

UNIVERSITY OF CAPE COAST

EXPLORATORY STUDY ON INTEGRATION OF EDUCATIONAL
TECHNOLOGY IN THE CURRICULUM OF COLLEGES OF EDUCATION IN
THE CENTRAL REGION OF GHANA

MIGHT KOJO ABREH

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THE CENTRAL REGION OF GHANA

BY

MIGHT KOJO ABREH

Thesis submitted to the Institute for Educational Planning and Administration of the
Faculty of Education, University of Cape Coast, in partial fulfilment of the
requirements for award of Master of Philosophy Degree in Educational Planning

JULY 2010

DECLARATION

Candidate's Declaration

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

Candidate's Signature..... Date.....

Name: MIGHT KOJO ABREH

Supervisors' Declaration

We hereby declare that the preparation and presentation of the thesis were supervised in accordance with the guidelines on supervision of thesis laid down by the University of Cape Coast.

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ABSTRACT

The purpose of this study was to examine how five personal and institutional factors influenced the way tutors in the Colleges of Education (CoE) in the Central Region (CR) integrate technology, specifically computers and their accessories, and the internet into the curriculum. This study also, investigated how tutors' individual personal factors are related to and interact with each other in the context of the Colleges of Education.

Questionnaire and structured interview guide were the instruments for data collection. Data collection instruments were field tested and found significantly reliable. Further, in this exploratory study, attention was focused more on individual items than on scales of items in analyzing the Likert rating scales. Also, the interview responses were subsumed to complement the data collected by questionnaire.

The study showed evidence that there were no technology integration plans in the three CoEs in the CR. Also, the tutors were both aware and had positive perceptions about integrating Educational Technology (ET) in the curriculum of CoEs. However, the background training of most of the tutors was not adequate and that affected their readiness to integrate educational technologies in their practice. Integration of educational technology was as well found to be affected by demographic characteristics of the tutors. It was recommended that Ministry of Education and state teacher education mandated institutions should take advantage of the high level of tutor awareness to formulate technology integration policies.

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DEDICATION

I dedicate this thesis to my father and mother who sparked the struggle for insight in me.

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CHAPTER ONE

INTRODUCTION

Background to the study

The use of computer technology and the internet in education, especially the teaching and learning process has resulted in academic improvements globally (Butzin, 2000; Sivin-Kachala & Bialo, 2000). As a result, there is an emerging concern for training teacher educators who have no background in Educational Technologies (ET) in developing countries (Cawthera, 2003), such as Ghana, to learn from countries that have already taken the lead in integrating educational technology into teaching and learning. An examination of the use of computer technology in Ghanaian schools indicates that computers and the internet for educational purposes are used more in urban than rural secondary schools (Parthermore, 2003).

In recent years, there has been a significant increase in the number of computers in schools both in the United States and other developed countries such as Canada and Great Britain, as well as in developing countries such as Ghana (Yidana, 2007). According to a release from the NCATE (2002), a survey of public schools in the United States conducted between 1994 and 2001 revealed that the number of computers available in public schools has grown exponentially. Results of the survey indicate that approximately 99% of all public schools in the United States were

connected to the Internet, an increase from 35 % in 1994. In addition, results from the survey indicate that there has been an improved student/instructional computer ratio and, in general, the ratio of students per computer has fallen from 12.1:1 in 1998 to 6.6:1 in 2000 to 5.4:1 in 2001.

Cudjoe (2005) points out the evaluation report by the World Economic Forum which ranked Ghana 65th on its Networked Readiness Index of 104 countries. Ghana had moved from 74th place to the 65th position in a year (that is, from 2004 to 2005). The index measures the propensity for countries to exploit the opportunities offered by ICT. During the period covered by the report, Cudjoe estimated the number of Ghanaian who had access to computers at half a million.

Despite these investments in computers and related technologies, there have been few corresponding changes to the way future teachers are being prepared to teach. The general findings from studies conducted in the United States show that future teachers are not adequately prepared to integrate computers in their teaching (Office of Technology Assessment, 1995).

The term *educational technology*, also referred to as learning technology, is the study and ethical practice of facilitating learning and improving performance by creating, and managing appropriate technological processes and resources (Laurillard, 1993). The term educational technology is often associated with instructional technology theory and practice. While instructional technology covers the processes and systems of learning and instruction, educational technology includes other systems used in the process of developing human capability to use

technology in teaching. Laurillard further stressed that educational technology includes, software, hardware, as well as internet applications and resources. Other technologies commonly available to the mass of the population like television and mobile phones also serve as educational tools.

Teacher preparation in the 21st century has never been demanding like it is today because, according to Gold (1996), it has sought to engage stakeholders involved in teacher preparation in the world to develop strategies to aid technology use in the classrooms. The level of impact of educational technology on an educational system depends on the context and the stage of educational development, readiness of the economy and availability of seasoned literature in the local context besides other factors (Yackulic & Noonan, 2001).

Teaching is one of the most challenging professions in any society where knowledge is expanding rapidly and modern technologies are demanding teachers to learn how to use educational technologies in their teaching. According to Jonassen (1999), while new technologies increase teachers' training needs, they also offer part of the solution to quality teacher production for the 21st century classroom. Information and Communication Technology (ICT) can provide more flexible and effective ways of professional development for teachers, improve pre- and in-service teacher training, and connect teachers to the global teacher community. Teacher quantity is important to all meaning persons but teacher quality is not just important but also essential. Pupils learn better with the use of educational technology (Haughey & Anderson, 1998; Shutte, 1999). The extent of flexibility, accessibility, increasing communications and interactions in terms of teaching and learning that

educational technologies afford make them desirable in preparing quality teachers in the various sub-sectors of the technical and vocational training programmes for Ghana. Today, educational technology has contributed to the teaching and learning efforts and the advantages that come along with it are further strengthened by the contributions of these tools in effective teacher training programmes (Reynolds, 1989).

Toure (2008) discussed evidence from a study on school directors, teachers, students and parents who highlighted how meaningful integration of educational technology into teaching and learning processes provides opportunities for learners to broaden their horizons and develop critical thinking skills. Educational technology in the African context like in developed countries depend on the quality of education by supporting new pedagogical approaches in which the teacher is more of a "guide on the side" than a "sage on the stage" (p.23). According to Tchombe (2006), the shift from textbook-based schooling to web-supported process of inquiry has implication for teaching and learning. The knowledge resources available in content textbooks and the limited libraries are unable to sustain inquiry-oriented pedagogy in this age of technological advancement.

Advances in computer technology together with the increasing complexity of an evolving global society have had an enormous effect on education and have produced serious contemplation of some manner of educational reform. Of course, it is difficult to talk about educational change without inviting resistance. The educational system in Ghana in the first one and half decades after independence had been described as one of the best in Africa (Akyeampong, 2004; World Bank, 2004).

However, Akyeampong (2004) further points out that in the 1970s the educational system began to slip slowly into decline prompting several commissions of inquiry, notably the Dzobo Education Review of 1973 (formed to determine the causes and way forward for recovery). Thus, the subsequent restructuring that has plagued education ever since are bound to be the source of a great deal of today's educational cynicism (Kelceoglu, 2006).

Major parts of the planning stage for integration of educational technology in teacher preparation include strategizing, initiation, sustaining and monitoring and evaluation. Haddad (2002) was of the view that work sharing and work scheduling needs to be done which could only happen if the key role of all the players in the integration (implementation) are identified and noted for the process of integration. There are unanticipated changes in knowledge, methodologies, pedagogical issues, students, school culture – all of which a teacher is bound to deal with alone. Haddad further relates that educational technology can break this professional isolation by permitting, among educators, communication, and exchange of information, chat rooms, bulletin boards, discussion forums, and virtual conferences.

Statement of the Problem

Literature has shown that the integration of a literacy programme is an implementation agendum, and therefore as much as integration of educational technology relates with teaching and learning, the teacher educator's role cannot be downplayed (Haddad, 2002). Using educational technology in the classroom comes along with better educational output (Annick, Janson & Falloon, 2007).

The use of educational technology in teacher preparation in Ghana is a critical part of the processes arranged by Government of Ghana to achieve quality teacher education. The policy of ICT use in Ghana Education Service is spelt out in the Information and Communication Technology for Accelerated Development Policy (ICT4AD) in general, and the ICT in education policy in particular, although, this has remained in draft form since 2006. The use of Educational Technology (ET) in teacher preparation in Ghana is, however, lagging behind expectation (Boateng, 2007; Yidana, 2007). Although, literature regarding the use of ETs, access, availability, equity, utilization and maintenance could be found in the Ghanaian context, there is a dearth of literature on tutors' background, experience, awareness and perception on integration of educational technology in the curriculum of the Colleges of Education.

Consequently, it is vital to explore tutors' background, experience, awareness and perception on integration of educational technology in the Colleges of Education curriculum in preparing teachers in Central Ghana for the 21st century. It is also uncertain whether the curriculum of Ghanaian Colleges of Education appropriately captures issues about integration of educational technology as outlined in the educational technology policy. It is equally crucial to investigate the issues that potentially affect technology integration like tutors educational background, tutors experience using technology, curriculum relevance for technology integration and perception of tutors in Colleges of Education in the Central Region of Ghana. The study sought to unearth these pieces of information.

Purpose of the Study

The purpose of this research was to explore and gain a better understanding of the opinion of tutors about integrating educational technology into the curriculum of the Colleges of Education in the Central Region of Ghana. The study explored five issues related to integration of educational technology in teaching and learning in the Central Region of Ghana, namely:

1. The socio-demography of tutors in the Colleges of Education in the Central Region.
2. The extent of knowledge of tutors about teaching with educational technology.
3. The training that tutors receive to enable them teach with educational technologies.
4. Teaching pre-service teachers to integrate educational technology in professional practice.
5. The perception of tutors about educational technology integration in the curriculum of Colleges of Education in Ghana

Research Questions

The following research questions that emanate from the literature and from the researcher's professional practice guided the study:

1. What is the socio-demographic background of tutors in the Central Region of Ghana?

2. What is the extent of knowledge of tutors about teaching with educational technology in teacher education colleges in the Central Region of Ghana?
3. What technology integration training background do Colleges of Education tutors have to enable them teach with educational technology?
4. How does the curriculum for pre-service teacher preparation allow technology integration in Colleges of Education in the Central Region of Ghana?
5. What are tutor's perceptions on integrating educational technology in the Colleges of Education curriculum?

Significance of the Study

This exploratory study which used descriptive survey design is not only a forerunner of empirical research in educational technology integration in teacher education in Colleges of Education in Ghana, but it is also part of the growing literature on instructional technology in the Ghanaian context. By means of this study, an inference was made on how the ET policy and the ICT policy for education are guiding tutor's professional practice in the Colleges of Education in Central Region of Ghana. However, the extent to which the policy has impacted technology integration at the Colleges of Education level in the Ghanaian context is as shown in the findings of the study.

From a universal perspective, the findings from this research added to the limited but growing body of knowledge and literature concerning preparing teachers

to integrate technology in areas of the world where the digital divide is the greatest. It provides new explanations for findings of previous studies. It also offers insight into areas in educational technology integration that require further research in terms of influencing policy, practice and future research in teacher education in Ghanaian context in general and in educational technology integration in particular. Since most studies involved questions about causes, it is not always possible to isolate the variables that will explain those causes; descriptive research can play an important role in providing information for posterior studies.

Assumptions

The following assumptions are relevant to this study:

1. Using a five-point rating scale is an appropriate way to assess the attitude and perceptions of tutors in the Central Region Colleges of Education.
2. Tutors of Colleges of Education have a responsibility to use educational technology in their teaching in the 21st Century classroom.
3. Tutors should identify what influences them to adopt or adapt educational technology in teaching and learning.
4. Tutors provided the best of responses without or with very limited stimulus attached.

Delimitations of the Study

The study covered only the Colleges of Education in the Central Region Colleges of Education although it was acknowledged that University of Cape Coast and University of Education, Winneba have pre-service teacher preparation

programmes as well. The study is delimited to the self-reported views of tutors at the Colleges of Education in Central Region of Ghana. In addition, the population for this study is delimited to the tutors in the Colleges of Education where the study was conducted. Therefore, the results of this study could not be generalized over all teacher educators at the Colleges of Education in Ghana but only those in the study region only.

Limitations of the Study

A number of limitations were identified in the study. The first, relates with inability to reach the expected target of 95% return rate set out data collection. The second has to do with inability to use school administrators and students' responses to collaborate the responses of the tutors.

Definition of Terms

The studies used terms and words, some often and others sparingly but, a quick reference for the explanation of these words needs to be noted and they are:

Educational Technologies the field concerned with the design, development, utilization, management, and evaluation of processes and resources for learning via computer and related technologies

Instructional technologies frequently used alongside instructional media and instructional materials to mean all the materials and equipment that are used to enhance the teaching and learning process by means of technology.

K-12 teachers are teachers prepared to teach from kindergarten through Senior High School in the American and British systems.

Awareness relates with content knowledge of respondents.

Organization of the Study

The study is organized into five chapters. The Chapter One presents an introduction to teacher education in the context of educational technology, the statement of the problem, definition of terms, purpose of the study, the research questions, significance and delimitations of the study are related in it. The review of literature on topics regarding the use of educational technology and its relative position in teacher training as well as key issues that affect tutors' perceptions at the tertiary institutions have been highlighted in Chapter Two. The Chapter Two relates those themes that emerged to inform this study.

In Chapter Three, methodology of the study is discussed. It begins with the discussion on the research design chosen for the study; population and sample were considered under this chapter. Sampling procedures, instrumentation and the data analysis plan are also presented under this chapter. Chapter Four, on the other hand, presents the survey results for the three colleges used for the study as well as the illustrative tables, charts and diagrams and arranged by themes. Chapter Five contains the summary of results and the implication of the results for teacher education in the light educational technology in the 21st century classrooms. Recommendations based on the findings as regards an institutional plan of action to ensure expedient integration of educational technologies in Colleges of Education presented. Finally, suggestions are made for what can be done in future academic researches.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

Introduction

The literature review provides a methodological and conceptual basis for the study and starts by exploring the context of educational technology integration at higher education level and in particular Colleges of Education in the Central Region of Ghana. It then examines the nature of educational technology and the concept of technology integration in education, and particularly into teacher education programmes. A review of some perspectives and research findings in technology preparedness in pre-service teacher education is presented in order to inform the rest of the study. The review further considered approaches to Educational Technology (ET) integration as a basis for establishing the stage at which the tutors are integrating educational technology. The literature was reviewed under the following subheadings:

1. Policy basis for educational technology in Ghana education system
2. Professional development for higher education faculty (lecturers)
3. Pre-service teacher education development in Ghana
4. Colleges of Education curriculum in Ghana
5. Historical perspectives of educational technology
6. Studies of teachers' attitudes toward technology

7. Personal and employment variables and factors
8. Expectations of new technologies in teacher training in Ghana

Policy Basis for Educational Technology in Ghanaian Education System

The basis of educational technologies that apply in schools in the 21st century in Ghana hangs on two policy documents. The two policies that were identified to affect the design, development, utilization, management, and evaluation of educational technology according to the Ministry of Education (2009) are:

1. the ICT for education policy and
2. ICT for Accelerated Development (ICT4AD).

Ghana broke away from colonialism in the year 1957, and it was identified as the first African country south of the Sahara to do so. It has also been registered that Ghana, before an economic crisis in the late 1970s, experienced the highest GNP on the continent. Ghana also experienced the trauma of military takeovers long before others suffered similar fates, and it was among the first group of countries to subject itself to the African Peer Review Mechanism (APRM). The APRM is an instrument voluntarily acceded to by member states of the African Union as a self monitoring mechanism carried out by civil society and other stakeholders (Mangesi, 2007).

Ghana's economy is mainly rural: cocoa, timber, and pineapples are the main export crops, and mining (mainly gold) has become one of the biggest sources of foreign exchange. The annual real GDP growth rate reached 5.8% in 2005, sustaining the growth rate observed in 2004. Today, Ghana runs a vibrant multi-party democracy, with a strong opposition in Parliament and an active civil society (Mangesi, 2007). Most recently the country has embarked on exploration of oil and

gas in commercial quantities which adds up to the economic basket of the state. This emerging modern state has energy crisis and the government needs to put stringent measures to manage its oil resources so that it can support the education as well. The exposition by Yeboah (2009) that the progress of education in the country is being exposed to the strong winds of divisive politics and the earlier the ministry in charge straightens matters the better.

Against this background, there is a need for an educated manpower to manage the activities of the various sub-sectors of the economy as well as an educated and useful teaching force to execute training and capacity building, such that building the human capacity of the trainer and trainee would be useful in the 21st century workplace. In fact, a recent country report by Mangesi (2007) points out that the uncoordinated approach to policy implementation in the past has derailed the integration of educational technology in the Ghanaian education system. Currently, significant progress has been made at increasing access to and usage of educational technologies in the education sector. Mangesi revealed that tertiary level is the most advanced in educational technology deployment, followed by the secondary and primary/basic education sectors respectively. Overall, there is much optimism for huge advances once the policy implementation process and research geared towards best strategies to be utilized for the integration in the curriculum of the pre-service and in-service teachers is completed. This again sets forth a reason why research is required to understudy stakeholders' perception of educational technology in modern classrooms.

One of the thoughts expressed by the Ghana country report, a study that covered the whole of Africa, revealed some challenges that inhibit the integration of educational technology in the Ghanaian educational system. These challenges include:

- (a) access to ICTs still remains highly inadequate and unevenly distributed through Ghana, with an urban bias;
- (b) the capacity of teachers and educators to deliver policy still remains low with many averse to adopting ICTs in the classroom or with inadequate skills;
- (c) there is lack of adequate collaboration between the Ministry of Education and Ghana Education Service or as well as other implementing agencies such as ministries, departments, and agencies: and
- (d) there are inadequate partnerships and collaboration between the ministry and the private sector (Mangesi, 2007).

It could be inferred from Mangesi that the factors that impede educational technology integration are multifaceted. A study into the perception of a cross section of teacher educators could yield sound results as well as open avenue for further studies.

The Republic of Ghana through its principal agent of education, the Ministry of Education (MoE), has made appreciable progress in its socio-economic development efforts to the extent of acquiring substantial resources needed to be able to reduce the percentage of the population without any educational attainment, widening access to education to the vast majority of the population and increasing

the percentage of the population with tertiary level education (The Republic of Ghana, 2003). The ICT4AD policy emphasized the key role that educational technology plays in 1) widening access to education to a wider section of the population; 2) literacy education; and 3) for facilitating educational delivery and training at all levels. The government of Ghana has acknowledged the need for educational technologies in general, and ICTs in particular, for training teachers at the college and university level for the 21st century classrooms.

Table 1 describes the educational technology adoption with emphasis on the barriers, enabling features (indicators for success already available) and the constraints in the Ghanaian education context. Based on the premises outlined for the two policies already discussed the Republic of Ghana developed strategies aimed at achieving the integration of educational technology in the school curriculum. In this study, however, only a section of the strategies that affected teacher education were outlined in accordance with Education Strategic Plan (ESP) for 2010 – 2020. The Ministry of Education (2009) published ESP for the period above, listed the following set of strategies for technology adoption in the Ghanaian education system:

- (1) Modernise the educational system through educational technologies to improve the quality of education and training at all levels thereby expanding access to education, training (in particular teacher professional development) and research resources and facilities;
- (2) Use ICTs to orient all levels of the country's educational system to the teaching and learning of all subjects, including science and technology;
- (3) Improve national competence in 21st-

century ICT skills, and (4) Use ICTs to assist in ensuring that graduates from basic education are functionally literate and productive (p.17).

