning through ICTs". (ICT4AD, 2003). The policy stresses the utilisation of ICT at all levels in education including the colleges of education.

There is increasing pressure for teacher education programs to graduate teachers who are confident and competent in using Information and Communication Technologies for their personal and professional lives (Albion & Redmond, 2005). In the light of this, it is recommended by United Nations Educational Scientific and Cultural Organisation (2002) that, for education to reap the full benefits of ICTs in learning, it is essential that pre-service and in-service teachers have basic ICT skills and competencies. They must also provide leadership in determining how the new technologies can best be used in the context of the culture, needs, and economic conditions within their country (UNESCO, 2002).

Teacher education institutions however need to develop strategies and plans to enhance the teaching-learning process within teacher education programmes and to assure that all future teachers are well prepared to use the new tools for teaching. In direct relation to the above report by UNESCO, the case for an ICT integration education policy in 2008 acknowledges that, for Ghana to make any appreciable progress in its socio-economic development efforts, substantial resources will need to be directed at improving educational delivery. The key role that ICTs can play in widening access to education to a wider section of the population and literacy education for facilitating educational delivery and training at all levels has been recognized as a key priority area under Ghana's current Education Reforms (ICT4AD, 2003).

In fact in Ghana, the teaching of ICT in the colleges of education is studied for two semesters with the major course title 'Introduction to Information Technology1', with two credit hours for semester one and one credit hour for semester two. Four units are covered in the first semester with each having major subtopics. These include: Introduction to using computers in education, Computer components I, Computer security, and Productivity software applications. Five units are covered in the second semester. These also cover: Computer components II,

Communication and the Internet, Multimedia in the classroom, Education and technology integration and Productivity software applications.

The Rationale for ICTs in Teacher Education Curriculum in Ghana

In many of the developing countries such as Ghana who are targeted with this curriculum, ICTs are in the early stages of development in commerce, industry, and particularly, in society. Communities and regions may have very limited resources, so it is important to undertake a careful analysis using an ethnographic approach to develop an organic strategy for the growth and development of education and teacher education that takes advantage of ICTs. The vision is not simply of ICTs, but of better education facilitated through the adoption and promotion of ICTs. An explanation of this vision is attempted in a limited way in the illustration provided in the framework section.

The Society for Information Technology and Teacher Education has identified basic principles for development of effective ICT teacher education (SITE, 2002). These are:

• *Technology should be infused into the entire teacher education programme*.

Throughout their teacher education experience, students should learn about and with technology and how to incorporate it into their own teaching. Restricting technology experiences to a single course or to an area of teacher education, such as methods courses, will not prepare students to be technology-using teachers. Pre-service teacher education students should learn about a wide range of educational technologies across their professional preparation, from introductory and foundations courses to student teaching and professional development experiences.

• *Technology should be introduced in context*.

Teaching pre-service students' basic computer literacy-the traditional operating system, word

processor, spreadsheet, database, and telecommunications topics is not enough. As with any profession, there is a level of literacy beyond general computer literacy. This more specific or professional literacy involves learning to use technology to foster the educational growth of students. Professional literacy is best learned in context. Pre-service students should learn many uses of technology because they are integrated into their coursework and field experiences. They should see their professors and mentor teachers model innovative uses of technology; they should use it in their own learning, and they should explore creative uses of technology in their teaching. Teacher educators, content specialists, and mentor teachers should expose pre-service teachers to regular and pervasive modelling of technology and provide opportunities for them to teach with technology in K-12 classrooms.

• *Students should experience innovative technology-supported learning environments in their teacher education programme.*

Technology can be used to support traditional forms of learning as well as to transform learning. A PowerPoint presentation, for example, can enhance a traditional lecture, but it does not necessarily transform the learning experience. On the other hand, using multimedia cases to teach topics that have previously been addressed through lectures may well be an example of a learning experience transformed by technology. Students should experience both types of uses of technology in their programme; however, the brightest promise of technology in education is as a support for new, innovative, and creative forms of teaching and learning (SITE, 2002). While the proposed ICT in teacher education curriculum should aspire to no less, the trajectory of the development for countries, regions, and organizations should be appropriate to the level of resources, including expertise, leadership, and ICTs themselves. A widespread approach to reach a scattered population of teachers and organizations that are ready to move a small step forward with very limited resources may be helpful at an early stage. Creating centres of transferable excellent practice that encourage 'reference site' visits, and

mentoring teachers in other locations, are also approaches that may be effective. This section will review the stages of teacher education and provide examples of approaches for teacher education in ICTs and through ICTs.

The need for development of ICT integration in Ghanaian Curriculum

It is a challenge for teacher educators to shift pre-service teachers away from traditional Pedagogical beliefs towards pedagogy approaches in an ICT-enhanced learning environment (Lin, 2001). Most pre-service teachers' prior learning experiences were in school classrooms that adopted traditional instructional practices. As a result, many students hold traditional pedagogical beliefs when they join the pre-service teacher education programme. Student-teachers holding traditional beliefs tend to perceive teaching as the dissemination of information, and learning as a passive activity. They may expect to perform minimal task management and may hold little responsibility for their own learning. This contrasts with technology pedagogical beliefs whereby teaching is geared towards guiding and facilitating students in the process of knowledge construction, and learning by the use of ICTs in teaching. The latter approach is consistent with today's knowledge societies and economies, in which students are expected to be active seekers and constructors of knowledge, engaged in learning that involves the discovery and transformation of complex information the use of ICTs. Yet it should also be noted that traditional beliefs are not to be underestimated. The stance of this study is to promote more ICTs integration approaches that encompass not only dynamic engagement with concepts, theories and the making of meaning, but also self-regulated learning and personal agency.

A series of learning tasks has been developed in which ECU provides pre-service teachers with opportunities to adopt ICTs integration approaches in the design of multimedia learning packages and the documentation of their experiences in schools.

ECU is aware that pre-service teacher education programmes play a crucial role in preparing

quality teachers and it grooms student-teachers to be change agents, role models and ICT champions in schools.

This issue is corroborative with a Case Study conducted on Integrating ICT into Teacher Education Curriculum in Asia by the UNESCO in 2013.This paper documents the development and implementation of one course, Learning *with Technology* (ICT1100), a core course in the Bachelor of Education (K-7) programme. Two key challenges in designing an educational technology course are the diversity of ICT competencies and confidence among pre-service teachers and their lack of pedagogical knowledge and strategies to use ICT. Students who are more ICT competent and confidence may become bored when too much time is spent on basic ICT-related instruction and may perceive that they are already capable of using ICT effectively for teaching and learning. Students with lower competence in the use of ICT may give up if not enough instruction is given and may then lack the confidence to use ICT in classrooms. To cater to the diverse needs of pre-service teachers there is a need for educational technology courses to create a meaningful context that allows teachers to critically examine their own pedagogical beliefs and explore the application of ICT in teaching environment, (UNESCO, 2013).

2.9 Social Cognitive Theory

The researcher underlines the social cognitive theory as the main concept behind self-efficacy beliefs. Social cognitive theory proposed by Albert Bandura (1977, 1986, and 1997) is a socio-cognitive perspective that enables individuals to self-regulate cognitive processes and behaviors, rather than simply react to events. This perspective ascribes to the belief that "individuals are capable of exercising a degree of control over their thoughts, feelings, motivation and actions" (Pajares, 2003) after a self-interpretation of performance. This control impacts and has the potential to alter subsequent actions and behaviors. Bandura (1986, 1997)

believed that behavior is more effectively predicted by the beliefs that individuals have regarding their capabilities rather than what they are actually capable of accomplishing. Therefore, the beliefs individuals have about themselves provide a driving force in their academic accomplishments. It is these beliefs that determine "how well knowledge and skill are acquired" (Pajares, 2003).

Research intensely demonstrates that self-efficacy can influence behaviour (Bandura, 1992; Delcourt & Kinzie, 1993). Miura (1987) also indicates that a person's self-efficacy towards a task will influence the decision to take on a task, the amount of effort used on the task and the persistence in accomplishing the task. Applied to ICTs self-efficacy, this would suggest that one's choice, effort and persistence in using ICTs is influenced by one's level of self-efficacy in the use of ICTs.

Teacher self-efficacy in itself is influenced by four sources as explained by Bandura (1995): mastery experiences, vicarious experiences, social persuasion, and emotional states.

i. Mastery experiences are the most effective means of creating a sense of Self-Efficacy. These in fact represent the memories of past successful experiences that individuals may revert to while facing current or future situations. Positive mastery experiences reinforce Self-Efficacy, while negative mastery experiences weaken it.

ii. Vicarious experiences emanate from the observation of peers or "models": a process of comparing oneself to other individuals. Seeing these models succeed may increase the observer's Self-Efficacy, while seeing them fail may weaken Self-Efficacy. This process is intensified if the observer regards him- or herself as similar to the model.

iii. Social persuasion represents positive (verbal) reinforcement. It is possible here that one's Self-Efficacy may increase if encouraged or motivated by others. Despite social

persuasions being less powerful than mastery experiences, they may yet exert a strong influence on self-belief.

iv. Emotional states (psychological factors) represent the final source of Self-Efficacy according to Bandura. Individuals often consider that their skills are (strictly) related to the way they feel in a particular moment, where a state of stress or tension may be an indication of failure. Individuals with a high sense of Self-Efficacy may employ these kinds of emotional states to improve their performance. Those individuals with a lower sense of Self-Efficacy consider these states as a negative influence on the activities they are engaged in. (Bandura 1977)

2.10 Self-Efficacy Beliefs

According to social cognitive theory, self-efficacy beliefs provide the foundation for human motivation, well-being, and personal accomplishment: Unless people believe that their actions can produce the outcomes they desire, they have little incentive to act or to persevere in the face of difficulties (Bandura, 1997). These self-perceptions touch virtually every aspect of people's lives-whether they think productively, self-debilitating, pessimistically or optimistically; how well they motivate themselves and persevere in the face of adversities; their vulnerability to stress and depression; and the life choices they make (edutechwiki.unigech). Self-efficacy is also a critical determinant of the self-regulatory practices in which individuals engage as they go about the important task of self-correcting their actions and cognitions.

It must be said that Self-efficacy beliefs should not be confused with outcome expectations, which are people's judgments of the consequences that their behavior will produce. Self-efficacy is a motivational construct based on self-perception of competence rather than actual level of competence" (Tschannen-Moran & Woolfolk, 2007). Typically, self-efficacy beliefs help foster the outcome one expects.

This implies that confident individuals anticipate successful outcomes. Students confident in their social skills anticipate successful social encounters. Those confident in their academic skills expect high marks on exams and expect the quality of their work to reap academic benefits. The opposite is true of those who lack confidence. People who doubt their social skills often envision rejection or ridicule even before they establish social contact. Students who lack confidence in their academic skills envision a low grade even before they begin an exam or enrol in a course. The expected results of these imagined performances will be differently envisioned: social success or greater career options for the former, social isolation or curtailed academic possibilities for the latter. (edutechwiki.unigech).

A research conducted by Suleyman (2007) on teachers' perception of their computer self-efficacy found teachers' self-efficacy to be high. His study found a high self-efficacy mean value of (3.74) on a scale of 1 – 5. An examination of the relationship between teacher self-efficacy and teachers' perception about their ability to implement computers for instruction indicated that majority of teachers (76.5%) hold a positive belief about computer integration and are likely to integrate computer use in their classes (Taylor, 2011).

2.11 Adaptation of ICTs Self-Efficacy

Adapted from the computer self-efficacy concept, ICTs self-efficacy is the level of an Individual's perceived ability to use ICTs. In this study the term ICTs self-efficacy would be frequently used alongside with computer self-efficacy to mean all the ICT tools that can equally be used in place of computer in teaching and learning. According to Delcourt and Kinzie (1993) computer self-efficacy is a measure of how certain computer (ICTs) users are with their capability to understand, utilize, and apply computer (ICTs) learning and abilities. The authors established that people who have high Computer (ICTs) self- efficacy will feel competent in utilizing diverse computer hardware and software.

In any case, a low computer (ICTs) competence prompts the belief that people will experience difficulty in utilizing ICTs tools in teaching. As suggested by Ertmer (1999) teachers with higher ICTs self-efficacy beliefs are prone to be more active to utilize innovation in their classrooms than those with lower levels of self-adequacy. They presumed that teachers' personal beliefs regarding their ICTs capability are the principle variables in figuring out if or not they will utilize ICTs in teaching and learning. This is in accordance with the study by Czaja, Charness, Fisk, Hertzog, Nair, Rogers, and Sharit (2006) among 1,204 adults (men = 454, female =750) ranging in age from 18 to 91 years ICTs self- efficacy was an essential predictor of general use of technology and that people with lower self-efficacy are less likely to use technology in general.

Dimensions of Self-Efficacy

In defining self-efficacy, it is also important to consider the relevant dimensions of self-efficacy judgments. According to Bandura (1984), self-efficacy judgments differ in three distinct, but interrelated, dimensions: magnitude, strength, and generalizability. The magnitude of self-efficacy refers to what one thinks about the level of difficulty of a task and one's ability to succeed at it. Individuals with a high magnitude of self-efficacy will see themselves as able to accomplish difficult tasks, while those with a low self-efficacy magnitude will see themselves as only able to execute simple forms of the behavior or task. Self-efficacy strength refers to one's level of conviction about the judgment. Individuals with a low sense of self-efficacy will be frustrated more easily by obstacles to their performance and will respond by lowering their perceptions of their capability to overcome barriers. By contrast, individuals with a strong sense of efficacy will not be frustrated by difficult problems and will retain their sense of self-efficacy and are more likely to overcome whatever barrier was present because of their continued persistence. Generalizability of self-efficacy indicates the extent to which perceptions of self-

efficacy are limited to particular situations. Some individuals may believe they are capable of performing some tasks, but only under a particular set of circumstances, while others might believe they can execute the particular task under any circumstances and also perform tasks or behaviours that are slightly different.

Measurement of ICTs Self-Efficacy

In existence are many measuring instruments developed to measure computer self- efficacy in literature by Hill, Smith, and Mann (1987), Murphy, Coover, and Owen (1989), Delcourt and Kinzie (l993), Compeau and Higgins (1995) and Durndell, Haag, and Laithwaite (2000) yet no single measure is universally acknowledged.

Murphy et al., (1989) was the first to introduce with 32- items to measure an individual's perceptions of his capability regarding specific computer-related knowledge and skills. The instrument was administered to 414 individuals that included graduate students, adult vocational students, and professional nurses learning to use computers.

