The application of ict in teaching and learning education essay

A number of studies have been conducted on ICT in higher learning institutions in developed countries and in some developing countries outside Ghana. An attempt has been made to review some of the literature relevant to this study, with reference to the three respective objectives of the study which are; use of ICT in teaching and learning, cost of ICT training materials and technical support, and administrative support in relation to ICT implementation.

The application of ICT in Teaching and Learning

Towards the end of the 1980s, the term ' computers' was replaced by ' IT' (information technology) indicating that there had been a change in the focus from computing technology to a new era that involved the capacity to store and retrieve information. The term ' ICT' (information and communication technology) was later introduced in 1992 around the time when e-mail started to become available to the general public (Pelgrum and Law, 2003). Alemna and Sam (2006) quoting Bartlett (2002), state that ' ICT refers to systems for producing, storing, sending and retrieving digital files'. (Adeya, 2002) in a United Nations Economic Commission (ECA) report, states that ICTs cover Internet service provision, telecommunications equipment and services, information technology equipment and services, media and broadcasting, libraries and documentation centers, commercial information providers, network-based information services, and other related information and communication activities. ICT can thus be described as a diverse set of technological tools and resources used for creating, storing, managing and communicating information electronically.

(Rouse, 2011) consents this definition of ICT but further broadly details the range of technologies embraced by ICT: ICT includes the full range of computer hardware, computer software, and telecommunications facilities. Hence it includes computing devices ranging from handheld calculators to super computers. It includes the full range of display and projection devices used to view computer output. It includes the local area networks and wide area networks that allow computer systems and people to communicate with each other. It includes digital cameras, computer games, Compact Discs (CDs), Digital Versatile Discs (DVDs), Cell telephones, telecommunication satellites, and fiber optics. It includes computerized machinery, and computerized robots. In a short and snappy term ICT as applied to education, are those technologies include computers, the Internet, multimedia simulations, virtual labs, broadcasting technologies (radio and television), and telephony that can facilitate not only delivery of instruction, but also learning processes itself. These technologies has been recognized as an important tool for realizing a new paradigm of learner-centered education that better supports learners' needs through differentiated and personalized instruction (Watson, 2011). Components that provide mutual content, assessing learning , diagnosing student needs, giving immediate feedback, given effective remediation, and storing examples of student work (e. g., files) are vital elements in digital technology that is able to support learner-centered instruction for diverse learners (Bush, 2009); (Reigeluth, 2008).

Furthermore ICT can boost international collaboration and networking in education and professional development. There are varieties of ICT options from videoconferencing where two or more participants, based in different

physical locations, can see and hear each other in real time (i. e. live) using special equipment. It is a method of performing interactive video communications over a regular high-speed Internet connection. A videoconference can be either two-way (point-to-point) or multipoint, linking three or more sites with sound and video. (Skill, 2004). Also through multimedia delivery to web sites which can be used to meet the challenges teachers face today. Therefore, ICT will be capable of providing more flexible and effective ways for lifelong professional development for today's teachers. As a result both teachers and students will get vast benefits for their empowerment and development.

Cost and Technical Support in ICT Implementation

According to (Businessdictionary. com, 2012) cost is an amount that has to be paid or given up in order to get something. Implementation according to this study refers to the application of ICT in Education. The cost of ICT training materials was considered to be among the problems that could negatively affect the implementation of ICT in Tamale Polytechnic. According to (Mulira, September 2004) the cost of a Desk top Computer (PC) connected to the Internet is often too expensive for most people in developing countries and for those who can afford a PC, regular maintenance, virus protection and servicing, is thus another problem that is not easily manageable by the first generation computer users. Compared to traditional forms of off-campus learning, technology facilitated has proven to be quite expensive in all areas of consideration, infrastructure, course development and course delivery (Oliver, 2002).

Empirical studies on the relationship between cost of ICT training materials and ICT implementation are many. For example (Makau, 1986) recognized that financial resources form a key factor to the successful implementation and integration of ICT in higher education in Kenya. (Mumtaz, 2000) reveal that inadequate resources within schools is a great hindrance to the take up of ICT and lack of computers and software in the classroom can limit what teachers are able to do with ICT. (United Nations Conference, May 2012) reported that one of the problems facing integration of ICT in learning and teaching in developing countries are high cost of software and hardware.