The strategies as set forth could be carried out with the implementers in mind. One category of the implementers of the ESP 2010 -2020 could be identified as tutors at Colleges of Education. The perceptions of tutors of Colleges of Education are important if the system is to integrate educational technologies without setbacks. Yidana (2007) describes the ICT in education policy as the roadmap for Ghana's ICT utilization in the education sector. The description offered by Yidana further deepens the reason why studies should be conducted into perceptions and attitude of tutors toward technology integration in teacher training institutions in Ghana due to its asserted implication for improved classroom performance (Palak, 2004).

Professional Development for Higher Education Faculty (Lecturers)

According to Mehlinger and Powers (2002), prior to the introduction of technology, professional development at the higher education level consisted mainly of sabbatical leaves so that the faculty member could develop experientially. The four most common types of professional development for university faculty as developed by Mehlinger and Powers as (1) providing funds for course revision during the summer, (2) funding conference travel, (3) providing group classes through a full-time professional staff, and (4) providing skilled student mentors to faculty. The beginning point for successful professional development lies in the conduction of needs assessment on the level of the organization, the learning context, and the individual (Picciano, 2002; Robinson, 1998).

Table 1**Barriers for Success in Technology Integration in Ghana**

Factors	Enabling features	Constraints
<i>Policy Framework and Implementation Plans</i>	Both the national and the proposed education sector polices provide clear strategies for achieving significant growth in ICTs and education.	Co-ordination among the various implementing agencies has not been as good and consolidation of activity is needed.
<i>Advocacy Leadership</i>	The president has placed Human resource development as part of his key objects and this is advocated by all sector ministries and departments within the education sector.	There is need for adequate resource to match the talk.
<i>Gender Equity</i>	Both national and education policy focus on promoting gender equity.	The perception that science courses are for boys can hinder policy objectives.
<i>Infrastructure and Access</i>	Progress has been made in these areas with many tertiary and secondary schools equipped with computer	Primary sector is still behind in access to infrastructure, especially in rural areas.
<i>Collaborating Mechanisms</i>	With increasing support by major donors and the private sector, there is hope for meeting policy objectives.	Sustainability remains an issue.

Table 1 *continued*

Factors	Enabling features	Constraints
<i>Human Resource Capacity</i>	A large pool of ICT training institutions is able to provide the training needs of teachers.	
<i>Fiscal Resources</i>	Education continues to receive the highest percentage of the national budget	
<i>Learning Content</i>		No structured ICT in school content is available.
<i>Procurement</i>	Policy that encourages the setting up and sourcing of ICT equipment on the local market is emphasized.	
<i>Attitudes</i>	Positive attitudes with high levels of government.	Lower expectations of ICT at the school level among administrators.
<i>Sustainability</i>		Inability of certain schools to charge the mandatory ICT levy.

Source: Mangesi, 2007: 8, 9

The needs assessment provides the means to identify “the strategy and action required at improving current and future practice” (Lan, 2001, p.386) which is a primary goal in effective technology integration. A study of ubiquitous computer access and teachers’ shifts to constructivist pedagogy revealed that development opportunities should be subject-specific and that should determine how various modes of inquiry could be supported with technology (Windschitl & Sahl, 2002).

An important component in faculty development design and its relationship with the faculty are the perceived benefits of instruction by the faculty. Particularly with technology integration, learners must ascertain a sense of need for the instruction for it to be effective in changing their beliefs, behaviors and skill levels of pre-service teachers (Lan, 2001; Strudler & Wetzel, 1999). If the ultimate goal of the revised curriculum for teacher education is to be accomplished, faculty must be able to understand how technology can transform instruction, yet not become overly concerned with becoming technicians rather than content experts (Dusick, 1998).

Guskey (1994) provides observation of best practices that are applicable up to K-12 for teachers and higher education faculty. Guskey points out that although studies tend to search for a single best approach, it is the mix of optimal strategies that affect the most changes that occur in the teaching and learning classrooms. Recognizing professional development as an individual, on-going process is imperative for success. Encouraging collegiality and professional respect within opportunities for collaborative support are additional features of best practices for professional development of teacher educators (Haddad, 2002). Previous research indicates that knowledge about instructional uses of technology for university faculty

as socially constructed build human capital in the university system (Brown, Collins, & Duguid, 1989; McAlpine & Gandell, 2003). The provisions for on-going support, just-in-time assistance, and opportunities for feedback are additional success factors in exemplary teaching programmes (Bradshaw, 2002). Bates' (2001) survey results of 35 institutions of higher education revealed that instructional technology professional development works best when embedded in actual teaching practices.

Studies indicate that a major factor in successful faculty development is the intrinsic and extrinsic motivation of the individual faculty member (Surry & Land, 2000). The uniqueness of each learner brings a wide variety of interests, anxiety levels, and values to the learning environment. Faculty will enter the quest for technology integration and technical instruction from a wide variety of motivational levels. Surry and Land developed sets of strategies for increasing faculty motivation to use educational technology based on four succinct categories of Keller's (1987) ARCS Model of Motivational Designs. The strategies for gaining attention, relevance, confidence building, and satisfaction provide a solid framework for designing motivational instructional strategies and materials.

In order to ensure additional success in meeting goals and encouraging change, professional development needs to be based upon adult-learning theories and research. The understanding of andragogy, a theory regarding the teaching of adults, is a necessary component for success in adult instruction for faculty and professional developers (Cravener, 1998; Davidson-Shivers, 2002; North Central Regional Educational Laboratory, 1999). Diverse understanding about necessary technical issues, as well as pedagogy and course design helps to ensure success in designing

appropriate faculty development opportunities for higher education faculty, which, in turn, supports achievement of goals and expectations of technology integration.

In an attempt to help readers understand the individual characteristics of effective faculty development programmes, Lim (2000) states that “training and development should not be an after-thought; it should be part of a successful implementation plan for technology adoption in an educational setting” (p.243). The CEO Forum on Education and Technology (1999) report indicates that, “professional development for teachers is an ongoing, long-term commitment that begins with the decision to pursue a career in education and continues through a combination of formal and informal learning opportunities, for the duration of a career” (p. 8). Long-term, sustained higher education faculty development strategies evolved as potentially effective methods according to Camblin and Steger (2000). Therefore, the studies that affirm that there should be room for development of teacher educators in the use of technology must be accompanied by support services that enable technology users to sustain their initiatives (Mitra, Steffensmeier, Lenzmeier, & Massoni, 1999).

Most of the literature on best practices in professional development was written from the standpoint of the K-12 teacher (standard of preparing teachers from Kindergarten to Senior High School in the American and British systems). To generalize training of teacher educators is questionable as the educational planning imperative of professional development took place in a different context. This context does not match the need analysis for the training and development of teacher educators at the Colleges of Education level. The aforementioned cultures affecting

technology integration at the higher education level are relevant consideration when designing faculty development and integration strategies. Quinlan and Åkerlind (2000) note that “developmental activities that occur within departments or disciplines are likely to be seen by individual professors as more relevant to their personal situation and directly transferable to their teaching practice” (p. 24). Higher education-specific studies need to be conducted in order to document significant factors affecting technology integration.

Literature regarding professional development in technology for tutors at the College of Education level in Central Region of Ghana consists mainly of case studies, reports, book chapters, papers, and articles. Little empirical research has been conducted in this field and the current body of knowledge garners the majority of its support from studies qualitative in nature (Garet, Porter, Desimone, Birman & Yoon, 2001). Additionally, professional development research overwhelmingly makes use of volunteer participants, thus limiting findings about the individuals who may need the professional development opportunities the most in the teaching and learning endeavour (Bobrowsky, Marx, & Fishman, 2001).

Providing technology instruction to tutors often encounters extrinsic barriers that may cause frustration before even beginning the technology adoption process (Ertmer, 1999). Such problems are generally related to equipment access, time for adequate training and the follow-up practice needed for success, lack of administrative support, and the absence of technical support (Bruce & Goodall, 2001; Cyrs, 1997; Dusick, 1998; Ertmer, 1999; Groves & Zemel, 2000; North Central Regional Educational Laboratory, 1997). Many of these issues must be

addressed at an administrative level and supported by all involved. If tutors at the Colleges of Education in Central Ghana are to make requested paradigm shifts in instructional methodology by teaching with technology, appropriate teacher educator development opportunities must be made available that address the tertiary education cultural climate, specific needs of tutors, goals of the colleges and individual academic departments, as well as the infrastructure that supports instructional change (Davidson-Shivers, 2002; Seider, Ferrara, Rentel, & Dittmer, 1999; Web-Based Education Commission, 2000). In addition, research is needed in making the connection between appropriate professional development activities and what students learn as a result of teachers' participation (Bobrowsky, Marx, & Fishman, 2001).

Pierson (2001) succinctly indicates from her study that, technology holds the position of peripheral ancillary to teaching unless a teacher views it as an integral part of the learning process. Therefore, Dooley (1999) advises that technology innovation must become a part of a teacher's teaching repertoire. Pedagogical goals must be a driving force for technology use to be effective in the classroom (Donovan & Macklin, 1999). Professional development has been delivered in the traditional group formats of in-service workshops, seminars, and conferences. According to the National Council for Accreditation of Teacher Education (1997), non-traditional methods of delivery should increasingly be utilized.

Pre-service Teacher Education Development in Ghana

Teacher education in Ghana was started by the missionaries. The first teacher education institution and a systematic teacher training programme in the Gold Coast

(now Ghana) started by the Basel mission in 1848 at Akropong Akwapim (Graham, 1971; MacWilliam, 1969). From 1845 to 1851, unsuccessful attempts were made at establishing a teacher training in Accra (Graham, 1971). Initial teacher education in Ghana is concerned mostly with the training of teachers for Basic schools (primary and junior high) education. Currently, it is a three-year programme for high school graduates leading to the award of Diploma in Basic Education (DBE). The development of teacher education has had a plaid history sometimes calling for ad-hoc programmes to meet emergencies (Akyeampong, 2001). According to Anamuah-Mensah (1999), teacher training institutions have had not less than eight different models. The changes have been in response to changes and reforms in the Ghanaian educational system.

Teacher education in Ghana started in 1930 with a four-year teacher training course which led to Certificate “A”. The Certificate “A” was meant for middle school graduates who were trained to teach at primary and middle schools. In 1937, a two-year Certificate B” teacher training programme was instituted to train more teachers to cope with the ever increasing number of schools (Graham, 1971; MacWilliam, 1969). The introduction of the Accelerated Development Plan in 1951 which had the vision of expanding and improving access and participation in education in the country was necessitated by the introduction of a two-year post-B programme to upgrade such teachers to Certificate “A” (i.e., Post-B Certificate “A”) after teaching for some time. After independence in 1957, there was increase in school enrolment which called for an increase in demand for teachers.

The Certificate “B” programme was found to be ineffective leading the nation to reintroduce the four-year post middle Certificate “A” in 1961. A new programme evolved over time, a three year post secondary training programme was introduced to train teachers for the middle school level in 1974 following the Dzobo committee’s recommendation (PRINCOF, 2008). The three-year programme was later abandoned and replaced with a two-year post secondary Certificate “A” which was later eliminated and replaced with the three-year post secondary Certificate “A” in 1979. In 1982, the Modular Teacher Training Programme (MTTP) was introduced. This programme blended with the distance education and conventional teacher training approaches for pupil teachers (unqualified) to become trained teachers (Akyeampong, 2001).

Under the Modular Teacher Training Programme (MTTP), classroom teachers completed two years sandwich courses to complete prior to enrolling in a teacher training institution to earn a four-year Certificate “A” to teach at the primary school level after completion. However at present, all the enumerated models have been phased out except the three-year post secondary Certificate “A” which was upgraded into diploma programme called ‘Diploma in Basic Education’ (DBE) in 2004. Table 2, summarizes how initial teacher education in Ghana has evolved over the years.

As of 1967, Ghana had eighty-three (83) initial teacher education institutions. At the time of this writing there are thirty-eight (38) public and two (2) private teacher education colleges. Seven of these institutions are female single-sex institutions, there is one male only institution and the rest are mixed sex colleges

(Owu-Ewie, 2008). For the purposes of this study Colleges of Education located in the central region refers namely to Komenda, OLA and Foso Colleges of Education. All subject specialization areas are pursued in at least one of these three Colleges of Education (PRINCOF, 2008). Table 2 shows the programmes models of teacher preparation and levels for the Colleges of Education.

Table 2

Pre-Service Teacher Preparation Models in Ghana since Post-Colonial Era

Programme model	Certificate	Teaching level
Two-year post middle	Certificate “B”	Primary school
Two-year post “B”	Certificate “A”	Primary/middle school
Four-year post middle	Certificate “A”	Primary/middle school
Two-year post Secondary	Certificate “A”	Primary/middle school
Three-year post Secondary	Certificate “A”	Primary/JSS school
Three-year Diploma in Basic Education	Diploma	Primary/JHS

Source: Adopted from Owu-Ewie (2008: 83)

Table 3 presents a review of some key historical facts about the Colleges of Education in the research region for this study.

College of Education Curriculum

The curriculum of teacher training colleges in Ghana has undergone many evolutions since the Accelerated Development Plan (ADP) launched in 1951 gained legal backing through the introduction of the 1961 Education Act. The 1961 Education Act sought to provide free, universal and compulsory basic education (of

6 years duration) for all children from 6 years of age (Kadingdi, 2004). Kadingdi further relates that it empowered Local Authority Councils to be in control of educational management whilst parents and guardians were expected to make some contribution to the running of schools in their areas. Primary education underwent a rapid and steady growth and the number of schools rose from 1,081 in 1951 to 3,372 in 1952 (Foster, 1965).

As a result of interventions in the education sector enrollment doubled within a period of five years (from 1951 through 1956) and Ghana was acclaimed as having the most developed education system in Africa (Ghana Human Development Report, 1998; Foster, 1965; Scadding, 1989). The Dzobo (1974) committee identified four aims of pre-service teacher education as:

1. Provide teachers with a sound content base of the courses at the levels at which they will function.
 2. Provide teachers with sound professional skills to make them effective and efficient to guide their learners.
 3. Inculcate the qualities of leadership into would-be teachers to make them able to integrate the school with the community, to create an ecosystem which will make children learn with pleasure, and to prove themselves acceptable in the society.
 4. Train teachers in manual skills so that they motivate the children they teach in the acquisition of basic vocational skills
- (p. 34).

These objectives have outlived their usefulness in an information and technology age but nevertheless, the information it provides for the academic community for future planning of education in Ghana as a modern state remains appreciated. The teacher preparation curriculum at the time was tailored to the achievement of the stated objectives (Kadingdi, 2004).

The curriculum of Colleges of Education in Ghana since the ADP era to this day could be classified into three themes (Owu-Ewie, 2008): (a) the old curriculum, (b) the new In-In-Out programme, and (c) Diploma in Basic Education programme. Each of these themes have been elaborated upon in the pages that follow.

The Old Curriculum

The pre-service teacher education curriculum had undergone primarily minor changes in concert with changes in the structure and content of education system. In 1998, major change occurred. Previously pre-service initial teacher education curriculum for basic education was as follows: general education (30%), academic education (30%), and professional studies (40%) (Akyeampong, 2001). The general education encompasses core subjects: basic mathematics, English language, basic science, Ghanaian language, physical education, cultural studies, education, and agricultural science. Akyeampong further exposes the composition of academic education which is made up of two elective subjects chosen by each student from group one or group two. The group one included science-based subjects while the group two comprised vocational subjects. Some teacher institutions specialized in group one, others in group two, while the remaining engaged in both.

Table 3**Historical Facts about Colleges of Education in the Central Region of Ghana**

College	Brief history
Komenda	The Komenda college of education established in the year 1948 with initial enrolment of 40 men. It remained a male college until 1952 when management decided to enrol both sexes. The college was started by the Methodist church. The college has grown over the years in terms of number of tutors, number of pre-service teachers produced, and infrastructure, and seen some growth in its technological advancements. The college has a computer laboratory with 45 seating capacity and laboratory is connected to the internet. The college initially started for men is being headed by a female principal since 2007.
OLA	The college was established in 1924 for graduates from OLA high school to be trained as teachers to support the convent schools. The college still remains an all female school. The college's infrastructure capacity has increased over the years and most noteworthy is its two 60-seater capacity computer laboratory. It is the lead institution in the deployment of Open Educational Resources in all the colleges of education in Ghana. The college has two principal access points which serve as source of entry onto the internet.
Foso	The Foso college of education was established in the year 1965 at its present site. It has served the people in around Assin communities and the either country in terms production of certificated teachers over the years. In the year 2008 the current principal described the phenomenal achievements of school as "spectacular and significant" (PRINCOF, 2008: 46). The college has an ICT laboratory which is hooked up to the internet.

Source: Adapted from PRINCOF, 2008: 45, 46, 56, 57, 65, 66, 67

Time allocation per week for the various subjects depended on the emphasis given to it in the teacher education programme. Each period consisted of a forty-minute lesson. Each teacher training institution had flexibility to organize its time schedule and time allocation per subject but had to inform the Teacher Education Division of the Ghana Education Service. The professional component of the curriculum includes two weeks school observation and two weeks for on-campus practical teaching (micro-teaching) in first year, and in years two and three teacher trainees are required to stay six weeks practical teaching in schools in the colleges' catchment area (Owu-Ewie, 2008).

The New Teacher Education Curriculum (In-In-Out Model)

One criticism leveled against the old curriculum in the old teacher training system was that it offered insufficient supervised field experience for its products. This necessitated the proposal of the new curriculum, the IN-IN-OUT model, in 1999/2000. It has been operationalized and subsequently fused into the system of teacher education practice in the Colleges of Education in Ghana today. In the IN-IN-OUT model, students spend the first two academic years in College classroom and the whole of the third year teaching in a school for practical training. The new system of teacher education has an advantage over the old teacher training system with the emphasis both on conceptual and methodological knowledge that students should acquire in their professional development (Akyeampong, 2001).

A key feature of this programme which differs from the old model is the role of district assemblies in recruiting and sponsoring of candidates in their teacher training. These sponsored teachers are then committed to teach in the

district after their training. Funding problems in some districts has resulted in this key feature not being fully implemented (ED/HED/TED, 2003).

Teacher institutions under this model offer either programmes “A” or “B” courses. For Programme “A” students who study all the subjects, there are no elective courses. On the other hand, students in Programme “B” specialize in two subjects from programme “A” and two other subjects as elective. This implies that students pursuing Programme “B” specialize in four subjects. Assessment which used to be conducted at the end of the second and third years is now done at the end of the first, second, and third years. The first year assessment is composed of internal and external promotional examinations. Failure in this examination results in withdrawal from college. The subjects examined in the external examination include environmental and social studies or technical skills, Integrated Science or French, English, Ghanaian language, and Mathematics. The “pass mark” in this examination is at least 40% in all subjects. In addition, learners are required to pass the following internal subjects: Religious and Moral Education, Music and Dance, Physical Education, and Vocational Skills. A student’s progress to the second year depends on passing in the internal and external subjects. The second year assessment encompasses an in-class continuous assessment and an external examination. The students are also assessed on on-campus practice teaching. A student who fails in the examination has two additional chances to write the examination and pass before moving on to the third year (Akyeampong, 2001).

