UNIVERSITY OF CAPE COAST

THE USE OF ICT IN TRAINING TEACHERS AT THE PRE-SERVICE LEVEL: A STUDY OF THREE TEACHER EDUCATION INSTITUTIONS IN SOUTHERN GHANA

IVON SUMANA-ANG

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BY

IVON SUMANA-ANG

Dissertation submitted to the Centre for Continuing Education of the Faculty of Education, University of Cape Coast in partial fulfilment of the requirements for award of Master of Education Degree in Information Technology

MAY 2013

DECLARATION

Candidate's Declaration

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

Name: Ivon Sumana-Ang

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

Supervisor's Declaration

I hereby declare that the preparation and presentation of this dissertation was supervised in accordance with the guidelines on supervision of dissertation laid down by the University of Cape Coast.

Name: Mr.Kankam Boadu

Supervisor's Signature: ..... Date:.....

ABSTRACT

The main purpose of this study was to ascertain the contention that first cycle school teachers in Ghana were not proficient in ICT and that was because their training in ICT in the colleges of education was not effective. The study was conducted in two colleges of education and one of the University of Cape Coast Distance Education Centres. The colleges of education were Accra College of Education in Accra, OLA College of Education in Cape Coast and the University of Cape Coast Distance Education programme for teachers that is centred at Accra High School in Accra. The survey was conducted by using questionnaires. Items in the questionnaires were of relevance to the purpose of the survey. They were administered in the three teacher training institutions. Data were collected, organized and analyzed using frequencies and percentages.

It came to light that students' ICT literacy in the teacher training institutions in Ghana was low. Again the study revealed that students in teacher training institutions in Ghana had a negative perception of ICT. It was concluded that the challenges of using ICT included resistance to change from tutors and other authorities, lack of skills to operate the computers where some could be found and lack of technical support. In effect, educational use of ICT was not significant.

Based on the findings it was recommended that ICT should be taught effectively in teacher training institutions in the country, and structured in-service ICT training should be given to on-field teachers. Also, ICT resources should be made available in schools and colleges for the use teachers and pupils.

ACKNOWLEDGEMENTS

I wish to also acknowledge the patience and help that Dr. Kankam Boadu and his Assistant, Mr. Isaac Kwenin Atta had for me throughout this research work.

DEDICATION

To my family.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS

CBI	Computer Based Instruction
ICT	Information and Communication Technology
INSEAD	Institute européen d′administration des affaires.
OLA	Our Lady of Apostles
UNESCO	United Nations Education and Cultural Organization
WEF	World Economic Forum

CHAPTER ONE

INTRODUCTION

Background to the Study

Over the past decade or so, increasing importance and attention have been attached to the potential of new technology to improve teaching and learning in schools (Clarke, 2004). Information and Communication Technology (ICT) now seems to be so integrated into all facets of society that it is almost impossible to do without it. People come into contact with the computer every day in one way or the other. With the help of the computer complex and laborious chores are made easy.

ICT has changed the way many things are done so much that Macfarlane (2001) describes it as an agent of change which applies in a revolutionary way. ICT has added reality and style to teaching and learning. The traditional educational environments do not seem to be suitable for preparing learners to function or to be productive in the workplaces of today′s society (Yelland, 2001). It is time all societies exploited the power of ICT in teaching and learning because it adds originality and practicality to teaching and learning. It also adds more effect to the learning theories. Some educationists are of the view that ICT should be introduced to learners from the lowest level of education as Grimus stated that by teaching ICT skills in primary schools the pupils are prepared to face future

developments based on proper understanding (Grimus, 2000). Pupils should get the benefit of the use of computers from the very beginning of education. It gives them a positive perception of the computer and they get to understand some of its functions from the onset. Many researchers and theorists assert that the use of computers can help students to be more knowledgeable, reduce the amount of direct instruction given to them, and give teachers the opportunity to help those students with particular needs (Idling, Crosby & Spiegel, 2002). Technologies can play a role in students' skills, motivation, and knowledge (Grabe & Grabe, 2007) in many countries, especially the developed ones a central strand of ICT policy in education has been the development of a technologically empowered teaching force so that ICT is embedded in teaching and learning (Clarke, 2004).

ICT is a powerful tool in any educational setting. It can be used in many innovative ways to suit any educational system. People can use ICT tools in their own unique ways to make their own meaning. Individual learners can use ICT to meet their customized needs. Since all learners are believed to be different, they all learn in different ways that apply and appeal to them. ICT helps in this dimension.

ICT offers equal opportunities to learners. People of varying social classes are catered for through the power of the computer. In the countryside ICT can be used in many innovative ways. In places where there is no electricity, the computer cannot be used but there are other common ICT gadgets that can fill the place of the computer. The radio and the mobile phone can be used. The e-book reader is now quite common the world over. It runs on battery power and can run

for days before it runs out of power. Some of them can run even longer on battery power. The e-book reader can be used quite conveniently in any remote village setting. City dwellers can also use ICT to suit their purpose. In cities noise may be a challenge to learners. The ear piece can be used to listen to audio version of lessons. The ear piece is able to shut out the noisy environment to able the learner to concentrate on whatever the one is listening to. There are many innovative ways of using IT in the education environment that enhances learning.

Learners with various learning and physical challenges are all supported sufficiently through the use of ICT. Visual representations make for hearing deficits while sound and audio do cater for poor sight. ICT is capable of making for the deficits of learners and that offers the learners equal opportunities. Younger learners are able to learn better with the help of animations. Colour and graphics help learners of all categories to understand their lessons better. Dangerous and life threatening experiments are safely done with the help of ICT. Some natural processes take many years to complete. IT is able to animate them conveniently. All these are innovative ways in which IT is used to help in learning.

Learning materials that are produced with the help of ICT are of very high quality. They are produced to meet the best standards of learning theories and principles and so they promote learning. They also promote self-efficacy and independent learning. Learning materials produced with ICT are capable of motivating learners to learn on their own equally well as they would if there were the physical presence of a teacher teaching them.

Distance learning is at its best with the help of ICT. Distance and time constraints are reduced if instruction is prepared with the learner as the main focal point. Distance learning really thrives on technology. Without technology distance learning would not develop as it has. With the help of technology learners can access tuition from any part of the world where they reside. Distance learners can access soft and hard copies of lessons in text. They also have the opportunity of accessing synchronous and asynchronous video lessons. These video lessons may be prepared to measure up to some of the highest standards anywhere in the world. The power of the computer has aided the introduction of many new branches of education and training. Areas like Instructional Design and Educational Technology are new emerging areas of study that are contributing to the solution of societal problems. Workplace and organizational challenges are attended to through the application of these innovative fields of study.

ICT is powerful in the area of professional development. It promotes lifelong learning and so is a powerful tool for professional development. Teachers and other professionals can form learning communities. They can share information about ways of doing the things they do; and collaborate to help one another overcome their challenges. The professional learning communities promote networking and leads to the development of better professionals. The individuals in that field improve their efficiency and perform better as professionals. The profession also improves in the body of knowledge that it has.

The power of ICT can be exploited in the 3rd world to enable them catch up with the industrialized society in education. Distance learning and open

Universities should be introduced and encouraged in their educational system with the help of ICT. This will reduce the strain on the limited educational resources and yet meet desired targets of manpower training. Colleges of education and other teacher training institutions can be the starting point of the introduction of ICT since our educators are trained there. It is, therefore, of paramount importance to have a well trained, competent and motivated teacher to teach with ICT in our schools. The teacher training institutions should be able to train the teachers so well that they will be knowledgeable in their areas of specialization and in the use of ICT to teach.

As stated by Mayo, Kajs and Tanguma (2005), teacher educators need to place instructional technology education within the context of teachers' work in the classroom. As educators, teachers should be trained to lead the way in ICT in education because they can only give what they have. The training should help create positive perceptions and attitudes about the computer and its capabilities. As put forward by Brownlee, Purdie and Boulton-Lewis (2001) teacher educators need to focus teacher thinking and teacher beliefs to facilitate changes in the teaching-learning process. This indicates that the attitudes and beliefs of educators play a very important role in teachers' use of ICT for instruction. Their attitudes and beliefs shape their behaviours and influence their preparedness in the use of ICT in teaching. The attitudes of the teachers also in turn influence their pupils' perception of the technology.

Beside attitudes there are other challenges which can be called barriers. Beggs (2000) thinks that 'fear of failure'causes teachers' lack of confidence in the use of ICT in the classroom. We can also talk of teachers' resistance to change as another barrier as Schoepps (2005) states that much research into barriers to the integration of ICT into education found that teachers' attitude and an inherent resistance to change were a significant barrier Schoepps (2005); Newhouse (2002) found that some initial training is needed for teachers to develop appropriate skills, knowledge, and attitudes regarding the effective use of computer to support learning by students.

Lack of effective training in ICT is cited as another barrier as Beggs (2000) stated that one of the top three barriers to teachers' use of ICT in teaching students is lack of training. Sicilia (2005) also found that accessibility was a barrier when he stated that teachers complained about how difficult it was to always have access to computers. Since teachers are not technicians they would need technical hands to be able to operate their computers effectively. Lewis (2003) stressed that without both good technical support in the classroom and whole-school resources, teachers cannot be expected to overcome the barriers preventing them from using ICT.

As stated by Moon (2004), the rapid development in technologies coupled with the world-wide challenge to educate all children has led to a global reform and development in teacher education. He thinks that this has motivated educational institutions to redesign and restructure their teaching methods such as to enable the students equip themselves for the future. Cheng and Townsend

(2000) are also of the view that the unprecedented development of ICT has led to a widespread intention of using ICT to advance educational goals. In that case if educational institutions in any part of the world are not using ICT as a tool of instruction they would not be giving their students the needed training to function effectively in the globalized world. Heppell (1993) also suggests that reshaping the delivery of instruction is supposed to be in the scenario where ICT alters the learning environment and the learners. He thinks that ICT influences the learning environment and also the learners in a positive way. The learning environment changes according to the pedagogies that are used. Some teaching and learning pedagogies are enabled by the use of technology in the classroom. Technology aids learner-centred education in no small way. The role of the teacher in the classroom may change to a facilitator rather than an instructor. In the technology rich environment knowledge may not be seen to reside in any one person's head. It is viewed to be out there and anybody can look for it and find it. On the World Wide Web any information that one wants can be accessed. The role of the teacher will then be to direct learners. The teaching paradigm may even change in such a way that active learning takes the place of passive learning in the classroom. Learners become active contributors and not passive recipients of knowledge.

The perception is that teachers in many first cycle schools are not using ICT in their lessons because they are not prepared sufficiently to teach ICT let alone integrate it in their lessons.

In the case of Ghana and many underdeveloped countries not much study has been done in this area. This study seeks to find out the level of computer literacy of the students in the teacher training institutions in Ghana. It will find out if student-teachers are prepared well enough to use ICT in their teaching. The study will also find out if there are challenges that the student-teacher encounters in learning ICT.

Statement of the Problem

It has been observed that Ghanaian students are not proficient in ICT. Miniwatts Marketing Group (2007) report showed that internet penetration in Ghana was 2.8% well behind neighbouring Togo 5.8% and Nigeria 4.8%. At the World Economic Forum(WEF), the Institut européen d'admintration des affairs (INSEAD) in April 2011 ranked Ghana 99th out of 138 economies in the World ICT ranking.

It has been observed that teachers are not able to handle the subject ICT well in the first cycle school. First cycle teachers do not teach with ICT. The powerful tools of ICT help pupils to understand concepts better but they are not used in the Ghanaian classroom. Technology is basically to solve problems. So Information and Communication for Education (ICT4E) is supposed to solve problems we have in education. The need for more teachers in our schools is one of the problems that ICT4E can solve. Though ICT cannot replace the teacher it can, all the same, enhance the abilities of the teacher who is already on the field.

Teachers should be trained in ways that they can use the capabilities of ICT to teach. The teaching methods that relate to the various capabilities of the

technology have to be taught from the pre-service level to make the student-teachers familiar with their uses. Challenges to the teaching and adoption of ICT4E have to be resolved.

Many of the assertions made regarding the use of ICT to teach in Ghanaian schools were based on observation. Studies in this area are still scanty. Since there was still not much empirical evidence of the assertions the study sought to find out if the assertions were true or otherwise.

Purpose of the Study

The study examined the extent of ICT proficiency of student-teachers and the level of use of ICT in teacher training institutions in Ghana. Specifically the study sought to examine:

(1) The level of computer literacy of student-teachers in teacher training institutions in Southern Ghana.