The authors used the 5 point Likert-type format (1 = very little confidence to 5 = quite a lot of confidence), and participating respondents were asked to indicate the degree to which they felt. The authors performed factor analysis with an oblique rotation which produced three factors concerning computer skills (a) beginning level, (b) conceptual (advanced), and (c) mainframe. The reported Cronbach's alpha for the three empirically derived factors was .97, .96, and .92, respectively.

Harrison and Rainer (1992) replicated the factor structure found by Murphy et al. (1989) in their study to measure respondent perceptions regarding specific computer-related knowledge and skills. The instrument was administered to 693 university personnel who fully completed the survey. The participant group derived from four broad university job categories: (a) clerical,

(b) technical, (c) faculty, and (d) administrative. The Cronbach's alpha coefficients for the three subscales on the computer self-efficacy skill scale were .97 on the beginning, .95 on the advanced, and .98 on the mainframe.

In respect to this Torkzadeh and Koufteros (1994) used the 32-item scale with minor modification from Harrison and Rainer (1992). Again Compeau and Higgins (1995) developed and tested a measure of computer self-efficacy, using a survey in an effort to understand the impact of self-efficacy on individual reactions to computer technology in business and industry. Bandura's (1997) social cognitive theory was employed to create a model for testing the effects of computer self-efficacy. The researchers' 10-item computer self-efficacy measure was designed to be task focused and to incorporate elements of task difficulty including computer use, anxiety, outcome expectations, and organizational support, as well as encouragement by others.

Their research concluded that computer self-efficacy influences individuals' use of the computer and learning to use computers, and empirically verified a strong link between self-efficacy and individual reactions to computing technology. They also found that computer self-efficacy exerted significant influence on (a) individuals' expectations of the outcomes of using computers, (b) emotional reactions to computers, and (c) their actual computer use. In this research, the authors discovered that individuals with high self-efficacy used more computers, enjoyed using them, and experienced less computer-related anxiety.

There are many notable instruments used to measure computer self-efficacy. Lee and Bobko (1994) found that asking the respondents to rate their self-efficacy strengths and weaknesses were the most common measures of self-efficacy. Karsten and Roth (1998) recommended that researchers select the computer self-efficacy instrument whose items most closely reflect the skills they wish to measure and that the skills be clearly identified.

Recent research confirms the previous study. Compeau and Higgins (1995) discovered a relationship between self-efficacy and learning to use computers and software. Beliefs about capabilities to use technology successfully were strongly related to decisions about whether and how much to use technology. A survey on 406 microcomputer users in Finland revealed to Igbaria and Iivari (1995) that self-efficacy was positively correlated with perceived ease of use, perceived usefulness and usage, but negatively correlated with computer anxiety. They concluded that individuals with a high self-efficacy will interact with computers and be less anxious than a person with a low self-efficacy. If individuals believe they will have problems using a computer then they will avoid them due to this fear. Zhang and Espinoza (1998) stated that computer-related self-efficacy influences a person's attitudes, perceptions, and beliefs about technology, and this relationship was clearly demonstrated in their study.

The few tools available in the literature to measure the computer self-efficacy. But some of them are developed based on the assumption that computer self-efficacy and computer attitude are same (Eachus & Cassidy 1997), which is not correct. A review of the literature concerning self-efficacy of computers uncovered few existing tools. One utilized a three-item scale to measure computer self-efficacy in a study of the early adoption of computing technologies (Burkhardt and Brass, 1990). This tool requested general perceptions about an individual's ability to effectively use computers in his or her job. Another tool used a four-item scale, revised from a scale used in an earlier study Hill *et al.,*(1987). This measure did not, however, appear to be measuring self-efficacy. Three of the items used measured general perceptions about the nature of computing, such as "only a few experts really understand how computers work." Responses to these statements may or may not reflect computer self-efficacy. In another tool by Webster & Martocchio (1993) a five-item scale was developed to measure software efficacy. This measure, while it does seem to capture elements of self- efficacy, also

incorporated other concepts, in addition to self-efficacy. For example, one item, used to measure self-efficacy before training, asked the respondents the extent to which they agreed with the statement "I expect to become very proficient at using Word Perfect merging." Responses to this item would also reflect expectations of the quality or content of the training program and might reflect elements of interest (in becoming proficient at WordPerfect merging). The last two measures studied the relationship between computer self-efficacy, computer training methods, and training performance, and both were developed by Gist, Schwoerer & Rosen (1989). The first concerned the general construct, computer self-efficacy. The second focused on a measure specific to using a spreadsheet package. Neither of the measures could be considered task focused. This examination of existing measures of computer self-efficacy indicated the need for additional development work which also possesses required psychometric properties.

Adaptation of ICTs Self-Efficacy Scale

Adapted from the computer self-efficacy concept, ICTs self-efficacy is the level of an Individual's perceived ability to use ICTs. In this study the term ICTs self-efficacy would be frequently used alongside with computer self-efficacy to mean all the ICT tools that can equally be used in place of computer in teaching and learning. According to Delcourt and Kinzie (1993) computer self-efficacy is a measure of how certain computer (ICTs) users are with their capability to understand, utilize, and apply computer (ICTs) learning and abilities. The authors established that people who have high Computer (ICTs) self- efficacy will feel competent in utilizing diverse computer hardware and software.

In any case, a low computer (ICTs) competence prompts the belief that people will experience difficulty in utilizing ICTs tools in teaching. As suggested by Ertmer, Addison, Lane, Ross and Woods (1999) teachers with higher ICTs self-efficacy beliefs are prone to be more active to utilize innovation in their classrooms than those with lower levels of self-adequacy. They

presumed that teachers' personal beliefs regarding their ICTs capability are the principle variables in figuring out if or not they will utilize ICTs in teaching and learning. This is in accordance with the study by Czaja, Charness, Fisk, Hertzog, Nair, Rogers, and Sharit (2006) among 1,204 adults (men = 454, female =750) ranging in age from 18 to 91 years ICTs self-efficacy was an essential predictor of general use of technology and that people with lower self-efficacy are less likely to use technology in general.

However the current study adapted a professional Self-efficacy scale for Information and Communication Technology teachers by Koksal, Ruben and Rauf (2015) which aimed at a self-reported efficacy scale for ICT teachers in assessing their confidence level in the use of ICTs in teaching.

Based upon the relevant competency framework, seven-factor structure with 34 items was evidenced by EFA and it explained 65.90 percent of the overall variance with .60 of minimum factor loading. At first phase, Harman's single factor analysis was performed to verify the common method bias (CMB) and single-factor unrotated solution accounted for only 30 percent of the overall variance indicating the absence of the CMB issue. The follow-up CFA evidenced the seven-factor construct with acceptable model data fit index with one excluded item. As a conclusion, the present research provided a sound psychometric property for the developed scale.

Moreover, the convergent and discriminant validity analyses supported the absence of CMB through CFA estimates. Besides, the developed measurement model produced robust internal consistency results so that all Cronbach's Alpha coefficients were greater than .80. Over two week period, test-retest correlations evidenced strong time invariance in reliability. At last factors were named on the basis of their common characteristics such as measurement and evaluation, hardware and software, instructional design, multi-media applications, safe and ethical use, instructional material development, and use of ICT terms.

This study adds to the literature in several respects. First, the developed scale can play an important role in prospective performance management system to be issued into teaching because the scale items completely based upon official national framework curriculum. Second, the present research show up a shortcoming of the national framework in combining technology leadership competencies with other competencies because this is the only way to promote ICT teachers being leader for all school share-holders in generating a shared vision on technology

Integrated learning. In achieving the study objectives, the existing ICT scale was adapted for since the above was too technical and therefore was modified to by extending it to be used for general teachers.

2.12 Teaching Experience and ICT Usage

The relationship between years of experience of teachers and ICT use has been investigated by various scholars with the results showing variations in findings. For example, Mueller, Wood, Willoughby, Ross, & Specht (2008) investigated the discriminating variables between teachers who fully integrate computers and teachers with limited integration and found huge significant relationship between teaching experience of teachers and their use of ICT in teaching. This is also corroborated by Abu-Obaideh *et al.,* (2012) who revealed a significant relationship between teachers' years of experience and ICT use in teaching process. This result is however inconsistent with the results of the study conducted by Inan & Lowther (2009) which revealed that years of teaching experiences affect teachers' use of computer in a negative manner.

Also, Kalogiannakis (2008), Ertmer (2005), and Bebell, Russel, & O'Dwyer (2004) discovered through their studies that teachers' years of work experiences influence the teachers' ICT use in teaching. These are pointers to the fact that demographic variables do have implications on ICT use by teachers. Morley (2009) believes teaching experience allows the teacher to

determine when computers can be best used for teaching and learning. (Morley, 2009). Drent & Meelissen (2008) posits that solid experience in the use of ICT and the changes related to ICT, support the development of a learner centered pedagogical practice, while Becker (1994) views substantial previous computer use by teachers, as one of the key determinants, in his classification of teachers, as either 'exemplary computer-using' or 'non-exemplary computer-using'.

Mahmud & Ismail, (2010) found out that formal ICT training and ICT experience influence the teachers' knowledge, skills and attitude in implementing ICT in the classroom. Therefore, teachers especially the older ones and normally with more teaching experience need to be identified, and provided with specially designed training programs, in various forms of ICT courses and workshops (Mahmud & Ismail, 2010).

Research regarding experienced teachers has shown that experienced teachers generally know more about ICT content they teach, have different attitudes regarding their students, and behave differently in the classroom than novice teachers do (Wolters & Daugherty, 2007). Blackburn and Robinson (2008) suggested that experienced teachers' mastery experiences should allow them to perfect their preferred learning styles when implementing ICTs in the classroom. Tschannen-Moran and Hoy (2007) stated that experienced teachers may develop higher self-efficacy especially in technology usage due to the real successes they experience with students in the classroom. Increased experience as a teacher has been associated with higher levels of teacher ICT self-efficacy (Ross, Cousins, & Gadalla, 1996). Wolters and Daugherty (2007) found that teachers with additional years of experience felt more confident in their ability to employ instructional tools and assessment practices that would benefit even the most difficult students. More experienced teachers were also reported to have greater confidence in their ability to avoid classroom disruptions and provide adequate classroom management during

technology implementation. However, a massive collection of research exists to suggest that novice teachers actually exhibit high levels of self-efficacy the first few years of teaching (Blackburn & Robinson, 2008; Epps, Foor, & Cano, 2010; Whittington, Mcconnell, & Knoblock, 2006).

In the Ghanaian context, Asabere & Ahmedin (2013) in their study of Polytechnic Lecturers in Ghana suggested that new teachers are likely to be more technologically inclined and will use ICT to teach due to the recent and current proliferation of ICT. They continued with the notion that teachers with more experience may not be conversant with using ICT for teaching, since technology had not proliferated to the level it is now when they started teaching. Obiri-Yeboah, Owusu-Kwarteng & Kyere-Gyan, (2013) in their study 'Factors Affecting ICT Adoption in Tertiary Institutions in Ghana' indicated a strong correlation between teachers' teaching experience and ICT usage in the classroom.

The relationship between years of experience of teachers and ICT use was also investigated by various scholars with the results showing variations in findings. For example, Mueller, Wood, Willoughby, Ross, and Specht (2008) investigated the discriminating variables between teachers who fully integrate computers and teachers with limited integration and found no significant relationship between teaching experience of teachers and their use of ICT in teaching. This is also corroborated by Abu- Obaideh et.al. (2012) study that revealed a no significant relationship between teachers' years of experience and ICT use in teaching process. This result is however inconsistent with the results of the study conducted by Inan and Lowther (2009) which revealed that years of teaching experiences affect teachers' use of computer in a negative manner.

Also, Kalogiannakis (2008), Ertmer (2005), and Bebell, Russel, and O'Dwyer (2004) revealed through their studies that teachers' years of work experiences influence the teachers' ICT use in teaching. These are pointers to the fact that demographic variables do have implications on ICT use by teachers.

There is a saying that experience is the best teacher. Though some research have reported that teachers' experience in teaching did not influence their use of computer technology in teaching ,most research have showed that teaching experience influences the successful use of ICT in classrooms .A report by Gorder (2008) discussed that teacher experience is significantly correlated with the actual use of technology. In her study, she revealed that effective use of computer was related to technological comfort levels and the liberty to shape instruction to teacher-perceived student needs. Also, Baek et al. (2008) argued that experienced teachers are less ready to integrate ICT into their teaching as compared to less experienced teachers. Furthermore, a report by the United States National Centre for Education Statistics revealed that teachers with less experience in teaching were more likely to integrate computers in their teaching than teachers with more experience in teaching. According to the report in, teachers with up to three years teaching experience reported spending 48% of their time utilizing computers, teachers with teaching experience between 4 and 9 years, spend 45% of their time utilizing computers, teachers with experience between 10 and 19 years spend 47% of the time, and finally teachers with more than 20 years teaching experience utilize computers 33% of their time. The reason to this disparity may be that fresh teachers are more experienced in using the technology or more technologically inclined.

As stated and cited above, new teachers are likely to be more technologically inclined and will use ICT to teach due to the recent and current proliferation of ICT. Teachers with more experience may not be conversant with using ICT for teaching, since technology had not proliferated to the level it is now when they started teaching. As a result of such scenarios,

Wollo University and Accra Polytechnic should organize ICT related seminars, conferences or workshops to encourage teachers who are experienced in teaching but don't teach without ICT to improve their pedagogy by using current ICT tools and facilities to teach. Teachers who are also experienced in using ICT to teach should also be encouraged to attend such seminars, conferences or workshops so that they can be educated more in using ICT to improve their pedagogy.

2.13 Self-efficacy Beliefs and ICT Usage

According to Pajares (2000), "beliefs are a driving force in academic accomplishments. It is these beliefs that determine how well knowledge and skills are acquired". With regards to this, Cziko (2001) acknowledged one condition that is necessary for teachers to use technology as their perceived ability and availability of resources to use technology.

However, Ertmer (2005) debated that although the environmental conditions affecting technology use, such as infrastructures to facilitate technology integration, have enhanced to some extent, personal factors such as teachers' beliefs affecting technology use in teaching, are yet to be committed to.