The model has a practice teaching (practicum) component. At the end of the first year, there is school attachment for observation of teaching and work practice where student teachers observe regular teachers in the classroom teach. In the second year, students do on-campus practice teaching for practice in lesson designing and the development of specific skills in teaching. The third year is out of campus practice teaching where students spend a years teaching in a school. They are mentored by seasoned teachers in the schools in which they are practicing (Akyeampong, 2001; Owu-Ewie, 2008).

The Diploma in Basic Education Programme (DBE)

The three-year postsecondary teacher programme which had the IN-IN-OUT component added to it was upgraded to a three-year Diploma in Basic Education in September 2004. This move is to ensure quality education delivery in the country's basic education system. Akyeampong (2001) opines that the curriculum is based on the semester and course system, and Akyeampong further points out that the idea about starting a teacher diploma for teacher trainees at the then teacher training colleges was conceived as far back as in 1992 as part of the regional colleges of Applied Arts, Science and Technology institutes programme. This programme has two basic components; DBE "A" and DBE "B". DBE programme "A" is structured to produce teachers to teach all subjects in a primary school while programme "B" teachers are trained to teach two or three subjects in the Junior Secondary School. The underlying principles of this programme include demand, integration of theory and practice, school/classroom focus, competency and process assessment (ED/HED/TED, 2003).

The Table 4 describes the “IN-IN-OUT” model of teacher training in Ghana. The old DBE teacher education system had five curriculum components: foundation academic courses, specialized personal development, educational studies, curriculum studies and methodology, and practical training. The foundation studies courses include all subjects studied at the basic education level. The specialized personal development studies encompassed communication and study skills in addition to economic issues that underlie national development. The educational studies include studies focusing on the learner, the teaching-learning process, and assessment. Curriculum studies and methodology focused on the teaching of content of either the primary school subjects or Junior Secondary school subjects. The practical training consisted of school visits, school attachments, on-campus practical teaching, design and preparation of teaching learning materials, and external school-based teaching (ED/HED/TED, 2003).

The methodology courses at the College of Education institutions in Central Region of Ghana have Introduction to ICT as a course. The course on introduction to ICT touches on fundamentals in computing as it relates to knowledge and its application to Microsoft Word and Excel. The content of this course does not focus on integration of technology in teaching and learning at the College of Education level in Ghana (Course Syllabus, 2005).

Historical Perspectives of Educational Technology

The term, *educational technology*, emerged in literature around 1948 (Saettler, 1990), but the idea of educational technology has been in existence

from the time of early man. From the recording of pictographs and subsequent instructional techniques developed across cultures, Saettler also noted that the technology of instruction reflected particular ways of thinking, acting, speaking, or feeling. Further notation indicated that significant shifts in educational values, goals, or objectives led to diverse technologies of instruction. These technologies of instruction take on many varying forms, ideas, concepts, strategies, and tools used in the total application of educational technology.

A number of definitions have evolved over the last half century, these slowly morphed from targeting audio-visual communication in the learning process to instructional technology being described as a process. A third definition incorporated the term 'educational technology' as a field involved in the facilitation of human learning.

Further tweaking produced a definition that listed the factors involved in the process. The Association for Educational Communications and Technology (AECT) is responsible for authoring the most recently updated definition for Instructional technology (IT) (Thompson, Simonson, & Hargrave, 1996).

Before the most recent definition, the 1994 definition of Instructional Technology (IT) is "the theory and practice of design, development, utilization, management, and evaluation of processes and resources for learning" (Reiser & Ely, 1997). The authors of this definition were noted to consider IT and ET to be synonymous which is in line with the conception of Reiser and Ely.

Table 4

The “IN-IN-OUT” Teacher Training Model

“IN” (Year 1)	“IN” (Year 2)	“OUT” (Year 3)
<p><i>Curriculum</i> (i) Foundation Academic courses (Subject content knowledge). (ii) Education Studies (Introductory Education courses) (iii) School attachment at end of year one</p> <p><i>Assessment</i> (i) Year 1 promotional Examination based on Education studies and Foundation academic Courses</p>	<p><i>Curriculum</i> (i) Curriculum Studies and Methodology (CSM) in all subject area. (ii) Education studies (iii) On campus practice teaching iv. Classroom based project work</p> <p><i>Assessment</i> i. External Exam in CSM (ii) Continuous Assessment (40% of final score) in CSM iii. Project work assessment</p>	<p>Courses that students take are Introduction to guidance and counseling and trends in education. (i) Distance learning materials reflecting classroom teaching (ii) Mentorship training</p> <p><i>Assessment</i> (i) Final external examination of classroom based teaching experience (ii) Mentors and selected college tutor assessment of teaching</p>
“IN” (Year 1)	“IN” (Year 2)	“OUT” (Year 3)
<p><i>Curriculum</i> (i) Foundation Academic courses (Subject content knowledge). (ii) Education Studies (Introductory Education courses) (iii) School attachment at end of year one</p> <p><i>Assessment</i> (i) Year 1 promotional Examination based on Education studies and Foundation academic Courses</p>	<p><i>Curriculum</i> (i) Curriculum Studies and Methodology (CSM) in all subject area. (ii). Education studies (iii) On campus practice teaching iv. Classroom based project work</p> <p><i>Assessment</i> (i) External Exam in CSM (ii). Continuous Assessment (40% of final score) in CSM (iii) Project work assessment</p>	<p>Courses that students take are Introduction to guidance and counseling and trends in education. (i) Distance learning materials reflecting classroom teaching (ii) Mentorship training</p> <p><i>Assessment</i> i. Final external examination of classroom based teaching experience ii. Mentors and selected college tutor assessment of teaching</p>

Source: Akyeampong (2003, p.46)

The acronym, IT, used outside the realm of education refers to Information Technology which largely encompasses data processing and communications as well as other foci (Nicolle, 2005). Today, Educational Technology which is variously referred to as e-learning, instructional technology and learning technology - is the use of technology to support the learning process. Although, the term could refer to all kinds of analogue technologies as in photographs, film, video, audio recordings etc, it is usually used to specifically describe digital computer technology and the internet (Weigel, 2001).

Early instructional theories and methods that lay the groundwork for modern day educational technology were made available by catalogue from Saettler (1990). He also chronicled the evolution of media, such as film and radio, which characterized educational technology in the early- to mid-1900s. The field focused upon communication theory, behaviorism, cognitive science, instructional design, and broadcasting through the 1980s. At that time, there was an emergent focus on information exchange, educational research, instructional television, and programmed instruction. Throughout the 1980s and 1990s there was interest in information technologies, cognitive processes in teaching and learning, and the educational impact of computers.

Early research was dominated by media studies of four primary types: evaluation, media comparison, intra-medium, and aptitude treatment interaction. Research in the field of educational technology has been reported for over 90 years (Thompson, Simonson, & Hargrave, 1996). Over time, the early behaviorist theory-based studies slowly gave way to more cognitive theory-based approaches.

The emphasis on a constructivist perspective on learning and the rallying criticism of research methods spearheaded by Clark (1983), effectively ended media comparison studies. Kozma's (1991) opposing view to Clark's stance provided a call for research on the contributions of a technology-based methods rather than the medium itself.

The early quantitative studies conducted are presently being accompanied by more naturalistic, qualitative research (Driscoll & Dick, 1999). Thompson, Simonson, and Hargrave (1996) indicated that "a naturalistic research approach will assist in producing information that will influence the design of instruction to match individual needs" (p. 24). Research in the field of educational technology is changing in response to a current emphasis on exemplary teaching strategies and the need for evidence of technology's impact on student learning.

Roblyer and Knezek (2003) were involved in the development of the new National Educational Technology Plan (U.S. Department of Education, Office of Educational Technology, 2005). This undertaking led them to evaluate past educational technology research and speculate where it should be heading. Roblyer and Knezek suggested the need for new research into technologies as "components of solutions to educational problems" (p. 63), and to address the relative advantage, the impact on student achievement, the achievement of societal goals, and to provide information to guide the use of emerging technologies in education.

The field of educational technology reflects the view that “any change in educational technology will be evolutionary rather than revolutionary” (Saettler, 1990, p. 539). Saettler noted:

The prospects for advancing education through information technology require, for their success, a great deal in the way of non-technological developments. These include such things as creating the necessary human resources, primarily skilled teachers who like to teach and who are knowledgeable in the subjects they teach and in the use of computer tools they teach with” (p.538).

Though written in 1990, thoughts similar to his continue to resonate in the literature, research, goals, and expectations of those interested in and responsible for effective technology integration into teaching and learning.

As technological advancements have been made over the centuries they have influenced and changed the social culture. The invention of the printing press by Johannes Gutenberg in 1450, transformed life immeasurably. Suddenly, the written word that once was tedious and time consuming to share, and therefore available only to those who could afford it, became mass produced and available to anyone. This had incalculable ramifications on education. The ability to produce information so easily and quickly ignited a dissemination of ideas and theories that had never before been brought to bear. The advent of the printing press was what made the ability to read, once important only to a few, essential for many. Education was forever transformed as the schoolroom, which once was controlled by the Catholic Church, became a means of exploring and teaching

other ideas and beliefs such as those of Martin Luther and John Calvin (Butts, 1955). The printing press subverted the power of the Church by making the written word accessible to all.

Another example of how technological advances influenced social culture was the Industrial Revolution. The Industrial Revolution, “through technologies like the steam engine – transformed countries” (Provenzo, Brett, McCloskey, 1999, p. 2). What was once unindustrialized land changed into populated towns and cities, the issues and goals of education has changed. Other technological advances, including the railroad and telegraph, made travel and communication faster and more manageable, transforming American culture thought and worked (Provenzo, et al., 1999). As society changed so did education.

In the United States, during the twentieth century, with every new technology came a hope for an improved educational system. Educational reform had been seen as a matter of urgency since the Progressive Movement. Expounding on the importance of education in a culture fraught with challenges, Cummins & Sayers (1995) pointed out that , “As parents contemplate these daunting realities and wonder what the future holds for their children, education assumes a new urgency” (p.83). With the invention of the radio and motion picture there came hopes of transforming education. “The introduction of film and radio into schools in the 1920s and 1930s and instructional television in the 1950s and 1960s saw a similar pattern of blue-sky promises of the new technology revolutionizing instruction and learning” (Cuban, 1993, p.187).

Technology has continually brought with it hopes for a new and improved educational system. Historically, these hopes have been dashed as the technologies found little cohesiveness within American classrooms. In the late 1970s, when the personal computer was invented, computers quickly shifted into the hands of the masses. This paralleled the printing press bringing books to the masses. This new technology, brought along with it hopes for a new panacea. This too has fallen short, however, and Cuban questions, “Yet why is it with all the talk of school reform and information technologies over the last decade, computers are used far less on a daily basis in classrooms than in other organizations?” (p. 185).

Expectations of New Technologies in Teacher Training in Ghana

The commitment of Ghana at integrating educational has been expressed in a report to UNESCO (Benneh, 2006). Benneh, the national coordinator of the Teacher Training Initiative for Sub-Saharan Africa (TTISSA) programme, highlighted strategies as the assigned reasons why Ghana Education Service (GES) through the Teacher Education Division should be particular about integrating technology as:

1. New breed of teachers could be produced; that is e – teachers who are well – vested in electronic teaching and learning approaches.
2. New technologies syllabuses can be drawn for teacher professional development
3. A regional online teacher resource base and offline net work for teacher training institutions could be established to share teacher – developed education course wares and innovative pedagogies.

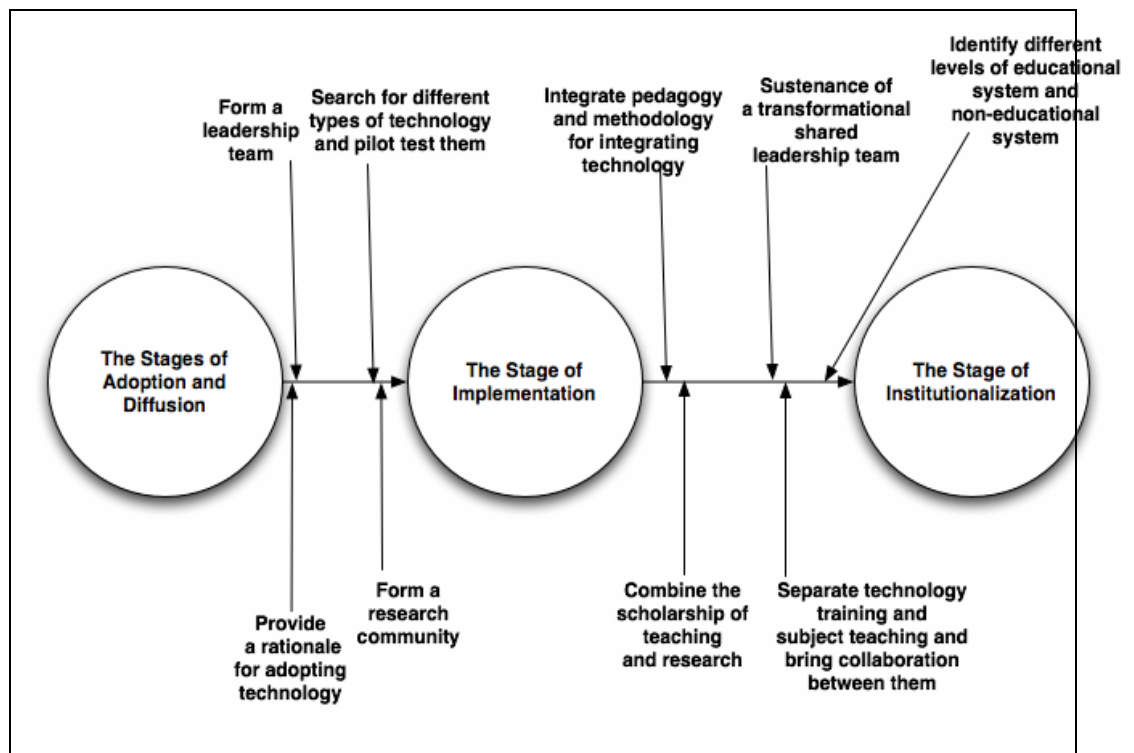
4. Country specific ICT pedagogies and models of different learning environments and teacher – developed e – lesson plans and educational software could be achieved.
5. ICTs as pedagogical tools and educational resources could be used to link pre-service teacher training and in-service teacher professional development.
6. More trained teachers in ICT pedagogies should be produced from colleges to take advantage of e-learning (p/9-10).

Benneh further stated that,

- (a) More curriculum specialists and technicians need to be trained to provide the range of skills necessary for quality IT-based teaching materials,
- (b) Educational facilities in schools and community libraries should be made available,
- (c) There should be a total commitment from governments, communities and other stakeholders in education to support ICT-enhanced Open Distance Learning (ODL) programmes for teachers,
- (d) There should be Higher Education research support in the use of ICTs in teaching and learning at all educational levels,
- (e) ICT forms part of TTC (CoE) curriculum. The infrastructure will continually be deployed until each institution has enough of such facilities. Training of curriculum leaders is ICT education is on-going (pp. 9, 10).

Notably, the concerns and strategies enumerated by Benneh did not deviate from ICT4AD (2003) policy which spelled out the general strategy of government integrating technology but rather she selected focal agenda for

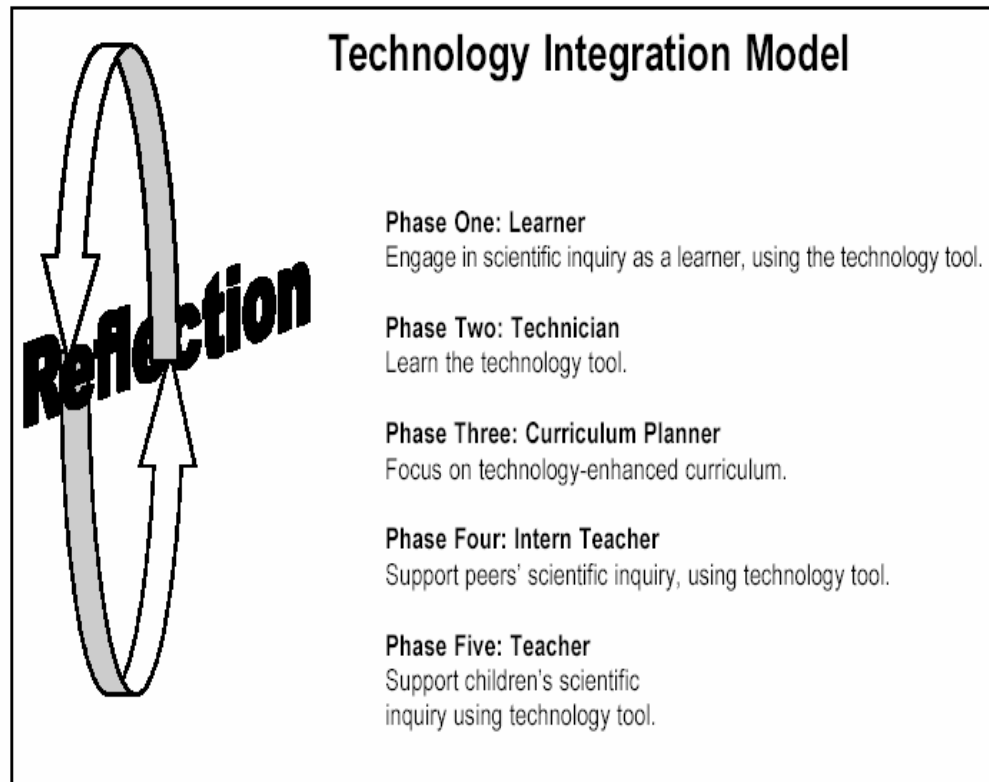
teacher preparation. Other researchers point to strategies and actions that could lead to success in integrating teaching technology in the Ghanaian context (Mangasi, 2007, Yidana, 2007). The current study, however, is aimed at breaking the grounds for posterity in terms of technology adoption at the Colleges of Education in Ghana. The suggested model for educational technology integration follows the framework Figure 1.



Source: Adopted from Pi-Sui (2004: 153).

Figure 1: Framework for Integrating Technology in Educational Settings

The comprehensive framework designed by Pi-Sue (2004) supports an educational system grounded in educational technology. In a related strategy, Pi-Sue reflects on a simplified model for the adoption of educational technology. Figure 2 shows the reflection model for educational technology integration.



Source: Adopted from Pi-Sui (2004, p 81).

Figure 2: Technology Integration: The Reflective Model

Personal and Employment Variables in ET Integration

Chapman (2003) hypothesized in his studies that personal and employment variables (e.g., gender, level of education, type of institution, tenure, rank, years of teaching experience, and years of computer use), and social, organizational, and motivational factors that should be understood when determining whether adoption of an innovation will occur in an academic institution.. The current study, however, included social, organizational, and motivational factors that help to determine the extent to which faculty adopt educational technology as a teaching tool.