(2) Examine student-teachers' perception of ICT.

(3) Identify challenges student- teachers encounter when using ICT in learning.

Research Questions

The study was guided by the following research questions:

(1) What is the level of ICT literacy of student-teachers in the institutions of education?

(2) What is the perception of the student-teachers on ICT usage?

(3) What challenges do student-teachers encounter in using ICT?

Significance of the Study

The study showed the level of ICT use and integration in the institutions of education where the research was conducted. The findings of the study would therefore be of interest to the tutors of those institutions. The findings of the study would also be of interest to the principals of those teacher training institutions and other teacher training institutions . It would be of interest to the University of Cape Coast distance education programme and other distance education programmes in the country. The study would be of importance to the directors of education where the two colleges of education are sited. The study would also be of interest to the Ministry of Education and all other stakeholders of education in Ghana and the larger academic community.

Delimitation of the Study

The study was conducted in two Colleges of Education in southern Ghana and one Distance Education Centre: Accra College of Education, Accra; OLA College of Education, Cape Coast; UCC CCE Accra High School Centre. By stratified random sampling 40 final year students were selected in each of the institutions for the survey. The study surveyed their ICT literacy. It also looked at the students' perception of ICT. The study surveyed only third (final) year students in the Colleges of Education and the distance education centre. The results of the study would be generalized to colleges of education in Ghana.

Limitation of the Study

This study was originally designed to study pre-service teachers' ICT literacy through to ICT integration in lessons but the researchers' visit to two colleges of education and interaction with students there revealed that ICT was taught but the students were not helped to practice it. It was therefore pointless to test for integration of ICT into lessons.

Secondly, the study was supposed to randomly select 3 colleges of education from the 38 state owned colleges. However, due to financial and time constraints the researcher had to choose 3 colleges of education closest to him. He still had to survey the UCC distance education students at the Accra High School for the sake of convenience. That was good for the study anyway because the researcher thought that it widened and deepened the study.

Also tutors of the three teacher education institutions were actually surveyed but still due to time and logistical constraints the researcher did not include the findings of the tutors' data analysis. Again, this study was limited because the researcher thought some of the items in the questionnaires might have been misunderstood by the students because of their low ICT literacy. Both of them could affect the findings of the study.

Definition of Terms

In this research, the following terms may have meanings which are somewhat different from their meanings in everyday usage.

Teacher-trainees: Students of teacher training institutions.

Student-teachers: Students of teacher training institutions.

Organisation of the Rest of the Study

Chapter Two of the dissertation put forth theories of education that are related to the study. This was spelled out in the theoretical framework. It also presents the researchers' opinion on the subject. This was stated in the conceptual framework. It also puts forth a review of empirical literature that is relevant to the study. This is in the empirical framework. The literature focuses on the relevance of Information and Communication Technology (ICT) and its uses in education. The chapter ended with a summary.

Chapter Three talks about the methodology that was used in the study. It explains the research design, population, and sample and sampling techniques, instrument that was used in data collection procedure and data analysis. Chapter Four shows the results of the statistical analysis of the data. This is found in tables. Frequencies and percentages of scores were used in the analysis. The results were used to fail to reject the hypothesis. They were used to discuss and answer research questions. Chapter Five presents an overview of the research problem, the methodology and summary of the key findings. Conclusions were drawn. The researcher also made recommendations and suggestions. A direction was also given for further research on the topic.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

Overview

In this chapter the researcher discussed the theoretical basis of the research. He discussed three learning theories namely Behaviourist, Cognitive and Constructivist theories. The researcher's conceptual view of the study was also discussed. Thirdly, related literature about research findings of other people in the field of educational research were discussed in the empirical framework. These were linked to their relevance to the use of ICT in education.

Theoretical Framework of the Study

Theories are constructed in order to explain, predict, and master phenomena. A theory makes generalizations about observations and consists of an interrelated, coherent set of ideas and models. The theoretical framework of the study is the structure that holds or supports the basis of the research work. It represents the theory which explains why the problem under study exists. It serves as the basis for conducting the research. Three major theories of teaching and learning were discussed and their importance to teaching and learning were put forth. Their relationship to teacher education was highlighted. The study also linked them with the use of technology.

Behaviourism

Behaviourism is a theory of animal and human learning that only focuses on the objectively observable behaviours and discounts mental activities. Behaviour theorists define learning as nothing more than the acquisition of new behaviour (Philips & Soltis, 1998). Behaviourists believe that we can understand human behaviour by a meticulous study of particular behaviour (Ozmon & Carver, 1992)

Behaviourists are psychologists who think that whatever a person thinks is what he exhibits in his behaviour. They are not interested in whatever the person is thinking which does not manifest in his behaviour. They measure human thoughts by studying his outward behaviour by word or deed.

Behaviourist hold fast to 3 claims:

1. They claim that psychology is the science of behaviour and not of the science of mind;
2. They think that behaviour can be described and explained without making reference to mental events or internal processes. They argue that the sources of behaviour are external (in the environment), not internal (in the mind or the head);
3. They think that, in the event of developing a behaviourist theory in psychology, all mental terms and concepts that are used in describing or explaining behaviour should be eliminated and replaced by behavioural terms or they should be translated or paraphrased into behavioural concepts, (Philips & Soltis, 1998).

Behaviourist techniques have been employed in education to promote desirable behaviour in learners and discourage undesirable ones. Some of the methods that have been adopted by educationists and applied in the classroom include contracts, consequences, reinforcement, extinction, cueing and behaviour modification.

Contract is when the educator or parent enters agreement with the learner that the learner will learn a task within a given time. The contract method of behaviour change can be used in school and at home. It is helpful because the educator or parent together with the learner ensure that the contract is fulfilled (Philips & Soltis, 1998).

Reinforcement is the presentation of a stimulus that increases the probability of a behaviour/ response re-occurring. This type of stimulus occurs frequently in the classroom. A remark, a clap or any kind of approval or disapproval is enough to encourage the learner to want to repeat behaviour or to discontinue in that direction, (Philips & Soltis, 1998).

Consequence is a reaction in the form of reinforcement by a teacher or educator to behaviour of a learner. Consequence occurs immediately after the behaviour. It may show approval or disapproval of that behaviour or response, (Philips & Soltis, 1998).

Extinction is when unfavourable reinforcement is received after a behaviour which makes the one who elicited that behaviour to find it unrewarding. The habit reduces gradually until it dies completely, (Philips & Soltis, 1998).

Modelling is observational learning. The learner observes behaviour and also behaves in that way, (Philips & Soltis, 1998).

Cueing is when a student is encouraged to give the right response to a question/behaviour by providing him or her with hints that will lead him or her to the response/behaviour, (Philips & Soltis, 1998).

Shaping is the process of gradually changing the quality of a behaviour/ response. The desired behaviour is broken down into small units that each can be accomplished within a given time. Each of the units should be reinforced as it progresses towards the overall behavioural goal, (Philips & Soltis, 1998).

Behaviour Modification is a method of eliciting better classroom performance from reluctant students (Philips & Soltis, 1998). Behaviourism has been adopted as a teaching and learning theory. It is taught in schools of education.

Behaviourist techniques of teaching are used in technology to help in teaching and learning (Philips & Soltis, 1998). The computer is able to use both visual and audio cues to help learners form right behaviours. Desired behaviours are rewarded while undesirable ones are discouraged by the computer. Instructions are broken into smaller frames and this helps learners to learn them better. It helps learners to master each frame before progressing to the next. This is the technique of shaping. Computer Based Instruction (CBI) is able to show approval of responses by applause and audible remarks. It can be programmed to show visual and verbal cues to encourage learners. Feedback of exercises is immediate to prevent learners from repeating wrong responses.

Behaviourist techniques of teaching are supported by CBI.

Cognitive theory

Cognitive theorists recognize that much learning involves associations established through contiguity and repetition. They also acknowledge the importance of reinforcement, although they stress its role in providing feedback about the correctness of responses over its role as a motivator. Cognitive theorists view learning as involving the acquisition or reorganization of the cognitive structures through which humans' process and store information (Good & Brophy, 1990).

Cognitive psychologists believe that the human mind is an active and important factor in learning. They focus on how people think, how people understand and how people know. They think that learning involves the transformation of information in the environment into knowledge that is stored in the mind. They believe that learning occurs when new knowledge is acquired or existing knowledge is modified. Two prominent cognitive psychologists are Jean Piaget (1896-1980) and Lev Vygotsky (1896-1934), Chang, Dooley & Tuovinen, (2002).

Some principles of cognitive psychology are those put forward by the Gestalt psychologists, Max Wertheimer (1880-1943), Wolfgang Kohler (1887-1967) and Kurt Koffka (1886-1941) and others. They think that human perception makes meaning when things are seen as a whole. Gestalt psychologists are of the view that the brain is holistic, parallel and analogue. They say that the whole is different from the sum of its parts (Chang, Dooley & Tuovinen, 2002).

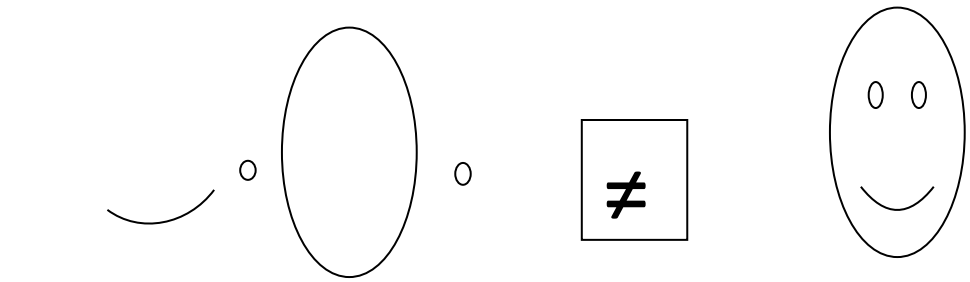


Figure 1. Whole is different from the sum of its parts.

Chang, Dooley and Tuovinen, (2002)

The gestalt theorists believe that the cognitive learning theory can best be explained with the laws of perception. Boring (1942) states that in Helson (1933) extracted 144 laws of Gestalten. Some of those laws are discussed here.

The Law of Good Form

Gestalt means "form" or "shape". Gestalt psychologists are of the view that psychological organization will always be as good as prevailing conditions allow. For Gestalt psychologists, form is the primitive unit of perception. When we perceive we always pick out form. Our perceptions are influenced by past experiences. This principle is also called Pragnanz Law. (Seng, Parson, Hinson & Sardo-Brown 2003)

The Law of Figure-Ground Discrimination

Viewers will perceive an object (figure) and surface (ground) even if shapes are grouped together (Ehrenstein, 2004). Figure is the concept that the presenter is trying to put forth, while the ground is the background information. This can be presented in the black and white illustration. We do not simply see

black and white shapes; we also see faces and vases. This explains the point that things are viewed holistically and not as parts. It also shows that the background to every visual or conceptual presentation is important. If the background is not properly laid it leads to confusion.

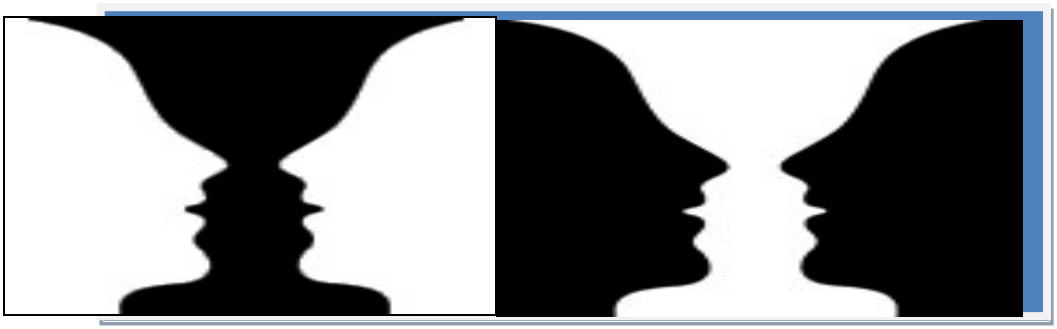


Figure 2. Law of Figure-Ground

Chang, Dooley and Tuovinen (2002)

The Law of Proximity

The closer objects are to each other, the more likely they are to be perceived as a group (Ehrenstein, 2004) objects and concepts which are close together in space or time tend to be perceived as grouped together. They perceive those that are far apart as unrelated. In that case if you want ideas or objects to be seen as associated, then they must be presented in close proximity. This law refers to closeness both in space and in time.