With respects to ICT self-efficacy, teachers' judgements of their ability has been found to be a significant predictor of technology usage and intention to use technology (Teo, 2009). In other words, teachers' beliefs about using ICT play an important part in shaping their responses to instructional reforms, including technology integration (Selwyn, Dawes, and Mercer, 2001). An example of teachers' beliefs include ICT self-efficacy beliefs among teachers on how technology should be used in teaching.

In Ghana many studies have focused on issues related to the integration of ICT by teachers and academic faculty in schools. However, very few studies have focused on ICT self-efficacy beliefs among teachers in the use of ICTs in teaching at the Colleges of Education.

In their study Obiri-yeboah, Owusu-Kwarteng and Kyere-Gyan (2013) observed the factors that encourage the adoption and use of ICTs. Summaries from the interviews and questionnaires revealed willingness to use ICTs, reliability, trust in using ICTs, results/outcome of ICTs, perceived usefulness, perceive ease of use of ICTs, attitude, behaviour and self-efficacy, accessibility of ICTs infrastructure and other factors which are very diverse based on the environment. The researcher believes there is the need to improve these factors to enhance the usage of ICTs in the Colleges of Education.

In other related study, effective and successful use of ICTs in teaching depends on competence, access, leadership support and self-efficacy (Woreta et al, 2013; Chen, 2010; Plump, Anderson, Law & Quale, 2009; Tondeur, Coopert and Newhouse, 2010).

Buaben-Andoh and Yidana (2015) however highlighted teachers' lack of confidence in the integration of ICTs as the main hindrance to ICT integration as well as its teaching. In the researcher's view, frantic efforts should be made to develop teachers' confidence level and pedagogical use of ICTs. Taylor (2011) in his examination of the' relationship between teacher self-efficacy of non-public school teachers and implementing computers for instruction' uncovered statistically significant relationship between teacher self-efficacy and teachers' perceptions about their ability to implement computers for instruction.

Technology and Computer Self-Efficacy

A great body of research done in computer technology shows that computer self-efficacy construction is crucial in the basic element of an individual's behaviour and attitudes (Beas &

Salanova, 2006). Many studies have been conducted to measure in-service teachers' and pre-service teachers' computer self-efficacy perceptions. Within the context of continuous technological changes, self-efficacy has been viewed as the most useful individual domain in determining the outcomes technology influences (Conrad & Monro, 2008). Technology efficacy of teachers was also stressed by ISTE3 and knowledge and technology efficacy within the skills that teachers should have was highlighted. According to ISTE (2000), teaching standards comprises being a literate of technology, being able to use technology in the courses, leading students to use technology and arranging the setting in a way that students could use technology. In order for teachers to be able to offer their students rich learning settings integrated with new technologies, it is necessary that they should first attain the efficacy of technology literacy. Otherwise, no matter how well the curriculum may be prepared, the expected and desired result cannot be achieved unless teachers have desired efficacy (Bandura, 1995; Fullan, 1993).

In particular, whether computer self-efficacy perceptions are related to such variables as gender, computer using experience and frequency of individuals' technology usage are examined in most of the studies done with teacher candidates (Aşkar and Umay, 2001; Yılmaz *et al.*, 2006; Özçelik and Kurt, 2007). Among these, Özçelik and Kurt (2007) determine the level of teachers' computer self-efficacy and whether the computer self-efficacy changes according to their age, gender, owning computer and frequency of computer use. The results indicate that the teachers' level of computer self-efficacy was 71.52. It was also seen that teachers aged between 20-25yrs and 0-5 years experienced teachers' computer self-efficacies were higher than the others. There was not a significant difference between gender and teachers' computer self-efficacy. The teachers who had computer and who always used computer had higher computer self-efficacies than the others. On the other hand, the efficacy

and attitudes of teachers and teacher candidates aiming at computer or teaching technologies (Asan, 2003; 2005; Sa'ari *et al.*, 2005) were also examined in many researches. For instance, Penna and Stara's (2009) study reports on an investigation performed in a primary school, designed to test whether expectations and opinions on computers, both of students and teachers might be related to the effectiveness of computer use within a particular educational context. Findings do not appear to support the hypothesis that a positive opinion on computers can lead to higher learning efficacy in a computer-based educational environment. Besides, Adalıer (2012) reveals the relation between 136 Turkish and English language teacher candidates' perceived computer self-efficacy and attitudes toward computer at the universities in Cyprus. He found that there is a medium level positive statistical difference between perceived computer self-efficacy and attitudes toward computer.

2.14 Actual use of ICTs in teaching

In many educational systems, teachers are expected to use ICT in their teaching (Haydn and Barton, 2008) and to act as change agents for technology integration in the schools (Zhao, Tan, and Mishra, 2001). Meanwhile, according to Selwyn (2003), technology adoption by teachers has been slow and below expectations in many parts of the world. Therefore it is important to understand the factors that drive teachers' use of technology for teaching purposes. Literature has found many factors influencing teachers' use of technology. Generally these factors may occur from the external environments, where the teachers work (Ertmer, 2005) as well as their attitude towards computer use (Teo, 2008).

Asabere and Ahmedin (2013), posited that for successful integration of ICTs into teaching for enhancement of quality education, factors including personal characteristics such as educational level, age, gender, educational experience, and experience with the computer for

educational purpose and attitude towards computers, teachers' attitudes and ICT teaching delivery acceptance, computer literacy and ICT competence and ICT self-efficacy should be considered. It therefore implies that teachers should be encouraged to develop ICT self-efficacy in order to improve and enhance quality education using ICTs.

Buabeng-Andoh (2012) in his study of the factors influencing teachers' adoption and integration of information and Communication technology into teaching identified teacher ICT skills, teacher confidence and pedagogical training as the main issues in adopting and integrating ICTs into education.

The researchers at the Center for Applied Special Technology (2006) pointed out that acquisition of computers and other related resources is not enough to guarantee the use of ICT resources by teachers but adequate access should be guaranteed. This can be in form of making the ICT resources available in allocation where the teachers can easily have make use of it without any difficulties. This ease of access may end up increasing the frequency of use of the resources. Ertner (2005) describes schools' acquisition of computers as just the beginning of ensuring use. Obviously, for teachers to use computers in classroom instruction, they must have access to computers. While great strides are being made to place computers in classrooms in schools, there are still some great inequalities of access (Russek, 2001). The type of access is an issue because teachers find signing up for the use of a laboratory cumbersome and inconvenient. Teachable moments do not often allow the luxury of signing up for the computer laboratory.

For teachers to effectively use ICT for teaching in classrooms, they must have easy access to the various types of ICT resources. Alston, Miller (2001) found that in North Carolina schools, certain types of technology were widely available and accessible for teachers use, meaning the various types of ICT resources were located in the classroom or were easily

accessible within the building. Therefore location of access can be considered as a major factor that may influence the use of ICT resources by teachers. Access to ICT within the school is an important component when implementing its use into the classroom (Alston, Miller, and Williams, 2003).

The individual teacher is usually the one who makes the decisions on the classroom practices, also concerning technology. It is obvious that teachers use such tools and practices that support their beliefs about "good learning" and tools that fit easily into the existing conceptual and social organization of their classrooms. As Marx, Bluemenfeld, Krajcik and Soloway (1998) noticed, the use of technology tools mainly maintains the existing culture, and they have little potential for transforming teachers' work, or the nature of teaching and learning in classrooms. In the studies of Hakkarainen *et al*., (2001) and Moseley *et al*., (1999), it was found that there was a relationship between teachers' pedagogical conceptions and the type of instructional use of ICT. Teachers who intensively used information technology emphasized the importance of using ICT for facilitating students' participation in progressive inquiry, collaborative learning, and the learners' active engagement in the knowledge formation process. But as Lin (2001) says, the relationship between teachers' conceptions and practice, is complex, not clear or uncertain.

As far as education qualification is concerned, it was important, not only with respect to gaining the needed skills to use ICT, but also with respect to people's motivation to even use ICT. Olatokun (2009) emphasised that level of education had the strongest influence on the use of ICT as most of the people that use ICT are mainly educated people. Yi (2008) also asserts that those with higher education levels are more likely to use ICT because they may have more skills and chances to go online. At the same time, the role of formal education in building

teachers equipped with ICT skills is currently the subject of debate. Taylor (2003) reported that teachers with higher education levels are more likely to use ICT because they may have more skills and chance to go online. Meso, Musa and Mbarika (2005) reported academic discipline as another demographic factor that determines the adoption and use of ICT by teachers. They reported a significant difference between academic discipline of teachers, (that is, science, social sciences and humanities, and arts) and their use of ICT. Teachers in the social sciences and humanities were found to use ICT the most.

Teachers with good ICT skills used ICT more, and more often in a student-centered way (Moseley *et al.,* 1999), and they appeared to have adequate pedagogical means for pursuing new pedagogical practices (Hakkarainen *et al.,* 2001). In a study on the instructional use of software (Cox, Preston & Cox, 1999), the results indicated that teachers who used open-ended software had a strong learner-centred orientation and a weak computer-directed orientation, while teachers who used only skill-based software had the strongest computer-directed and lowest learner-centred orientations. Only very few teachers used open-ended software (but probably there were only a few such available). Lim & Barnes (2002) in their case study described, how a teacher who succeeded in using a digital application had long experience in using ICT in teaching, and he had the necessary attitude, skills and knowledge to identify the cognitive opportunities and limitations of the program, and to plan and organize activities to exploit its opportunities and address its limitations. There are also findings regarding teachers who do not use ICT in teaching. Norton, McRobbie, and Cooper (2000) found that teachers did not use ICT in teaching [mathematics] because of a teacher-centered view of teaching as a transmission/absorption image. Because the non-use was essentially based on such beliefs, teachers did not take any actions to increase their knowledge levels and subsequent use in teaching.

Teachers' ICT skills have been less often discussed. An interesting review about necessary ICT competence areas for teachers is presented by Sabaliauskas, Bukantaitė, & Pukelis (2006). They defined seven competencies which are needed to integrate ICT into education: basic ICT competencies (however, not defined), technological ICT competencies, ICT policy competencies, competencies in the ethical area of ICT use, competencies of ICT integration into the teaching subject, competencies of didactical methods based on the use of ICT, and competencies of managing teaching/learning process working with ICT. These competencies are far from the ideas of the technical skills, necessary for teachers. Lakkala and her colleagues (2005) found in their study that technology was not a challenge for teachers, but that they had problems in scaffolding students in open learning environments, which refer to missing competencies in didactic methods and in managing the teaching/learning process.

2.15 Relationship between ICT self-efficacy and Actual Use in Teaching

An educator's belief that ICT integration is possible may or may not necessarily relate to the actual practices. In fact, "what we know, the skills we possess, or what we have previously accomplished are not always good predictors of subsequent attainments because the beliefs we hold about our capabilities powerfully influence the way we behave" (Madewell and Shaughnessy, 2003).

In Social Cognitive Theory, "human functioning is viewed as a dynamic interplay of personal, behavioural, and environmental influences. How people interpret the results of their own behaviour informs and alters their environments and the personal factors they possess, which, in turn, inform and alter subsequent behaviour" (Usher *et al.,* 2011).

Social Cognitive Theory provides an insightful view of human behaviour in which individuals, through their own self-referent thoughts and feelings, can in part determine the course of actions

they take. Of these self-referent thoughts, none is more important than the beliefs individuals hold about their own capabilities, or Self-Efficacy beliefs (Bandura, 1995).

Furthermore, many scholars investigated Self-Efficacy beliefs of teachers using ICT in a variety of contexts, e.g. pre-service teacher training and science high school teachers (Albion 1999; Wang et al. 2004; Milbrath and Kinzie 2000; Abbitt and Klett 2008).

Some researchers have explored the role of self-efficacy in computing behavior (Burkhardt and Brass, 1990; Gist *et al*., 1989; Hill *et al.,* 1987; Webster and Martocchio, 1993). These studies provided initial evidence that self-efficacy has an important influence on individual reactions to technologies (Compeau & Higgins, 1995). Other researchers (Gist et al., 1989; Webster and Martocchio, 1993) found evidence of a relationship between self-efficacy with respect to using technologies and a variety of ICT-related behaviors such as registration in courses at universities (Hill *et al.,* 1987), adoption of high technology products (Hill *et al.,* 1986), and technology innovations (Burkhardt & Brass, 1990).

In terms of the outcome expectancy component of efficacy, ICT self-efficacy represents an "individual's perceptions of his or her ability to use technologies in the accomplishment of a task" such as using an Overhead projector, slide projectors, making slides for teaching or using a word processing program (Compeau & Higgins, 1995). Substantial evidence suggests that teachers' belief in their capacity to work effectively with technology is a significant factor in determining patterns of classroom ICT use (Abdal-Haqq, 1995; Albion, 1999; Burkhardt and Brass, 1990; Chen, 2008; Compeau & Higgins, 1995; Ertmer & Ottenbreit-Leftwich, 2010; Hermans et al., 2008; Hill et al., 1986; Marcinkiewicz, 1994; Paraskeva et al., 2008; Piper, 2003).

Dafaei, Ismail, Samsudin & Shakir (2013) posited in their study "The Mediating effect of self-Efficacy towards the Relationship between attitudes and level of use towards Instructional computer technology in Oman" that self-efficacy fully mediate the relationship between attitudes and the level of use on using instructional computer technology. This is an indication that a teacher's ability in using technologies directly relates to their use of instructional technologies more frequently.

In a similar vein, Taylor (2011) in his study revealed a statistically significant relationship between teacher self-efficacy and teachers' perceptions about their ability to implement ICTs for instruction. Taylor's (2011) finding is buttressed by Teo (2009) who found out in his study "Examining the relationship between student teachers' self- Efficacy beliefs and their intended uses of technology for Teaching" that teachers' self-efficacy is a significant influence on whether they use technology. Thus the relationship between teachers' competency and teacher's confidence level towards using ICT is significant (Tasir, Khawla, Halim & Abour, 2012).

2.16 Conceptual Framework

The impact of ICT integration cannot be underestimated in any educational setting. It is expedient that teachers gain insight into ICTs and how they can be integrated efficiently into teaching. Traditionally, ICTs are viewed as teaching and learning resources. For a teacher to effectively use a teaching resource in their teaching requires sufficient mastery and confidence in the usage of that resource. Personal variables such as self-efficacy beliefs are better exhibited when put into practice especially in the use of ICTs. When teachers believe their actions can produce the outcome they desire, they have the confidence to act and persevere in the face of difficulties.