Gender and Computer Technology Adoption

Findings in the literature concerning gender use of computer technology are contradictory. Although, research revealed very small or neutral gender differences in technology use, many studies have found that males are more inclined to use technology (Whitley, 1997, Yaghi & Abu-Saba, 1998). Ray, Sormunen, & Harris, 1999 indicated that women had more positive attitudes toward the use of computers than males.

In a meta-analysis by Whitley (1997), gender differences in computer-related attitudes and behavior were examined. According to Whitley, a meta-analysis is a quantitative synthesis of the results of a set of studies that integrates the results of the individual statistical analyses (i.e., effect sizes), compared with the narrative literature review that uses qualitative techniques to integrate a body of research. The research studies in the meta-analysis were completed from 1973 to 1993, and included adult, college, high school, and grammar school participants from the United States and Canada. The sample consisted of 82 studies that provided 104 effect sizes from 40,491 respondents. Whitley further assessed emotional responses to computers, including such constructs as anxiety, liking, and fear. He also compared women and girls with men and boys and found that men and boys viewed computers as more appropriate for males, saw themselves more competent on computer-related tasks, and reported a more positive affect toward computers. Whitley also found that the effect of gender differences in attitudes towards computers was statistically significant although it

was functionally zero at $d = .065$. Whitley concluded that gender differences in the meta-analysis were statistically significant.

Okinaka's (1992) and Gordon's (1993) found no gender differences in using computer technology in education. However, in a research study by McAulay (1993), there was a significant difference in the frequency of computer use between men and women surveyed. Furthermore, in a research study of the National Association of Business Teacher Educators use of computer technology as an instructional tool in non-computer oriented courses, Lu (1995) found that a larger proportion of the female educators perceived computer technology as an effective tool than the male educators. There was an increased desire to own computers among males than females. Men also were significantly more likely to report that computers were of use to them as a job skill. More recently, Ray, Sormunen, and Harris (1999) found that females had more positive attitudes concerning the computer's value in making users more productive. Their research also revealed that women express greater comfort than men in using computers. Further, research on the relationship between computer attitudes and web attitudes of doctoral students in a school of education revealed significant gender differences (Liaw, 2002). Findings indicated that male students had more positive attitudes toward computers and the Internet than female students.

Adams (2002) examined the degree to which faculty attend technology development programmes correspond to the use of faculty teaching methods. The population consisted of a convenience sample composed of 589 full and part-time faculty members at a metropolitan postsecondary teaching institution. Adams

found significant correlations between gender and technology development activities, integration levels, and higher-order concerns. Females reported a greater integration level than males.

The literature revealed conflicting findings in regard to gender in the use of computer technologies. Earlier studies (Lu, 1995; Ray, Sormunen, & Harris, 1999) indicate that males use technology more than females. Other studies (Schumacher, & Morahan-Martin, 2001; Nelson, & Watson, 1995) reported that gender differences in the use of computers are very small; however, research also revealed that more females than males are more positive towards their use of computers. As gender may be a factor in determining whether a teacher educator will adopt and use computer technology in his or her instruction, it will be included as a variable in this study.

Years of Teaching Experience

Researchers have not only studied gender and computer technology adoption, but they have also studied the number of years of teaching experience in which faculty members adopt computer technology (Chapman, 2003). A review of the literature revealed few studies on the years of teaching experience and the impact it has on faculty technology adoption. Oscarson (1976) found faculty members who had been in their position for a longer period of time appeared to be less prone to adopt technology than those who had been in their position for a short time period. The National Center for Education Statistics (2000) found teachers with nine or fewer years of teaching experience are more likely to teach using computers or the Internet than teachers with twenty or more years of

experience. In a study of 589 part-time and full-time postsecondary tutors in a metropolitan teaching institution, Adams (2002) found a significantly high level of computer integration by tutors with up to three years of teaching experience. Faculty with tenure and 10 to 19 years of teaching experience had the least integration of computers into their teaching. Adams concluded that faculty with less than ten years of teaching experience and faculty with 20 years or more of teaching experience demonstrated a large degree of technology integration into their teaching. Female faculty members with few years of teaching experience were more prone to integrate computers into their teaching than older, male faculty with more years of teaching experience.

Years of Computer Use

It appears that teachers may need a period of time working with technology before they become proficient. Sheingold and Hadley (1990) contended that teachers need five to six years working with technology to develop expertise. When the teachers reached this level, they changed their instructional strategies and the classroom environment.

Additionally, Sandholtz, Ringstaff, and Dwyer (1997) determined that teachers experience an evolutionary process as they continuously increase their use of technology. They identified five phases that teachers go through: (1) Entry: Teachers adapt to the physical environment changes created by technology; (2) Adoption: Teachers support textbook instruction with technology; (3) Adaptation: Teachers integrate word processing and databases into their instruction; (4)

Appropriation: Teachers change their attitude towards technology; and (5) Invention: Teachers master technology and create new learning environments.

This evolutionary process to learn, master, and develop expertise with computer technology is different for each individual faculty member. Some may become proficient integrating computer technology into their instruction fairly quickly while for other educators it may take more time. Literature indicates that teachers need time to learn to use computer technology in their instruction. Therefore, years of computer use will be used as a variable in this study to determine the time frame that a business teacher educator would need to become proficient with computer technology and adopt it in his or her teaching. Researchers have not only studied years of computer use in computer technology adoption, but they have also studied the type of educational institution in which computer technology adoption may occur.

Type of Institution

Little literature exists concerning the type of educational institution in the adoption of computer technology into instruction in higher education. Sanderson (1998) examined factors that contribute to the adoption or non-adoption of distance education technologies in instruction at the university level. The 119 participants were business educators who were employed by 41 higher education institutions in the Intermountain West region of the United States. Slightly more than 10.1% of the respondents were employed in a research institution, 11.8% taught in a non-research institution, 12.6% reported a 4-year college, and 63.9% indicated a 2-year institution. Based on the final model analysis, Sanderson

concluded that there was no difference between business educator adopters and non-adopters of distance education technologies and type of institution. For the purposes of this study, type of institution will be used as a variable as the type of institution in Ghana in which a teacher educator is employed may have an influence on his or her use of a technological innovation. Additionally, this study will also examine faculty access to computers in relation to their adoption of an innovation.

Faculty Access to Computers

It is important that faculty have convenient access to computers, updated software, and hardware to successfully adopt and use computers in their instruction. Vannatta (2000) surveyed 65 tenure-track faculty members in the SUNY Oswego School of Education concerning the extent of their computer technology proficiency and integration. Vannatta found that all participants had a computer at home, 95.3% had an office computer, and 50% had an office computer with sufficient software, hardware, and memory. The findings also indicated that faculty reported moderate to high levels of computer proficiency and integration in word processing, email, and Internet activities.

In another study concerning faculty computer use, Dusick and Yildirim (2000) surveyed 117 part-time and full-time faculty members at an urban California community college. They found that 85% had a computer at home. Fifteen percent of the faculty reported that they did not use computers in their instruction. Dusick and Yildirim concluded that access to computers was significantly correlated with competency and also had an indirect effect on

computer use in the classroom. In a study conducted at Virginia Tech's Faculty Development Institute, Banks (2002) found that each participant who completed computer technology training received a state-of-the-art computer installed in his/her office with specific software to support technology infusion into their teaching. The updated computers and software provided faculty with an equitable base of computing technology. Virginia Tech students and faculty had access to 24-hour technical support, to professional technical staff, consultants, and a support laboratory to help them use technology in their teaching as recorded in the University Plan: Progress Toward 1991-1996 Goals (Chapman, 2003).

As a review of the literature indicates, tutors at some colleges and universities have access to a computer at their schools. Since literature revealed that computer access correlates to an educator's use of the computer in the classroom, access to educational technology in Central Ghana will be used as a variable in this study to interview tutors who know for integrating technology at their schools.

Faculty Access to Training

Whether teacher educators have or do not have access to the best hardware and software available, it is unlikely that the computer technology will be used effectively, or at all, if teachers are not properly trained (Hohlfeld, Ritzhaupt, Barron, & Kemker, 2008; National Center for Education Statistics, 2000; Norris, Sullivan, Poirot, & Soloway, 2003). There are concerns that teacher educators need more technological training to help them effectively infuse technology into their instruction (Means, 2001). Fabry and Higgs (1997)

contended that training is a critical factor in the successful implementation and integration of technology. In order for present and future educators to effectively integrate technology into their classroom instruction, they must be trained in the use of technology in classroom activities, which are supported, by sound teaching and learning principles (Duhaney, 2001). It logically follows that in order for students to be better prepared to learn with technology, teachers should be better prepared to teach with technology (Luke, Moore, & Sawyer, 1998).

Banks (2002) found that the Faculty Development Institute faculty training model at Virginia Tech was a successful model to follow to enable faculty to adopt technology in their instruction. However, Banks concluded that faculty needs and expectations should be assessed prior to training in order to meet faculty training expectations and not just introduce them to the technology. Penn State is a large research university that provides 24-hour technological support services to its faculty. The Educational Technology Services unit of the Center for Academic Computing provides Penn State faculty with computing technology services, trains and supports faculty to use technology to improve their teaching and learning. Technological services include seminars on instructional use of technologies for novices and experts, consulting by technological specialists, and sponsors special events that feature the effective use of technologies for instruction (Dwyer, 1999).

The literature supports that some teacher educators obtain new technological skills through self-directed learning (Stipp, 1997). McEwen (1996) in a study of National Business Education Association members found that most

of the business educators considered themselves proficient in technology skills such as word processing, spreadsheet, and database. The majority of the business educators, self-trained using reference materials, was most likely to teach using that approach and experienced the greatest training needs in the use of electronic communications such as the Internet.

In a related study, Reddman, Kotrlik, Harrison, and Handley (1999) found that 93% of teacher educators received information technology training through self-directed learning and 73% of this group obtained learning by self-instruction in the past three years. Reddman et al. (1999) also reported that business educators held the opinion that computer technology such as the Internet promotes self-directed learning. According to Bartlett and Kotrlik (2001), business teacher educators, business education leaders, and business teachers should integrate self-directed learning skills in educating business teachers and encourage them to use self-learning resources such as professional organizations, demonstrations, observation, and mentoring.

A research study by Dusick and Yildirim (2000) revealed that faculty at a Californian Urban Community College found that an effective way to encourage faculty to use computers in the classroom is to increase their level of competency. Thus competency could be achieved by providing training that is designed for each individual's level of anxiety, liking, and confidence when using computers.

Adams (2002) found that survey participants who attended teacher educator professional development programmes were mostly younger females with few years of teaching experience. The majority of non-participants in teacher

educational professional development programmes in the study were older males who have more years of teaching experience. Survey data also showed that 25% of the respondents were non-users of computers in their teaching.

Some colleges and universities provide faculty access to training through campus computer support initiatives. It is also evident from literature that many educators are teaching themselves to use computer technology through manuals. Since a review of the literature revealed that training is a critical factor in educators' adoption and use of computer technology in their teaching, faculty background training was used as a variable in the study,

Studies of Teachers' Perception toward Technology Integration

In addition to an examination of faculty access to training, researchers have also studied social, organizational, and motivational factors when determining whether an individual will adopt and use an innovation. Pre-service and in-service teachers' attitudes toward the use and integration of technology in teaching and learning have been extensively studied in recent years (Dawson & Norris, 2000; Dawson, Pringle, & Adams, 2003; Fulford & Ho, 2002; Gunter, 2001; Marra & Carr-Chellman, 1999). Some surveys conducted on teachers' attitudes toward technology have disclosed that teachers hold optimistic attitudes about the use of technology in education, but they are not self-assured of their ability to employ technology in their classroom (Willis & Mehlinger, 1996; Willis & Montes, 2003). On the contrary, some studies have revealed that pre-service teachers who experienced technology in their courses at college are more

confident with their technological skills and more ready to integrate technology into their teaching practices (Dawson, & Norris, 2000; Fulford & Ho, 2002).

The literature also notes that developing positive attitudes toward the use of technology in teaching and learning help pre-service teachers plan their uses of technology in their future classrooms (Marra & Carr-Chellman, 1999; Rizza, 2000). Pre-service teachers who experienced constructivist uses of technology in their courses on classroom technologies developed strong and positive attitudes toward upcoming uses of the same technologies in their future classrooms (Marra & Carr-Chellman, 1999). After engaging pre-service teachers in constructivist uses of computers, Marra and Carr-Chellman observed that pre-service teachers developed strong and positive attitudes toward “future uses of that same technology” in their teaching (p.294).

In a study focused on the impact of the use of technology in an undergraduate course, Rizza (2000) found that pre-service teachers’ attitudes positively changed after experiencing technology in the course. Pre-service teachers, who experienced instructional technology in their undergraduate educational psychology course, felt their “comfort” and “confidence” increased as students and as future teachers (p.140). Similarly, Wright, Stallworth, & Ray (2002) found that after experiencing technology in their two methods courses, pre-service teachers had more positive opinions about the value of teaching and learning with technology.

The research has shown that pre-service teachers, who had experiences with technology in their teacher preparation programmes, were more confident

with their technological skills and ready to integrate technology into their teaching practices (Dawson & Norris, 2000; Fulford & Ho, 2002; Snider, 2002; Stuhlmann, 1998). In addition to attitudes, some researchers examined the relationship between pre-service teachers' experience with technology and their amount of anxiety and found that students' anxiety levels decreased after completing introductory technology courses or after experiencing the uses of technology in their methods courses (Fulford & Ho, 2002; Gunter, 2001; Wright, Stallworth, & Ray, 2002).

The literature shows that despite the growth of pre-service teachers' positive attitude toward technology, pre-service teachers rarely transfer their technology skills into their own teaching and learning practices (Clift, Mullen, Levin, & Larson, 2001; Dawson & Norris, 2000; Whetstone & Carr-Chellman, 2001). Whetstone and Carr-Chellman found that pre-service teachers perceive computers as important components of teaching and learning, and as a result prepare to integrate them effectively in their future classrooms. However, only one fifth of the pre-service teachers in the study registered and finished a computer course voluntarily. Therefore, they suggest there is a need for some kind of required computer instruction in pre-service teacher education to support pre-service teachers' skills and practices as well as their confidence and beliefs about using technology.

Haddad (2002) elaborates on the importance of well financed and properly resourced implementation of educational technologies into the teacher preparation

curriculum. He further advanced four prevailing issues that constrain the effectiveness of such teacher training:

- i. Many programs are limited to computer literacy and do not train teachers in the instructional use of technology.
- ii. Most programs are supply driven – if we supply training we ensure classroom success. The demand side is equally important. We have to consider the demands of teachers, their needs, interests, attitudes, etc. Why don't teachers make better use of instructional ICTs? Do they see a practical use of ICTs in their classrooms, or do they consider technology as a threat and a waste of time? Does the school environment (nature of the curriculum, role of teacher and student, allowance for innovation) demand or at least allow for the use ICTs to add value to the teaching/learning process?
- iii. Some training sounds like a selling pitch, amplifying the great benefits of ICTs for the teacher, the students, the school and the world at large! This is a recipe for fanaticism and frustration. Training should be grounded in realism and educational context: ICTs' potential, limitations, and conditions for success.
- iv. No training, no matter how good, can be a one shot intervention. Training in the use of ICTs for instructional and learning purposes takes time and individual handholding. The reasons are many: even the most knowledgeable and enthusiastic energetic teachers face time constraints and competing demands to learn new things; technologies are unreliable –

the more sophisticated and promising they are the more they break down; both hardware, software and educational applications keep changing; and, teachers need time to figure out a comfortable and beneficial zone of use of ICTs in their classrooms (Haddad, 2002: 5, 6).

In summary, a review of the literature revealed that five key areas that affect the teacher educators' integration of educational technology in teaching and learning: (a) socio-demographic characteristics of tutors (b) awareness of educational technologies in teacher training, (c) background of tutors in technology integration in education, (d) modes of preparing pre-service teachers to integrate technology, and (e) perception of tutors about educational technology in modern classrooms.

CHAPTER THREE

METHODOLOGY

The study sought to explore the views of tutors about integration of educational technology in Colleges of Education curriculum in the Central Region of Ghana. The research methodology used for the study have been described in this chapter under the following sections: (1) Research design, (2) Target population (3) Variables of the study, (4) Research instruments, (5) Pilot Testing, (6) Data collection procedure, and (7) Data Analysis Plan.

Research Design

The descriptive survey design is the most suitable research design to capture an educational phenomenon. One of the fundamental roles of a descriptive survey design is to provide platform for posterior (inferential) studies (Gall, Borg & Gall, 1996). The descriptive survey design was employed because it affords the subjects of the research the opportunity to describe situations as it is known or as it is seen in various settings and at different location (Owens, 2002). The descriptive survey design is a unique research methodology because it gathers information from first-hand sources, uses the most unbiased representation of its

population, and the descriptive survey data are mostly complimented by secondary data.

The descriptive survey design allows for a wide range of data collection strategies spanning from face-to-face, mail, telephone and interview to web and a combination of methods providing a quicker rate of responses and the strategy provides cost effective means of collecting data and handling them (Cohen, Manion & Morrison, 2000; Druckman, 2005; Owens, 2002). Survey design has the added advantage that it describes, explains and explores the research purpose (Pickard, 2006) and makes inference from the research data at close range (Gay, 1987; Polit & Hungler, 1993).

One intention of the descriptive survey is that, it tries to identify relevant educational phenomena and the variables that intervene at a first step for posterior studies. Apart from collecting data, descriptive investigatory action also attempts to give answer to the questions about the state of any educational situation, which is one of the main purposes of educational research (Mateo, 1997).

As an exploratory method, the utilization of a descriptive approach contributes to future research. There are several types of descriptive studies; among them the evolutionary, survey-based studies, case studies and observational studies are a few that comes to mind easily (Gall, Borg, & Gall, 1996). Data collection tools for descriptive surveys include the interview and the questionnaire (Ary, Jacobs, & Razavieh, 1990). Donald (1998) opine that interviews allow greater flexibility and more control of the questions, while

questionnaires can be designed to be self-administered and mailed to a larger group of subjects in more diverse locations. However, misinterpretation of questions or statements may result in incorrect or inappropriate responses and participants may not respond well to questions which seem too long, too confusing, too sensitive, or considered not interesting (Bourque & Fielder, 1995). Furthermore, the reliability and validity of the design in eliciting data may be an issue. Descriptive design's reliability is affected by random error, measurement error and internal consistency, while the overall validity is determined by content and criterion validity (Litwin, 1995). Research supports Donald (1998) that the overall validity of any survey can be greatly affected by the importance of the topic to the respondents, as well as the degree of anonymity that it provides (Ary, Jacobs, & Razavieh, 1990).

Descriptive studies often do not require complex statistical analysis (Ary, Jacobs, & Razavieh, 1990). Data gathered from self-administered questionnaires are typically analyzed using simple statistical tools such as tally or frequency counts; measures of central tendencies; measures of dispersion; and cross-tabulation correlation between categorical and nominal data (Fink, 1995a).