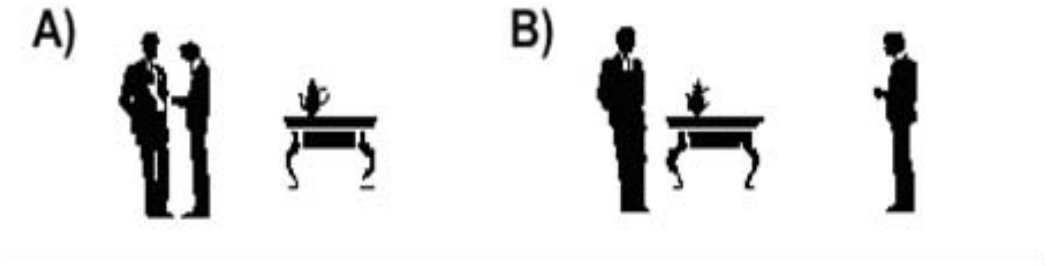


Figure 3. Two men and the table

Chang, Dooley & Tuovinen (2002).

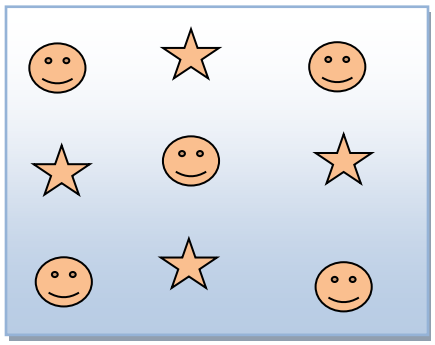
A) The picture is perceived as (a man +a man) +a table.

B) The picture is perceived as (a man +a table) +a man.

The Law of Similarity

Objects that are similar, with like components or attributes are more likely to be organized together (Schamber, 1986). Things that are similar are likely to form a group. They are likely to be considered as together and counted as a unit.

A



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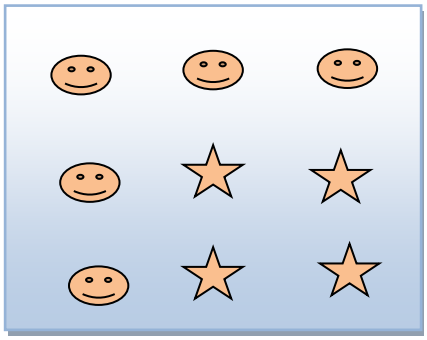

Figure 4. Groupings of shapes (Chang, Dooley & Tuovinen, 2002).

Things that are similar are likely to form “Gestalten” groups. In picture (A) you might quite easily perceive an X of faces against a background of stars. In picture

(B) you might observe a square of stars partly surrounded by faces. This is an example of similar grouping emphasizing good form or Pragnanz.

The Law of Closure

In perception there is the tendency to complete unfinished or partial objects (Ehrenstein, 2004). The human mind completes the uncompleted parts into a whole. Kanisza's triangle is one of the most recognizable examples of this law (Wikipedia, 2008).

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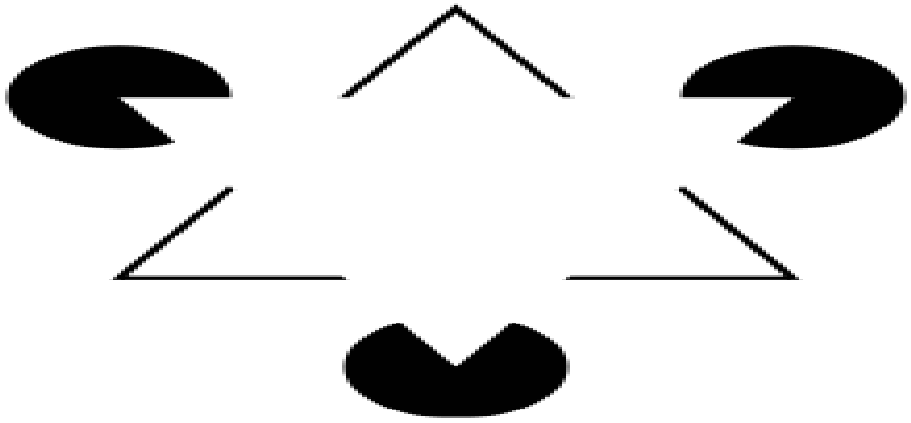

Figure 5. Figures that are not complete

Wikipedia (2008)

The Law of Continuity

Objects will be grouped as a whole if they are co-linear, or follow a direction. (Chang, Dooley & Tuovinen, 2002, Lyons, 2001). This applies 5 to visual and also conceptual continuity. The eye and mind are likely to follow the direction that has continued for some time even though flow might have stopped.

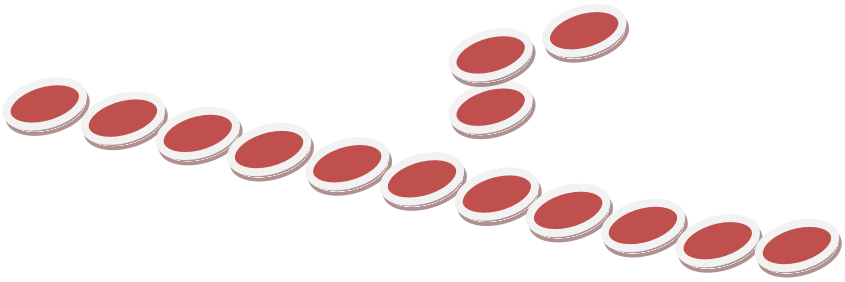

Figure 6. Illustration of the Law of Continuity

Chang, Dooley and Tuovinen (2002)

The Law of Focal Point

The idea is that a point of interest, something emphasized or different will catch and hold viewers' attention (Chang, Dooley & Tuovinen, 2002). Too many focal points are likely to confuse the learners and diffuse their learning interest. Lauer (1979) said that when everything is emphasized, nothing is emphasized. Important issues should be singled out and emphasized to help learners note them.

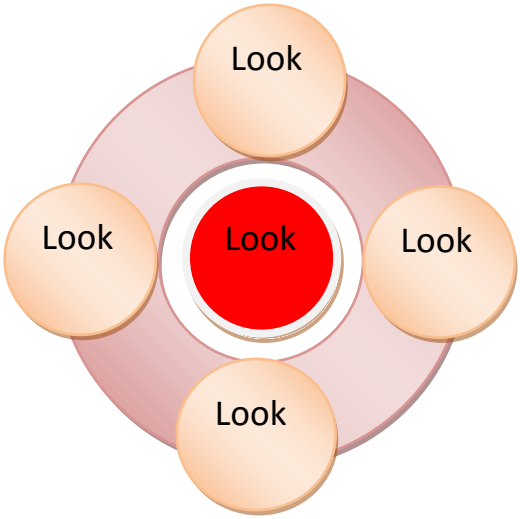

Figure 7. Illustration of the Law of Focal Point

Chang, Dooley and Tuovinen (2002)

Law of Unity

This law has to do with arrangement of things where the elements and structures have a visual connection and look like they belong together, in unity. This law can be used to make visual presentations or to make learners visualize a concept (Lauer, 1979) states that unity implies that a congruity or arrangement exists among the elements in a design; they look as though they belong together, as though there is some visual connection beyond mere chance that has caused them to come together. If related elements or concepts do not appear within the same form they are considered as separate and unrelated to the main concept and may lead to confusion. The first group of letters below may be perceived as unrelated, while the second group may be seen as related.

Figure 8. Illustration of law of unity

Chang, Dooley and Tuovinen (2002)

Law of Simplicity

This is the law that states that people will visualize according to the simplest way of grouping items – and the effort to simplify complex items is unconscious (Chang et al, 2002). This law applies to objects and concepts. It is always easy for people to find simple concepts to relate to more complex ones in order to make better appreciation of the complex ones. This works well when learners are presented with a graphical message which is well organised and uncluttered, and yet complex and ambiguous. The simplification process may lead to unintended conclusions. Fisher & Smith-Gratto (1999) have it that when learners are presented with visuals, then there is an unconscious effort to simplify what is perceived into what the viewer can understand. The closer objects are to each other, the more likely they are to be perceived as a group (Ehrenstein, 2004)

The gestalt laws have been accepted as aspects of the cognitive learning theory. They form part of the tried and tested ideas and model that are taught in institutions of education. By their nature they help explain concepts visually. These cognitive laws of learning have direct implication for CBI. They can be illustrated in computer instruction to give their best effect in teaching and learning.

Information Processing Model (IPM) Theory

The information Processing Theory approach to learning evolved out of the cognitive theory in America. Here the human mind is likened to the computer. The theorists think that the mind is like the computer in its compliance with logical rules and strategies. They think that the mind has a limited capacity in the

amount and nature of the information it can process. Information Processing emphasizes the significance of 'encoding' (input) of information, the 'storage' of information, and the 'retrieval' (access) of information. It is believed that the computer is similar to the human mind in many respects. It is thought that the computer is similar to the human mind in its capacity to receive information. They are also thought to be similar in the way they store and retrieve information. IPM theorist, U. Neisser, maintains that the correlation between cognition and computers is a powerful one (Benjafeld, 1992; Tan, Parson, Hinson & Sardo-Brown 2003).

Rehearsal

Information Processing Model

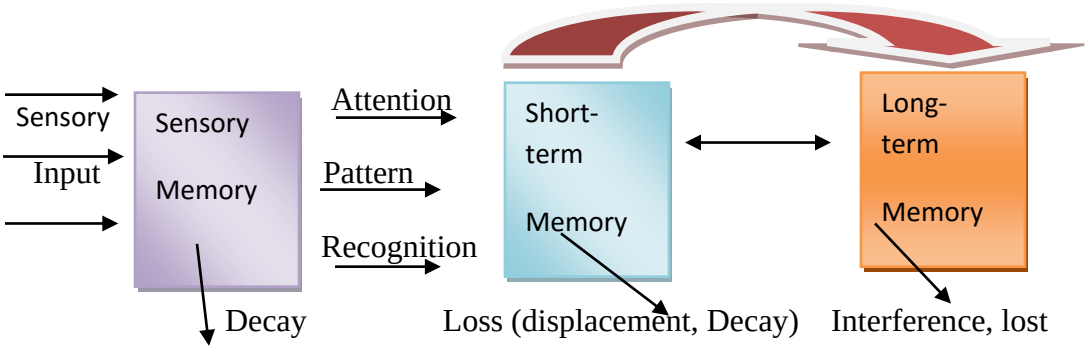

Figure 8. Information Processing Model

Benjafeld (1992; Tan 2003)

Also, just as it is possible to improve the processing power of computers by upgrading its hardware and software (programming), we can as well help children to be better thinkers by the training we give them.

The diagram above shows a model of the human mind as proposed by the information processing model. The theorists believe that the human mind comprises of sensory memory, short-term memory and long-term memory. They think that information is received from the environment through our sensory organs. They believe that the sensory memory is affiliated with transudation of energy. They put forth that the environment makes available information through light, sound, heat, smell, cold etc. But that the brain only understands electrical energy. It is also believed that the body has cells that receive the information which they call transducers. They believe that in the process of transudation memory is created. It is believed that this memory is very short. In the case of vision it lasts for about half of a second, and in the case of hearing it lasts for about three seconds. The visual system has iconic memory stimuli which elicits in shape, size, colour and location but not meaning. Hearing system has echoic memory for auditory stimuli Besner and Coltheart (1974) state that the momentary freezing of visual input allows us to select which aspect of the input should go on to further memory processing.

Short-term memory is relatively longer memory system information storage than the sensory memory. It is also called working and relates to what we are thinking about at any point in time. This is a conscious memory and is created by paying attention to an external stimulus or an internal thought or both

conditions. This lasts 15 to 20 seconds. It can be repeated. This repetition is known as maintenance rehearsal, after which it will last for 20 minutes. , 4r one more means by which short-term memory can be expanded is chunking. This is the means by which we group small bits of information into a larger and meaningful unit. Long-term memory is the third stage of memory. This is more lasting memory. It lasts from minutes to lifetime. Its capacity to retain information appears to be limitless.

Contemporary psychologists agree that long-term can be divided into subtypes of declarative and procedural memory (Santrock, 2008).