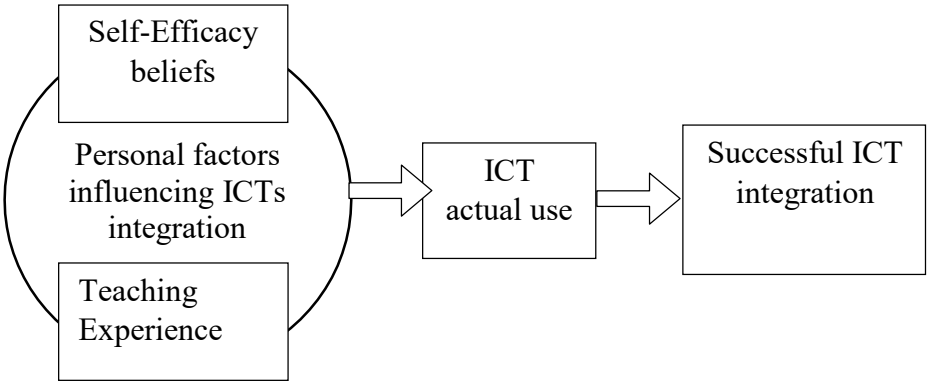

Figure 2.1 Conceptual framework for teachers' ICT usage in teaching

On the contrary, when teachers have no belief that their actions might lead to the production of the required results, they become less confident to persevere or act in the face of adversity. It must also be noted that even though self-efficacy belief relates with actual practice, it may or may not necessarily predict practice. Teaching experience as part of the personal variables can positively or negatively influence teachers' self-efficacy beliefs in ICT and consequently affect their actual use. The success of ICTs integration in teaching depends on its actual use which is influenced by Self-Efficacy beliefs and Teaching experience of teachers. Self-efficacy belief beliefs and teaching experience constitute teacher related factors affecting ICT integration in teaching.

2.17 Summary

The literature reviewed above concentrated on ICTs and Teacher Education, Social Cognitive Theory, Self-Efficacy Beliefs, the use of ICTs at the Colleges of Education and the relationship between teacher ICT self-efficacy and actual use.

The concerns raised from the review revealed Self-Efficacy belief as one factor among others that affect ICT integration into teaching and learning. Several studies revealed that there is a relationship between teachers' self-efficacy beliefs and their actual use on ICTs (Taylor, 2011;

Teo, 2009; Tasir, Khawla, Halim & Abour, 2012; Abdal-Haqq, 1995; Albion, 1999; Brinkerhoff; 2006; Burkhardt & Brass, 1990; Chen, 2008; Compeau and Higgins, 1995; Ertmer & Ottenbreit-Leftwich, 2010; Hermans et al., 2008; Hill et al., 1986; Marcinkiewicz, 1994; Paraskeva et al.,

2008; Piper, 2003). Also, it was seen that teaching experience inversely affect ICT self-efficacy beliefs, however not significant research findings were given to support this (Ozcelik & Kurt, 2007).

Findings from the reviewed literature shows that many studies conducted concentrated on reporting on teacher self-efficacy beliefs; with Teo (2009) going a step further in examining the relationship between teachers' self-efficacy beliefs and their intended uses of technology for teaching.

Nevertheless, these reports lack empirical evidence on the application of teacher self-efficacy beliefs on actual usage in the classroom. This present study therefore reports the issue yet again within the Ghanaian context, which will not only concentrate on the relationship between self-efficacy beliefs and intended use but its actual use.

As has been seen in the research, there are multifaceted relationships between the barriers to successful integration of ICTs in the classroom. Some barriers such as lack of teacher competence and lack of accessibility seem to be closely related to others. Some barriers such as lack of teacher confidence and resistance to change seem to be more significant than others. Also, it was reviewed in literature that, factors that affect ICTs integration in the classroom are both external and internal. Self-Efficacy was found to be a significant predictor of ICTs integration in the teaching environment of teachers. Lack of competence is one of the most important obstacles to teachers' use of technology in education. Teacher training in the use of modern technology in the classroom helps to increase the teachers' efficiency in using ICT in education effectively.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

The purpose of this research is to investigate the possible relationships between teacher self-efficacy beliefs and actual use of ICTs among teachers at the Colleges of Education. This chapter looks at the research design (3.1), population (3.2), sample of the study (3.3), sampling procedure (3.4), data collection instruments (3.5), data collection procedure (3.6), pilot study (3.7), the reliability and validity of the study (3.8), data analysis and presentation (3.9), the ethical considerations (3.10) employed in the study and ends with a summary of the chapter (3.11).

3.1 Research Design

This study adopted the descriptive design and mixed methods approach. According to Best (1970), descriptive research is concerned with the conditions or relationships that exist, practices that prevail, beliefs, points of views or attitudes that are held, processes that are going on, effects that are being felt or trends that are developing. At times, descriptive research is concerned with how 'what is' or 'what exists' is related to some preceding event that has influenced or affected a present condition or event. The purpose of the mixed method approach in the context of this study was to "obtain different but complementary data on the same topic" (Morse, 1991, p.122) to best understand the research problem. Creswell (2013) explained that mixed method is an approach to inquiry involving collecting both quantitative and qualitative data, integrating the two forms of data to provide a more complete understanding of research problem than either approach alone. Specifically, the explanatory sequential type of the mixed method approach was employed in this study. The explanatory sequential design begins with the collection and analysis of quantitative data followed by the collection and analysis of

qualitative data. The researcher interprets how the qualitative results help to explain the initial quantitative results.

3.2 Population

The collection of well-defined collection of individuals or objects about which the researcher is interested in gaining information and drawing conclusions is what is known as population (Amedahe and Gyimah, 2002). In this study the population consists of all colleges of Education Teachers in the Kumasi Metropolis in Ashanti Region. The population for the study comprised all the teachers in the five colleges of Education (Public and Private) in Kumasi Metropolis.

3.3 Study Sample

The population for this study comprised all Colleges of Education teachers (both public and private) in the Kumasi Metropolis. Out of an estimated number of 135 College of Education teachers in the study area, a sample of 115 teachers was selected. This number was selected based on the suggestion of Cohen, Manion & Morrison (2007), that a sample size of 85% of the total population in a study is considerable for achieving a 95% confidence level and also sufficient for generalisation purposes. Furthermore out of the 115 Colleges of Education teachers a sample of 13 teachers were made again to collect observation data. This was reached in line with Asamoah-Gyimah and Duodo (2005) suggestion that for a qualitative studies, a sample size of 10% to 30% of the population size is sufficient for generalisation purpose.

In all study sample of 115 Colleges of Education teachers was spread across three Colleges of Education namely: Wesley College of Education, St. Louis College of Education and Cambridge College of Education.

3.4 Sampling Procedure

In sampling the schools and participants for the study, it was considered that the Metropolis currently has five (5) Colleges of Education; two Public (regular) and three private. The private Colleges of Education include: Cambridge College of Education (Regular), Jackson College of Education (Distance) and Christ the Teacher College of Education (Regular). The researcher purposefully included three of these schools; Wesley College of Education, St. Louis College of Education and Cambridge College of Education. These institutions were selected to ensure homogeneity because Jackson College of Education operates on distance basis whereas the other selected institutions operate on regular basis. Even though the researcher emphasized on regular Colleges of Education, Christ the Teacher College of Education has been in existence for only three years falling short of the researcher's discretion of selecting regular institutions that have been in operation for at least five years.

In all two sampling techniques were employed in selecting the samples for the study.

The simple random sampling technique was employed in selecting the sample from two of the participating institutions (Wesco and St. Louis Colleges of Education).

Simple random sampling gives all units of the target population an equal chance of being selected and it is appropriate when the population of the study is similar in the characteristic of interest (Amedahe & Gyimah, 2002). In Wesco and St. Louis Colleges of Education, the researcher specifically employed the lottery method of the simple random sampling technique to select 55 and 43 participants respectively. Wesley College of Education had sixty three (63) teachers made up of 33 males and 30 females. There were fifty five (55) teachers in St. Louis College of Education, consisting 24 males and 21 females. The researcher used the convenience sampling in selecting 10 teachers out of 17 from Cambridge College of Education. Cambridge College of Education had the least number of teachers; seventeen (17), made up of 12 males and 5 females. According to Amedahe and Gyimah, (2002),

Convenience sampling involves choosing the available or nearest individuals to serve as respondents, continues the process until the required sample has been obtained. This was because some of the teachers were employed on part-time basis and hence were not easily accessible for the study. Again, simple random sampling was used to select 13 participants for collecting observational data. In all, the researcher took three weeks to successfully collect the data for the study. The data was collected by the researcher herself without using the services of any research assistant.

3.5 Data Collection Instruments

In the collection of data for the study, structured questionnaire and observation checklist were used. The questionnaire was used to collect quantitative data whereas the observation checklist was used to gather qualitative data. According to Amedahe and Gyimah (2002), data for relationship study under descriptive design can be collected by various methods including questionnaire and observational techniques.

The questionnaire consisted of three (3) parts; A, B and C. Part 'A' provided six (6) items that dealt with demographic information of respondents: age, gender, educational qualification, years of teaching experience, type of institution and subject taught. Part 'B' consisted of ten (10) items, that elicited information on Teachers ICT self –efficacy Beliefs whilst the last part, Part 'C' comprised five (5) items which measured teachers' actual use of ICTs in teaching.

To achieve the study objectives, the researcher adapted the Professional Self-Efficacy Scale for Information and Communication Technology Teachers developed by Koksal *et al.,* (2015). This constituted part 'B' of the questionnaire. The scale used measured teachers' perceived ICT self-efficacy beliefs and ICT actual use on a 5-point Likert-type scale from 1= 'Strongly Disagree' to 5= 'Strongly Agree'. Examples of items included in the questionnaire part 'B' included "I can use PowerPoint Presentations for classroom delivery," "I can engage

students in using the computer to make their own meaning of content during lessons", "I can use PDAs as alternative to other ICTs during teaching", "I can implement teaching methods effectively using ICTs" and "I can use the LCD projector to present lessons".

Part 'C' of the questionnaire consisted of ICTs actual use variables which were converted from the self-efficacy beliefs variables. They were also put in on a 5-point Likert-type scale from 1= 'Strongly Disagree' to 5= 'Strongly Agree'. For instance, "I can use PowerPoint Presentations for classroom delivery" was converted to "I use PowerPoint Presentations for classroom delivery" to measure teachers' actual use of ICTs and other examples followed as: "I engage students in using the computer to make their own meaning of content during lessons", "I use PDAs as alternative to other ICTs during teaching", "I implement teaching methods effectively using ICTs" and "I use the LCD projector to present lessons".

The observation checklist was self-constructed based on a *review* of the ICTs actual use variables. It came out clearly that not all the activities assessed quantitatively were observable. The researcher therefore had to look out for the ICT tools that the COE teachers actually used to support their teaching .According to Bell (2005) it is impossible to record everything as planned in an observation schedule. Sometimes the researcher needs to decide on what to find out and refine the observation guide in light of the purpose for which it is to be used.

This approach is also in sync with the suggestion of Ary, Jacobs and Razavieh (2002) that in constructing an observation guide, the object of interest must be identified and categorized to suit the purpose of the research study. The lesson plans of the 13 selected teachers used as a subject of the study were perused to identify ICT tools that were indicated to be used to facilitate teaching. The common tools that were stated in the lesson plans were selected and formed the items of the observation checklist. These were; Computers, LCD projector,

PowerPoint software, the Internet and PDAs. These items were put on a five point Likert- type scale; namely, Never =1, Rarely =2, Sometimes =3, Often =4 and Always =5.

3.6 Pilot Test

Before the actual collection of the research data, the researcher conducted a pilot study of the questionnaire. The pilot was conducted with Offinso College of Education teachers (n=37) of Ashanti Region which was outside the study area. The objectives of the pilot test were to determine if the language used in the survey instrument could be easily understood, to identify any ambiguities within the questionnaire, to determine if there were any problems that the participants might encounter, to estimate the time to complete the survey, and to solicit comments and suggestions (Roslani, 2007).

The feedback of the respondents helped to improve the quality of the research instruments by making changes in some parts of the questionnaire items and some teachers provided suggestions to rewrite few items in the questionnaire.

The reliability test for the 20 items, representing questionnaire parts 'B' and 'C', generated a Cronbach alpha of .920, representing a high internal consistency. Furthermore, the reliability coefficient for ICTs self-efficacy beliefs in teaching was .969 and that for Actual ICTs integration in teaching .950.The questionnaire instrument for the pilot test was highly reliable and applicable since the reliability coefficients was above 0.78 as indicated by Fraenkel and Wallen (2000) as acceptable reliability coefficient.

Subsequently, a pilot observation was done taking note of Spradley's (1979)

and Kirk and Miller's (2001) suggestion that in order to increase reliability of an observational guide, observers should consider the observational data including: notes made in situ, expanded notes made as soon after the initial observations, journal notes on record issues, ideas, difficulties that arise during the fieldwork and developing a tentative running recorded

of ongoing analysis and interpretation. After this check, the general word projector was qualified as LCD projector as the subjects (ie the teachers) indicated awareness of the availability of the type they use.

3.7 Data Collection Procedure

The administration of the two research instruments, ie, the questionnaire and the observation checklist was personally done by the researcher in all the three colleges over a two month duration between May 5th and July 28th, 2016.

Prior to the collection of the data for the study, an official introductory letter (Appendix D) was sought from the department (Department of Educational Leadership, UEW-K) which the researcher presented to the institutions she went to. The letter was meant to introduce the researcher to the heads of the institutions and explain the purpose of the study to them. The researcher visited the schools selected for the study and introduced herself to the Principals and sought permission for the conduct of the study. Afterwards, the researcher was given the opportunity to meet the participants and explain the purpose of the study to them. Participants were informed of their rights to participate voluntarily in the study.

The questionnaires were distributed to respondents only after all the relevant issues had been clarified .Each respondent was given not less than 2 hours (2hrs) to enable them adequately respond to the items. Ninety-seven (97) questionnaires were retrieved on the same day they were administered. The remaining ten (10) took two weeks to be retrieved because the teachers in the private college were part time teachers and could only be met based on the times they were scheduled to teach as per the time table. A total of One Hundred and Seven (107) out of the One Hundred and Fifteen (115) teachers completed and returned their questionnaires as represented in Table 3.1.