A survey design was chosen for this study for two reasons: (a) the study required data collection from all tutors (census of tutors) in the three Colleges of Education located in the Central Region of Ghana at a first stage. At a second stage, further data were collected from two tutors in each of the three colleges under review by means of structured interviews. Therefore, administering survey instruments (primarily questionnaires) for these participants is the most efficient

means of collecting the required data, and (b) since one of the primary aims of the study is to gather various perspectives to describe and make inference regarding tutors use of educational technology at the Colleges of Education in the three Colleges of Education the method became the most apparent.

A census of the tutors in the Colleges of Education in the Central Region was considered for the study. Dunn (2001) maintains that larger samples exhibit smaller amounts of sampling error than smaller samples which exhibit higher sampling error in practice. It follows from Dunn's proposition that making use of census is better than using sample provided the entire population is accessible to the researcher. Again, Dunn maintains that sampling error that might find its way into the results might be avoided and that supports Gall, Borg and Gall's (1996) view that larger samples have better judgment over smaller ones, provided such larger samples are available and accessible. For the purposes of this study, a census of tutors was considered under the assumption that all the tutors are liable to inform the study about integration of educational technology in the Colleges of Education curriculum. Again, by using the census it affords the researcher the opportunity to have an in-depth understanding of the real issues of use of educational technologies among Colleges of Education tutors in the Central Region of Ghana, as well as open an avenue for secondary studies. There are three Colleges of Education in the Central Region of Ghana.

The study was limited to only the three colleges located in the Central Region as the two major universities specialized in preparing teachers for Ghana (University of Cape Coast and University of Education, Winneba) are located in

the Central Region and represents a convenience sample for the researcher. Furthermore, research has shown that integration of educational technology is affected by the subject area of specialization. Choosing Colleges of Education within the Central Region which have all the optional programmes being offered to prepare teachers at the Diploma level is most appropriate. Focusing the study in the Central Region also allows for a generalization over the whole of the Central Region tutors thereby enhancing the external reliability of the study (Dunn, 2001).

Target Population

The target population consists of all tutors in the three Colleges of Education in Central Region of Ghana. At the time this study was conducted, there were 140 tutors in the three Colleges of Education in the Central Region of Ghana. A target response rate was set at 95%. Table 5 shows the number of tutors in various colleges' in the target study region. Despite the stated target of 95% return rate, the usable data collected amounted to 91.43% a little lower than the said target.

Table 5

Number of Tutors in Each of the Central Regional Colleges

Name of College	No. of Tutors
Komenda College of Education	36
OLA College of Education	55
Foso College of Education	49
Total	140

Source: Field Data, 2010

Selection of Interviewees

The interview participants were purposively sampled from the population. A letter was sent to the Vice Principal (Academic Affairs) to assist with the selection of the interviewees as shown in appendix B. Individual tutors known for integrating educational technology in teaching and learning were selected to ascertain how they are affected by the educational technology in the teaching and learning setting in the various colleges where they currently teach. In all, six tutors were selected to participate for the structured interview (Appendix D). The six interviewees consisted of two interviewees from each of the three Colleges of Education the Central Region of Ghana.

Variables of the Study

The purpose, design and research questions sought to establish some interaction and intra-action between the variables in the study. In all, five variables were used for the study to learn about integration of educational technology by tutors for teaching and learning. The five variables are: (1) socio-demographic characteristics of the tutors, (2) awareness about educational technology, (3) background of tutor in teaching with educational technology, (4) how pre-service teachers are prepared to teach with educational technology, and (5) perception of tutors about educational technology integration.

Research Instruments

The questionnaire (Appendix E) and interview guide (Appendix D) are the main data collection instruments. The questionnaire has been prepared with five

themes in view; these include (a) General information (demographic characteristics) of respondents, (b) awareness about educational technologies, (c) background of tutors in educational technology, (d) preparing pre-service teachers to integrate technology, and (e) perception of tutors on integration of educational technology in teacher preparation. In all, there were (i) seven factual questions in the questionnaire (Section A, excluding question 8), and 46 opinion statements (question 8 and Sections B – E) were used to answer the research questions.

A structured interview was carried out by means of an interview guide (see Appendix D) to gather extensive data on the subject of the study from two tutors each from each of the three Colleges of Education in the Central Region of Ghana. A letter (see Appendix B) was sent to the Vice-Principal Academic (each College of Education in Ghana has two vice principals – the Vice-principal Academic and the Vice-Principal Administration) to assist with the selection of two tutors who are known for integrating educational technology in teaching and learning at the college.

Pilot Testing

The survey instrument was given to 45 tutors who previously taught in the target colleges but had relocated to teach in a different Region or gone on pension in the last one year. The pilot test was conducted to identify ambiguities in the instructions, clarify the wording of questions, detect omissions or unanticipated answers in the questionnaire, and to determine the internal reliability of the questionnaire. The researcher met 30 out of the 45 field test participants in

February, 2010 at a marking centre in Saltpond. After two separate meetings, all 30 completed questionnaires were retrieved; 6 of the remaining 15 completed pilot questionnaires were posted by land mail to the researcher; 3 pilot participants emailed their input to the researcher. In all, 86.67% return rate was recorded for the completed pilot test questionnaire.

As a result of the pilot testing, sections B – E of the rating scale was revised to a five point scale instead of the initial four point scale. Question 33, 47 and 48 were added. Several pilot test participants reported that it took them about ten (10) minutes to complete the survey. The instructions and the survey instrument were revised to incorporate the changes. In addition, the revised questionnaire was given out to the same pilot test participants. In the second administration, 36 of the 39 revised questionnaire were obtained with a completed questionnaire return rate of 92.31%. Three participants whose questionnaires were omitted due to incomplete responses were left out of computed statistics. The interview guide was externally reviewed by a former tutor at one of the Colleges of Education now a faculty member with the University of Cape Coast. Suggested amendments were incorporated as in Appendix D.

One of the objectives of pre-testing or piloting the research instruments was to measure the reliability and validity. Dunn (2001) defines reliability as the extent to which a given measure provides a stable or consistent reading each time it is used. The idea expressed here however is, how consistent it measures its variables or construct? For the purposes of academic research however, the interest lies in reliability coefficient (*reliability coefficient* refers to a numerical

index of how stable or consistent the scores on a measure are across two or more administrations). Table 6 shows the Cronbach alpha coefficient for the items in the five variables used for the study. The reliability coefficients from the Table 6, ranged from .711 to .801 which showed high consistency in the coefficient of reliability measure. Hence, the items could be said to be internally consistent to what it seeks to measure.

Table 6
Reliability Coefficient for Questionnaire

Variable	Cronbach Alpha	N of items	N of participants
Variable 1	.801	5	36
Variable 2	.711	11	36
Variable 3	.753	13	36
Variable 4	.788	16	36
Variable 5	.750	7	36

Source: Pre-test data, 2010

Data Collection Procedure

The questionnaire was administered on all tutors in the three Colleges of Education used for the study. The questionnaire was hand delivered to the participants by the researcher. An introductory letter from the Institute for Educational Planning and Administration - IEPA (see Appendix C), introducing the researcher as an M. Phil degree candidate who is undertaking a research study. A research visit letter (see Appendix A) in addition to the introductory letter obtained from the IEPA was sent to the principal. These two letters and an

additional letter (see Appendix B) requested the Vice-Principal (Academic Affairs) select two tutors known for integrating technology in teaching and learning in order to assist the researcher to gain access to the study participants.

A Excel sheet was maintained for the three Colleges of Education containing the addresses, email contacts and telephone numbers of vice-principals as key contact persons at various colleges involved in this study. The contact details (telephone numbers and emails) of the two interviewees selected by the Vice-Principals in consultation with the heads of department in each of the colleges were also noted in the database. This afforded the researcher the opportunity to book appointment with the interview participants for the administration of the interview. Although a target of 95% return rate was set, the usable data collected amounted to 91.43% a little lower than the stated target response rate.

Data Analysis

Questionnaire data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 17.0. According to Bell (1999) the following three stages should be followed: (1) Data coding, (2) data input and cleaning, and (3) data analyses. In this study Bell's three point stages were followed in handling the research data.

The responses gathered from the structured interview were categorized according to patterns and themes and a description offering explanations, and what respondents feel about the situation and condition that prevails in the various

instances (Bell, 1999; Denscombe, 2003). Denscombe proposed the qualitative researcher needs to distance himself/herself from the normal, everyday beliefs to suspend judgments on social issues for the duration of the research for responses to become meaningful and void of researcher bias. As part of the ethics observed in this study, actual names of the six interviewees were not used rather; pseudonyms were employed to introduce the respondents.

The data analysis method used in this study is both quantitative and qualitative. After receiving the survey results, the completed questionnaire responses were incorporated into the Statistical Package for the Social Sciences (SPSS) versions 17.0 to organize, reduce, and assign codes to the data. The data was analyzed by computing the basic descriptive statistics for all items on the questionnaire, such as frequencies and percentages. Descriptive research involves describing an issue, event, or situation (Gall, Borg, & Gall, 1996), therefore exploring awareness, use and perception of tutors about integration of educational technology in Colleges of Education curriculum through these statistics was in place.

The demographic characteristics of the tutors were described using charts, simple frequency tables and percentages. The question on extent of use of educational technology was explored using simple frequency tables and percentages and the responses to the item on the extent of use were further explored by means of cross-tabulation. However, Variables 2 to 5 were explored by means of a five point Likert scale to measure the extent of agreement with those statements that come before them. The range of responses available to

respondents was from “*strongly disagree*” through “*undecided*” to “*strongly agree*”. In this study however, both “*strongly disagree*” and “*disagree*” were classed under *disagreement* response type, also all “*agree*” and “*strongly agree*” options were classified under *agreement* response types and “*undecided*” responses were placed under *indecision* response types. Using these three (3) categories, it became evident that simple proportions (i.e. frequency and percentages) could be used to describe the data.

The categorization of the statements in items nine (9) through 53 into three (3) response types further requires that a decision rule has to be set to explain the patterns of responses that emerged. The stipulation was that the simple majority of the tutors’ answers informed the study of what the tutors consider as variables that hinder or otherwise improve the listed statements. The approach used in this study for data analysis meets the criterion of Converse and Presser (1986) who were of the view that there should be a confounded extremeness of direction not intensity. Albaum (1997) points out that the idea that extremity is confounded with intensity, and that makes extremity a dimension of attitudinal position. The use of the three types of responses turns to suggest that an intensity of attitude has been catered for in this study. However, such intensity were sparingly discussed under research questions 2 through 5 in this study.

CHAPTER FOUR

RESULTS AND DISCUSSION

The chapter first reports the results that have been obtained from the data collection and, secondly discusses the findings in relation to what existing literature reveals and what this particular study reveals. In this chapter, the qualitative results were organized into patterns and themes whereas the quantitative results were organized into tables and charts. The Chapter Four as well reported on the five research question that guided the study.

Socio-Demographic Distribution of Tutors in the Central Region

The research question one sought to find out the socio-demographic characteristics of the respondents. As already described in Chapter three, the questionnaires for tutors and the interview schedules were prepared for two tutors drawn from each of the three Colleges of Education in Central Region of Ghana. In all 128 completed usable questionnaires were collected for inclusion in this study. Figure 3 gives the gender distribution of tutors who participated in the study as well as the Colleges where the tutors (respondents) teach.

The percentage distribution of the tutors in the bar chart as indicated on figure 3 reveals that most of the tutors are males (72.7%, 56.9% and 78.0% from Komenda, OLA and Foso Colleges of Education respectively).

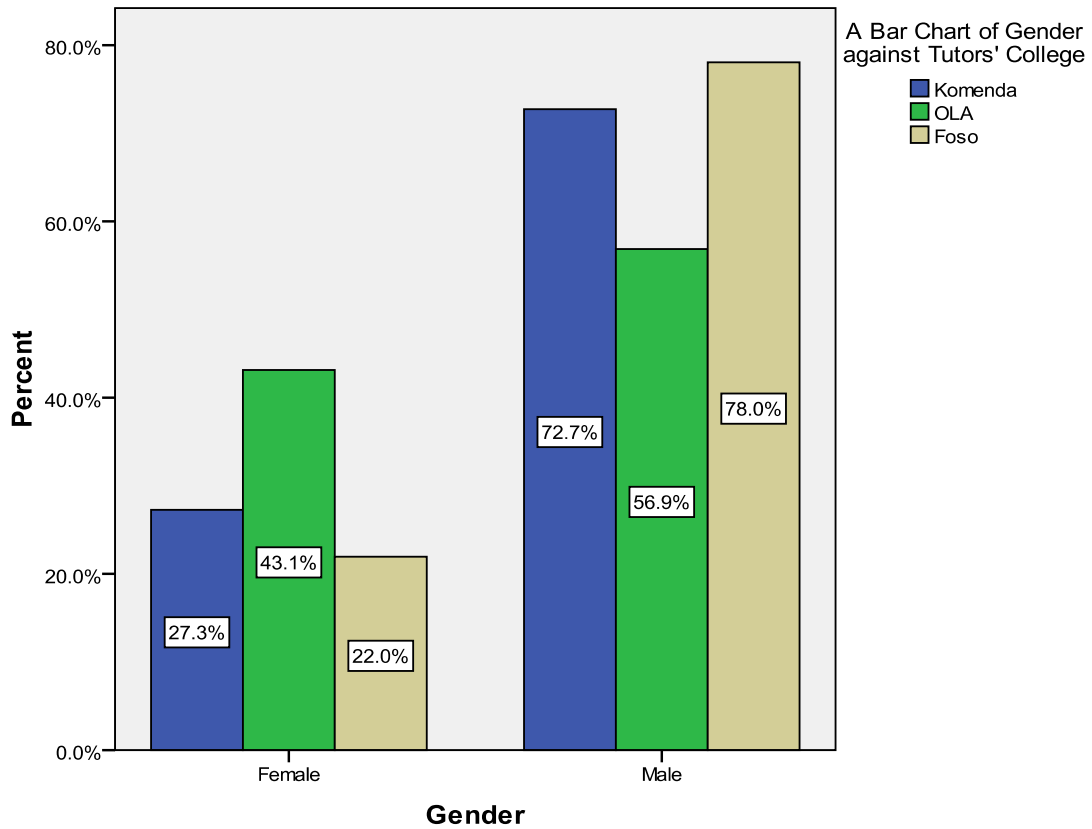


Figure 3: Gender of Tutors in Central Region Colleges of Education

The highest proportion of female tutor representation was that of OLA College of Education (41.1%). Although, the total number of tutors in the respective colleges did match it was worth identifying the pattern of staffing by sex as it has implication for staff development and distribution.

The literature suggests that the age of tutors has implication for use of educational technology in the teaching and learning process (Bill, 2003). Table 7 depicts the age distribution of tutors in the Central Region colleges.

Table 7
Age of Respondents

Age	Name of College		
	Komenda	OLA	Foso
	N (%)	N (%)	N (%)
25 - 29yrs	1(2.92%)	4(7.84%)	2(4.76%)
30 - 34yrs	5(14.72%)	11(21.57%)	5(11.90%)
35 - 39yrs	0	1(1.96%)	1(2.38%)
40 - 45yrs	18(52.94%)	24(47.06%)	13(30.95%)
Over 45yrs	10(29.42%)	11(21.57%)	21(50.00%)
Total	34(100.00%)	51(100.00%)	42(100.00%)

Source: Field Data, 2010

Most of the tutors in the three colleges considered in this study were more than forty-five years old. For instance, Foso College of Education has 50% of its tutors in the age brackets of 45 years and above. A significant proportion of the teacher educators in Komenda and OLA Colleges of Education were more than the 45 years old. If the retrainable age of teacher educators were set to tutors with less than forty-five years of age, a sizeable number of teacher educators (tutors) at these three colleges are not eligible for retraining on integration of educational technology in classroom practice. Thus, tutors younger than 45 years of age (70.58%, 78.43% and 50% for Komenda, OLA and Foso Colleges of Education

respectively) could be classified as retrainable based on the International Institute for Educational Planning's (IIEP) classification (Alleyne, 2001).

Table 8

Respondents' Years of Teaching

No. of years spent in the teaching profession	Name of College		
	Komenda N (%)	OLA N (%)	Foso N (%)
1 - 5yrs	4(11.76)	9(17.31)	5(11.90)
6 - 10yrs	6(17.65)	7(13.46)	4(9.52)
11 - 15yrs	9(26.47)	13(25.00)	9(21.43)
16 - 20yrs	5(14.71)	9(17.31)	11(26.19)
21 – 25yrs	4(11.76)	8(15.38)	7(16.67)
Over 25yrs	6(17.65)	6(11.54)	6(14.29)
Totals	34(100.00)	52(100.00)	42 (100.00)

Source: Research Data, 2010

As shown in Table 8, all the 128 tutors indicated the number of years that they have taught. The data showed that most tutors (representing 26.47%, 25% and 21.43% for Komenda, OLA and Foso Colleges of Education respectively) had been teaching for 11 – 15 years. The years of teaching experience approximates a normal curve with a similar number of tutors in the 1-5 and over 20 year groups. Another significant finding was the 10, 14 and 13 tutors from Komenda, OLA and Foso Colleges of Education, respectively, have been teaching for more than twenty years. The remaining tutors had been teaching for

less than 20 years. According to Adams (2002), younger tutors are more prone to using educational technology than older counterparts. Therefore, based on Adams assertion, a better proportion of the respondents in this study who are within the youthful group would be more likely to integrate educational technology if the best opportunities are offered to them. That was further evidenced by the six tutors, all under 45 years of age, who were selected by their vice principals to be used for the structured interview portion of this study. They were all less than 45 years of age. Table 9 shows the number of years that tutors have been teaching in current college as a teacher educator.

The data in Table 9 revealed that very few (representing 5.88%, 7.69% and 14.29% for Komenda, OLA and Foso Colleges of Education respectively) tutors have taught in their respective colleges for over fifteen years. At all three institutions, more than 50% of the tutors had taught in their respective institutions for less than 6 years. The largest percentage of tutors at Komenda fell in the 6-10 years of experience range and 3-5 at the other institutions. The distributions are positively skewed for both Komenda and Foso while OLA tutors are represented in a bi-modal distribution region.

It became evident that number of tutors varied from subject to subject. More than 10 tutors taught in each of the Central Regional colleges in the areas of English, Mathematics, Science, Education Studies which represented 8.7%, 14.2%, 11.8% and 13.45 respectively. Only Sewing had one person teaching it; the rest of the subjects were taught by more than a person in the Central Region

colleges. One of the tutors did not indicate the subject that he/she teaches in the college.

Table 9

Tutors' Number of Years of Teaching in Current College

No. of Years of Teaching in Current College	Name of College		
	Komenda N (%)	OLA N (%)	Foso N (%)
Less than 3 years	8(23.53)	7(13.46)	3(7.14)
3 – 5 years	10(29.41)	22(42.31)	19(45.24)
6 – 10 years	11(32.35)	5(9.62)	9(21.43)
11 – 15 years	3(8.82)	14(26.92)	5(11.90)
^b Over 15yrs	2(5.88)	4(7.69)	6(14.29)
Totals	34(100.00%)	52(100.00%)	42(100.00%)

Source: Field Data, 2010

Figure 4 illustrates the highest degree that respondents possess as at the time the data was collected. Most (75%) of the tutors were bachelor degree holders compared to the 25% who were masters' degree holders as at the time data were collected in the Colleges of Education considered. Notwithstanding the finding in Figure 4, one of the Vice Principals related that,

Most of the Bachelor holders are undergoing further studies leading to the award of master's degree in education principally by

sandwich [distance mode] (personal communication, 9th March, 2010).