Diagram Illustrating Long-Term Memory

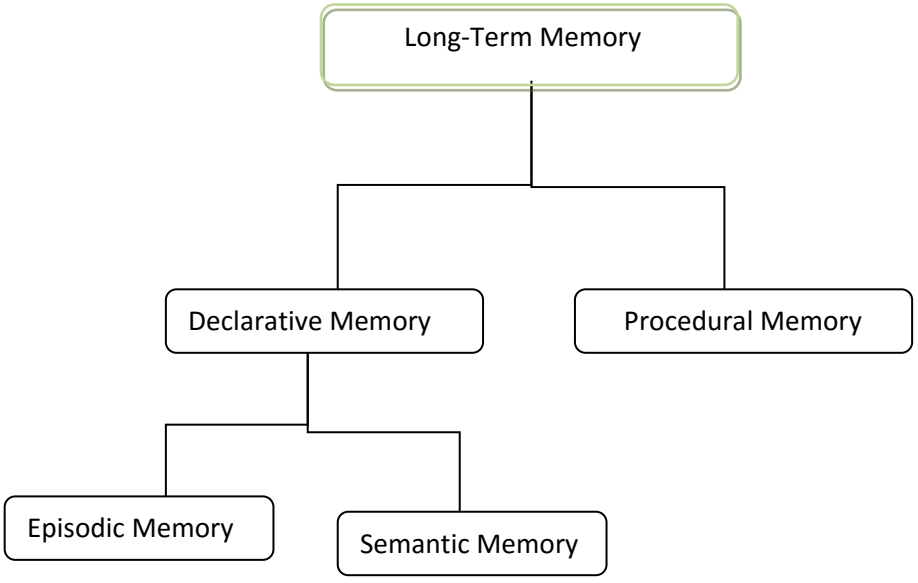

Figure 9. Illustration of long-term memory

Santrock (2008)

Procedural Memory

This sort of memory is non-declarative knowledge. They are difficult to describe or narrate. They are in the form of skills and cognitive operation. They cannot be consciously recollected in the form of specific facts. They are sometimes referred to as “Knowing How” or “Implicit Memory”. Example is the exhibition of dancing skills.

Declarative Memory

This type of memory is information that can be recollected consciously. They are specific facts or events that can be verbally recounted or communicated. They can also be called “Know that” or “Explicit Memory”. They are exhibited when we explain a basic mathematical principle.

Episodic Memory

These are memories that we have of place and time. Example is My First Day at School. This kind of information is encoded in the form of images.

Semantic Memories

Semantic memories are general facts and concepts. They are those facts that are learned in school. We can call them instructional content.

Constructivism

Constructivism is a philosophy of learning founded on the premise that, by reflecting on our experiences, we construct our own understanding of the world we live in (Brooks & Brooks, 1999). It is based on the type of learning in which the learner forms, or constructs, much of what he learns or comprehends

(Cashman, Gunter & Gunter, 2006). Constructivists assume that learners are not empty vessels to be filled with knowledge. They believe that learners are actively attempting to create meaning. Learners often select and pursue their own learning. They believe that real-life learning may be messy and complex. Constructivist theorists think that education should be whole. It should be mental, social and physical and not just dispensation of facts and information. They believe that learners construct meaning for themselves individually and socially as they learn. Constructivists believe that while the learners are constructing meaning they are really learning and that there is no other learning besides the constructing of meaning. The implication of this notion is that the learner should be the focal point when considering learning. The focal point of learning should not be the subject or the lesson but the learner. Constructivist theorists also believe that there is no other knowledge besides the meaning that the individual learner or the community of learners make.

Principles of Constructivist learning

The theory of constructivism is based on 9 major principles:

1. Learning is an active process in which the learner uses sensory inputs to construct meaning out of it. The learner plays an active part in the construction of meaning. He is therefore an active participant and not a passive one.
2. People learn to learn as they learn. The learner constructs meaning and also a system. In that case he learns two things at the same time. An example is in

research. The researcher learns to conduct research and at the same time learns more about the topic he is conducting the research on.

3. Learning involves language. This means that the language that we use influences our learning. Vigotsky believes that language and learning are intertwined.
4. The crucial action of constructing meaning is mental and it happens in the mind. In some learning physical activity may be required, but ultimately the mind is actively involved.
5. Learning is a social activity. The people around us influence our learning. These people may include our teachers, peers and family.
6. Learning is conceptual. Learners relate what they learn to what they already know, what they believe, their fears and the like. We can then say that learning is not only active but that it is also a social activity. We cannot separate what we learn from our lives.
7. Learning takes time, it is gradual not instantaneous. We always have to go back to the ideas that we are learning, ponder them, try them out, play with them and use them. We need to repeat them a lot of times to master them.
8. Motivation is an important ingredient of learning. Motivation helps learners to learn what they are learning. If learners know the importance of what they are learning, that is even a bigger motivation.
9. One needs Knowledge to learn. To learn, the learner needs a previous build up of knowledge to build.

Conceptual Framework of the Study

The conceptual framework of the research presents the researcher's position on the use of ICT in the classroom. It draws from Larry Cuban's assertion that technology in education is over hyped, Cuban (1986). It points out the researcher's conviction that the live teacher is better than any computer based instruction. But the researcher acknowledges the fact that technology can be used by the teacher to enhance his work. It also highlights the fact that the education system needs the number of teachers it cannot produce and the use of technology enables instruction to reach otherwise inaccessible learners.

Technology in Education

Technology is known to be contributing to the advancement of education. If well integrated, ICT is known to possess many positive contributions to teaching and learning. But if history is anything to go by then we have to consider the faith we have already put in computers. The history of failures of electronics in education are too many to overlook.

The Repetitive Cycle of Technology in Education

Technology is not new in education. Over the centuries there have been efforts to introduce technology into education. Many of them were successful but some of the recent attempts were met with failures. It, therefore, suggests that technology can have positive impact in education. It also means that there could be failures. Electronics have not been particularly successful in education. The expected results have not been achieved.

Failures of electronics in education are thought to be due to hype, investment considerations, poor integration and lack of educational outcomes. Each new technology reinitiates the cycle. Movies were considered to have the potential to revolutionize our educational system. This was the general view as was expressed by Thomas Edison in 1922, (Oppenheimer, 2003).

Radio was another electronic device that was considered to have the potential of making great contributions in the classroom around 1945. The popular idea was that portable radios should be introduced in the classroom and be "integrated into school life" alongside blackboards, (Oppenheimer, 2003).

In the 1960s efforts were made by way of investment by the US government in getting TV sets in the classroom. But Lyndon Johnson who was one of the presidents that invested in getting the TV sets in the classroom was able to foresee the failure of the project, (Oppenheimer, 2003).

All these technologies which were seen to have wonderful potential of making great contributions to education had to be abandoned because they could not serve the purpose they were planned for. The question to ask is "what makes the computer different?"

In 1964 Wilbur Schramm, who is regarded as the father of communication suggested that what if the full power and vividness of television teaching were to be used to help the schools develop a country's new educational pattern. He was referring to the power of the television which he thought function of the teacher which technology does not have. Computers are, undoubtedly, different from other electronic devices because of its ability to offer interaction. They have the

capability for promoting interaction among its users and so has an added advantage over electronic devices like the radio and television and film, (Oppenheimer, 2003).

With the advantage of interaction the computer is able to moderate interaction among learner and to do a lot to help learners to learn. But it falls short of the presence of a live teacher. One single factor that the live teacher alone can offer to learners is the motivation to learn. The learner needs motivation from the teacher. This motivation helps the learner to put in the needed effort to learn. There is also the need for the learner to benefit from ongoing guidance and encouragement. There is need also for "caring supervision" of the learner's work. These are very important ingredients for learning. Without them learning will not be complete. These are often given by the teacher. Unfortunately the computer is not known to be good at them.

Cost of Technology

Cost of technology is very high. There is the cost of acquisition and cost of maintenance. The cost of acquiring the equipment and maintaining them to be functional is so high. Only schools that are well funded would be able to meet the cost of technology. In less endowed schools, funds that could be spent on interventions that could accrue obvious academic benefits would be used to fund the introduction of the technology and those interventions abandoned or postponed. Interventions like a meal for the pupils at school and de-worming of school pupils which have shown proven success of keeping the pupils in school

might have to be abandoned (Oppenheimer, 2003). This opportunity cost is too high for some schools.

Myth of Technology in Education

The mention of technology sets people thinking that it is capable of solving all problems. The myths of technology in education are those that educators and learners should be conscious of. One of these common myths is the belief that the skills that the 21st Century youth needs can only be acquired through the new technology of the 21st Century. There may be many of those skills that their acquisition can be facilitated by the use of the new technology. This could be because the educators of this century have decided to use them for their instruction or better still they are made to use the in that direction (Oppenheimer, 2003).

It is argued that we need ICT for 21st Century skills like critical thinking, communication, collaboration and creativity. We fail to observe that before the advent of ICT we acquired all these skill through traditional methods. The problem we have to solve is the number of teachers that are needed in the classroom. As reported by UNESCO in its 2008 data the world needs about 50 million new teachers to add to the present number to be able to take up all teaching positions. The same report states that we will need up to 400,000 teacher trainers to be able to produce that number of new teachers (UNESCO, 2004).

The world cannot afford that number of teacher trainers; neither can it obtain that large number of trainees for the job. When we consider the amount of

money governments spent on acquisition of books the most likely conclusion that one arrives at is the integration of ICT in schools.

With its dynamic educational features ICT can help solve the problem of lack of teachers since distance learning can be encouraged at places where there may not be the required compliment of teachers. The distant instructor is recommended where there are no teachers. And where there are teachers ICT can still be used to supplement or enhance the teachers' work (UNESCO, 2004).

Ebook readers are recommended where the desktop and laptop computers may be inappropriate since they are easier to handle and use less power. The teacher should, therefore, be trained in the various pedagogies and how they are relevant in computer based instruction. The colleges of education are the places where ICT should be an important part of teacher training. Thereafter there should be continuous in-service training in ICT embedded teaching.

Empirical Framework of the Study

Computer Literacy

Teacher computer literacy could be looked at as the ability to use the computer at an adequate level for creation, communication and collaboration in the literate society (Son, Robb & Charismiadji, 2008). The use of the computer may include producing word document, some basic programmes of the computer, operating windows, making PowerPoint presentations and scanning out viruses and the like. To be able to do these operations one must be able, first, to boot the computer. Entering and exiting programme is also very important in computer literacy. The brightness of the computer helps to maintain one's ability to read

from the computer. The teacher should be able to manage their files on the computer to enjoy the full benefits of the computer. In order to integrate technology into the classroom successfully, teachers need to develop their working knowledge and skills in IT environments (Rilling, Dahlman, Dodson, Boyles & Pazvant, 2005) and have technical competence to use various computer applications for educational purposes (Cunningham, 2000).

Lack of resources, inadequate training, insufficient technical support, and lack of time; intrinsic barriers include teachers'/instructors' beliefs, visions concerning technology integration, and views about teaching, learning, and knowledge (Ertmer, 1999). It would be pointless to talk about computer literacy if the resources to learn with are not there. Computer literacy can only be learned with computers. IT hardware and software are important if the computer literacy level of teachers is a concern.

It is apparent that teachers' technology use and knowledge are closely related to their confidence level (Atkins & Vasu, 2000; Lam, 2000) and affect their attitude towards technology integration (Rakes & Casey, 2000). Pre-service teacher education programs do not currently provide prospective teachers with the necessary skills, competencies, and experiences to prepare them to use ICTs effectively in their future profession (Duran, 2000; Moursund & Bielefeldt, 1999; Bullock, 2004; Mehlinger & Powers, 2002). In many teacher education institutions today, adequate ICT education is not is provided to the teacher trainees for them to be functional ICT literate.

Lack of Confidence

In the view of (Beggs, 2000) empirical evidence suggest that fear of failure causes lack of confidence. Confidence is one important factor in any endeavour, especially in teaching. Some teachers fail to use ICT tools in lesson delivery because they are not confident enough to use them. Teachers need to be trained in the use of ICT. According to (Balanskat, Blamire & Kefala , 2006) limitations in teachers ICT knowledge make them feel anxious about using ICT in the classroom and thus not confident to use it in their teaching. Training in ICT spans from the simple operation of the computer through the use of softwares to the design and production of educational softwares. The training of teachers in ICT may best be started in the teacher education institution but it is not supposed to end after training. It is supposed to continue even when he is practising as a teacher. This helps him to build the confidence he needs to use ICT in his lessons.