The observation schedule was employed to observe the 13 selected teachers to check for the authenticity of their questionnaire responses. The researcher observed the teachers deliver their lessons from a reasonable distance and recorded their actual use of the ICT tools in teaching based on the issues stated on the observational guide. The teachers were observed while they were teaching to see whether they actually used the common tools in the observation guide which they had stated in their lesson plans. The researcher observed each teacher in the study on five separate occasions. These observations were made at times when the teachers had started teaching new topics. Even though permission had been sought for the observation the researcher deliberately dropped in at those occasions without prior notice based on their time of lessons as indicated on their time table. The number of teachers observed in each college is represented in Table 3.1 below.

Table 3.1 Administration of research instruments.

Teacher Training Institution	Number of questionnaire presented	Number of participants observed
Wesley College of Education	55	6
St. Louis College of Education	43	5
Cambridge College of Education	17	2
Total	**115**	**13**

Source: Author's construct (2016)

3.8 Validity

In employing the mixed method approach, all the instruments (observation checklist and questionnaire) were reviewed by my supervisor and in ensuring internal consistency of the questionnaire instrument. Research validity refers to the researcher's objectivity in actually measuring what was supposed to be measured and not something else (Burns & Grove 1997). The following steps were taken in order to ensure the validity of the data. The questionnaire

was based on information obtained from literature review. This was to ensure that it was from a representation of elements from the topic under discussion (Polit & Hunger, 1993). For reliability compliance, a pilot testing of the questionnaire on different teacher training institutions outside the study area was conducted. To validate the qualitative data obtained from the observation, the researcher observed the participants from a far distance since according to Cohen, Manion and Morrison, (2007), the presence of the observer in conducting observation might bring about different of the observed participants. Subsequently, to increase the validity of the observation, a pilot observation was done. This was done to ensure that the observational variables themselves were appropriate, exhaustive, discrete, unambiguous and effectively operationalise the purposes of the research (Cohen, Manion & Morrison, 2007).

In all the researcher administered 115 questionnaires of which 107 were successfully retrieved from participants of the study.

3.9 Data Analysis

Research Question One: *What are the College of Education Teachers' ICTs Self Efficacy beliefs in teaching?*

Frequencies and percentages were used to assess the ICTs self-efficacy beliefs of Colleges of Education Teachers in teaching using ten questions on a five-point Likert scale ranging from SA=Strongly Agree to SD=Strongly Disagree. Frequencies and percentages were used in the analysis of this research question.

Research Question Two: What are the College of Education Teachers' actual use of ICTs in teaching?

In ascertaining the actual use of ICTs among colleges of education teachers ten variables were used on a five-point Likert scale ranging from SA= strongly agree to SD= strongly disagree.

With this scale the researcher used frequencies combined with percentages to conduct the analysis.

Further, observational analysis was conducted to validate the quantitative results obtained through the questionnaire administration. The observation checklist (Appendix B) was in the form of a Likert-type scale. It had five dimensions namely; never (0%), rarely (less than 50%), sometimes (50%), often (75%) and always (100%).

Research Question Three: How does ICTs self-efficacy beliefs of teachers at the colleges of education relate to their actual use in teaching.

Correlational analysis was conducted to identify how ICTs self-efficacy beliefs of teachers affect their actual use in teaching using the Spearman's correlation coefficient. Again, a scatterplot of the overall ICTs self-efficacy belief was plotted against the overall actual use of ICTs. The Spearman's rho correlation coefficient was used because it was the most appropriate for the variables under consideration since the variables were ordinal in nature (Cohen, Manion & Morrison, 2007).

Research Question Four: Effect of teaching experience and self-efficacy beliefs held by teachers.

A one-way ANOVA was carried out to determine the differences in teachers' self-efficacy beliefs based on their teaching experience. Overall means were calculated for the three groups of teaching experience (1-5, 6-10 and above 10) to determine the kind of relationship that exists between experience and self-efficacy beliefs held by teachers. In conducting the Anova statistics, teacher experience was used as independent variable whilst ICTs self-efficacy was used as dependent variable.

3.10 Ethical Considerations

A major ethical concern for researchers in their line of duty is that which requires them to strike a balance between the demands placed on them as professional scientists in pursuit of truth and their subjects' rights and values potentially threatened by the research (Cohen, Manion and Morrison, 2007). Written permission to conduct the study was sought from the Department of Educational Leadership, University of Education, which was provided to the heads of institutions selected for the study. The respondents were informed of their rights to voluntarily participate or decline. They were informed about the purpose of the study and were assured of not reporting any aspect of the information they provided in a way that will identify them. They were again assured that there were no potential risks involved in the process.

3.11 Summary

This chapter outlines and discusses the methodology that was used in the conduct of this study. The chapter discussed the population, the sample, instruments, and the pilot study. A description of data collection procedures and data analysis is also presented under this section. In this study, 115 questionnaires were presented of which 107 were successfully retrieved. From the pilot study conducted, a Cronbach alpha value of .938 was generated for the reliability of the study. The validity of the research instruments was duly ensured. The researcher analysed the responses from the respondents using SPSS version 21.0. The SPSS software was used for the data analysis because it was user friendly and did most of the analysis of the quantitative data for the researcher. The data entries were done by the researcher in order to check the accuracy of the data. Data was cleaned before running any analysis. Cleaning the data helped the researcher to get rid of errors that could result from coding, recording, missing information, influential cases or outliers. The findings obtained from the application of these methods are discussed in Chapter Four.

CHAPTER FOUR

PRESENTATION OF RESULTS

4.1 Introduction

This study set out to uncover the ICTs self-efficacy beliefs of teachers in the colleges of education in Kumasi metropolis and their actual use of ICTs. This section of the study presents the results emanating from the data collected from the field survey. Descriptive statistical tools such as frequencies, percentages, means and standard deviations were used for the data presentation. Frequency distribution tables were used to illustrate the outcomes of the data collected. The study also made use of inferential statistics such as Anova and correlational presentation. The presentation of the data were guided by the objectives of this study in the design of the questionnaires administered on the field.

This chapter consists of five (5) sections. The first section talks about the demographic characteristics of the respondents for this study. The second section presents teachers' ICTs self-efficacy beliefs in teaching. The third section talks about the actual use of ICTs among teachers whilst the fourth part talks about the relation between self-efficacy beliefs of teachers and their actual use in teaching. The last section talks about the impact of teaching experience on ICTs actual use among teachers.

The total number of questionnaires distributed to the respondents were 115. Out of this total number 55 questionnaires were administered at Wesley College of Education, 43 questionnaires were administered at St. Louis College of Education and finally 17 questionnaires were also administered at Cambridge College of Education.

In all, 107 were successfully retrieved from the respondents which represents 93% of response rate of questionnaires retrieved.

4.2 Demography of Respondents

The demographic background information was meant to give the researcher an understanding of the profiles of the participants and also establish the suitability of the respondents for the study. This also provided a basis for further discussions. The questionnaire presented to respondents sought the details about their gender, age groups, educational qualification, years of teaching experience and type of institution for analytical purposes in this study. The results obtained are presented in a frequency distribution in Table 4.1.

Table 4.1 Socio-demographic information of respondents

Variables	Frequency (*f*)	Percentage (%)
Gender		
Male	63	58.9
Female	44	41.1
Total	107	100.0
Highest Educational Qualification		
Certificate	-	-
Diploma	1	0.9
Bachelors	19	17.9
Masters	86	80.2
Other	1	0.9
Total	107	100
Teaching Experience (Number of years taught)		
1 – 5 years	11	10.3
6 – 10 years	23	21.5
Above 10 years	73	68.2
Total	107	100.0
Type of Institution		
Public	97	90.7
Private	10	9.3
Total	107	100.0

Source: Researcher's field work (2016).

The demographic information presented in Table 4.1 as per the gender distribution indicates that a majority of 58.9% were males whilst 41.1% females.

The highest educational qualification of respondents yielded the following results. No teacher was reported to have ordinary certificate as their highest educational qualification whilst only one teacher which translates to 0.9% held Diploma as their highest educational qualification.

From the data, it is seen that 19(17.9%) respondents held Bachelor's degree as their highest educational qualification. Majority of the respondents, 85(80.2%) however possessed Masters' degree as their highest qualification with one respondent reporting to have other qualification which was resolved upon enquiry to be a PhD.

Teachers' teaching experience expressed in number of years was also surveyed and presented. The data as presented in the table shows that majority of teachers 73(68.2%) have taught for 11years and above with 23(21.5%) possessing teaching experience of 6–10years. Similarly, 11 respondents representing (10.3%) had taught for between 1–5years. Again, from the data presented, 97 (90.7%) of respondents taught in public institutions whilst 10 (9.3%) taught in private schools. This goes to indicate the fact that the number of public colleges of education in the Kumasi metropolis outnumber their private counterparts.

4.2 Research Question One: What are the Colleges of Education Teachers' ICTs self-Efficacy Beliefs in Teaching?

The college of Education teachers were asked to indicate their ICTs self-efficacy beliefs in teaching using a five-point Likert scale ranging from Strongly Disagree (SD = 1) to Strongly Agree (SA = 5). Frequency distribution and percentages were used in analysing the variables presented under this research question. Based on this, the total averages were used to ascertain the College of Education teachers' self-efficacy beliefs in teaching. The result is presented in Table 4.2.

Table 4.2 Descriptive statistics of teachers' self-efficacy rating on the use of ICTs in teaching

Variables	SD *Freq.(%)*	D *Freq.(%)*	N *Freq.(%)*	A *Freq.(%)*	SA *Freq.(%)*	SD (σ)
I can use PowerPoint presentations for classroom delivery	15(14%)	21(19.6%)	19(17.4%)	23(21.1%)	29(26.6%)	1.413
I can engage students in using the computer to make meaning of content	16(15%)	21(19.6%)	25(23.4%)	25(23.4%)	20(18.7%)	1.334
I can use LCD projector to present lessons	17(16%)	17(16%)	14(13.2%)	29(27.4%)	29(27.4%)	1.440
I can use available ICTs in collaborative activities	13(12.1%)	19(17.8%)	32(29.9%)	24(22.4%)	19(17.8%)	1.260
I can encourage students to think critically using ICTs	13(12.1%)	23(21.5%)	30(28%)	24(22.4%)	17(15.9%)	1.252
I can portray ICTs as learning aids and not objects of instruction	16(15%)	24(22.4%)	28(26.2%)	17(15.9%)	21(19.6%)	1.373
I can retain students' attention using ICTs	14(13.2%)	23(21.7%)	26(24.5%)	24(22.6%)	19(17.9%)	1.301
I can implement teaching methods using ICTs	15(14.2%)	22(20.8%)	24(22.6%)	23(21.7%)	22(20.8%)	1.348
I can evaluate lessons using ICTs	12(11.3%)	35(33.0%)	22(20.8%)	22(20.8%)	15(14.2%)	1.252
I can use PDAs as alternative to ICTs	12(11.2%)	14(13.1%)	16(15.0%)	32(29.9%)	33(30.8%)	1.347
Average Total	14.3(13.41%)	21.9(20.55%)	23.6(22.1%)	24.3(22.76%)	22.4(20.97%)	1.33

Source: Author's field survey, 2016

Key: SD = Strongly Disagree, D = Disagree, N = Neutral, A = Agree, SA = Strongly Agree.

From Table 4.2, majority of respondents 52(47.7%) strongly agreed and agreed that they can use PowerPoint presentations for classroom delivery as against 36(33.6%) who strongly disagreed and disagreed to the same variable whilst 19(17.4%) remained neutral.

Again, looking at the table, a majority of 58 respondents representing 54.8% strongly agreed and agreed that they can use LCD projector to present lessons whilst only 34 respondents representing 32% strongly disagreed and disagreed. Only 14 respondents which represents 13.2% were not sure of their self-efficacy in this regard and therefore remained neutral.

Also, Table 4.2 shows that 45(42.5%) respondents were in agreement to the assertion that they can implement teaching methods using ICTs as compared to 37(35%) respondents who

disagreed. It is further seen that a significant number of 24(22.6%) respondents opted to remain neutral to this variable.

A further look at Table 4.2 reveals that 65(60.7%) respondents responded affirmatively to the statement that they can use PDAs as alternatives to ICTs whilst only 26(24.3%) disagreed. To this variable too, 16(15%) respondents were neutral.

A similar trend is observed from the table which is confirmed by the average totals computed. A look at the average totals from the table showed that a majority of 46.7(43.6%) strongly agreed and agreed to the self-efficacy variables presented to them whilst 36.2(33.96%) strongly disagreed and disagreed with only 23.6(22.1%) remaining neutral to these self-efficacy variables.

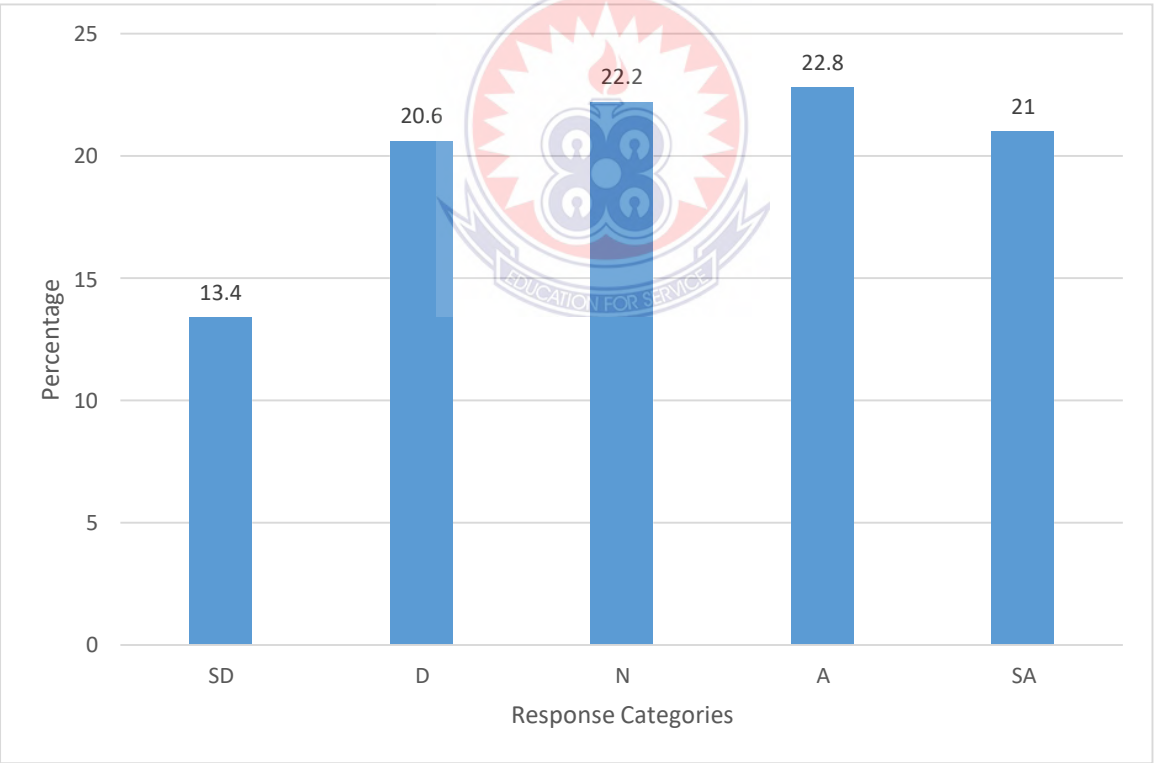

Figure 4.1 Bar graph showing level of agreement and disagreement of teachers' ICTs self-efficacy beliefs.