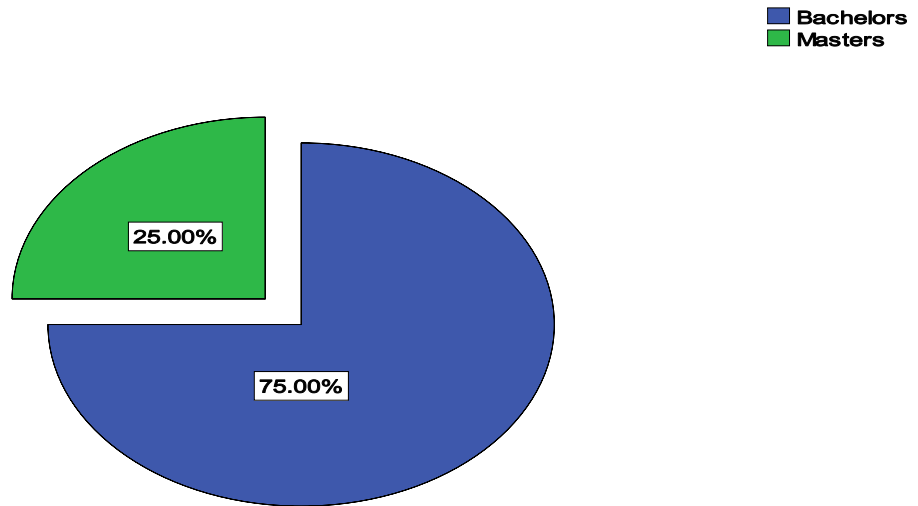


Figure 4: Academic Qualification of Respondents

Supplementary information was obtained from selected respondents to the questionnaire. The Vice Principals facilitated the selection of two tutors from each college who were known for integrating technology in their teaching. The structured interviews supported the study as it provided additional demographic data and information on awareness, background, and perception about educational technologies in a more interactive section with the interviewer. In all, six respondents' views were captured.

Table 10 shows the distribution of age of interviewees' by gender. A single female (16.67%) tutor who taught at OLA College of Education, a female college, in Central Region of Ghana, was nominated as one of the tutors known

for integrating educational technology into classroom practice. The rest (83.33%) of the tutors were males. All the tutors used in the study fell in the age brackets of 20 to 45 years. Based on the pattern that emerged from both the questionnaire and the interviews it could be inferred cautiously that tutors below 45 years of age are more likely to integrate educational technology compared to their counterparts.

Table 10

Distribution of Age and Gender of Interviewees

Age of Interviewee	Male N (%)	Female N (%)
20 – 29years	1 (16.67)	0
30 – 34 years	2 (33.33)	0
35 – 39 years	1 (16.67)	1(16.67)
40 – 45years	1(16.67)	0
Total	5 (83.33)	1(16.67)

Source: Field Data, 2010

According to Boyd, Lankford, Loeb, Ronfeldt, and Wyckoff (2010), both newly transferred and newly hired teachers are more likely to adopt new professional development standards than teachers who have been teaching in the same institution for a long time. The study showed that most (50.1%) teacher educators in OLA have been teaching less than four years and similar trend was observed for Komenda and Foso College of Education. Further, on the basis of age and the gender distribution that the study reports, Zhou and Xu (2007)

recommended that professional development for females should involve more showcases and interactions, as well as additional training would be more appropriate when it provides many hands-on activities.

Awareness about Educational Technologies

Research Question 2 which centers on the knowledge of the respondents about educational technology was also explored by means of the questionnaire and the structured interview that was conducted. Table 11 depicts the distribution of respondents by their knowledge about educational technology. Five statements were listed to test respondents' awareness of educational technologies. In the first case, respondents were asked whether they are aware if there is a policy or plan at their college that requires tutors to teach with technology. Most of the respondents (representing 63.5%) "*agreed*" that such a policy exists. Although 63.5% "*agreed*", indeed it was 17.6% who 'strongly agree' whereas the remaining region while the majority were in the 'agree' region. Also, 37 (29.4%) and 9 (7.1%) representing "*disagreed*" and "*undecided*" response types respectively were noted.

The respondents were asked whether there was a plan that outlined how educational technology resources should be acquired in their college. The proportion of the respondents (48.4%) who "*agreed*" that there is such an awareness as opposed to the 41 (32.5%) who "*disagreed*" that there is a plan that outlines how educational technology resources should be acquired. However, 24 (19.0%) respondents were "*undecided*" whether there is such a plan that outlines acquisition of educational technology resources.

Table 11**Respondents' Awareness about Educational Technology**

Awareness about Educational Technologies	Response type		
	Disagreement	Indecision	Agreement
	N (%)	N (%)	N (%)
1) There is a policy or plan at my college that requires teachers to teach with technology	37 (29.4)	9 (7.1)	80 (63.5)
2) There is a plan that outlines how educational technology resources should be acquired at my college	41 (32.5)	24 (19.0)	61 (48.4)
3) My college has a policy from the TED of GES that outlines computer skills that pre-service teacher's need to be able to teach in the 21st Century classroom	26 (20.5)	20 (15.7)	81 (63.8)
4) There is a plan at my college that outlines the goals of teacher training and how educational technology can be used to achieve these teacher training goals	25 (19.7)	19 (15.0)	83 (65.4)
5) Workshops are organized at my college to show new teaching technologies available for pre-service teacher training	40 (31.7)	11 (8.7)	75 (59.5)

Source: Field Data, 2010

Tutors were asked if their respective colleges have a policy from the Teacher Education Division (TED) of GES that outlines computer skills that pre-service teacher's need to be able to teach in the 21st Century classroom. The majority 81(63.8%) of the respondents said that they "*agreed*" that pre-service teachers need to acquire some computer skills as the TED asserts. However, the minority of the respondents "*disagreed*" (20.5%) and 20 (15.7%) were "*undecided*" over computer skills teachers should acquire to teach in the 21st century classroom.

Respondents' awareness of the stipulation that there is a plan at their respective college that outlines the goals of teacher training and how educational technology could be used to achieve these teacher training goals was queried. Again, a majority, 83 (65.4%), "*agreed*" that their respective colleges have outlined goals about teacher training with educational technology.

The final item investigated the respondents' awareness as to whether workshops are organized at their college to show new teaching technologies available for pre-service teacher training programmes. A notable group of tutors (59.5%) representing the simple majority of tutors in the three colleges "*agreed*" that such workshops are organized at their institutions.

In summary, the study revealed that most of the respondents are aware of educational technologies. Five items were used to study the variable on tutor's knowledge about educational technology. In all instances, the simple majority were in the "*agree*" category. Although the least represented response is the respondents who were "*undecided*", there were also those respondents (mid

range) who “*disagreed*” that they have knowledge about educational technologies to use in their teaching and learning endeavour.

Tutor’s knowledge about educational technologies was further explored through a structured interview that was carried out on six tutors in the three colleges of education (that is, two interviewees per college) in the Central Region of Ghana. In the structured interview, knowledge about educational technology was assessed along the training that interviewees have acquired at the university or elsewhere to make them ready for teaching appointment in a College of Education.

Initially, a question was posed as to the educational technologies that respondents used in class during their training in the university or elsewhere. This item elicited a number of responses. For instance *Alice* had this to say:

While studying in college the real grasp with educational was sorely lacking but I relied on the theoretical cases, that is, courses I took on information retrieval and educational technology to develop interest in educational technology (personal communication, April 5, 2010).

Felix spoke about a similar experience, during this training, stating:

I took a programme in bachelor of education in computer science but we were not taught how to integrate computers into our teaching. Though I took courses in computer applications, information retrieval and educational technology, I must say that we used [Educational Technology] it sparingly in class as these

was related to computers and projectors (personal communication, May 8, 2010).

However, *Charles* stated:

I happened to attend a teacher training college before going to university. At [teachers'] college we did nothing about and use [d] no educational technology. On the other hand, at the university lecturers as well as students make use of statistical packages, library resources that support educational technology (personal communication, May 5, 2010).

In the case of *Dan* and *Ernest*, they listed Computers, [Microsoft] PowerPoint, TV, DVD, overhead projector as the educational technology that they saw being used at the university. There was another question on the training interviewees have received on how to use educational technology in the classroom. *Bashiru* had this to say:

I took a course on educational technology in 1st year in bachelor's programme which was compulsory. I think that course together with the introduction to ICT that I took at the masters level were just fantastic start [in the use of educational technology] for me (personal communication, May 5, 2010).

Apart from *Felix* who happened to attend an extra capacity building workshop in Abetifi, it was figured that *Dan*, *Ernest*, and *Felix* happened to attend capacity building in ICT use in Kumasi organized by Teacher Education Division of the GES. However, *Alice* and *Charles* are two science tutors who had been teaching

for less than three years, they said they have used Teacher Education for Sub-Saharan Africa (TESSA) resources to enrich their educational technology skills and other capacity building avenues that they explored themselves.

Knowledge of educational technology was explored to find out whether the training received by the teacher educators equipped them for the teaching assignment in a College of Education. The recurring response as received could be summarized in the words of *Alice*:

I did not receive enough training on use of educational technologies; this is a nice way of saying that my teacher education programme did not prepare me to integrate educational technology in my teaching. We were introduced to educational technology but we were not immersed into using educational technology in the classroom (personal communication, 5th April, 2010).

As if speaking the same language, *Charles* stated,

I was not introduced to software I could use in my teacher education career in the University (personal communication, 5th May, 2010).

The awareness of respondents on educational technology is significant. Most tutors responding to the quantitative survey showed that they are aware about educational technology and their role as teacher educators as shown on the five point likert scale. This confirms the findings on researches conducted on technology integration which pointed out that awareness about educational

technology is to a high extent among schools and colleges of higher education tutors (Di Benedetto, 2005, Yildirim, 2000, & Vannatta, & Fordham, 2004).

Tutors' Background in Educational Technology Integration

The research question 3 explored the educational technology background training that tutors' might have acquired during university training. Table 12 shows the responses given by 128 tutors who returned the completed questionnaire. Eleven (11) statements were structured to test the tutors' background in educational technology integration.

Item 1 of Table 12 related the opportunities at respondents' college for staff development of tutors interested in using educational technology in their classes. A total of 127 tutors responded to this statement with the majority (74.8%) "*agreeing*" to the opportunities that are offered to staff development in educational technology integration. In reality, 48.82% '*strongly agreed*' that opportunities for staff development in educational technologies were available. However, 8(6.3%) tutors were "*not decided*" whether such staff development opportunities occurred in their institutions. Twenty-four (18.9%) respondents stood their ground that such opportunities for staff development "*did not occur*" for tutors who are interested in using educational technology in their classes as shown in Table 12.

For Item 2, 61 (48.4%) indicated that they "*agree*" workshops are organized in their college for tutors to improve their skills in technology use in the classroom. This was closely followed by 52 (41.3%) who said that they "*disagree*" that workshops are organized in their college for tutors to improve

their skills in technology use in the classroom. Thirteen respondents on the other hand, were “*not sure*” whether any such workshops are offered in their college or not suggesting that a communication issue may be present.

In Item 3, 66 (52.0%) “*disagreed*” that training is conducted for tutors on how to use educational technology in their teaching and learning programmes. Indeed, 43.4% “*strongly disagreed*” that training is conducted for tutors on how to use educational technology in their teaching and learning programmes. Whereas, more than a third of the respondents 61 (37.8%) also said that they “*agree*” that they got training on how to use educational technology in teaching and learning. Still some tutors remained unidentified with the agreement and disagreement groups; this represents 10.2% of the respondents. Tutors background in educational technology was also traced to college leadership and support services that respondents receive in order to integrate technology in class as shown in Item 4 of Table 12. Three respondents out of the 128 total respondents did not respond. More than three-fourth (97: 77.0%) of the tutors said that they “*agree*” that their college leadership encourages and supports teaching with educational technology in their institutions.

Notwithstanding, a much smaller proportion 21 (16.7%) compared to those who “*agreed*” were of the view that leadership “*does not encourage*” educational technology use in the colleges. Also the same numbers were of the view that “*no support services*” are gotten from college management.

Table 12**Respondents' Background in Teaching using Educational Technology**

Background in Teaching using Educational Technology	Response type		
	Disagreement	Indecision	Agreement
	N (%)	N (%)	N (%)
1) There are opportunities at my college for staff development of tutors interested in using educational technology in their classes	24 (18.9)	8 (6.3)	95 (74.8)
2) Workshops are organized by my college for tutors to improve their skills in technology use in the classroom	52 (41.3)	13 (10.3)	61 (48.4)
3) I have had training at my college on how to use educational technology in my class	66 (52.0)	13 (10.2)	48 (37.8)
4) My college leadership encourages and supports teaching with technology	21 (16.7)	8 (6.3)	97 (77.0)
5) If I encounter problems when using the technology, there is someone at my college to provide technical assistance	15 (11.8)	11 (8.7)	101 (79.5)

Table 12 *continued*

Background in Teaching using Educational Technology	Response type		
	Disagreement	Indecision	Agreement
	N (%)	N (%)	N (%)
6)There is support from my college’s administration (e.g., release time) for tutors who want to learn how to use educational technology resources	37 (29.4)	10 (7.9)	79 (62.7)
7)I feel prepared to teach using educational technology resources	13 (10.3)	15 (11.9)	98 (77.8)
8)I feel prepared to teach my students “how-to-teach” with educational technology resources	29 (23.2)	13 (10.4)	83 (66.4)
9)I have sufficient knowledge about the different types of software to use in my classes	58 (46.4)	13 (10.4)	54 (43.2)
10)I feel prepared to use computers to communicate and collaborate with peers in the field	29 (23.0)	13 (10.3)	84 (66.7)
11)I feel prepared to use computers to conduct research	16 (12.7)	8 (6.3)	102 (81.0)

Source: Field Data, 2010

Further, the tutors related in Item 5 of Table 12 that if they encounter problems when using the technology, there is someone at the college to provide technical assistance. Apart from the 26 (20.5%) who either “*disagreed*” or were “*undecided*”, 101 (79.5%) of the 127 respondents “*agreed*” that there is someone to assist tutors if they encounter problems when using technology in the college.

In addition to how the leadership of the colleges encourage educational technology use (Item 4), Item 6 assessed the support that college administration gives (e.g., release time) for tutors who want to learn how to use educational technology resources. This was one of the populous items since it was responded to by all the 128 respondents. Though 37 (29.4%) of the respondents “*disagreed*” and a further 10 (7.9%) were “*undecided*”, most of the respondents agreed that the college administration supports (e.g., release time) for tutors who want to learn how to use educational technology resources.

Item 7 also showed teacher educator’s background in integrating educational technology on how prepared tutors are to integrate educational technology resources in their teaching and learning endeavour. Again, more than three-fourths of the respondents (98: 77.8%) “*agreed*” that they feel prepared to teach with educational technologies. The remaining 22.2% could not say whether they feel prepared to integrate technology in their teaching and learning.

The difference between teaching with educational technology and teaching how to teach with educational technology was addressed in Item 8. The intent of this item was to determine how prepared tutors are to teach teacher trainees to integrate educational technology in their teaching. Out of the 125 respondents, 13

(10.4%) were “*undecided*”, 29 (23.2%) “*disagreed*” that they teach their trainees how to teach with educational. The bulk (66.4%) of the respondents though “*agreed*” that they teach their trainees how to teach with educational technology.

Table 12 Item 9 addressed respondents’ knowledge about the software to use in class. The majority, 58 (46.4%), “*disagreed*” that they are aware of the software to use in class. A close proportion, 43.2% of the respondents, “*agreed*” that they aware of the software to use in class. Nonetheless, 13 (10.4%) were “*undecided*” on the response type they belong to. The preparedness to use of computers to communicate and collaborate with peers in the teaching field was also reported on in the Table 12 with Item 10. A total of 126 respondents answered the item. Two thirds of the respondents “*agreed*” that they use computers for communication and collaboration with peers. However, 29 (23.0%) “*disagreed*” that they use computers for such purpose. Overall, 42 (33.3%) did not agree or were undecided that they use computers to communicate and collaborate with the peers on the field.

The use of computers to conduct research was reported on in Table 12. The 102 (81.0%) of the respondents said that they “*agree*” that they feel prepared to do research with computers. The remaining 16 (12.7%) and 8 (6.3%) for those who “*disagreed*” and the respondents who said they were “*undecided*” respectively over preparedness to use computers to do research.

In exploring the interviewees’ background in educational technology it was found that one of the interviewees was not trained to be a teacher educator. That is what *Charles* related:

My University training did not prepare me to teach using educational technology. I was trained as an Engineering Physicist not a teacher educator, but I had a teacher training background before going to university, but even that I did learn about how to integrate educational technology in my class (personal communication, 5th May, 2010).

On the part of *Alice* who had been teaching Integrated Science and Biology for three years, said that two different avenues created the platform for educational technology integration and she shares her story,

The TESSA resources that I got contact with offered me a trilling start to explore educational technology resources. Also, a workshop organized by the Faculty of Science on how to design experiment using computers proved very helpful (personal communication, 5th April, 2010).

Moreover, although all the structured interviewees' said that their training in educational technology integration was not adequate; each of the six interviewees had attended a capacity building workshop organized by the Teacher Education Division of the GES.

The findings indicate that a few of the teacher educators in the Central Region's colleges seem not to have enough background educational technology integration. Also, most teacher educators did not receive any training during their training at the university on technology integration. However, Zhao and Bryant (2006) concluded in their studies that training that simply focuses on teaching

basic computer skills is unlikely to ensure the successful integration of technology into the classroom. To effectively integrate technology into the curriculum, teachers need to participate in intensive curriculum-based technology training that move them beyond the attainment of basic computer skills to activities that teach them how to seamlessly integrate technology into the curriculum (Baylor & Ritchie, 2002; Roberts, 2003; VanFossen, 2001).

Preparing Pre-Service Teachers to Integrate Educational Technology

The Research Question 4 dwells on how the curriculum for pre-service teachers' preparation permits the integration of educational technology at the Colleges of Education level in the Central Region of Ghana. The research question 4 sought to determine if the results that respondent provided are well collaborated by the ones they have earlier on provided in research Questions 2 and 3. Table 13 depicts the use of educational technology in their professional practice by 127 of the 128 tutors in the Central Region colleges.

Table 13

Respondents' Use of Educational Technologies

Rate of Use	Number of respondents (N)	Percentages (%)
Very Often	17	13.4
Often	33	26.0
Not Often	54	42.5
I do not use it at all	23	18.1
Total	127	100.0

Source: Field Data, 2010

Most (42.5%) respondents rated themselves as those who do not use educational technologies often. Furthermore, 60.6% stated that they either did not use ET often or not at all. Nonetheless, it could be inferred from the Table 13 that a cumulative proportion (81.9%) of the respondents use educational technologies although at different rate of usage.

The use of educational technology was also reported on by age, and sex. Figure 5 shows the use of educational technology by gender.