According to Becta (2004), many teachers who do not consider themselves to be well skilled in using ICT feel anxious about it in front of a class who perhaps know more than they do. According to Balanskat, Blamire & Kefala (2006) lack of confidence and experience with technology influence teachers' motivation to use ICT in the classroom.

Lack of Competence

Empirical findings show that many teachers lacked the knowledge and skill to use computers and were not enthusiastic about the change and integration of supplementary learning associated with bringing computers into their teaching

practices (Newhouse, 2002). Teachers' lack of competence has been cited as the main barrier to the use of ICT in the classroom (Albirini 2006). Successful integration of ICT in the school system depends largely on the competence and on the attitude of teachers towards the role of modern technologies in teaching and learning. Thus, experienced teachers, newly qualified, and student-teachers need to be confident in using ICT effectively in their teaching (Kyriakidou, Chrisostomou & Bank, 2000). Other studies show that in the developing countries teachers' lack of technological competence is a main barrier to their acceptance and adoption of ICT (Pelgrum, 2001).

More studies found that many teachers still choose not to use ICT and media in teaching situations because of their lack of ICT skills rather than pedagogical/didactics reasons (Balaskat, Blamire & Kefala, 2006). The empirical findings show that teacher when teachers do not have the competence to use ICT in their lesson presentation they do not attempt using it at all. Teachers need to be trained in the use of ICT in lesson delivery. Teachers should be given this training from the pre-service level. Teacher's use of ICT is vast. The computer can be used in the preparation of lesson plan. Teacher can present their lessons on PowerPoint. Online assignment is an advanced use of ICT. The use of the project in presenting lessons is another innovative use of ICT in the classroom. Web authoring and other internet tools have advantage for education. Database of students' name, their examination scores and also question can be kept which helps the teacher to retrieve them any time he needs them.

Competent use of ICT includes the computer peripheral like to printer and the scanner.

Resistance to Change and Negative Attitudes

Much research into the barriers to the integration of ICT introduction found that teachers' attitude and an inherent resistance to change were a significant barrier (Shoepp, 2005). Teachers who are not using new technologies such as computers in the classroom are still of the opinion that the use of ICT has no benefits or unclear benefits (Empirica, 2006). Some teachers resist change because they do not see the need for changing the way things are done. They think that the new order must be a tried and tested one. Changing from the traditional way of teaching to the use of ICT is, to them, not acceptable. The argument some of them put across is that ICT has not proven to make any educational gains where it has been introduced. They quickly point to Larry Cuban's argument that ICT is not what contributes to gains where gains were thought to have been made with ICT but that was due to better administration and dedicated teachers. They think more attention should be given to the supply of better facilities to the schools rather than expensive ICT gadgets.

It is found that teachers' perception and attitude towards ICT affect that of their students (Dyck & Smither, 1994; Teo, 2008). Teachers tend to be role models for their students (Derbyshire, 2003). Students do not appreciate the positive effects of ICT. Some of them will prefer not to have anything to do with ICT. They lose interest in learning with ICT. They fail to realize that ICT can enhance their learning.

In some environments the number of computers is not enough to cater for the number of students. In others enough time is not given on the time table for the use of computers. In those environments researchers identified time limitations and the difficulty in scheduling enough computer time for class as a barrier to teachers use of ICT in their teaching (Al-Alwani, 2005) to plan technology lessons, explore the different internet sites, or look at various aspects of educational softwares (Sicilia, 2005). The school system is not able to exploit the potential of ICT because of the limited number of computer. The students are not able to develop the skills needed to use the computer as a learning tool. Students' phobias for computers are not dispelled while they are in school and so they carry them into working life.

Lack of Effective Training

One of the three barriers of teachers' use of ICT in teaching students was lack of training (Beggs, 2000). The issue of training is certainly complex because it is important to consider several components to ensure the effectiveness of the training (Becta, 2004). Pre-service teacher education can also play a significant role in providing opportunities for experimentation with ICT before using it in classroom teaching (Abirini, 2006). Lack of ICT focus in initial teacher education is a barrier to teachers' use of ICT. One of teachers' complained was about how difficult it was to always have access to computers (Sicilia, 2005) There is the need for colleges of education to integrate the use of ICT into their training. If the teachers are given effective training to be able to incorporate ICT in their lessons, it will be easy for them to practice it on the field.

Availability and Accessibility

Computers had to be booked in advance. If they forgot to book for the use of the computers, they would have to forego the use of the computers several periods in a row when they wanted to work on several projects with the students (Sicilia, 2005).

Studies have found lack of access as a major barrier to the use of ICT in schools. In some cases the computers are not available in school and/or home. Computer peripherals are also important. Unavailability of computer peripherals like printers discourages the use of ICT in schools. Old, slow and non-functional computers can be identified as reason for ICT not being used in schools Softwares are needed by teachers and learners to use in schools. Lack of softwares and internet connectivity can be fingered as a barrier to the use of ICT in education.

The inaccessibility of ICT resources is not always merely due to non-availability of the hardware and software or other ICT materials within the school. It may be the result of one of a number of factors such as poor organization of resources, poor quality hardware, inappropriate software, lack of personal access for teachers (Becta, 2004). The use of printers and digital cameras has become important ICT gadget that is used to enhance education. Photographs can be taken and included in lesson presentations.

Besides the availability and accessibility of computers, there is also the need to keep them functional. Broken down computers have to be serviced. Some

of these can be done by a technician that can be offering support to the teachers. The internet and intranet help in communication and in the search for information. Practitioners views from 26 countries on what were sought on what were the main obstacles to the implementation of ICT in schools. They concluded that four of the top ten barriers were related to the accessibility of ICT. These barriers, insufficient number of computers, insufficient peripherals, insufficient number of copies of softwares, and insufficient simultaneous internet access (Pelgrum, 2001).

Lack of Technical Support

Without both good technical supports in the classroom and whole school resources, teachers cannot be expected to overcome the barriers preventing them from using ICT (Lewis, 2003). Lack of resources, inadequate training, insufficient technical support, and lack of time; intrinsic barriers include teachers'/instructors' beliefs, visions concerning technology integration, and views about teaching, learning, and knowledge (Ertmer, 1999). The need of technical support cannot be over emphasized. A little technical hitch can mar a whole lesson if there is no support. In the view of primary and secondary school teachers, one of the top barriers to ICT use in education was lack of technical assistance (Pelgrum, 2001).

Technical problems were found to be a major barrier for teachers. These technical barriers include waiting for websites to open, failing to connect to the internet, printers not printing, malfunctioning computers, and teachers having to work on old computers (Sicilia, 2005).

Empirical data point to the view that if there is no technical support for the classroom and the school as a whole teachers will not be able to overcome barriers that prevent them from using ICT in schools. Some of the difficulties that arise from this lack include waiting for website to open, failing to connect to the internet and the like. Technical barriers impeded the smooth delivery of the lesson or the natural flow of the classroom activity (Sicilia, 2005).

Summary

In this chapter the researcher discussed the theoretical framework of the study. The study draws its frame from three learning theories, the behaviourist, cognitive and constructivist theories. The conceptual frame of the research was also put forth. Finally, empirical findings of related literature were also discussed.

CHAPTER THREE

METHODOLOGY

This chapter deals with the process through which the research was conducts. It included the research design, population, sampling and sampling technique, instrumentation, administration of instrument and data analysis.

Research Design

This is the overall plan of the project that was used to collect accurate and reliable data on the research questions that have been put forth in the first chapter of the study. In this study the descriptive survey approach was used to gather information. The descriptive approach is considered most appropriate because of the characteristics associated with the design. According to Gay (1987), a survey is an attempt to collect data from members of a population in order to determine the current status of that population with respect to one or more variables. The descriptive survey research design is also recommended by Babbie (1990) for the purpose of generating information from a population so that inferences can be made about characteristics relating to attributes of behaviour of a population.

The characteristics of the research expressed in chapter one of the project, however, point to the need for the descriptive survey approach to be used to gather data with the view of describing pre-service teachers' ICT literacy, their ability to integrate ICT in their teaching, their confidence, and competence in

using ICT in lesson presentation. The study also observed the availability of ICT hardware and software to student teachers, and student teachers' attitude towards ICT. The researcher studied the use of ICT in their lessons at teaching practice. The researcher also used the observation method to find out if tutors in the colleges of education use ICT in lesson delivery.

The results of the research were generalized to the population of all pre-service teachers in Ghana. Consequently, a questionnaire was developed and used as the appropriate instrument for data collection. Non-participatory observation was also used to assess the level of ICT integration in lessons by tutors in the colleges of education.

Population

The population for this study was pre-service teachers in two colleges of education and UCC distance education teacher-trainees at the Accra High School Centre. The two colleges of education and the distance education centre were chosen for the research because of three (3) reasons. The first is that these institutions of education were chosen for reasons of proximity. The second reason which emanates from the first was that the advantage of proximity enabled the researcher to be able to complete the project within time. The third reason which also stems from the first is that the cost of the research will be within the reach of the researcher.

In all, 2,667 students were surveyed from the three institutions. A total of 856 students were at the Accra College of Education, 502 were female while 354 were male. Total number of students in OLA College of Education was 627. They

were all female because the college is a women's college of education. The number of students at the University of Cape Coast distance diploma of education students at the Accra High School Centre were 1184. Out of that number 454 of them were male while 730 were female.

A total of 120 respondents were sampled, 40 in each of the three institutions of education. Final year students in the three institutions of education were used for the survey. These students in the colleges of education had almost completed their taught courses and were teaching at their mentoring centres. They were in the position to respond to items in the questionnaire appropriately.

Sampling and Sampling Procedure

By means of random sampling 40 students were selected from the final year class in each institution. No particular attention was paid to gender, however mixed gender was desired. OLA College of Education is a women's college of education and so all the 40 were female. Sample size from all the three institutions was 120.

Instrument

Questionnaire (see Appendix A) was used in the study. The questionnaire requested responses regarding demographic data and behavioural data. The questionnaire was used for collecting the data for analysis. It was made up of 29 items and 5 sections. Section one (A) of the instrument was made up of 6 items requesting demographic information of the respondent. Section two (B) of the questionnaire had 8 items. It inquired information about level of ICT literacy of respondent and the perception of the student-teachers of ICT; section three (C)

collected data about the perception of the student-teachers of ICT. Section Four (D) had 6 items that asked for information about challenges that respondents faced in their use or attempt to use ICT. All 29 items were asked to address the 4 research questions raised in the study. These were close-ended type.

A three-point Likert Scale was used to measure the responses. The Likert technique enabled the respondents to indicate the degree of their belief or perception of a given statement (Best & Khan, 1989). Hence this technique was chosen to measure the behaviour of the population. There was, however, provision made for respondents to express other views that might not have been presented in the Likert-form.

Data Collection

Administration of the instrument was executed by the researcher in person during normal school hours to ensure adequate co-operation from respondents. To facilitate administration of the instrument, a covering letter (see appendix A) was sent to the principals of the participating colleges of education. In the letter the purpose of the study, the need for the study and the importance of the individual's responses were explained. After establishing communication with the Heads of institutions visited the researcher obtained permission to conduct the study. The principals in turn gave the researcher introductory letters to head teachers of schools where the mentees were doing their mentoring. The letters were sent to the head teachers ahead of time by the researcher. On the day appointed to administer the questionnaires the researcher went at the appointed time and the student-teachers were allowed to see the researcher to respond to the

questionnaires. A total of 120 questionnaires were issued; 40 in each of the three colleges of education.

Data Analysis

Data analysis is the critical examination of the research data in order to understand the parts and relationships. Analysis includes the separation of the research data into its constituent parts. After the separation the researcher must study the nature of the data to determine the essential features and their relationships. Data analysis helps the researcher to eliminate unlikely possibilities so that he can guard against spurious relationships.

Questionnaires were used to collect the data in this research. The researcher sorted the questionnaires. The completed questionnaires were numbered serially to ensure easy identification. They were finally coded. The item were measured on the five point Likert scale as “Strongly Agree”, “Agree” , “Uncertain”, “Disagree”, “Strongly Disagree”. The positive items were rated 5,4,3,2,1 while the negative items were rated 1,2,3,4,5 respectively. To be able to analyze the data the researcher used the SPSS (Statistical Product for Service Solution, version 13.0). The data were entered into the SPSS for analysis.

Since the study was purely descriptive, the descriptive statistical analysis tools were used to analyze the data. The main tools that were used included percentages and frequencies. These tools were used to analyze all the responses of the questionnaires. Frequency and percentage tables were used to describe the data using the SPSS.