A cursory look at Figure 4.1 indicates that the agreement categories of teachers' ICTs self-efficacy beliefs were slightly higher than the disagreement categories but do not significantly overweigh them. This is further indication that the respondents remained neutral in reporting their ICTs self-efficacy beliefs. Therefore, it can be concluded that respondents were not certain of their ICTs self-efficacy beliefs.

4.3 Research Question Two: What is the level of ICTs actual use in teaching among college of education teachers?

In Table 4.3, teachers' actual use of ICTs in teaching was rated on a 5-point scale. This was done in a bid to determine the reported actual use of ICTs of teachers in teaching. The College of Education teachers were asked to rate their actual use of ICTs in teaching using a five point scale which ranged from Strongly Disagree (1) to Strongly Agree (5). For the purposes of analysis the researcher condensed the strongly agree and agree categories and also strongly disagree and disagree.

Table 4.3 Teachers' rating of their actual use of ICTs in teaching

Variables	SD	D	N	A	SA	Mean	SD
	Freq.(%)	*Freq.(%)*	*Freq.(%)*	*Freq.(%)*	*Freq.(%)*	($\bar{x}$)	(σ)
I use PowerPoint presentations for classroom delivery	47(43.9%)	28(26.2%)	7(6.5%)	12(11.2%)	13(12.1%)	2.21	1.421
I engage students in using the computer to make meaning of content	43(40.2%)	19(17.8%)	12(11.21%)	22(20.6%)	11(10.3%)	2.43	1.448
I use LCD projector to present lessons	50(46.7%)	21(19.6%)	10(9.3%)	17(15.9%)	9(8.4%)	2.20	1.390
I use available ICTs in collaborative activities	38(35.8%)	22(20.8%)	13(12.3%)	22(20.8%)	11(10.4%)	2.49	1.423
I encourage students to think critically using ICTs	37(34.6%)	16(15.0%)	15(14.0%)	27(25.2%)	12(11.2%)	2.64	1.456
I portray ICTs as learning aids and not objects of instruction	36(33.6%)	21(19.6%)	16(15.0%)	22(20.6%)	12(11.2%)	2.56	1.422
I retain students' attention using ICTs	37(34.6%)	23(21.5%)	15(14.0%)	18(16.8%)	14(13.1%)	2.52	1.443
I implement teaching methods using ICTs	42(39.3%)	23(21.5%)	12(11.2%)	18(16.4%)	12(11.2%)	2.39	1.432
I evaluate lessons using ICTs	44(41.1%)	26(24.3%)	11(10.3%)	14(13.1%)	12(11.2%)	2.29	1.408
I use PDAs as alternative to ICTs	23(21.7%)	13(12.3%)	8(7.6%)	31(29.2%)	31(29.2%)	3.32	1.540
Average Total	39.7(37.17%)	21.2(19.85%)	11.9(11.14%)	20.3(19%)	13.7(12.83%)	2.51	1.44

Source: Author's field survey, 2016

Key: SD = Strongly Disagree, D = Disagree, N = Neutral, A = Agree, SA = Strongly Agree.

A close examination of the data reported in Table 4.3 reveals that teachers consistently reported that they did not use ICTs in their teaching. The combined categories of 'strongly disagree' and 'disagree' of the variables yielded higher response values compared with the combined categories of 'strongly agree' and 'agree' which recorded consistently low responses.

From the table, the variable 'I use PowerPoint presentations for classroom delivery' received 75(70.1%) responses for strongly disagree and disagree whilst only 25(23.3%) strongly agreed and agreed. A relatively small proportion 7(6.5%) of respondents were however neutral to this variable.

It is also seen from the table that, 62(58%) strongly disagreed and disagreed that they do not engage students in using the computer to make meaning of content as against 33(30.9%) who strongly agreed and agreed to this statement. The table shows that 12(11.21%) of respondents however opted to remain neutral to this variable.

With regards to the variable, I use LCD projector to present lessons, a majority of 71(66.3%) respondents strongly disagreed and disagreed whilst 26(24.3%) strongly agreed and agreed that they use LCD projector to present lessons with 17(15.9%) remaining neutral.

Furthermore, 70 respondents representing 65.4% strongly disagreed and disagreed that they evaluate lessons using ICTs as against 26 respondents representing 24.3% who strongly agreed and disagreed to the variable.

A further look at the average totals lend evidence to the above presentation since a combined percentage of 57.02% with a corresponding average frequency of 60.9 strongly disagreed and disagreed that they do not actually use ICTs in their lesson delivery as against 31.83% which corresponds to an average frequency of 34% who strongly agreed and agreed that they used ICTs in their teaching.

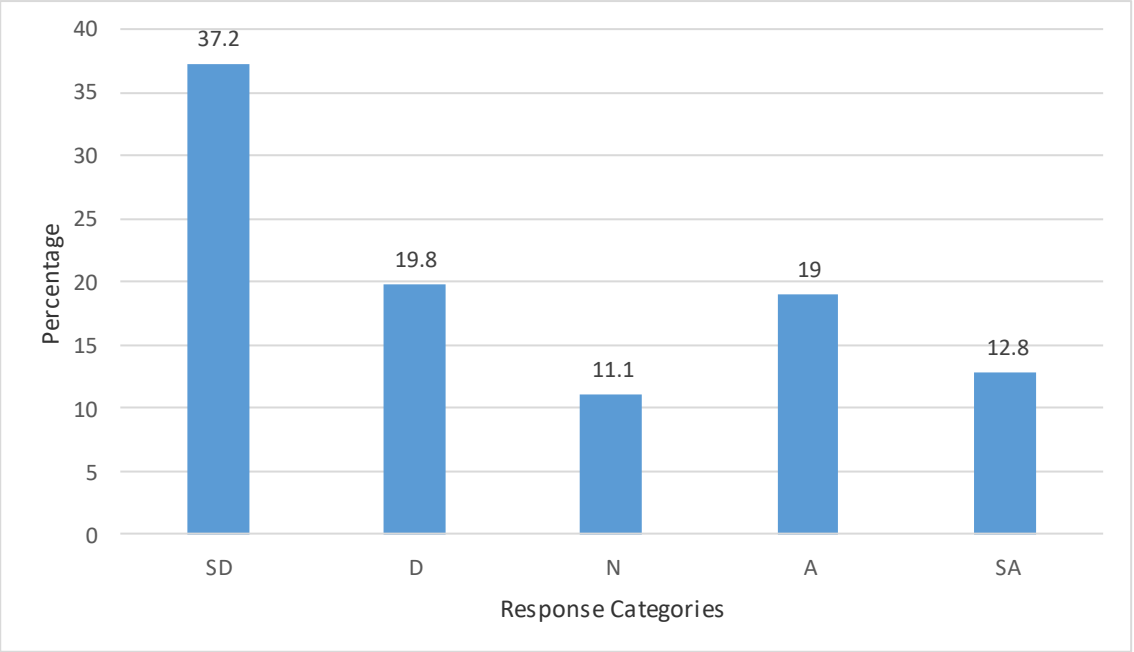

Figure 4.2 Bar graph showing agreement and disagreement levels of teachers' actual use of ICTs in teaching.

A look at Figure 4.2 indicates that the disagreement categories of teachers' actual use of ICTs were higher than the agreement categories. To corroborate the results obtained from the questionnaire administration, observation was carried out by the researcher. The result of the observation as presented below.

4.3.1 Report on Observation Data

i. Teachers Use of PowerPoint Presentation

During a visit to the various school where the study was carried out, it was observed that Out the thirteen (13) teachers, ten (10) never used PowerPoint presentation during teaching whereas only three (3) rarely used PowerPoint presentation in teaching. These recorded teachers who used the PowerPoint presentation were even ICT teachers. These teachers used it as a presentation tool to enhance lesson delivery and were also portrayed as teaching aids by incorporating multimedia in order to increase comprehension and retention.

ii. Teachers Use of Computers

During the observation, the researcher observed only five (5) teachers sometimes used the computer to teach. Three (3) out of the five (5) teachers were those ICT teachers who used it for PowerPoint presentation whereas the other two (2) teachers used it for other application e.g (MSWord). The remaining eight (8) teachers never used the computer when teaching at all.

iii. Teachers use of LCD (Liquid Crystal Display) Projector

In the use of LCD projectors, it was observed that ten (10) teachers never used it to present lessons whereas only the three (3) ICT teachers as reported earlier rarely used it to project PowerPoint presentation.

iv. Teachers use of PDAs(Personal Digital Assistants)

In the use of PDAs, it was observed that among all the tools observed, PDAs happened to record the highest number of usage. Thus, five (5) teachers were rarely observed to be using PDAs during teaching. They basically used smartphones, iPads and tablets as reference tools where important points in lessons were referred to during teaching.

v. Teachers use of Internet

Surprisingly, the researcher observed that none of the thirteen (13) teachers observed used internet during teaching.

Summary of Observation Report

In summary majority of the COE teachers never used ICTs such as PowerPoint, Computer LCD Projector, PDAs and Internet in teaching. On the other hand, few rarely used Powerpoint, Computer, LCD projectors and PDAs in their teaching. These few teachers happens to be ICT teachers and their usage in classroom was credible. Never the less, only five (5) teachers sometimes use PDAs such as smartphone, ipad and tablets to facilitate teaching. The observation result is presented in table 4.4 below.

Table 4.4 Observation checklist recording COE teachers' use of ICTs in Teaching

No.	Use of ICTs tools in teaching	1 Never	2 Rarely	3 Sometimes	4 Often	5 Always
1.	The use PowerPoint Presentation	-	√	-	-	-
2.	The use of Computer	-	-	√	-	-
3.	The use of LCD Projector	-	√	-	-	-
4.	The PDAs in teaching	-	-	√	-	-
5.	The use of Internet	-	-	-	-	-

Source: Author's construct (2016)

4.4 Research Question Three: How does ICTs Self-Efficacy beliefs of teachers at the Colleges of Education relate to their Actual Use in Teaching

The relationship between teachers' self-efficacy beliefs in ICT and their actual use of ICTs were correlated using the Spearman rho correlation coefficient. The Spearman's rho correlation coefficient was used because it was the most appropriate for the variables under consideration since the variables under consideration were ordinal variables (Cohen & Holliday, 1996 as cited in Cohen, Manion & Morrison, 2007).

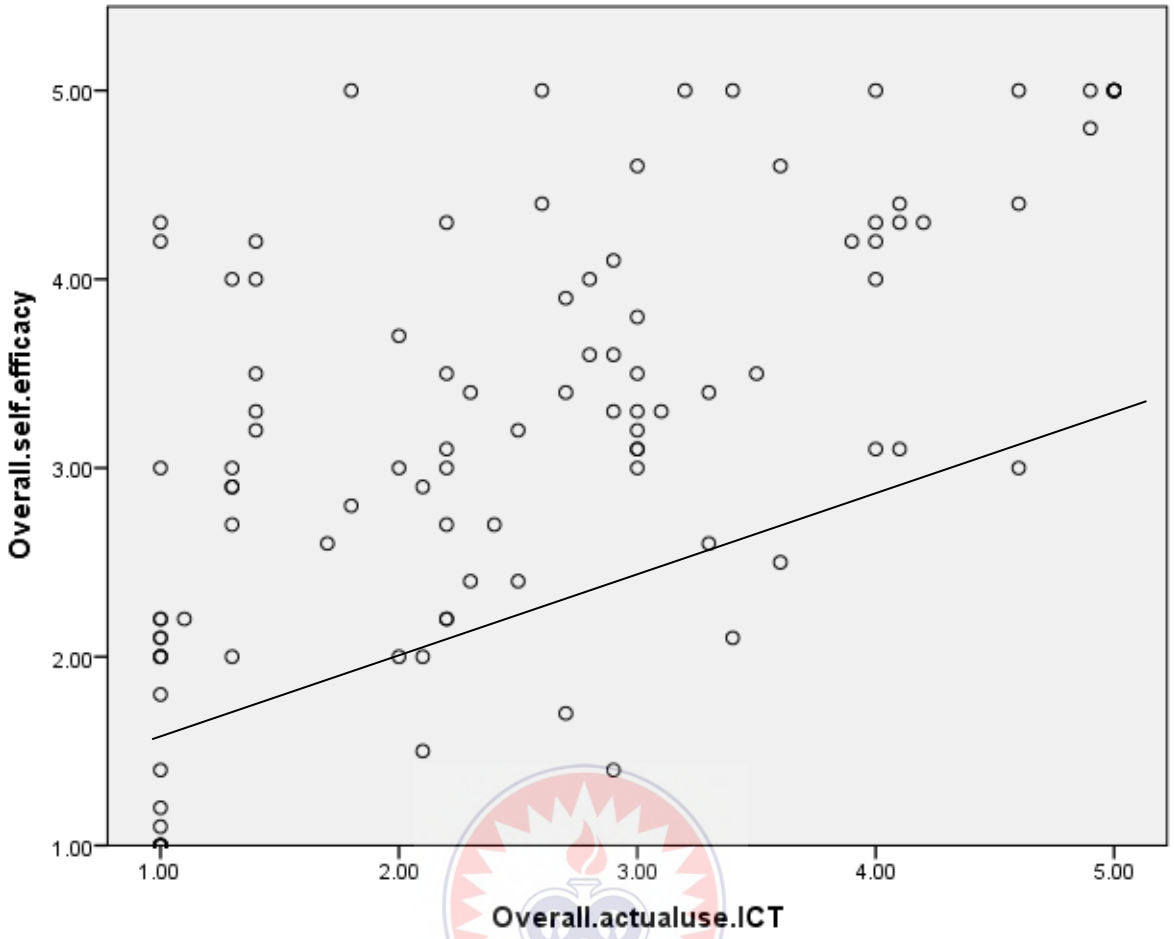

Figure 4.3 Scatterplot showing correlation between teachers' ICTs self-efficacy and teachers ICTs actual use.