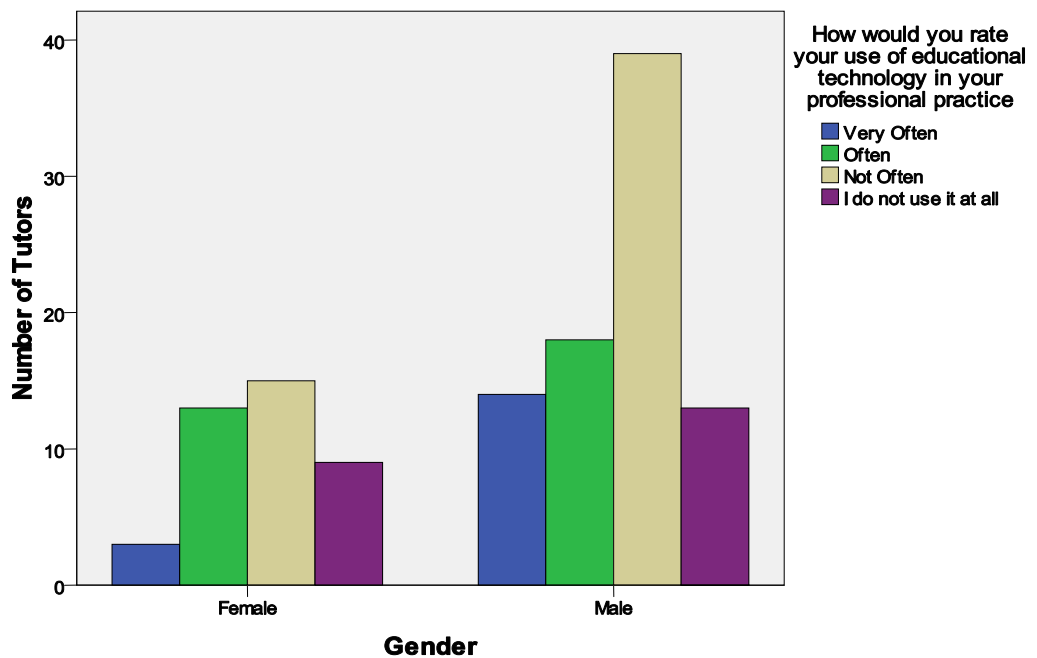


Figure 5: Gender and Extent of Use of Educational Technology

Among the male users of educational technology those who fell in the “often” and “not often” categories outweighed those in the “very often” category. A similar pattern emerged for the females but the proportion of female tutors in the region was less frequent compared to their male counterpart as shown in the

figure 5. Overall, the males were more frequent users in terms of user strength compared to females.

Furthermore, the opinions of tutors about preparing pre-service teachers to integrate technology was sought and reported on in Table 14. Besides modeling, the tutors related in item 2 of Table 14 that they show trainees how to use educational technologies. The majority of the tutors (48.0%) “*disagreed*” about putting in such efforts. Nevertheless, 55 (43.3%) “*agreed*” that they engage their trainees on how to use and a further 11 (8.7%) registered their indecision on the item. That item was followed by yet another (Item 3) on whether they model a positive attitude towards the use of educational technology in the teaching endeavour. Most of the respondents 80 (64.0%) “*agreed*” that they model positive attitude toward use of educational technology, also 33 (25.8%) “*disagreed*” that they model positive attitude whereas the remaining 12 (9.6%) said that they are” *undecided*”.

The tutors were asked whether they feel competent to model use of educational technology to their trainees. Table 14 Item 4 revealed that 40 (32.3%) tutors” *disagreed*” about their competence in modeling educational technology use to their trainees. Secondly, 65 (52.4%) “*agreed*” that they feel competent to model use of educational technology to their trainees while the remaining 19 (15.3%) were “*not sure to agree*” or “*disagree*”.

Table 14**Respondents' by how They Prepare Pre-Service Teachers to Integrate Educational Technology**

Preparing Pre-Service Teachers to Integrate Educational Technology	Response type		
	Disagreement	Indecision	Agreement
	N (%)	N (%)	N (%)
1)In my teaching, I model ways in which educational technologies can be used as teaching tools	49 (38.6)	12 (9.4)	66 (52.0)
2)I show my students how to use educational technology in their classes	61 (48.0)	11 (8.7)	55 (43.3)
3)I model a positive attitude towards the use of educational technology	33 (25.8)	12 (9.6)	80 (64.0)
4)I feel competent to model the use of educational technology to my students	40 (32.3)	19 (15.3)	65 (52.4)
5)The training students receive at my college adequately prepares them to teach with educational technology during their practice as teachers	42 (33.1)	17 (13.3)	68 (53.5)

Table 14 *Continued*

Preparing Pre-Service Teachers to Integrate Educational Technology	Response type		
	Disagreement	Disagreement	Disagreement
	N (%)	N (%)	N (%)
6)Students in my college are taught how to teach using educational technologies	21 (16.5)	12 (9.4)	94 (74.0)
7)Methodology classes expose students to ways in which educational technology can be used as teaching tools	25 (19.7)	19 (15.0)	83 (65.4)
8)At my college, there are courses specifically designed to teach students how to integrate educational technology in their classes	28 (22.2)	21 (16.7)	77 (61.1)
9)I require my students to make use of computers to complete course assignments	34 (27.2)	12 (9.6)	79 (63.2)
10)My students are required to use projectors for class presentations	74 (58.7)	23 (18.3)	29 (23.0)
11)I encourage my students to use the internet (e.g., e-mail, blog) to communicate with tutors and peers.	33 (26.6)	14 (11.3)	77 (62.1)
12)During teaching practice, I require my students to use computers to prepare their lessons	65 (51.2)	24 (18.9)	38 (29.9)
13)During teaching practice, I ask my students to use computers to complete classroom related activities (e.g., keep records, presentations)	67 (52.8)	24 (18.9)	36 (28.3)

Source: Field Data, 2010

Table 14 Item 5 also revealed the perceptions of the tutors on the extent of adequacy that the training teachers receive is to enable them integrate educational technology during their practice. Most (53.5%) tutors “*agreed*” while the proportion who “*disagreed*” were 33.1% and the remainder of the 127 respondents (13.3%) said that they were “*undecided*” over the issue of adequacy of the training to aid educational technology integration in schools. reveal

Item 6 reflects the tutors’ perceptions that students are taught how to use educational technology. Almost $\frac{3}{4}$ “*disagree*” with this statement in contrast to their report regarding their own teaching of educational technology previously reported in Item 2 of Table 14. Item 7 supports respondents’ use of methodology classes to integrate technology. Apart from the respondents who “*disagreed*” (representing 19.7%) and the 19 (15.0%) who were “*undecided*” the rest, 83 (65.4%) of the 127 respondents indicated their agreement with the use of methodology classes to expose students to ways in which educational technology can be used as teaching tools.

One explanation for this seeming inconsistency between Items 2 and 6 may lie in the responses to Item 8 which shows that most tutors (61.1%) “*agreed*” that there were courses designed specifically to teach trainees how to integrate educational technology in their classes. However, remaining respondents were not in agreement that their colleges have specific courses designed to teach trainees how to use educational technology in their classes. These represent 22.2% who “*disagreed*” and 16.7% who were “*undecided*”.

From Table 14 Item 10 it became evident that students generally are not required to use projectors for class presentations. Whereas, 74 (58.7%) “*disagreed*”, 23 (18.3%) indicated that they were “*undecided*” and a further 29 (23.0%) “*agreed*” that they require their students to use projectors for classroom presentation. In Item 11 respondents said that they encourage their trainee teachers to use educational technology in the form of the internet (e.g., e-mail, blog) to communicate with tutors and peers. The majority of the respondents, 77 (61.1%) “*agreed*” that they encourage their teachers to communicate by means of internet technologies.

In Item 12, 38 (29.9%) of the respondents “*agreed*” that during teaching practice they require teachers to use computer to prepare lessons, whereas 24 (18.9%) were “*undecided*”, but, 65 (51.2%) representing the biggest proportion of respondents “*disagreed*”. Further, in Item 13, 67 (52.8%) respondents did not ask teachers to use computers to complete classroom related activities like record keeping. Also, 24 (18.9%) tutors were “*undecided*” and the 36 (28.3%) tutors said that they “*agree*” that during teaching practice, they ask their students to use computers to complete classroom related activities (e.g., keep records, presentations)

The six structured interviewees’ revealed that the integration of educational technology into the teaching curriculum is not mandatory, as it is not grounded in the syllabi. However, five out the six interviewees (80%) pointed out that, they are very much prepared to integrate educational technology in the

teaching and learning process in the college. Despite the assertion of the five, *Alice* related the extent to which she integrates technology in teaching, she says,

I present lessons with powerpoint and also teach students [trainees] how to go online to harvest resources for their lessons (personal communication, 5th April, 2010).

Felix, Charles and *Dan* related that they integrate only educational technologies with which they are familiar. Moreover, apart from *Alice*, the remaining five tutors told the researcher that they are aware of the software to use depending on the study objectives. *Alice*, however, indicated that, she goes to the internet to look for the type of software to use. All the interviewees were able to give evidence of how to conduct a search on the internet.

The interviewees said that it was not crucial at the time they received training at the university on the use of computers and the internet for communication. The tutors further pointed out that it was not critical to use computers for conducting assignments and class presentations. The interview responses provided activities that interviewees make use of the computer. The common use of computers was for surfing the internet, storage of data files, secretarial duties and research purposes. However, other uses include social uses (like watching TV, videos, music), presentation of lessons, and lesson note preparation.

It could be inferred from the data in Table 14 and the structured interviews conducted on the six tutors that educational technology is not getting

the attention it deserves because is not mandatory in the teacher training syllabi. Studies conducted by renowned educational technologist seem to suggest that there are enormous benefits to could be gleaned from using educational technology in the 21st century classrooms which by extension means using technology in training 21st century classroom teachers (Baylor & Ritchie, 2002, and Di Benedetto, 2005; Russell, Bebell, O'Dwyer, & O'Connor, 2003:). The findings of this study imply that little or nothing is done to teach teacher candidates how to integrate technology in classroom practice.

Perception of Tutors about Teaching with Educational Technology

The research question 5 underscores the perception of teacher educators about teaching with educational technology in the three Colleges of Education in the Central Region of Ghana. The Table 15 features the distribution of respondents' perception about teaching with educational technology as shown below.

The first finding in Table 15 queries tutors' perceived understanding about educational technology was on how "educational technology could improve the quality of teaching and learning that takes place in schools". All respondents (100.0%) agreed that educational technology can improve the quality of teaching and learning that takes place in schools in Item 1. On the other hand, in Item 2 majority 114 (89.8%) of the respondents agreed that students who have access to educational technology resources are more likely to do better than those who do not have.

Table 15**Respondents' Perception about Teaching with Educational Technology**

Perception of Tutors about Teaching with Educational Technology	Response type		
	Disagreement N (%)	Indecision N (%)	Agreement N (%)
1)Educational technology can improve the quality of teaching and learning that takes place in schools	0	0	127 (100.0)
2)Students who have access to technological resources are more likely to do better than those who do not	9 (7.1)	4 (3.1)	114 (89.8)
3)Educational technology resources are important learning tools	0	0	125 (100)
4)Educational technology resources should be available in all schools	0	1 (0.8)	126 (99.2)
5)Educational technology resources should be available in all classrooms	9 (7.1)	2 (1.6)	115 (91.3)
6)Access to computers should be limited to the school library for research	96 (76.8)	5 (4.0)	24 (19.2)
7)Having computers in my class is a waste of resources	110 (88.0)	2 (1.6)	13 (10.4)
8)If I use educational technology, I will not have enough time to cover all the topics on the syllabus	97 (76.4)	8 (6.3)	22 (17.3)
9)My students have access to computers to complete course assignments	51 (40.5)	10 (7.9)	65 (51.6)

Table 15 *continued*

Perception of Tutors about Teaching with Educational Technology	Response type		
	Disagreement	Indecision	Agreement
	N (%)	N (%)	N (%)
10) If I want to teach a computer-based lesson, computers are available for use	25 (19.7)	3 (2.4)	99 (78.0)
11) My college administration does support activities geared towards educational technology integration	32 (25.6)	8 (6.4)	85 (68.0)
12) There are enough educational technology tools in my college	39 (31.5)	13 (10.5)	72 (58.1)
13) Monies are made available for procurement of educational technology tools for my department	75 (59.1)	20 (15.7)	32 (25.2)
14) Colleagues in my college do encourage me to use educational technology in my teaching and learning	47 (37.9)	12 (9.7)	65 (52.4)
15) The integration of educational technology into the curriculum results in only minor improvement in learning over the traditional methods	85 (67.5)	9 (7.1)	32 (25.4)
16) I have a need to use educational technology in my instructional activities	9 (7.1)	1 (0.8)	117 (92.1)

Source: Field Data, 2010

Table 15 Item 3 further showed the recognized impact of educational technology in teaching in the 21st century classroom. All the 125 (100.0%) respondents agreed that educational technology resources are important learning tools. Tutors view on whether educational technology resources should be available and used as important learning tools in all schools was additionally explored. Although none of the responses “*disagreed*” about making educational technology available in schools, 1 (0.8%) was “*undecided*” whether educational technology resources should be made available in schools. Nearly all the respondents, 126 (99.2%) of the 127 total respondents “*agreed*” that educational technology resources should be available in all schools in Item 4.

Item 5 further reveals that most (91.3%) respondents agreed that educational technology resources should be available in all classrooms. Besides the respondents who “*agreed*” that educational technologies should be made available in classrooms, 9 (7.1%) “*disagreed*” and a further 2 (1.6%) were “*undecided*” about whether educational technologies should be made available to classrooms. Tutors thought on whether access to computers should be limited to the school library for research was asked. Of the 125 tutors who responded to the question, 96 (76.8%) failed to agree that it should be limited to the school library for research which represents the majority of responses received. Although a few 29 (23.2%) of the respondents did “*agree*” that computers should be limited to the school library for research in Item 6.

In Table 15 Item 7, although, 13 (10.4%) tutors “*agreed*” that having a computer in their class was a waste of resource, majority 110 (88.0%) of the

respondents differ in their opinion that having computers in their classroom is a waste of resource. The opinion of respondents was gathered in Item 8 on whether using educational technology will not afford them enough time to cover all the topics in the syllabus. For the most part, 97 (76.4%) of the 127 respondents said that they “*disagree*” that by using educational technology they will not have enough time to cover all the topics in the syllabus. On the perceived availability of computers in colleges to assist teacher trainees complete their course assignment, Table 15 revealed that 51 (40.5%) respondents disagreed that their students have access to computers to complete assignment while 65 (51.6%) agreed that their trainees have access to computers to complete course assignments. As to whether computers are available should a tutor want to teach a computer based lessons as related in Item 9, 99 (78.0%) of the respondents said that they “*agree*” there is enough computers in case they want to use it for computer based lessons, while 25 (19.7%) of the remaining 28 respondents “*disagreed*” that there are enough computers available in the colleges for tutors who want to use them for computer based lessons.

Item 10 of Table 15 shows the perceived administrative support activities that tutors received were geared towards educational technology integration. Although 32 (25.6%) and 8 (6.4%) could not decide whether the administrative support services were offered, 85 (68.0%) respondents representing the uppermost proportion of responses said that college administration support activities are geared towards educational technology integration in Ghana. In a related item (#11), 72 (58.1%) of 125 respondents indicated that there are enough educational

technology tools in their college, although 39 (31.5%) “*disagreed*” about the perceived adequacy of educational technology tools that their colleges have.

Perception of tutors was also collected on the availability of funds for procurement of educational technology resources (Item 12) As shown in Table 15 most of the respondents, 75 (59.1%) showed disagreement about monies being made available for procurement of educational technology tools for their department. However, 20 (15.7%) had mixed feelings about monies being made available for procurement purposes while 32 (25.2%) tutors “*agreed*” that monies are made available for procurement educational technology resources.

The respondents related their perception in Item 13 of Table 15 about the encouragement that their colleagues provide about the use of educational technology in the teaching and learning work. This item shows that most respondents 65 (52.4%) “*agreed*” that they get encouragement from the colleagues to use educational technology. On the other hand, 47 (37.9%) “*disagreed*” about receiving encouragement from their colleagues to use technology. As shown Item 14 of Table 15, 85 (67.5%) of the respondents “*disagreed*” that the integration of educational technology into the curriculum results in only minor improvement in learning over the traditional methods. Although, a few (7.1%) did disagree, it was found that, 32 (25.4%) of the research participants failed to disagree that the integration of educational technology into the curriculum results in only minor improvement in learning over the traditional methods.

Finally on the perception of tutors about educational technology integration (Item 15), the tutors were asked if they needed to use educational technology in their instructional activities. For the most part, 117 (92.1%) of the 127 respondents agreed that they needed to use educational technology in their instructional activities, however, 9 (7.1%) disagreed that they need educational technology to be able to attend to their instructional activities, but one respondent did not either agree or disagree to having a need for educational technology to carry out instructional activities.

The perception of interviewees to educational technology integration was also explored through the structured interviews that were carried out on the six teacher educators. The interviewees related that they are comfortable having educational technology in their classes. *Charles* on his part had more to say than just being comfortable with the presence of educational technology in his class. He tells the researcher that,

...by using educational technology in my class my students [actively] take part in the lesson, and it had always been joy to see my students use educational technologies in imitation of what I teach them. That [is] certainly a delight for me as a tutor [teacher educator] preparing teachers for [the] future generation (personal communication, 5th May, 2010).

On the role of education technology in the teaching and learning process the interviews revealed issues that further enlighten this exploratory quest. *Felix* pointed out that:

Educational technology aids teaching and learning. It gives the opportunity to expose [teacher trainees] students to different instructional [technology] media, and I also think it arms the classroom teacher with modern technologies in the [21st century] classroom (personal communication, 8th May, 2010).

This study revealed that tutors have a positive perception about the importance and the higher achievement that comes along with educational technology as demonstrated by the responses included in Table 15. The findings in this study support earlier studies on both the perception and attitudes of teacher educators being positive to technology integration (Davis, Preston, & Sahin, 2009, Ertmer, 2005, Judson, 2006; Pancer, George, & Gebotys, 1992). One of the issues that educational technologists have to contend with has been teacher educators' perception of educational technology and their role in teacher education. The findings of this study tend to align with research that suggests that the personal perceptions of teachers which relates that technology integration in the classroom is considerably influenced by the perceptions and attitude of users (Ertmer 2005; O'Dwyer et al. 2004; Vannatta & Fordham, 2004).

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Overview of the Study

As discussed in Chapter One, this study explored the issues surrounding the demographic characteristics of the tutors in the Central Region's Colleges of Education; their awareness, background, training offered to pre-service teachers; and the perceptions of tutors in the integration of educational technologies in the teacher training curriculum. Indeed, it is crucial to examine how tutors think about their practice and the way they strive to deepen and broaden their practice through technology. The study explored and described tutors contribution mainly to technology integration in Colleges of Education in Central Region of Ghana. Apart from eliciting data through questionnaire administration from tutors, data was also collected by means of structured interview from a couple of tutors each from the three colleges.