These tables helped the researcher to have an overall fair view of the findings, to identify the trends and also to display the relationships (Sarankos, 1998). Responses with greater percentages were considered as the population's general view on the study.

The analysis of the questionnaire items and the data of each group will be found in the next chapter with possible explanations given to serve as basis for more definite projections which enabled the researcher to make good suggestions and recommendations. The level of objectivity and consistency in the data collection and analysis cannot be over-emphasized.

CHAPTER FOUR

RESULTS AND DISCUSSION

Overview

This chapter deals with the presentation of results and discussion of the data collected. Descriptive statistics was used in presenting the results. Frequencies and percentages were employed. These were presented in tabular form. There is a general discussion of the results at the end of each section aimed at answering the research questions.

Demographic Information of Student-Teachers

This Section takes a critical look at the demographic data collected from the study which was collected from the three teacher education institutions. The institutions surveyed were the Accra College of Education in Accra, OLA College of Education in Cape Coast, and the University of Cape Coast Distance Education students of the Accra High School Centre. They were chosen for the sake of convenience since they were easy for the researcher to reach. The University of Cape Coast Distance Education, Accra High School Centre was chosen instead of the earlier group, Ada College of Education partly because of convenience and also to cover a wider spectrum of teacher trainees. Forty students were randomly sampled from each of the three institutions making a total of 120 respondents in all. Sampled students of the colleges of education were those in their final year

and were undergoing mentorship in neighbouring first cycle schools. They had the experience of student life and the mentorship gave them a level of teaching experience in the classroom.

The study was conducted in 3 teacher training institutions. Forty final year students were surveyed from each of the institutions. Table 1 gives a summary of the colleges that were surveyed for the study. The number of students and the percentage are given college by college.

Table 1: Colleges that were sampled

College surveyed	frequency	%
Accra College of Education	40	33.3
OLA College of Education	40	33.3
UCC CCE Accra High School	40	33.3
Total	120	100.0

Source: Field Data, 2012

Table 1 shows the sampled Teacher Education Institutions. One hundred and twenty respondents were surveyed in all. The first institution was the Accra College of Education in Accra. It is a mixed college of education sited in Accra. Forty (33.3%) respondents were sampled there. Those surveyed were the third (final) year students who were attached to schools as mentees.

The second is OLA College of Education. It is a women's college of education sited in Cape Coast. Forty (33.3 %) respondents were surveyed from there. Those surveyed here too were in the third (final) year. They were also attached to schools as mentees. The third institution is Accra High School Centre

of CCE UCC. It is one of the centres in Accra that is training teachers through distance education. It is run by the university of Cape Coast. This group was the third (final) year Diploma in Basic Education (DBE) students. They are all supposed to be teaching already. Some of them are supposed to have had certificates in education and some years of teaching experience. Others would have been teaching without certification for some time.

Age profile of sample members in years

The sampled students varied in age. Table 2 presents the age distribution of the sample. The numbers and percentages of the age groups are given.

Table 2: Age Profile of Sample Members in Years

Age category	frequency	%
20-25 years	69	5 8.4
26-30 years	27	22.9
31-35 years	18	15.3
36 and above	4	3.4
Total	118	100

Source: Field Data, 2012

Table 2 shows the age profile of the respondents in the survey. The age categories that featured in the survey were 20-25 years, 26-30years, 31-35 years and then 36 years and above. Out of the 118 responses that were returned sixty-

nine (58.5%) of the respondents were in the age range of 20-25 years. Ages 26-30 years were twenty-seven (22.9%) of respondents. Age 31-36 years were eighteen (15.3%) of respondents. Finally, the age 36 years and above category were three (2.5%) of respondents.

Sex of Respondents

Sex is important in a survey of this type. Table 3 gives the sex profile of the sample. The numbers and percentages of the sex of the sample are given in Table 3.

Table 3: Sex Distribution of Respondents

Sex	Frequency	%
Male	34	28.8
Female	84	71.2
Total	118	100.0

Source: Field Survey, 2012

Table 3 shows the sex profile of the study. There were 118 respondents in all. Thirty-four (28.8%) of the respondents were male while eighty-four (71.2%) of the respondents were female. The results imply that more females than males were training to be teachers. The number of female teacher-trainees was double that of the male. It also means that in the near future number of female teachers can exceed number of male teachers.

Time one spends on computer

Time one spends on computer daily has an impact on the one's ability and perception of ICT. The time the respondent spends on the computer every day is presented in Table 4.

Table 4: Time Spent on the Computer Daily

Time	Frequency	Percentage
Less than 1 hour	103	87.3
1-2 hours	9	7.6
2 hours and above	6	5.1
Total	118	100

Source: Field Data, 2012

Table 4 shows the length of time (in hours) that each respondents spends on the computer each day. Out of the 118 respondents 103 (87.3%) spent less than an hour each day. This represented 87.3% of the sample. Nine (7.6%) of the respondents spent 1-2 hours each day on the computer daily. Six (5.1%) of the respondents spent 2 hours and above on the computer daily.

Research Question 1

What is the level of ICT literacy of students in the college of education?

ICT literacy is the basic skill to operate the computer. Teachers should have the skill before they make attempts at IT integration into their lessons. Table 5 sought to verify the respondents' level of ICT literacy. Eight items were

presented in the table and responses to them were used to determine the ICT literacy level of the respondents.

Table 5: Student-teachers' ICT Literacy

Statement	A		U		D		Total	
	freq.	%	freq.	%	freq.	%	freq.	%
I can boot the computer.	102	86.4	9	7.6	7	5.9	118	100
I can produce a word document on the computer	69	58.5	32	27.1	17	14.4	118	100
I can prepare my own PowerPoint presentations.	2	1.7	8	6.8	108	91.5	118	100
I can start and exit a computer programme.	16	13.6	60	50.8	42	35.6	118	100
I can minimize, maximize and move windows on the desktop.	16	13.6	37	31.4	65	55.1	118	100
I can change the brightness and contrast of the monitor.	10	8.5	33	28.0	75	63.6	118	100
I can scan virus on the computer.	9	7.6	25	21.2	84	71.2	118	100
I can delete and rename files on the computer.	14	11.9	27	22.9	77	65.3	118	100

Source: Field Data, 2012

Table 5 shows results of the respondents' ability to boot the computer. Out of 118 respondents one hundred and two (86.4%) agreed that they could boot the computer. Nine (7.6%) of them were uncertain whether or not they could boot the computer. Seven (5.9%) of the respondents disagreed that they could boot the computer. This is one basic level of ICT literacy. In all 86.4% could boot the computer and that means that at that level the students' ICT literacy is high. The results differ from Ertmer (1999) who asserted that teachers are not well trained in ICT and so are generally not ICT literate. The results show that teachers were generally literate in the booting of the computer.

Table 5 also shows respondents' ability to produce a word document on the computer. Out of a sample of 118 respondents sixty-nine (58.5%) respondents agreed that they could produce a word document on the computer. Thirty–two (27.1%) of them were uncertain about their ability to produce a word document on the computer while seventeen (14.4%) of them disagreed that they could produce a word document on the computer. Respondents showed high ICT literacy level on this item. This is another item on which the findings differ with Ertmer (1999). Teachers would generally be able to produce a word document on the computer. Ertmer found that teachers were generally not literate in ICT.

Table 5 again, shows responses indicating if respondents could prepare a PowerPoint document on the computer or not. Out of the 118 responses, two (1.7%) agreed that they could prepare a PowerPoint presentation on the computer. Eight (6.8%) of them were uncertain about their ability to prepare a PowerPoint presentation on the computer. Then 108 (91.5%) disagreed that they could prepare

a PowerPoint document on the computer. This is a low ICT literacy. This finding agreed with the findings of Ertmer (1999). His findings indicated that teachers were generally not ICT literate. The responses on this item indicated that most of the respondents could not prepare a PowerPoint presentation.

Also, Table 5 shows responses regarding respondents' ability start and exit a computer programme. Out of a total of 118 respondents sixteen (13.6%) thought that they could start and exit a computer programme. Sixty (50.8%) respondents were uncertain whether or not they could start and exit a computer programme. Forty-two (35.6%) respondents thought they could start and exit a computer programme. This is quite a low ICT literacy rating. This result agreed with Ertmer (1999) which asserts that teachers were generally not literate in ICT. Respondents would not be able to start a computer programme and if it is started for, they cannot exist the programme.

Table 5 shows the respondents' ability to minimize, maximize and move windows on desktop. Out of 118 respondents 16 (13.6%) agreed that they could minimize, maximize and move windows on desktop. Thirty-seven (31.4%) respondents were uncertain whether or not they could minimize, maximize and move windows. Sixty-five (55.1%) of the respondents thought they could not minimize, maximize and move windows. This shows low ICT literacy. Results from this item agree with that of Ertmer (1999). Ertmer's findings show that teachers are generally not computer literate due to lack of ICT training. The findings on this item show low ICT literacy due to lack of ICT training.

The sixth item in Table 5 shows the respondents' ability to change the brightness and contrast of the computer monitor. Out of 118 respondents ten (8.5%) thought they could change the brightness and contrast of the computer monitor. Thirty-three (28.0%) of respondents were uncertain about their ability to change the brightness and contrast of the computer monitor. Seventy-five (63.6%) respondents thought they were not able to change the brightness and contrast of the computer monitor. This result suggests low ICT literacy.

The seventh item on Table 5 reports the results of the respondents' ability to scan virus on the computer. Out of a total of 118 respondents nine (7.6%) thought they could not scan virus on the computer. Twenty-five (21.2%) were uncertain about their ability to scan virus on the computer. Eighty-four (71.2%) thought they could not scan virus on the computer. This is indicates low ICT literacy. This agrees with the findings of Ertmer (1999). His assertion is that teachers are generally not ICT literate due to lack of ICT training.

The eighth item on Table 5 shows the respondents' ability to delete and rename files on the computer. Out of a total 118 respondents fourteen (11.9%) agreed that they could delete and rename files on the computer. Twenty-seven (22.9%) of the respondents were uncertain about their abilities to delete and rename files on the computer. Seventy-seven (22.9%) of the respondents disagreed with the assertion they could delete and rename files on the computer. This suggests low ICT literacy on this item. This finding also agrees with Ertmer (1999) on his assertion that teachers are generally not ICT literate due to lack of ICT training.

Out of the 8 items in this section 2 of them showed positive ICT literacy while 6 of them showed negative literacy. The conclusion can then be drawn that the ICT literacy of the teacher-students is low. This finding agrees with the findings of Ertmer (1999) Atkins and Vasu (2000) and Lam (2000). ICT literacy among teachers was low and so they lacked the confidence and competence to use ICT in their lessons.

Research Question 2

What is the perception of the student-teachers about ICT?

Teachers' perception helps to shape the attitudes of the learners under them. Nine items have been provided in the form of statements asking for responses that were used to determine the respondents' perception of ICT.

Table 6: Student-teachers' Perceptions of ICT

Statement	A		U		D		Total	
	Freq.	%	Freq.	%	Freq	%	Freq	%
ICT enhances students' learning.	112	94.9	3	2.5	3	2.5	118	100
Teacher education should include ICT	96	81.4	16	13.6	5	4.2	118	100
ICT provides better learning experiences.	23	19.5	42	35.6	53	44.9	118	100
I learn more from ICT than I do from books.	0	0.0	25	21.2	93	78.8	118	100
I won't have anything to do with ICT.	69	58.5	31	26.3	18	15.3	118	100

Table 6 continued

ICT makes my course more interesting.	16	13.6	34	28.8	68	57.6	118	100
I would work harder if I could use ICT	73	61.9	28	23.7	17	14.4	118	100
The state of facilities in my school discourages me from using ICT.	98	83.1	15	12.7	5	4.2	118	100
ICT can't address the needs of my school system.	41	34.7	58	49.2	19	16.1	118	100

Source: Field Data, 2012

Table 6 shows results of perception of student-teachers about the ICT. It sought answers from the respondents if they thought ICT enhances the learning of students. Out of a total of 118 respondents 112 (94.9%) of them agreed that ICT enhances students' learning. Three (2.5%) of the respondents were not certain whether or not ICT enhances students' learning. Another three (2.5%) respondents thought that ICT did not enhance students' learning. This is considered as a positive perception of the ICT in education. This finding disagees with Teo (2008) whose findings show that teachers have negative perception of ICT . This finding shows respondents' positive perception of ICT .