A close-up examination of Figure 4.3 reveals that the correlation existing between teachers' ICTs self-efficacy and their actual use of ICTs is moderate owing to the relative scattered nature of the variables on the plot. From the diagram, a line of best-fit can be drawn to pass through few dots on the plot which indicates a positive linear correlation. As has been explained earlier, this indicates that as teachers' ICTs self-efficacies go up, a small increase is observed in their actual use of ICTs.

Table 4.5 Correlation matrix for self-efficacy variables against actual use of ICTs variables.

			Overall self-efficacy	Overall actual use of ICT
Spearman's rho	Overall ICTs self-efficacy	Correlation Coefficient	1	.666**
		Sig. (2-tailed)	.	.000
		N	107	101
	Overall ICTs actual use	Correlation Coefficient	.666**	1
		Sig. (2-tailed)	.000	.
		N	107	105

**. Correlation is significant at the 0.01 level (2-tailed).

Source: Author's field survey, 2016

To examine the relationship between teachers' self-efficacy beliefs and their actual use of ICTs in the classroom, a correlation matrix was plotted for the overall self-efficacy belief variables against the overall actual use of ICTs variables.

Table 4.5 presents the correlation matrix for the self-efficacy variables against actual use of ICTs in teaching. The table made use of the Spearman's rho correlation coefficients of variables under study and their associated significance levels. The correlation coefficient from the table was presented as ($r=0.666$, $p<0.000$) indicate that there exists a positive correlation between teachers' self-efficacy beliefs in ICT and their actual use of ICTs in classroom instruction delivery. This implies that, there is a relationship between the self-efficacy of teachers and their actual use of ICTs in teaching.

4.5 Research Question 4: Relationship between Teaching Experience and the Self-Efficacy Beliefs Held by Teachers

To investigate the extent to which the teaching experience of teachers in this study affected their self-efficacy beliefs, the researcher conducted a one-way analysis of variance (ANOVA) test using the self-efficacy variables as dependent variables and teaching experience as independent variable. This is presented in Tables 4.6 and 4.7.

Table 4.6 One-way ANOVA of ICTs self-efficacy beliefs and teaching experience

Variables	Teaching Experience (in years)						Total mean
	1 – 5 (N)		6 – 10 (N)		Above 10 (N)		
I can use PowerPoint presentations for classroom delivery	3.45	11	3.83	23	3.08	73	3.28
I can engage students in using the computer to make meaning of content	3.55	11	3.43	23	2.95	73	3.11
I can use projector to present lessons	3.64	11	3.57	24	3.22	72	3.34
I can use available ICTs in collaborative activities	3.55	11	3.48	23	3.00	73	3.16
I can encourage students to think critically using ICTs	3.73	11	3.35	23	2.90	73	3.08
I can portray ICTs as learning aids and not objects of instruction	3.64	11	3.35	23	4.15	73	3.93
I can retain students' attention using ICTs	3.73	10	3.26	23	2.96	73	3.10
I can implement teaching methods using ICTs	3.73	11	3.14	22	3.05	74	3.14
I can evaluate lessons using ICTs	3.80	11	2.87	22	2.84	73	2.93
I can use PDAs as alternative to ICTs	4.45	11	3.87	23	3.33	73	3.56
Overall Means	3.73	109	3.42	229	3.15	740	3.26

Source: Author's field survey, 2016

A detailed look at Tables 4.6 and 4.7 reveal that there was no significant effect of teaching experience on the ICTs self-efficacy beliefs of teachers even though the teaching experience of teachers affect their ICT self-efficacy beliefs. The overall mean values for the different groups of the teaching experience of teachers show a decrease in self-efficacy beliefs when teachers' years of experience increase. The table shows that teachers with 1 – 5 years of experience had a mean of 3.73, whilst those of 6 – 10years experience had 3.42 and teachers with experience of more than 10years had 3.15 mean score. The F-test showed that the differences in the self-efficacy of College of Education teachers with respect to their years of experience was not significant at 10% level (F-value=1.673, p=0.178).

Table 4.7 ANOVA descriptive of Overall self-efficacy of teachers

Variables	Teaching Experience			Total Mean	F-value	Sig.
	1 – 5	6 – 10	Above 10			
Overall Self Efficacy of teachers	3.75(10)	3.43(22)	3.01(71)	3.17(103)	1.673	0.178

Source: Author's computations (2016)

Table 4.6 presents the ANOVA description of overall self-efficacy of ICT teachers in the Colleges of Education.

4.6 Summary

This chapter reports the results from the study. The researcher administered 115 questionnaires of which 107 were successfully retrieved from participants of the study. From the data obtained, it was revealed that majority of 43.6% of teachers at the colleges of education responded affirmatively in their ability to use ICTs to deliver lessons as against 33.9% who did not. However they did not actually use them in their lessons. Again, it was seen that the ICTs self-efficacy beliefs held by teachers did not significantly impact their use of such in the classrooms. The researcher further investigated the extent to which the years of teachers' teaching experience had an effect on their ICTs self-efficacy beliefs. It was found out that teaching experience has no significant effect on college of education teachers' self-efficacy beliefs in ICTs integration.

CHAPTER FIVE

DISCUSSION OF RESULTS

5.1 Introduction

This study was conducted to find the ICTs self-efficacy of teachers of colleges of education in the Kumasi Metropolis and their actual ICT usage. This chapter discusses the findings of the study relative to Research Question One; what are the colleges of education teachers' ICTs self-efficacy beliefs in teaching?, Research Question Two; what is the level of ICTs actual use in teaching among college of education teachers?, Research Question Three; To what extent do ICTs self-efficacy beliefs of teachers at the Colleges of Education relate to their actual use in teaching and Research Question Four; To what extent does Colleges of Education teachers' teaching experience affect their ICTs self-efficacy beliefs in teaching? The findings of the study as obtained from the data collected is presented and explained below:

5.2 Discussion of Findings

Research Question One

The aim of research question one was to find out the ICTs self-efficacy beliefs of teachers teaching in the colleges of education in Kumasi. In order to achieve this objective, the researcher presented a 10-item Likert scale questionnaire items structured around beliefs in the use of ICTs in presenting lessons.

The results of the descriptive analysis showed that the average total frequencies and percentage values for the self-efficacy variables was 46.7(43.6%) in agreement whilst that of disagreement was 36.2(33.9%). This indicates that even though in comparison, majority of respondents responded in agreement to the variables, it was below 50% indicating that respondents' ICT self-efficacy beliefs in teaching was at the neutral level.

In effect, this means that respondents' perception of their ICTs self-efficacy was inconclusive. This outcome is probably due to the fact that teachers were not given pedagogical training in the use of ICTs and as such they were not confident enough to report positive self-efficacy. This is however at variance with research findings reported by Suleyman (2007) on teachers' perception of their computer self-efficacy which found teachers' self-efficacy to be high. His study found a high self-efficacy value of 74%. Further research evidence supports this finding that people actually report high self-efficacy beliefs in technology usage (Delcourt & Kinzie, 1993). This is at variance with the findings from this study. Self-efficacy is a critical determinant of the self-regulatory practices in which individuals engage as they go about the important task of self-correcting their actions and cognitions.

In response to research question one, teachers' ICTs self-efficacy levels was less than 50% indicating respondents' ICTs self-efficacy levels. In contrary to this, Taylor (2011) in his study found that majority (76.5%) of teachers hold a positive self-efficacy belief about computer integration and are likely to integrate computer use in their classes.

Research Question Two

This research question aimed at assessing the actual use of ICTs among teachers of colleges of education in the Kumasi Metropolis. In assessing Research Question Two, frequency distribution and percentages were used. As a means of confirming the results obtained through the questionnaire, the researcher conducted an observational inquiry. These were also analysed and presented.

The average totals from the analysis showed that a combined percentage of 57% of respondents responded negatively to using ICTs in their teaching whilst only 34% responded in the affirmative. This clearly shows that more than half of the respondents did not use ICTs in their teaching.

This finding corroborates that of Beaudin (1999) in investigating into computer self-efficacy and classroom practice among selected schools in southern Alberta. The research found that those teachers with high levels of Computer Self-Efficacy do not necessarily teach using computers. Even though teachers were found to be computer literate (as illustrated by a high CSE score) but it was further found out that they do not actually use computers in their classroom teaching.

The researcher further used observational inquiry based on a structured observational guide/checklist (see Appendix B) to assess whether teachers actually use the ICTs in their lessons. Even though the intension of the researcher was also to observe how COE teachers used the identified ICT tools in teaching the revelation of the researcher also yielded similar results in the sense that most of the teachers were actually observed not using the ICTs in their lesson delivery. The results of the observation showed that a greater majority of respondents never used ICTs in their teaching. The total average from the observation indicates that majority of teachers observed never used ICTs in their teaching compared with the few who rarely and sometimes used ICTs in their teaching. This is due to the fact that, most of the classrooms where teaching was observed lacked infrastructures such as wall sockets, projector boards, extension boards and displaced wirings.

Thus, the conclusive response to research question two is that teachers did not integrate ICTs in their teaching. This result was found to be consistent with research findings as Selwyn (2003) reported in her study that, technology adoption by teachers has been slow and below expectations in many parts of the world. Even though there were sufficient ICT infrastructure and facilities in the schools, the teachers not actually using them was as a result of their lack of ICT pedagogical training.

This is further supported by Cox et al., (1999) who showed that after teachers had attended professional courses in ICT, they still did not know how to use ICTs in their classroom and hence did not use them in teaching. Instead, they just knew how to run a computer and set up a printer. This they concluded, was because the courses only focused on teachers' acquiring of basic ICT skills and did not often teach teachers how to develop pedagogical aspects of ICT. Again, Balanskat et al., (2006) indicated that inappropriate teacher training is not helping teachers to use ICTs in their classrooms and in preparing lessons.

Research Question Three

Research question three sought to find out the relationship that exists between teachers ICTs self-efficacy beliefs and their actual use ICTs in their teaching. In pursuance of this research objective, the researcher conducted a correlational analysis and presented the overall correlation value for the ICTs self-efficacy variables against the ICTs actual use variables. The correlation value (r=0.66) obtained indicates that there was a positive correlation that exists between the ICTs self-efficacy beliefs held by teachers and their actual use of ICTs in their lesson delivery. This result is widely supported by literature. In the studies of Hakkarainen *et al*., (2001) and Moseley *et al*., (1999), it was found that there was a relationship between teachers' pedagogical conceptions and the type of instructional use of ICT. Teachers with good ICT skills used ICT more, and more often in a student-centered way (Moseley *et al.,* 1999), and they appeared to have adequate pedagogical means for pursuing new pedagogical practices (Hakkarainen *et al.,* 2001). In fact, "what we know, the skills we possess, or what we have previously accomplished are not always good predictors of subsequent attainments because the beliefs we hold about our capabilities powerfully influence the way we behave" (Madewell and Shaughnessy, 2003, p. 97). Other studies conducted into the relationship between ICTs self-efficacy and ICTs actual use provided initial evidence that self-efficacy has an important

influence on individual reactions to technologies (Compeau & Higgins, 1995). Other researchers (Gist *et al.,* 1989; Webster & Martocchio, 1993) found evidence of a relationship between self-efficacy with respect to using technologies and a variety of ICT- related behaviors such as registration in courses at universities (Hill et al., 1987), adoption of high technology products (Hill *et al.,* 1986), and technology innovations (Burkhardt & Brass, 1990).

From the foregoing, the conclusive answer to research question three is that teachers' ICTs self-efficacy beliefs is positively related to their ICTs actual use in teaching. In this study therefore, teachers' ICTs self-efficacy was found to be neutral or inconclusive and hence translated into their non-usage of ICTs in their teaching. This result is a true reflection of actual happenings on the grounds since respondents reported a neutral self-efficacy beliefs which correlated with their actual non-usage of ICTs in teaching.

Research Question Four

This research question explored the possible effect of teachers' teaching experience on their ICTs self-efficacy beliefs they hold in teaching. This research objective was analysed by using Anova statistics which compared the group means for the three year groups of teaching experience and the ICTs self-efficacy variables. From the analysis conducted, it was observed that the lower the years of teaching experience, the higher the ICTs self-efficacy beliefs held.

There was an inverse relationship between teachers' years of experience and their self-efficacy beliefs held. As Ozcelik and Kurt (2007) found in their study, teachers with less experience (0 – 5 years) reported higher computer self-efficacies than the others. In their study, the difference between technological self-efficacy of teachers and their professional experience was statistically significant. The relation between technology self-efficacy of teachers with

experience of 1-5 years and the ones having experience over 10 years was in favor of the teachers with experience of 1-5 years. Such a case shows that the technology self-efficacy of teachers with less experience was at a better level compared to the ones with more experience. In this study, the significance values reported in the Anova statistics show that these associations are not significant. Several research report variable findings as regards the relationship between teaching experience and ICTs self-efficacy beliefs. For example, Willoughby *et al.,* (2008) found a huge significant relationship between teaching experience of teachers and their self-efficacy beliefs in ICTs which is also corroborated by Abu-Obaideh *et al.,* (2012). However, Inan and Lowther (2009) reported that teachers' years of teaching experience affect their use of ICTs in a negative manner. According to Ross, Cousins and Gadalla, (1996), increased experience as a teacher is associated with higher levels of ICTs self-efficacy, an observation supported by Wolters and Daugherty (2007). In their study, Wolters and Daugherty (2007) found that teachers with additional years of experience felt more confident in their ability to employ instructional tools and assessment practices which include ICTs that would benefit their students more.