The rate of diffusion and use of ICT in developing countries are significantly lower than developed countries (Sharma, 2003). Malcom and Godwyll (2008) in their research, diffusion of information communication technology in selected Ghanaian senior high schools discloses that the basic problems facing ICT implementation in senior high schools are lack of adequate ICT infrastructure and coherent ICT policy framework. Furthermore, (Ensafi R., 2007) reported that, in Iran the high price of computers is not the main impediment in the development of e-learning but on the otherhand of government policy for allocating universities, schools and public places with hardware infrastructure and new computers. Allocating computers into universities and institutions is relatively easy for the government but keeping them up and running is a greater challenge. The research further showed that in most developing countries laboratory coordinators in some institutions of higher learning are not skilled enough in resolving technical problems. (Aryatuha, 2007)reveals that where ICT is introduced the competency to handle it is significantly low due to lack of enough resources

as most of African economies are so poor. It is therefore certain that successful use of ICT in institutions of higher learning in developing countries is hindered by high cost of ICT tools.

The price of computer hardware and software continues to drop in most developed countries, but in developing countries, the cost of computers is more expensive due to high levels of poverty and inadequate funding (A. S. Sife, 2007) et al, Following up to this statement, it was reported that whereas a desk top computer may cost less than a month's wage in the USA, the average worker in developing countries may require more than six month's wage to buy one. The study further show that, apart from the basic computers themselves, other costs related with peripherals such as monitors, projectors, printers, modem, and extra disk drives could be beyond the reach of some institutions of higher learning in most developing countries.

(Ssewanyana, 2007) in their research, stated that usage of computers and internet is high in medium and large firms, and mainly firms owned by foreigners. The small firms which are mostly locally owned, have low usage due to the high cost of requisite investment, limited knowledge and skills, and being very responsive to charges. The results of the research suggest that there is need to broaden ICT training facilities for the local entrepreneurs to take advantage of opportunities related with the implementation of ICT; and to address charges on the Internet services and other ICT consumables to lower the cost of acquisition. The results further point out that people do appreciate the contribution of ICT to the performance of their firms, but the various impediment such as high costs of

hardware, software, Internet and ICT professionals among others are a barrier to their progress. One has to go through vigorous training in order to become a computer knowledgeable individual, however, high cost of ICT training materials would hinder this process. Though many researchers urged for the use of computers in management activities, there are reasonably a number of problems which affect the effective exploitation of computers. In accord with the statement, (Zziwa, 2001), in his paper on networking and the use of information technologies, pointed out that computer utilization is affected by training, organization, and supply of resources. With reduced costs on ICT tools, adoption of ICT innovation could be advantageous over other innovations. According to ....(2007), in universities, polytechnics and colleges in Ghana, all departments, institutes, faculties and schools have included the acquisition of more computers, the setting up of local area networks, technical assistance and training of staff in their strategic plans, however, much as there are such efforts in institutions, ICT implementation has not taken a firm foundation among staff and students. This could be as a result of high costs in purchasing computers and related peripherals, negative attitude of lecturers towards using computers in teaching. This indicates that when the cost of ICT training materials is high, ICT implementation in institutions of higher learning tend to be minimal and vice versa. High cost of ICT training materials could be assumed a obstacle to teaching using computers in institutions of higher learning in Northern Ghana. However, this assumption remains a theoretical one until it is proved and thus the need for this study to establish the extent to which cost of ICT training materials influences ICT implementation in polytechnics in Northern Ghana. While most studies above show that the cost of ICT

training materials pose a challenge to the adoption of ICT, (Mulira, September 2004) and (Ensafi R., 2007) seem to be taking a different position of considering cost of computer as a less important factor. According to (Mulira, September 2004), Cost of ICT training materials was not taken as a major inhibitor of ICT implementation in institutions of higher learning. They considered lecturer's awareness and positive attitude towards ICT as necessary conditions for effective ICT implementation. They urged that institutions of higher learning in Uganda could adopt freeware and open software for teaching and learning activities. Much as most studies above were concerned with cost of ICT training materials, the population studied was different. For example, some studies were concerned with secondary school teachers while others considered only post graduate lecturers like (Ebenezer Malcolm, 2008) for senior high schools in Ghana and (Namukangula, 2007) for post graduate lecturers in Uganda. Further more such studies were in line with other institutions of higher learning like Makerere University, Kyambogo University, Iranian University and none was related to any institution of higher learning (polytechnic) in northern region. To contribute to the closure of this gap, this study needed to investigate the effect of cost of ICT training materials towards ICT implementation in polytechnic in the northern Ghana.

Administrative Support in relation to ICT Implementation.