The second item on the table wanted to find out from the respondents if they thought ICT should be part of teacher education. Out of 118 respondents

ninety-six (81.6%) thought ICT should be included teacher education. Sixteen (13.6%) were uncertain if ICT should be included in teacher education. Five (4.2%) repondents thought that ICT should not be included in teacher education. One(0.8%) respondent returned the questionnaire with that portion blank. This table shows repondents' positive perception about ICT in teaching. Here again this finding disagrees with the findings of Teo (2008). While his findings shows negative teacher ICT perception that of this research shows positive perception on this item.

The third item in Table 6 above results on the item that seeks to find out from respondents if they thought that ICT provided better learning experiences (than learning without ICT). Out of a total of 118 respondents 23 (19.5%) of them thought that ICT provided better learning experiences. Forty-two (35.6%) of the respondents were uncertain whether ICT provides better learning experiences. Fifty-three (44.9%) respondents thought that ICT does not provide better learning experiences. This is negative perception of ICT in education. This finding shows negative ICT perception and it agrees with the findings of Derbyshire (2003) and also of Teo (2008) that student-teachers generally have negative perception of ICT.

Table 6 above reports the result of item that sought responses whether the respondents learn more from ICT or from books. Out of a total of 118 respondents twenty-five (21.2%) were uncertain whether they learned more from ICT than they learned from books. Ninety-three (78.8%) of respondents thought they did not learn more from ict than they learned from books. None(0.0%) of the respondents agreed that they learned more from ICT than they learned from

books. This is considered as negative perception of ICT in education. This finding agrees with Derbyshire (2003) and Teo (2008).

The next item in Table 6 reports the result of the item that seeks to find out whether respondents would have anything to do with ICT. Out of a total of 118 respondents eighteen (15.3%) disagreed that they would not have anything to do with ICT. This means that they would have a lot to do with ICT. Thirty-one (26.3%) of the respondents were uncertain whether or not they would have anything to do with ICT. Sixty-nine (58.5%) of the respondents agreed that they would have nothing to do with ICT. This means that they would have nothing to do with ICT. This is also considered as negative perception of the use of ICT in education. This finding agrees with Derbyshire (2003) and Teo (2008)

Table 6 also reports on the item that ICT makes the student-teachers' course interesting. A total of 118 responses were turned in. Sixteen (13.6%) respondents agreed that ICT makes their course interesting. Thirty-four(28.8%) of the repondents were uncertain whether ICT made their course interesting. Sixty-eight(57.6%) respondents thought ICT did not make their course interesting. This is also considered as negative perception of ICT in education. The finding on this item agrees with that of Derbyshire (2003) and Teo (2008).

The table 6 reports on the item whether the respondents would work harder if they could use ICT. In all there were 118 respondents and seventy-three (61.9%) responded that they would work harder if they could use ICT. Twenty-eight(23.7%) were not certain if they would work harder if they could use ICT. Seventeen (14.4%) of the respondents disagreed that they would work harder if they could use ICT. This means that they would not work harder if they could use

ICT. This is considered as a positive perception of ICT in education because majority of them thought that ICT would make them work harder. This finding agrees with the findings of Derbyshire (2003) and Teo (2008).

Table 6 shows results of the item that sought to find out if the state of facilities in the respondents' colllege discouraged them from using ICT. Out of a total of 118 respondents ninety-eight (83.1%) agreed that the state of facilities in their colleges discouraged them from using ICT. Fifteen (12.7%) of the respondents were uncertain whether the state of facilities in their colleges discouraged them from using ICT. Five (4.2%) of the respondents were uncertain whether the state of facilities in their colleges discouraged them from using ICT. This is considered a nagative perception of ICT in education. This finding agrees with that of Derbyshire (2003) and Teo (2008).

Table 6 shows results of the item that sought to find out whether respondents perceived ICT to be able to address the needs of their school systems. A total of 118 responses were turned in and out of that number forty-one (34.7%) thought that ICT could not address the needs of their school systems. Fifty-eight (49.2%) of the respondents were uncertain whether ICT could address their school system. Nineteen (16.1%) respondents thought ICT could addressed needs of their school syestems. This can also be considered as a negative perception of ICT in education. This finding agrees with that of Derbyshire (2003) and Teo (2008).

Out of 9 perception items 3 of them gave positive results while 6 were negative. The conclusion can be drawn that the student-teachers' perception of ICT was nagative. This finding confirmed the findings of Derbyshire (2003) Shoepp(2005)

and Teo (2008) that teachers had a negative perception of ICT and it affected the attitude of the pupils towards ICT .

Research Question 3

What challenges do students encounter in using ICT?

The use of ICT poses challenges in schools and other educational institutions. Some of these challenges are suggested in statements for respondents to agree or deny or otherwise. The results were analyzed to determine if the colleges faced those challenges or not.

Table 7: Challenges that Student-teachers Encounter in Using ICT

Statement	A		U		D		Total	
	Freq.	%	freq.	%	freq.	%	freq.	%
Resistance to change is a challenge to the use of ICT in schools.	102	86.4	15	12.7	1	0.8	118	100
Lack of ICT skills is a challenge	116	98.3	2	1.7	0	0.0	118	100
Lack of effective training in ICT is a challenge.	113	95.8	4	3.4	1	0.8	118	100
Anxiety in the use of computers is a challenge.	107	90.7	3	2.5	8	6.8	118	100
Lack of technical support for ICT in schools is a challenge.	117	99.2	1	0.8	0	0.0	118	100
Slow computers is a challenge to the use of ICT in schools.	112	94.9	3	2.5	3	2.5	118	100

Source : Field Data,2012

Table 7 reports on challenges that students encounter in their use of ICT . There are 6 items in the table that seek to find out the kind of challenges that might exist in the colleges. The first item wanted to find out whether or not resistance to change was a challege to the use of ICT in the college.

One hundred and two (86.4%) of the respondents agreed with the assertion. Fifteen (12.7%) of the respondents were uncertain whether or not resistance to change was a challege to the use of ICT in the college. One (0.8%) respondent disagreed with the assertion that resistance to change was a challege to the use of ICT in the college. The results is an agreemnent that resistance to change was a challege to the use of ict in the school. This finding agrees with the assertion that teachers' attitude and an inherent resistance to change are a significant barrier (Schoepps 2005).

The next item in Table 7 reports on the contention that lack of effective training was a challege to the use of ICT in the college. Out 118 respondents, One hundred and sixteen (98.3%) of them agreed with the assertion that lack of effective training was a challenge to the use of ICT in the colleges. Two (1.7%) of the respondents were uncertain whether or not the assertion that lack of effective training was a challenge to the use of ICT in the colleges. None (0.0%) of the respondents disagreed with the position that lack of effective training was a challenge to the use of ICT in the college. The results suggest that lack of effective training was a challenge to the use of ICT in college. The finding agrees with Empirica (2006).

Also, Table 7 shows results of the statement that anxiety in the use of computers was the a challege. Responses received in all were 118. Out of that 107(90.7%) of the respondents agreed with the contention that anxiety in the use of computers was a challege.Three (2.5%) of the respondents were uncertain whether or not anxiety in the use of computers was a challenge. Eighty (6.8%) respondents disagreed with the contention that anxiety in the use of computers was a challenge. Reponses on this item indicate that anxiety in the use of computers was a challenge. This finding agrees with Empirica (2006).

Moreover, Table 7 illustrates the results of the statement that lack of technical support was a challenge to the use of computers in the college. A total of 118 responses were received. Out of that number 117(99.2%) of them agreed that lack of technical support was a challenge to the use of ICT in the college. One (0.8%) respondent was uncertain whether or not lack of technical support was a challenge to the use of ICT in the colleges. None of the respondents disagreed with the statement. This suggests that lack of technical support was a challenge to the use of ICT in the college. This finding supports Lewis (2003) contention that since teachers are not technicians they would need technical hands to be able to operate their computers effectively (Lewis 2003).

Table 7 further shows results of the assertion that slow computers was a challenge to the use of ICT in the college. In all 118 responses were received on this item. One hundred and twelve (94.9%) of the respondents representing 94.9% agreed that slow computers was a challenge to the use of ICT in the college. Another 3 (2.5%) respondents representing 2.5% disagreed with the assertion that

slow computers was a challenge to the use of ICT in the college. The results here concede to the assertion that slow computers was a challenge to the use of ICT in the college.

Other Challenges of Using ICT

This section asked questions to find out other challenges that student-teachers face in their use of ICT in the colleges. It was realised that resistance to change was one of them. This agrees with the findings of Shoepps which states that research into the barriers to the integration of ICT introduction found that teachers' attitude and an inherent resistance to change were a significant barrier (Schoepps, 2005). Another one was lack of effective training, and anxiety in the use of the computer.

Table 8: Other Challenges

Statement	Freq.	%
My college lacks internet services	16	20.0
Too little time is given to ICT on timetable	19	23.7
ICT lessons have no practicals	22	27.5
There are no computers to learn with	23	28.8
Total	80	100

Source: Field Data, 2012

Out of that number 16 (20.0%) of the respondents thought that lack of access to the internet was a challenge in their college. Nineteen (23.7%) of the respondents thought too little time was given to ICT on the school time table and

that was a challenge to the use of ICT in the colleges. This was 16.0% of the respondents. Twenty-two (27.5%) of the respondents thought that the teaching of ICT in the college did not involve the practical use of the computer and that was a challenge to the use of ICT in the colleges. Twenty-three (28.8%) of the respondents thought that there were no computers in the colleges to learn with and they thought that was a challenge to the use of ICT in the colleges. This finding agrees with findings of Sicilia (2005) that educational institutions are faced with many challenges in their use of ICT. He thinks that is a major reason why teachers do not use ICT in their lessons.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This chapter deals with the summary of the study in its totality. It gives a gist of the findings that emerged from the data collected. Conclusions are drawn from them and recommendations made from the findings. It also gives suggestions for further research in this area of study.

Summary

The objective of the study was to examine the extent of ICT proficiency of students in teacher training institutions in Ghana. It sought to examine the educational use of ICT in the institutions of education in Ghana. The population of interest in this research was students in teacher training institutions. Two colleges of education and one distance education teacher training institution were surveyed. Accra College of Education in Accra and OLA College of Education in Cape Coast were surveyed. UCC, CCE Accra High School Centre in Accra was also surveyed. Forty final year students in each of the institutions were randomly selected. The sample size was 120. Questionnaire was used to seek responses from the students concerning their level of ICT literacy, their perception of ICT, availability of ICT hardware and software and also challenges they encountered in their use of ICT.

Summary of Key Findings

The main findings of the study are that:

With regard to student-teachers' ICT literacy, it was discovered that:

1. Students in the college of education could boot the computer. Majority of the student-Teachers could boot the computer.
2. Students in the college of education could produce a word document on the computer. Most of the respondents could produce a word document on the computer.
3. Student-teachers could not prepare a PowerPoint presentation on the computer. Most of the student-teachers could not prepare a PowerPoint presentation on the computer.
4. Students in the college of education were uncertain whether or not they could start and exit a computer programme. Majority of the student-Teachers were not sure about their ability to start and exit a computer programme.
5. Student-teachers could not minimize, maximize and move windows on the desktop. Majority of the student-teachers could not minimize, maximize and move windows on the desktop.
6. Student-teachers could not change the brightness and contrast of the monitor. Majority of the respondents could not change the brightness and contrast of the monitor.
7. Student-teachers could not scan virus on the computer. Most of the respondents could not scan virus on the computer.

8. Student-teachers could not delete and rename files on the computer. Majority of the respondents could not delete and rename files on the computer.

On student-teachers perception on ICT usage, it was discovered that:

1. Student-teachers perceived ICT as not able to enhance their learning. Most of the respondents thought that ICT could not enhance their learning.
2. Student-teachers thought that teacher education should include ICT. Majority of the respondents thought that ICT should be included in teacher education.
3. Student-teachers thought that ICT did not provide them with better learning experiences.

   Majority of the respondents thought that ICT did not provide better learning experiences.
4. Student-teachers learned more from books than from ICT. Most of the respondents indicated that they learned more from books than they did from ICT.
5. Student-teachers' would work harder if they could use ICT. Majority of the respondents believed that they would work harder if they could use ICT.
6. The state of facilities in the college discourages student-teachers from using ICT.

Finally, regarding the challenges of ICT usages, the study revealed that:

1. Resistance to change was a challenge to the use of ICT in the college.

2. Lack of effective training was a challenge to the use of ICT in the college.
3. Lack of technical support was a challenge to the use of ICT in the college.
4. Slow computers was a challenge to the use of ICT in the college
5. Too little time was given for ICT on the time table
6. The teaching of ICT lacked practical work.
7. There were no computers to learn with.