From the findings of the study in relation to research question four, the definite answer provided is that teachers' teaching experience have a negative impact on their ICTs self-efficacy beliefs. This in effect means that as teachers' years of experience increase, a drop in their ICTs self-efficacy beliefs is reported and vice versa. This finding could be attributed to the phenomenon of 'digital generations' as described by Prensky (2001). According to him, the younger generation which corresponds to the youth are digital natives because they have had an increased exposure to technology which has changed the way they interact and respond to technology use making them more efficacious in the use of ICTs in teaching. On the other hand, the older generation is referred to as digital immigrants who find it difficult to integrate

technology into their lifestyle. With technology moving so fast, it is hard for digital immigrants to keep up with technology as such resulting in low ICTs self-efficacy.

5.3 Summary

This chapter presented a discussion of the research findings obtained from the study. The analysis revealed that respondents reported a neutral self-efficacy belief which reflects a weak confidence in holding such beliefs. According to the results, teachers of colleges of education do not actually use ICTs in their teaching. There exists a positive correlation between teachers' self-efficacy beliefs in ICT and their actual use in their teaching. This implies that teachers reporting to have neutral self-efficacy in ICTs translates into them not actually using the ICTS in teaching. There is no significant link between teachers' teaching experience and their ICTs self-efficacy beliefs. Observed means suggest that the lower the years of experience, teachers' ICTs self-efficacy increases. On the other hand ANOVA statistics and p-values generated give no evidence of significant association between these two variables.

CHAPTER SIX

SUMMARY, CONCLUSION AND RECOMMENDATIONS

6.0 Introduction

This chapter is the concluding part of the study which presents the summary of findings (6.1), conclusions (6.2), recommendations (6.3) and suggestions for further studies (6.4). Findings of the study are presented in accordance with the research objectives.

6.1 Summary of Findings

This study was designed to investigate the ICTs self-efficacy beliefs of teachers, the actual use of ICTs, the relationship between teachers' self-efficacy beliefs and their actual use, and the possible relationships between teaching experience of teachers and their self-efficacy beliefs. Questionnaires were distributed to one hundred and fifteen (115) respondents selected for this study from three college of education in Kumasi. Out of this 107 were successfully retrieved. Thirteen (13) participants were observed for qualitative data to back the data obtained from research question two. The data was analysed using descriptive statistics such frequencies and percentages, and correlation analysis using Spearman's product moment correlation. Several findings were arrived at after analysis of the data collected through questionnaire administration. These findings are presented in a summarised form as follows:

6.1.1 Level of Teachers' self-efficacy beliefs in the use of ICTs in Teaching

From the results obtained, it was found that most teachers reported a neutral self-efficacy belief in ICTs. From the results, even though in comparison, majority of respondents reported high ICTs self-efficacy percentage, it was below 50% indicating that respondents' ICT self-efficacy beliefs in teaching was at the neutral level. This shows that respondents were not certain in reporting their self-efficacy beliefs.

6.1.2 Teachers' Actual Use of ICTs in Teaching

To access the actual use of ICTs in teaching among respondents, the researcher presented a 5-point Likert scale type questionnaires. To obtain supporting evidence to back what was obtained through the questionnaire, an observational inquiry was also conducted. From the analysis, it was revealed most of the respondents do not actually use ICTs in teaching which was backed by results from observational inquiry.

6.1.3 The relationship between teachers' self-efficacy beliefs and actual use of ICTs in teaching

To assess the relationship between teachers' ICTs self-efficacy beliefs and their actual use of ICTs in teaching, the researcher conducted correlational analysis on the respective variables. The correlational analysis brought to the fore that there exists a positive correlation between teachers' self-efficacy beliefs in ICT and their actual use of ICTs in classroom instruction delivery. The implication is that there is a relationship between the self-efficacy of teachers and their actual use of ICTs in teaching however.

6.1.4 Effect of teachers teaching experience on their ICTs self-efficacy beliefs in teaching

To investigate the effect teaching experience of teachers have on their self-efficacy beliefs, the researcher conducted one-way analysis of variance (ANOVA) tests using the self-efficacy variables as dependent variables and teaching experience as independent variable. From the analysis, it came to the fore that teachers' teaching experience has no significant effect on teachers' ICTs self-efficacy beliefs.

6.2 Conclusion

From the findings of the study, the researcher concludes COE teachers were not certain in their ICTs self-efficacy beliefs in teaching .Again, the researcher concludes that COE teachers do not actually use ICTs in teaching. Furthermore from the study, the researcher concludes that COE teacher's uncertainty in reporting to have self-efficacy in ICTs translates into them not actually using the ICTS in teaching. It was additionally concluded that the number of years of experience of teachers do not translate into their actual use of ICTs in teaching.

6.3 Recommendations

From the findings of this study, the researcher wishes to make the following recommendations;

1. Ghana Education Service (GES) should make ICT training an integral part of teacher education.

The researcher recommends that ICTs training should be made an integral aspect in the training of teachers to increase COE tutors' ICTs self- efficacy beliefs in teaching

2. GES should conduct periodic in-service training for teachers on ICTs

The researcher recommends that the Ghana Education service should conduct periodic in-service training in ICTs for COE teachers to develop and boost their capabilities in the use of ICTs in teaching.

3. T-TEL (Transforming Teacher Education and Learning)

As part of the T-tel program offered for COE teachers in effectively involve the use of ICTs in training activities especially for the more experienced teachers. This will ensure that experienced teachers are fully migrated from the traditional ways of teaching to digital methods.

4. The COE authorities should extend ICT infrastructure to the classrooms by providing and repairing wall sockets, projector boards, extension cords and displaced system.

6.4 Suggestions for Further Studies

Further research in the following areas would be beneficial and contribute to the current body of knowledge in this area:

i. The study used subjective, self-reported measures of ICTs self-efficacy and ICTs actual use, hence the results are a measure of how the respondents perceived their own competence and self-efficacy and not an actual demonstration of competence. Thus the researcher suggests that future studies could make use of objective and independent means of collecting the data such as from students' perspective.

ii. This study only focused on teachers, but not the students. Further research could be conducted on the teaching processes using ICTs and how it impacts students' academic performance.

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APPENDIX A

COLLEGES OF EDUCATION TEACHERS' ICT SELF-EFFICACY BELIEFS AND ACTUAL USE IN TEACHING QUESTIONNAIRE

Dear teacher,

This questionnaire is part of a study designed to find out the Colleges of Education Teachers' self-efficacy beliefs and actual use of ICTs in teaching. And I would be grateful to have you participate in the study. Please be informed that your information is voluntary and responses will be treated confidentially and used for only academic purposes.

Thank you very much in anticipation of your co-operation.

Please respond to all questions frankly. Tick the appropriate box [√] for your answer.

A- Personal Information

1. Gender [ ] Male [ ] Female
2. Age [ ] 21-30 [ ] 31-40 [ ] 41-50 [ ] 51-60 [ ] 61 and above
3. Educational Qualification

[ ] Diploma
[ ] Bachelor's
[ ] Master's
Other, specify ……

4. Years of Experience in teaching

[ ] 1-5 [ ] 6-10 [ ] 10 and above

5. Type of Institution

[ ] Public
[ ] Private

6. Subject taught

…….

7. How often do you have access to a computer when you are in school?

[ ] Always
[ ] Sometimes
[ ] Not at all

8. Please indicate (tick) what you use the internet for in teaching.

[ ] Accessing information
[ ] using course site (syllabus, class schedule, assignments, links to readings, on-line class discussion, posting of student work, on-line testing.
[ ] assessing blogsites for information
[ ] providing updates and reminders to students
Others…….

Please answer questions 9-18 using the following scale:

Strongly disagree = 1, Disagree = 2 Neutral = 3, Agree = 4, Strongly Agree = 5

B- Teachers ICTs Self-Efficacy Beliefs Scale

No.	Teachers ICTs Self-Efficacy Beliefs	1	2	3	4	5
9.	I can use PowerPoint Presentations for classroom delivery.					
10.	I can engage students in using the computer to make their own meaning of content during lessons.					
11.	I can use the LCD projector to present lessons					
12.	I can use available ICTs to engage learners in knowledge construction through collaborative activities					
13.	I can encourage students to think critically on a particular subject using ICTs					
14.	I can portray ICTs as learning aids and not objects of Instruction					
15.	I can retain students' attention throughout the lesson using ICTs.					
16.	I can implement teaching methods effectively using ICTs.					
17.	I can evaluate lessons during the teaching process using ICTs.					
18.	I can use PDAs (Ipads, mobile phones, tablet PCs etc.) as alternative to other ICTs during teaching					

Please answer questions 19- 28 using the following scale:
Strongly disagree = 1, Disagree = 2 Neutral = 3, Agree = 4, Strongly Agree = 5

C- Teachers Actual Use of ICTs in Teaching.

No.	Teachers Actual Use of ICTs in Teaching.	1	2	3	4	5
19.	I use PowerPoint Presentations for classroom delivery					
20.	I engage students in using the computer to make their own meaning of content during lessons.					
21.	I use the LCD projector to present lessons					
22.	I use available ICTs to engage learners in knowledge construction through collaborative activities					
23.	I encourage students to think critically on a particular subject using ICTs					
24.	I portray ICTs as learning aids and not objects of instruction					
25.	I retain students' attention throughout the lesson using ICTs.					
26.	I implement teaching methods effectively using ICTs.					
27.	I evaluate lessons during the teaching process using ICTs.					
28.	I use PDAs (Ipads, mobile phones, tablet PCs etc.) as alternative to other ICTs during teaching					

APPENDIX B

COLLEGE OF EDUCATION TEACHERS ACTUAL USE OF ICTS OBSERVATION GUIDE

Classroom Observation Guide

Observation checklist recording COE teachers use of ICTs in teaching

No.	Use of ICTs tools in teaching	1 Never	2 Rarely	3 Sometimes	4 Often	5 Always
1.	The use PowerPoint Presentation	-	√	-	-	-
2.	The use of Computer	-	√	√	-	-
3.	The use of LCD Projector	-	√	√	-	-
4.	The PDAs in teaching	-	√	-	-	-
5.	The use of Internet	-	-	-	-	-

APPENDIX C

SPEARMAN'S RHO CORRELATION COEFFICIENTS OF VARIABLES AND THEIR ASSOCIATED SIGNIFICANT VALUES

Correlation coefficients/ Significance Values	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
9 Coefficient	1.000	.827**	.836**	.702**	.732**	.715**	.742**	.650**	.655**	.512**	.481**	.430**	.462**	.482**	.490**	.524**	.467**	.473**	.440**	.427**
Sig. (2-tailed)		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
10 Coefficient		1.000	.759**	.701**	.787**	.726**	.777**	.667**	.728**	.554**	.476**	.443**	.440**	.537**	.522**	.526**	.518**	.485**	.458**	.464**
Sig. (2-tailed)			.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
11 Coefficient			1.000	.738**	.777**	.742**	.748**	.691**	.680**	.536**	.502**	.464**	.447**	.533**	.527**	.506**	.518**	.491**	.432**	.468**
Sig. (2-tailed)				.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
12 Coefficient				1.000	.800**	.806**	.828**	.747**	.750**	.640**	.434**	.576**	.408**	.579**	.540**	.600**	.583**	.498**	.502**	.464**
Sig. (2-tailed)					.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
13 Coefficient					1.000	.855**	.879**	.792**	.797**	.674**	.420**	.496**	.389**	.552**	.572**	.565**	.529**	.458**	.462**	.536**
14 Coefficient						1.000	.837**	.711**	.748**	.625**	.461**	.531**	.391**	.553**	.553**	.623**	.583**	.488**	.487**	.497**
Sig. (2-tailed)							.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
15 Coefficient							1.000	.862**	.809**	.704**	.483**	.521**	.423**	.574**	.572**	.644**	.589**	.499**	.475**	.497**
Sig. (2-tailed)								.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
16 Coefficient								1.000	.829**	.632**	.389**	.394**	.323**	.454**	.503**	.538**	.434**	.410**	.351**	.407**
Sig. (2-tailed)									.000	.000	.000	.000	.001	.000	.000	.000	.000	.000	.000	.000
17 Coefficient									1.000	.621**	.439**	.470**	.356**	.579**	.563**	.578**	.552**	.475**	.467**	.523**
Sig. (2-tailed)										.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
18 Coefficient										1.000	.221*	.382**	.242*	.405**	.362**	.445**	.445**	.350**	.346**	.549**
Sig. (2-tailed)											.022	.000	.012	.000	.000	.000	.000	.000	.000	.000
19 Coefficient											1.000	.745**	.861**	.746**	.727**	.746**	.757**	.751**	.723**	.395**
Sig. (2-tailed)												.000	.000	.000	.000	.000	.000	.000	.000	.000
20 Coefficient												1.000	.759**	.866**	.774**	.784**	.781**	.729**	.754**	.407**
Sig. (2-tailed)													.000	.000	.000	.000	.000	.000	.000	.000
21 Coefficient													1.000	.722**	.675**	.638**	.758**	.840**	.826**	.426**
Sig. (2-tailed)														.000	.000	.000	.000	.000	.000	.000
22 Coefficient														1.000	.822**	.796**	.824**	.721**	.715**	.529**
Sig. (2-tailed)															.000	.000	.000	.000	.000	.000
23 Coefficient															1.000	.888**	.841**	.785**	.763**	.508**
Sig. (2-tailed)																.000	.000	.000	.000	.000
24 Coefficient																1.000	.877**	.764**	.745**	.459**
25 Coefficient																	1.000	.866**	.840**	.561**
Sig. (2-tailed)																		.000	.000	.000
26 Coefficient																		1.000	.940**	.518**
Sig. (2-tailed)																			.000	.000
27 Coefficient																			1.000	.504**
Sig. (2-tailed)																				.000
28 Coefficient																				1.000

APPENDIX D RESEARCHER'S

INTRODUCTORY LETTER

UNIVERSITY OF EDUCATION, WINNEBA
College of Technology Education, Kumasi

DEPARTMENT OF EDUCATIONAL LEADERSHIP

P. O. Box 1277
Kumasi

June 27, 2016

TO WHOM IT MAY CONCERN

LETTER OF INTRODUCTION: LUCIANA AMA GBEMU
INDEX NO.: 8141770010

This is to confirm that Luciana Ama Gbemu is an M.Phil student pursuing a programme in Educational Leadership at the Department.

Lucina is currently engaged in a research on "Self Efficacy beliefs and Actual use of ICTs in teaching among College of Education Teachers in the Kumasi Metropolis" as part of the requirements for the award of Master of Philosophy Degree.

We should appreciate any courtesies that you could extend to her as she gathers data for writing the project work.

Thank

REV. FR. DR. FRANCIS K. SAM
Head of Department