(Answers, 2012) defines administrative support as a support that is given at the administrative side of a business. This includes such areas as accounting, office management, and data collection. Administrative support with regards to ICT refers to the presence of encouraging ICT-using role models, such as

the principal, and the presence of incentives for teachers to use technology (Priscilla, 2008). in this research, administrative support refers to the help and guidelines given out by administrators in institutions of higher learning to aid in computer training and integration of ICT into the curriculum. According to (A. S. Sife, 2007), administrative support is vital to the successful adaptation of ICTs into teaching and learning processes. It can be argued that administrators can provide the conditions that are needed, such as putting in place an ICT policy, incentives and resources.

(A. S. Sife, 2007) acknowledged that for the implementation of ICTs to be effective and sustainable, administrators themselves must be competent in the use of the technology, and they must have a broad understanding of the technical, pedagogical, administrative, financial, and social dimensions of ICTs in education. For any institution to adapt to new innovations there must be support from administrators (Mulira, September 2004). (Priscilla, 2008) stated that leadership from a head of department is very significant in encouraging the development of electronic lesson materials to promote computer use for the specific subject in the teaching-learning environment. The research came out that the success of integrating ICT into the teaching-learning communication among school teachers depends on the support provided by the principal of the school. A number of past studies had tried to relate administrative support and ICT implementation. Example, (Cameron Kim S., 1986) in their study, came out that short of administrative support is an obstacle to implementation of innovation in education system in Nigeria. (A. S. Sife, 2007) in their studies stated that the problems preventing teachers from using computers in teaching are short of administrative,

technical and financial support. (Hawkins, 2002) stated that school administrators offer very little structural support and incentives to teachers to efficiently use ICT in the classroom. Though lecturers devotedly engage in joint projects and constructivist pedagogy, administrative support given in reference to ICT is not adequate.

Teachers use computers more frequently for their teaching-learning process if they realized an adequate support from the school administration (Kariuki, 2004). Teachers who receive adequate ICT support from the administrators are more likely to use ICTs in their teaching practice while those who do not receive ICT support from the higher authorities in school are less keen in using computer or do not integrate technology at all. Administrators in school, such as the rectors and principals acts as a mediator to integrate ICT into the educational system by playing a key role in encouraging, supporting, and helping the teachers to use computers in their teaching-learning process. The support of the school principal or administrator can encourage and promote teacher's willingness to use the computer as a medium to deliver instruction. Therefore, the task of the school administrator is crucial in providing the force, support and conditions to improve the use of computer in the teaching profession. Although administrative support is optimistically a key factor in influencing ICT integration, ICT implementation in polytechnics in northern Ghana was still minimal and thus, need for this study to investigate the influence of administrative support towards ICT implementation. Technology support has a positive impact on educators own uses of technology, and their integration of ICT into the teaching-learning process. Technical support has been viewed as one of the facilitating

conditions that can influence computer usage. (Yang, 2008) stated that lack of technical support as one of the major barriers that resulted in computers being underutilized in the classes. Teachers do not use computers in teaching when they are not sure where to turn for help in case something goes wrong. Also (Afshari, 2009) in their study reported that schools should work to encourage ICT staff on how ICT integration in classrooms is very important. Ministry of Education and Sports should encourage Schools to purchase highly reliable technologies; improve systems for checking and maintaining ICTs in the classroom. This could be done by creating new approaches (including staff training) to guarantee that extremely rapid responses are made to breakdowns. In their report of small firm computing, (Toe, 1998) found that lack of technical support often discourages ICT growth. Technical support may be given to teachers by providing them with technical skills on how to handle computer hardware and software. (Afshari, 2009), reported that with support for information technology, teachers are able to access school network, internet and computer accessories (printer, digital camera, data projector, large TV screen, scanner and video camera). They also reported that as beginners of computer use, teachers need technical and training support to help them in teaching-learning process when they face constraints while for competent teachers, they are enthusiastic to share their knowledge and provide technology support to their colleagues. Therefore, lack of technical knowledge of maintaining the functionality of computers confused teachers to integrate ICT in the classroom. Several problems related to ICT implementation in classroom occur among the teachers due to the lack of technical knowledge of maintaining the functionality of the computers.

Thus, lack of technical support hampers the implementation of the computer program. (Priscilla, 2008), in their research of the three-year computer initiative, pointed out that educators were often confused by technicalities of using computers for the teaching and learning process.