Conclusions

Conclusions drawn from the study are that the ICT literacy level of the students of the colleges of education in Ghana was low. Although students could boot the computer and produce word document on the computer they could not prepare a PowerPoint presentation. They could not start and exit a computer programme. They could not minimize, maximize and move windows, they could not change the brightness and contrast of the monitor. They could neither scan virus on the computer nor delete and rename files on the computer. Students of colleges of education had negative perception of ICT.

Students of colleges of education in Ghana believed that ICT could enhance their learning. They thought that teacher education should include ICT. They thought that they would work harder if they could use ICT. These are positive perceptions of ICT. However they thought that ICT could not provide better learning experiences. They did not want to have anything to do with ICT and thought ICT could not make their course interesting. The state of facilities in the college also discouraged them from using ICT. Their negative perceptions of ICT were more than the positive perception. Over all the perception was negative.

It was found that students faced a lot of challenges in their effort to use ICT. Resistance to change by college authorities and tutors was one. Lack of ICT skills by tutors and students was another challenge. Lack of technical support in the use of ICT was yet another.

Recommendations

The situation in the colleges of education regarding the use of ICT needs prompt and decisive action to remedy it. It is therefore recommended that:

1. Government and college authorities should equip the colleges with enough computers and the necessary peripherals.
2. All colleges should be connected to the internet.
3. Tutors and teachers should be given effective ICT training while they are under training and followed by ongoing in-service training while they are on the job.
4. ICT periods should be increased on the college timetable to suit the needs of the time.

Areas for Further Research

This study was originally intended to survey the use of ICT in teacher training institutions by student-teachers and their tutors. The findings on the tutors were not included in this study for lack of time and resources. The researcher, therefore, suggests the following for future research:

1. The ICT literacy level of tutors in teacher training institutions.
2. The perception of tutors in teacher training institutions in Ghana.

3. The availability and accessibility of computers and ICT accessories in the teacher training institutions.

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APPENDICES

APPENDIX A

UNIVERSITY OF CAPE COAST

QUESTIONNAIRE FOR STUDENT-TEACHERS

Introduction

I am an M.Ed Information and Communication Technology Part-Time student of the Centre for Continuing education, University of Cape Coast. I am conducting a study into the ICT situation in colleges of education. The aim is to identify the level of educational use of ICT in colleges of education. The study is based on a sample so your participation is critical. The information you supply will be given the utmost confidentiality. You are therefore not to write your name anywhere in the questionnaire. In responding to the items on the questionnaire, please be as honest as possible.

Thank you for your help.

SECTION A

DEMOGRAPHIC DATA

1. Name of the College ----------

2. Your sex Male [ ] Female[ ]

3. Age 20-25years [ ]

26- 30years [ ]

31-35years [ ]

36years and above [ ]

4. What subject is your area of specialization? English [ ] Mathematics [ ]

Social Studies [ ] Integrated Science [ ]

Other specify ----------

6. How long do you use the computer each day? Less than 1hour [ ]

1hour-2hours [ ]

2hours and above [ ]

SECTION B

Level of computer literacy of student-teachers

Indicate [✓] the extent to which you agree with the following statements.

	Statement	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	I am able to boot the computer.					
2	I am able to produce a word document on the computer.					
3	I am able to prepare my own PowerPoint presentations.					
4	I am able to start and exit a computer programme.					
5	I am able to minimize, maximize and move windows on the desktop.					
6	I am able to change the brightness and contrast of the monitor.					
7	I am able to scan virus on the computer.					
8	I am able to delete and rename files on the computer.					

Others, please specify----------

SECTION C

Student-teachers' attitude/perception of ICT

Indicate [✓] the extent to which you agree with the following statements

	Statement	SA	A	U	D	SD
1	ICT enhances students' learning.					
2	Teacher education should include ICT.					
3	ICT provides better learning experiences.					
4	I learn more from ICT than I do from books.					
5	I won't have anything to do with ICT.					
6	ICT makes my course more interesting.					
7	I would work harder if I could use ICT.					
8	The state of facilities in my school discourages me from using ICT.					
9	ICT can't address the needs of my school system.					

Others, please specify----------

SECTION D

Challenges that Student-teachers encounter in the use of ICT

Indicate [✓] to show if you agree with the following statements or not

	Statement	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1	Resistance to change is a challenge to the use of ICT in schools.					
2	Lack of ICT skills..					
3	Lack of effective training in ICT.					
4	Anxiety in the use of computers.					
5	Lack of technical support for ICT in schools.					
6	Slow running computers is a challenge to the use of ICT in schools.					

Others, please specify----------

Please, if you have any more comments share with me----------

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Thank you for completing this questionnaire.

APPENDIX B

INTRODUCTORY LETTER FROM UNIVERSITY OF CAPE COAST

UNIVERSITY OF CAPE COAST

(Centre for Continuing Education)

Tel No: 03321 - 36947
Fax: 03321 - 36946
E-mail cce@ucc.edu.gh

University Post Office
Cape Coast

Our Ref. No: CCE/MED/17/Vol.1/042

Your Ref. No:

1st June, 2012

TO WHOM IT MAY CONCERN

This is to certify that **Mr. Ivon Sumana-Ang** with registration number **ED/ITP/10/0002** is pursuing a two year Master of Education Degree in Information Technology at the University of Cape Coast.

He is conducting a research on the topic **"The Use of ICT in Training Teachers at the Pre-Service Level: A Study of the Colleges of Education in Southern Ghana".**

We will strongly appreciate any courtesy extended to him.

Thank you.

Palmas Anyagre
(Programme Facilitator)

APPENDIX C

INTRODUCTORY LETTER FROM ACCRA COLLEGE OF EDUCATION

ACCRA COLLEGE OF EDUCATION

Telephone: 233 30 2 500961
Fax 233 302 522153
E-mail – atracoo@yahoo.com
Principal : C.B. HENAKU (MRS)
Our Ref:

AGYE NYAME

P. O. Box LG. 221
Legon.

October 29, 2012.

.....

.....

.....

.....

LETTER OF INTRODUCTION

I forward this letter herewith the attachment to introduce Mr. Ivon Sumana-Ang from the University of CapeCoast acknowledging him as a research student of the Center for Continuing Education.

See the attachment.

May I humbly ask that he is allowed to use the Accra College of Education mentees in collecting information for the study.

I count greatly on your co operation.

Thank you.

.....
Walter K. Apaloo
(Vice Principal)

VICE PRINCIPAL (ACAD)
ACCRA COLLEGE OF EDUC.

Cc :- Heads of Selected Schools
Teaching Practice Coordinator AcCE

APPENDIX D

INTRODUCTORY LETTER FROM ACCRA COLLEGE OF EDUCATION

TO ATOMIC HILLS COMMUNITY SCHOOL

ACCRA COLLEGE OF EDUCATION

Telephone: 233 30 2 500961
Fax 233 302 522153
E-mail – atracoo@yahoo.com
Principal : C.B. HENAKU (MRS)
Our Ref:

AGYE NYAME

P. O. Box LG. 221
Legon.

October 29, 2012.

The Headmistress
Atomic Hills Com. Sch.
Atomic Hills Estate
.....

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Walter K. Apaloo
(Vice Principal)

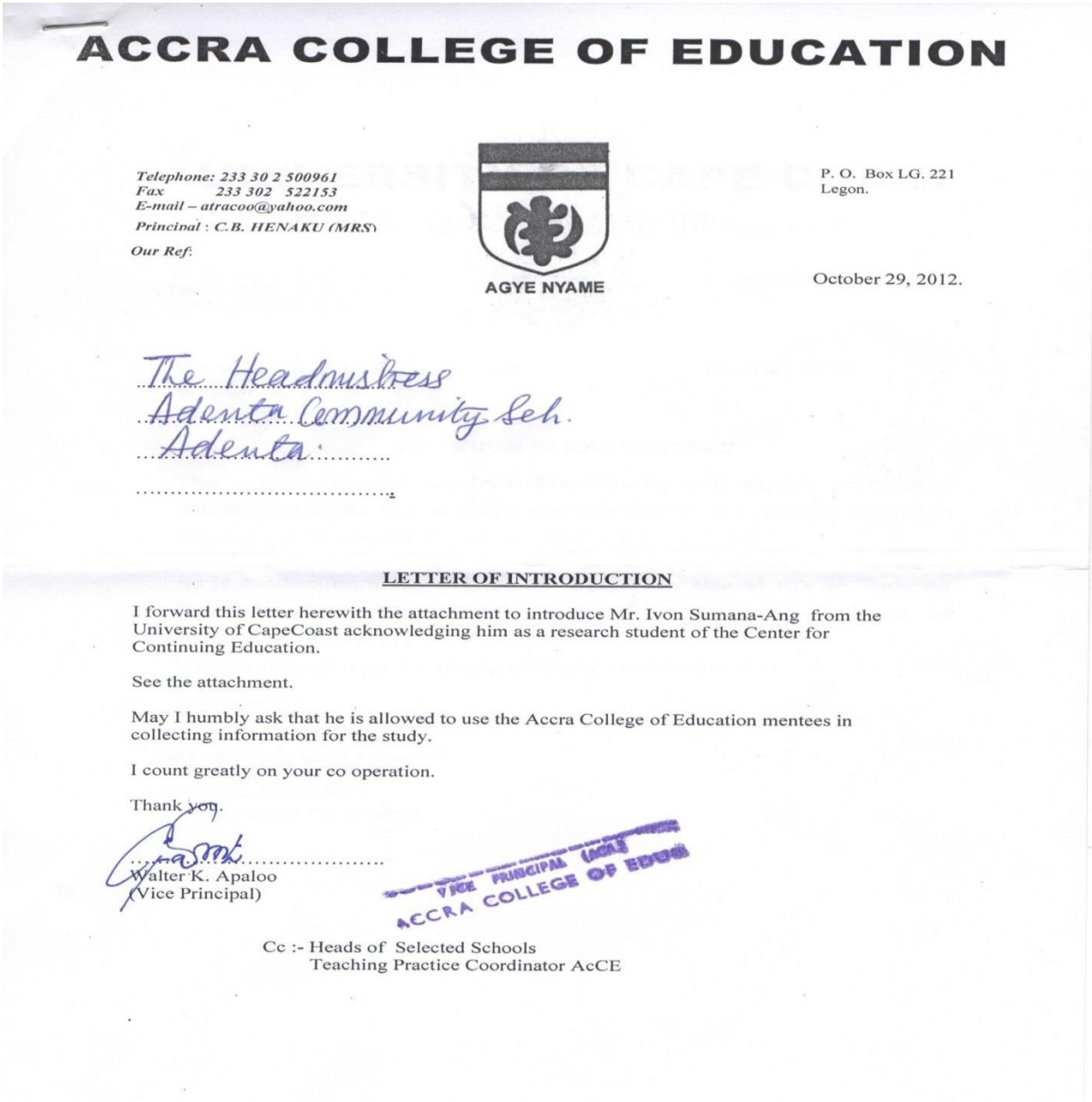
VICE PRINCIPAL (ACAD)
ACCRA COLLEGE OF EDUCATION

Cc :- Heads of Selected Schools
Teaching Practice Coordinator AcCE

APPENDIX E

INTRODUCTORY LETTER FROM ACCRA COLLEGE OF EDUCATION

TO ADENTA COMMUNITY SCHOOL



ACCRA COLLEGE OF EDUCATION

Telephone: 233 30 2 500961
Fax 233 302 522153
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Principal : C.B. HENAKU (MRS)
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P. O. Box LG. 221
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October 29, 2012.

The Headmistress
Adenta Community Sch.
Adenta.

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(Vice Principal)

VICE PRINCIPAL (ACAD)
ACCRA COLLEGE OF EDUC

Cc :- Heads of Selected Schools
Teaching Practice Coordinator AcCE

APPENDIX F

INTRODUCTORY LETTER FROM ACCRA COLLEGE OF EDUCATION

TO ACHIMOTA BASIC SCHOOL

ACCRA COLLEGE OF EDUCATION

Telephone: 233 30 2 500961
Fax 233 302 522153
E-mail – atracoo@yahoo.com
Principal : C.B. HENAKU (MRS)

Our Ref:

AGYE NYAME

P. O. Box LG. 221
Legon.

October 29, 2012.

The Headmistress
Achimota Basic Sch.
Achimota
.....

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