The reviewed literature covered the demographic details that matter in the integration of educational technologies in teacher education programmes. However, besides uncovering much detail on the other variables of the study, the study took particular note of the curriculum of pre-service teacher training in Ghanaian Colleges of Education, whereby the history of teacher preparation

colleges and the current status of the academic structure of the Colleges of Education programmes are reviewed.

Models of teacher preparation programmes as well as models of educational technology integration are reviewed in Chapter Two. Although the literature on models of technology integration has been reviewed, the three Colleges of Education explored in this study do not have educational technology plan, therefore, no comparison of models could occur. The study, however, revealed that teacher educators do not show their student teachers how to use educational technology in their classes. Interestingly, 65 (52.4%) tutors agreed that they feel competent to model the use of educational technology to student teachers. One thing that emerged from this study is that of the 13 items proposed to test how tutors prepare teachers to teach with education it was only 4 items that had majority of the respondents disagreeing but for the most part, 9 items was agreed by most respondents as strategies that tutors use to train teachers to use technology in their classes.

The exploratory study was conducted by means of descriptive survey design which employed questionnaire and a structured interview as tools for data collection. The study was conducted on the tutors of the only Central Regional Colleges of Education. A census of the tutors was considered for the study, however the eventual proportion of usable questionnaire received amounted to 91.43% of the census. Six tutors took part in the structured interviews that were conducted. The data was analyzed using the Statistical Package for Social

Sciences (SPSS) version 17.0 to summarize the distribution of tutors' responses in the descriptive tables and charts.

The issues of use and non-use of educational technology in the three colleges considered for this study is complex. The research revealed that the teacher education programmes that respondents went through were not sufficient to enable them to lead technology integration at the Colleges of Education level. As the interviews revealed, whose role it is to train teachers in technology integration and which policies could guide such course are questions for additional research. Further, it was determined that the only educational technology tools that are available in the three colleges were computers, internet and projectors. Teachers teaching or demonstrating teaching with educational technology was not observed for the two months of the data collection in the three colleges. Teacher educators do not receive student teachers' assignments and project work electronically for vetting and scoring, however, in most cases tutors used computers for different purposes during school hours on campuses (both institutional desktop computers and the tutor owned laptops). Also, the few tutors who teach with overhead projectors have to depend on the solitary overhead projector that the school has. A few teacher educators were seen using phones and digital cameras to demonstrate lessons to student teachers; these however happened at quite informal settings during the data collection as observations were not the focus of this thesis.

The tutors' role in the digital education of tomorrow's teachers for the 21st century classroom depends to a large extent on the tutor's knowledge about

educational technology and the use of such in the classroom practice. Therefore, the study was centered on the tutors of the colleges of education to examine the awareness, background integrating educational technologies, training offered to teachers in technology integration and perception of tutors about integrating educational technology in the 21st century classroom.

Summary of Major Findings

The study sought to explore issues related to integration of educational technology in the Colleges of Education curriculum. The summary of this study provides an overview of results reported in the Chapter Four. On the basis of the analysis of data captured through questionnaire and structured interview guides, the following key findings can be reported:

1. The varied socio-demographic characteristics of the tutors could affect integration of educational technology in teaching.
2. Younger and newer tutors were shown to be more adept with technology integration compared to their older and veteran colleagues.
3. Most of the respondents showed that they were aware about educational technology and its role in teacher education.
4. The largest proportion of the respondents revealed that they do not have enough background in educational technology integration in the teacher preparation curriculum.
5. Only a few tutors showed that they engage their teacher trainees in ways that educational technology could be used in the 21st century classroom.

6. The colleges in the Central Region of Ghana do not have educational technology integration plan or schedule.
7. The perception of the tutors' use of educational technology in classrooms has been shown to be highly positive.
8. It was not surprising to learn that most tutors were not aware whether monies were made available for the procurement of educational technology tools and support services because the institutions had no plan of their own on educational technology, procurement, use and support services; although all the institutions used for this study had computer laboratories of their own.
9. The tutors perceived that the support that college management and administration make is rather a loose and unstructured one, since the support is not based on workable institutional plan for integration of educational technology.

Conclusions

A number of conclusions could be drawn from the findings. In the first place, although the teacher preparation colleges in the Central Region of Ghana do not have educational technology integration plan, it was observed that some of the tutors still integrate technology in their teaching. The integration of educational technology in the Central Regional colleges is much more individualized than institutionalized. That supports Roblyer's (2005) conclusion

that, fundamental research on the potential impact of technology on school life must be conducted in order to encourage uptake of new educational technologies.

Secondly, most teacher educators in the Central Region blame their inability to use and integrate educational technologies in teaching on the absence or limited availability of educational technologies in the teacher education universities which trains the Ghanaian teacher educator force for the Colleges of Education. The respondents further hinted that the infrastructural support were lacking in their institutions, although they could not inform the study about whose responsibility it is to provide such infrastructural support for the colleges.

Thirdly, socio-demographic characteristics could affect technology use among teacher educators in the Central Region as shown in the findings. The study showed varied characteristics among the demography of respondents in the three colleges of education. Principally, genders, type of institution, level of education, years of teaching experience were some of the variables that stood out.

Fourthly, most of the teacher educators have shown that they are aware about educational technology. Although, most respondents indicated that they are aware about presence of educational technology in the teaching and learning environment none of the interviewees hinted whether their awareness of educational technologies affected their willingness to use them in teaching assignment. This confirms other studies about teacher educators' high level of awareness about educational technologies in the classroom.

Also the tutors indicated that they have little background in the integration of educational technologies in their classrooms based on their university studies.

The real situation in the universities that train teacher educators in Ghana is that, the curriculum was not structured to teach trainees how to integrate technology in teaching. The findings in this study contradict other studies that showed that teacher educator's background is a complement of what teacher educators receive during their training in college.

The study showed that the teacher educators in the Central Region have mixed feelings about whether they prepare their teachers to teach with educational technology. The disparities were evident because most respondents said their training at the university could not assist them to teach teacher candidates how to integrate educational technology in schools. The few teacher educators who showed that they teach their teacher candidates how to integrate educational technology elected to do so base on experiences acquired informally.

The respondents revealed that they have positive perception about the importance of educational technology in the 21st century classroom. This confirms other studies that concluded that using educational technology in the classroom brings about better working environment for the teacher and they as well result in better achievement for students.

Recommendations

The findings and conclusions from this study suggest several implications for past educational planning needs as well as for future studies in integration of educational technology in the College of Education curriculum.

1. Colleges of Education in the Central Region of Ghana may have to individually build a technology integration plan with support from the curriculum development department of the Ministry of Education in consultation with the Teacher Education Division of the GES.
2. The Ministry of Education could spark the willingness of institutions of higher learning to consider uptake of educational technology integration through a special campaign aimed at educational technology integration. The isolated factors that affect technology integration should be carefully explored before such plans for integration are drawn. Research institutions should be charged to develop innovative strategies aimed at educational technology integration in Colleges of Education in Ghana.
3. The universities that prepare teacher educators should develop courses aimed at training them to be more knowledgeable about integration of educational technology.
4. School administrators at the Central Region's Colleges of Education should take advantage of high level of awareness and strengthen their capacity for integrating educational technology into the curriculum for preparing teacher candidates.
5. It is equally important to raise the awareness level of circuit supervisors about new strategies of teaching using ETs in order to gain support for technology integration.
6. Based on the finding that awareness and perception of tutors of educational technology, it would be prudent on the part of government and

institutional structures to take advantage and incorporate this wisdom into policymaking and practice.

Suggestion for Further Studies

This exploratory study sets the ground for future studies in the integration of educational technology in Colleges of Education curriculum in Central Region in particular and the Ghanaian colleges at large. On the basis of conclusions and the recommendation delineated as above, the following recommendations are offered for further studies.

1. The study was restricted to only tutors in the Central Region of Ghana. Further studies in other regions should be conducted as well.
2. Further studies in the integration of educational technology are also suggested for education officials as well as school administrators in both the colleges and government's education ministry.
3. This study was exploratory and did not seek to manipulate the variables in any way; further, research on the cause and effect relationships in and among the variables of this study is recommended.
4. Research is also recommended into viable models of educational technology integration that Colleges of Educations in the Central Regions could create, adopt or adopt as a start up.
5. Finally, a study into infrastructural support systems available for technology integration in Ghanaian Colleges of Education should be as well perused.

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APPENDICES

APPENDIX A

18th March, 2010

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Dear Sir or Madam,

RESEARCH VISIT LETTER

I am an M.Phil candidate at the University of Cape Coast, Institute for Educational Planning and Administration. I am planning to conduct a descriptive survey study by exploring the views of tutor's on the integration of educational technology in the teacher training curriculum in the Central Region of Ghana. I am writing to solicit your support in accessing the research participants (tutors) in your college.

I am as well attaching an introductory letter from my academic department for your perusal please. If you would like to learn more about this study, or if you would like to nominate any contact officer in your college please let me know this by contacting me on 0246462001 or petiti2002@gmail.com.

Sincerely,

Might Kojo Abreh
M.Phil Candidate
petiti2002@gmail.com
0246462001
Institute of Education
University of Cape Coast

APPENDIX B

18th March, 2010

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Dear Sir or Madam,

RESEARCH VISIT LETTER

I am an M. Phil candidate at the University of Cape Coast, Institute for Educational Planning and Administration. I am planning to conduct a descriptive survey study by exploring the views of tutor's on the integration of educational technology in the Colleges of Education curriculum in the Central Region of Ghana. I shall be glad if you could consult with the heads of departments and select two tutors who are known for integrating technology in teaching and learning at your college for an interview.

I shall be glad to offer any explanation on what the research interview entails. Please kindly let me know the telephone numbers and/or emails of the selected tutors for my records. If you would like to learn more about this study, please let me know this by contacting me on 0246462001 or petiti2002@gmail.com.

Sincerely,

Might Kojo Abreh
M. Phil Candidate
petiti2002@gmail.com
0246462001
Institute of Education
University of Cape Coast

APPENDIX C



UNIVERSITY OF CAPE COAST
FACULTY OF EDUCATION
INSTITUTE FOR EDUCATIONAL PLANNING AND ADMINISTRATION

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University Post Office
Cape Coast
Ghana

March 18, 2010

Our Ref. EP/90.3/56


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LETTER OF INTRODUCTION

The bearer of this letter, **Mr. Might Kojo Abreh** is a graduate student of the Institute for Educational Planning and Administration of the University of Cape Coast. He requires some information from your outfit for the purpose of writing a thesis as a requirement of M.Phil degree programme.

We should be grateful if you would kindly allow him to collect the information from your outfit. Kindly give the necessary assistance that Mr. Abreh requires to collect the information.

While anticipating your cooperation, we thank you for any help that you may be able to give.


Mr. Y. M. Anhwere
Assistant Registrar
For: Director

APPENDIX D

UNIVERSITY OF CAPE COAST

INSTITUTE FOR EDUCATIONAL PLANNING AND ADMINISTRATION

Interview guide

This interview is structured for full time tutors who have been teaching in the College of Education and known for incorporating educational technology in their professional practice. Please, I the opportunity to interview you base on the recommendation by your Principal, Vice-Principals and some of your colleague tutors about how you have been integrating educational technology in your college. I shall please accept your candid responses to following questions. I wish to assure you that your responses will be treated as confidential and anonymous.

Demographic characteristics

1. Gender

Female

Male

2. Age

18-24

25-29

30-34

35-39

40-45

Over 45

3. Name of college where you currently teach.

Komenda

OLA

Foso

4. How long have you been teaching in this College of Education?

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5. What subject(s) do you teach at your college?

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Training

6. While studying in college, which educational technologies did you use in your classes?

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7. What training have you received on how to use educational technology in your classroom?

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8. During your training at the university, which specific types of software did you learn how to use in your class?

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9. How has your teacher training programme equipped you with the knowledge and skills required to plan lessons using computers as teaching tools?

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10. Apart from your technology in education class, which other avenues exposed you to ways in which educational technologies could be used as teaching tools?

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Preparation to Teach with Educational Technology

11. To what extent are you prepared to use technology in your classes?

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12. How well do you know about different types of software to use in your teaching and learning?

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13. Please explain what you do if you go online to get information on the internet to resource your lesson.

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Experience/Practice Using Computers at Your College

14. During your training at university, how important it was it to use computers to communicate with your lecturers?

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15. Please tell me how crucial computers were during your training in terms of conducting assignments and class presentations.

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16. What educational technologies did you employ in classes or to prepare activities while on teaching practice?

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17. For what kinds of activities do you use computers?

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Access

18. Please kindly comment on the state of access to educational technologies at your college?

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19. How do you and your other colleagues access the internet at your college?

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Modelling

20. How do you model educational technology use in your college?

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21. How do you expose your students to ways in which educational technologies can be used in class?

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Attitude

22. How comfortable are you with the presence of educational technologies in your class?

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23. What role do you think educational technologies play in the teaching/learning process?

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24. If you have educational technologies in your class, how would you use them with your students?

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.....

.....

.....

25. How nervous it is to use computers in teaching and learning?

.....

.....

.....

.....

Thank you very much for devoting your time for this study.

APPENDIX E

UNIVERSITY OF CAPE COAST

INSTITUTE FOR EDUCATIONAL PLANNING AND ADMINISTRATION

QUESTIONNAIRE FOR COLLEGE OF EDUCATION TUTORS

The purpose of this questionnaire is to gather data regarding the teacher educator's perception of integration of educational technology in Colleges of Education curriculum in Central Region of Ghana. Educational Technology here refers to technology resources that aid teaching and learning (including computers, projectors, internet and online materials). Your participation in this study is strictly voluntary and any information given will remain confidential and anonymous.

Section A: General information - Please tick (✓) as appropriate

1. Gender

Female

Male

2. Age

18-24

35-39

25-29

40-45

30-34

Over 45

3. Name of college where you currently teach.

Komenda

OLA

Foso

4. How long have you been teaching?

Less than 1 year

1-5 years

11-15 years

6-10 years

16-20 years

21-25 years

Over 25 years

5. How long have you been teaching at your current college?

Less than 3 years

3-5 years

6-10 years

11-15 years

Over 15 years

6. What subjects do you teach? (Choose all that apply).

- | | | | |
|--------------------|--------------------------|----------------|--------------------------|
| English Language | <input type="checkbox"/> | Music & Dance | <input type="checkbox"/> |
| Art Related | <input type="checkbox"/> | Science | <input type="checkbox"/> |
| Mathematics | <input type="checkbox"/> | Sewing | <input type="checkbox"/> |
| Physical Education | <input type="checkbox"/> | Home Economics | <input type="checkbox"/> |
| Social Studies | <input type="checkbox"/> | Catering | <input type="checkbox"/> |
| French | <input type="checkbox"/> | ICT | <input type="checkbox"/> |

Other(s) (Please specify) _____

7. Qualifications: Choose highest degree attained.

- Bachelors
- Masters
- Doctorate

8. How would you rate your use of educational technology in your professional practice as a teacher educator? (tick {√} the most appropriate option)

- Very often
- Often
- Not often
- I do not use it all

Instructions: For each of the statements in **Sections B-E**, there are five options that that respondents can choose from. Respondents are required to indicate with a tick (✓) the extent to which they agree or disagree with the statements that follow.

Section B. Knowledge about Educational Technology

SD = Strongly Disagree, D = Disagree, U = Undecided, A = Agree, and SA = Strongly Agree

Awareness of educational technologies	SD	D	U	A	SA
9. There is a policy or plan at my college that requires teachers to teach with technology.					
10. There is a plan that outlines how educational technology resources should be acquired at my college.					
11. My college has a policy from the Teacher Education Division of Ghana Education Service that outlines computer skills that pre-service teacher's need to be able to teach in the 21 st Century classroom.					
12. There is a plan at my college that outlines the goals of teacher training and how educational technology can be used to achieve these teacher training goals.					
13. Workshops are organized at my college to show new teaching technologies available for pre-service teacher training.					

Section C. Background in Teaching using Educational Technology

SD = Strongly Disagree, D = Disagree, U = Undecided, A = Agree, and SA = Strongly Agree

Tutors background in educational technology integration	SD	D	U	A	SA
14. There are opportunities at my college for staff development of tutors interested in using educational technology in their classes.					
15. Workshops are organized by my college for tutors to improve their skills in technology use in the classroom.					
16. I have had training at my college on how to use educational technology in my class.					
17. My college leadership encourages and supports teaching with technology					
18. If I encounter problems when using the technology, there is someone at my college to provide technical assistance.					
19. There is support from my college's administration (e.g., release time) for tutors who want to learn how to use educational technology resources.					
20. I feel prepared to teach using educational technology resources.					
21. I feel prepared to teach my students "how-to-teach" with educational technology resources.					
22. I have sufficient knowledge about the different types of software to use in my classes.					
23. I feel prepared to use computers to communicate and collaborate with peers in the field.					
24. I feel prepared to use computers to conduct research.					

Section D. Preparing Pre-Service Teachers to Integrate Educational Technologies

SD = Strongly Disagree, D = Disagree, U = Undecided, A = Agree, and SA = Strongly Agree

Preparing pre-service teachers to teach with Educational Technologies Resources	SD	D	U	A	SA
25. In my teaching, I model ways in which educational technologies can be used as teaching tools.					
26. I show my students how to use educational technology in their classes.					
27. I model a positive attitude towards the use of educational technology.					
28. I feel competent to model the use of educational technology to my students.					
29. The training students receive at my college adequately prepares them to teach with educational technology during their practice as teachers.					
30. Students in my college are taught how to teach using educational technologies.					
31. Methodology classes expose students to ways in which educational technology can be used as teaching tools.					
32. At my college, there are courses specifically designed to teach students how to integrate educational technology in their classes.					
33. I require my students to make use of computers to complete course assignments.					
34. My students are required to use projectors for class presentations.					
35. I encourage my students to use the internet (e.g., e-mail, blog) to communicate with tutors and peers.					
36. During teaching practice, I require my students to use computers to prepare their lessons.					
37. During teaching practice, I ask my students to use computers to complete classroom related activities					

Section E. Perception of Tutor's about Teaching with Educational Technology

SD = Strongly Disagree, D = Disagree, U = Undecided, A = Agree, and SA = Strongly Agree

Perceptions of tutor's about teaching with educational technology	SD	D	U	A	SA
38. Educational technology can improve the quality of teaching and learning that takes place in schools.					
39. Students who have access to technological resources are more likely to do better than those who do not.					
40. Educational technology resources are important learning tools.					
41. Educational technology resources should be available in all schools.					
42. Educational technology resources should be available in all classrooms.					
43. Access to computers should be limited to the school library for research.					
44. Having computers in my class is a waste of resources.					
45. If I use educational technology, I will not have enough time to cover all the topics on the syllabus.					
46. My students have access to computers to complete course assignments.					
47. If I want to teach a computer-based lesson, computers are available for use.					
48. My college administration does support activities geared towards educational technology integration.					
49. There are enough educational technology tools in my college					
50. Monies are made available for procurement of educational technology tools for my department					

51. Colleagues in my college encourage me to use educational technology in my teaching and learning.					
52. The integration of educational technology into the curriculum results in only minor improvement in learning over the traditional methods.					
53. I have a need to use educational technology in my instructional activities.					

Thank you for participating in this study.