The research showed that problems such as the breakdown of ICT devices and not having enough rapid support led to inadequate class time. Teachers, who do not have rapid support or lack technical knowledge, run into problems and frustrations concerning the technical management of ICT tools. Therefore it was hypothesized that ICT support has great impact on teacher's use of technology as it can aid boost the use of computers among educators in institutions of higher learning and thus in turn can increase the likelihood of ICT integration in the teaching and learning communication. Teachers often require technical support as well as pedagogical support such as guidance on choosing relevant software and integrating it into a lesson plan. Teachers also need recommendations for ways how ICT can be used to meet educational objectives, along with ideas on how to organize a classroom to take full advantage of only a few computers. This could be due to the difficulty and incompatibility of the innovation and thus, negatively affecting ICT implementation in polytechnics in northern Ghana.

An important obstacle towards implementation of computers in classrooms is due to lack of training support by administrators. (Krysa, 1998) reported that successful implementation of computers can only occur if administrators provide teachers support and leadership. In addition to administrators developing an attitude to direct the implementation of computer technology, they can support the technological professional development of teachers by:

establishing flexible schedules so that teachers can practice what they have learned (or to continue their learning);

promoting and facilitating team teaching and peer coaching allowing teachers to visit each other's classrooms to study computer technology integration and

scheduling regular meetings among teachers using technology to plan and evaluate instruction.

(Hsin-Kai, 2007) in their study, teacher's beliefs about using educational technology in the science classroom in Taiwan found that although many teachers share beliefs that educational technology could promote learning and that the use of technology is desirable, they are unwilling to use computers (ICT) because of insufficient support and resources provided by schools.

(Yang, 2008), in a case study at Curtin University of technology reported that university teachers who received support from administrators had a high commitment to the adoption of ICT for teaching and learning. In the research data suggested that the implementation of ICT in teaching and learning would be promoted by greater support of the change at the management level of the University. A critical factor contributing to the promotion of the innovation is the availability of infrastructure resources: hardware, in terms of the number of computers in the school available for students and teachers for educational purposes, and the quality and functioning of equipment (speed of processors, peripherals and access to the internet) as well as available software.

Furthermore, availability of ICT alone is insufficient and must be accompanied by technical as well as pedagogical support (Nachmis, 2004). Also (Aryatuha, 2007), noted that the availability of computer hardware and software should be accompanied with training of the users and constant technical support. Without this, even though high quality hardware and software are available, they could be wasted or remain underutilized by the users. This could support the hypothesis that minimal ICT implementation in polytechnics in northern Ghana and thus, the need for this study to investigate the extent to which administrative support influenced ICT implementation in polytechnics in northern Ghana.

(Mbulankende, 2007) in his research, assessment of teacher training in ICT in selected universities in Uganda, reported that ICT like most innovations will not work without administrative support. In the research it was suggested that continuous training should provide the support from which teachers can continue to keep and update with ICT and its application to subject pedagogy, in order to enhance their teaching skills. In all faculties, lecturers should be introduced and trained on how to use various ICT tools common in the classroom such as projectors, computers, electronic white boards, digital cameras and trouble shoot minor problems common with these facilities.

Ministry of Education and Sports should put in place appropriate strategies to ensure that integration of ICTs in teaching and learning process goes together with the recruitment, training and retention of staff.

(Peansupap, 2005) indicated that the failure of ICT change derives from the traditional beliefs of managers and ICT experts that technology is a magic

bullet and so neglect role of people in any change management task. However, solving technical issues can minimize user's resistance to technological innovation and thus, ICT implementation success is often realized by managers who understand the management of technological change. Thus, if teachers perceive ICT as a beneficial tool, compatible with their current activities, easy to use and have observable outcomes, they could demonstrate positive attitude towards ICT. This can positively influence ICT Implementation in institutions of higher learning. (Munyantware, 2006) in his study, problems affecting teacher's adoption of technology in classrooms among science and mathematics teachers in Kisoro District, reported that in addition to social support from colleagues, perceived support from the school influences teachers adoption decision. The study suggested that continuous support to teachers gives them confidence in using computers in teaching their relevant courses in institutions of higher learning in Kabale District. (Akankwasa, 2006) found out that although many teachers share beliefs that educational technology could promote learning and that the use of ICT is desirable, they are reluctant to use educational ICT because of insufficient support and resources. Much as the above mentioned studies were on the context of problems that influence ICT implementation, none of the problems studied were in line with cost of ICT training materials and administrative support the gap this study intended to close. The only factor that was similar was skills development in ICT. In addition, such studies did not even investigate problems influencing ICT implementation in polytechnic in northern Ghana, the gap this study intended to close.

Much as most of the above studies showed a positive relationship between administrative support and ICT implementation, none was on the context of polytechnics in northern Ghana. Hence the need for this study to investigate the extent to which administrative support influenced ICT implementation in polytechnics in northern Ghana