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Learning Management System Usage on Teaching and Learning in Akatsi College of Education

Joshua Kwabla Deku[1], Adane Michael[2], Adixey Eco[2], Rev. Alex Owusu[1],
[1]E. P College of Education, Amedzofe, Ho-West,Ghana
[2]Akatsi College of Education, Ghana

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ABSTRACT*: The main objective of this study was to examine the effect of Learning Management System (LMS) usage in education in public College of Education using Akatsi College of Education as a case study organization. However, the specific objectives to be included are to identify the Learning Management System (LMS currently in use to support teaching and learning at Akatsi College of Education, assess the extent of the adoption of Learning Management System (LMS by Akatsi College of Education in teaching and learning and ascertain challenges that the management of the College is encountering in the use of Learning Management System (LMS. The study used the descriptive survey method as the research design. The selected population for the study was the staff, management and students of College in Akatsi. A sample size of 120 was used. This was made up of 5 Heads of Department, and 15 tutors and 100 students. By this, the sampling method that was used in selecting the lecturers and staff is convenience sampling technique, while the simple random sampling technique was used in selecting the students. The main instrument that was used for the collection of data is the questionnaire and primary data and secondary data were used as sources of data. The findings of the study showed that some of the Learning Management System (LMS) devices used at the College include projectors, internet and telecommunication systems, audio and video visual communication systems, telephone, computers, fax machines and many others. These resources enable them to serve the university community better. Besides, the College has further employed an application called MOODLE that has all students and tutors enrolled on. This to them provides the platform for assessing the students and tutors. Recommendations were that it is important that LMS systems at College are made available to every member of the College whether student, tutors or a non-teaching staff. From the study, ICT systems have been very effective in ensuring the productivity of users including teachers and non-teachers. Significantly, not all the respondents admitted that they use Learning Management System (LMS) system of the university. However, if the College wants to achieve productivity across the College, then the need to ensure that every member of the university is made to use LMS in their functions.*

Key words*:* LMS, MOODLE, ICT, CIS, policy makers, NOC,LAN

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INTRODUCTION

Background of the study

The emergence of Information and Communication Technology (ICT) has brought changes to the society, especially teaching and learning through Learning Management System (LMS). Information Communication Technology is often regarded as the unquestioned cornerstone towards competitiveness in the 21st century (Chen & Soliman, 2006). These technological advancements have brought people especially those in the business world to utilise a strategy that would be helpful in enhancing the business value of any organisation (Weill & Broadbent, 1998). The effectiveness and use of ICT by students to achieving their academic objectives through increased efficiency, effectiveness and competitiveness, combined with innovative applications of ICT, has heightened the awareness of both IT and business managers towards more strategically oriented approaches for planning and management (Luftman, Lewis & Oldach, 2013).

As part of the Information Communication Technology system, internet has become one of the most demanded IT service in student's academic research. Accordingly, there are two kinds of consequences from this phenomenon (Holohan, 2010). First, students will discover new effective ways to enhance their academics and second, use the LMS to enhance their individual orientations. Technological optimistic argue from a technical perspective that, the IT possibilities for enhancing educational systems are endless. In principle, all educational facilitates today can be supported by ICT (Yeh, 2017). In this light, public tertiary institutions in Ghana play a major role in enhancing the quality of education in Ghana through the use of Learning Management System (LMS).

Akatsi College is one educational institution that the use of Learning Management System (LMS) has become paramount to the provision of quality education. The IT unit started as College Internet Services (CIS) in the mid-2016s with its main function being provision of internet and e-mail services to the College. Units were connected to the internet backbone mainly through dial – up services. There were few local Area Networks (LANs) at the units closer to the Network Operating Center (NOC) and the other nodes of the internet backbone.The CIS was made a center in 2018 and was renamed Information and Communication Technology Unit.

In the same year, the College obtained funding from Ministry of Education (MOE), Ghana to improve the infrastructure to facilitate and improve the core business of teaching, learning and research in the College. The Centre was converted into Directorate when the University changed its structures in 2005 and was relocated to its present location, which used to be the Balme Library annex. The directorate has managed other computing labs located in the five (5) traditional halls, and all the faculties in the universities. The functions of the Directorate have since improved to include training for faculty, staff and students, consultancy services and many other functions. Indeed, the demand of ICT usage by students of Akatsi College of Education is a need. However, students in the institution have encountered many problems in the usage of ICT facilities at Akatsi College of Education.

Many of such problems are attributed to lack of adequate facilities to support the Learning Management System (LMS) systems, easy accessibility of ICT facilities causing long queues, cumbersome processes in the use of LMS, slow processing of the internet facilities and lack of expertise to manage the LMS as well as the lack of application of ICT facilitates to manage LMS. These and many other problems are worrying and that cause students to use other ICT provided by other people rather than using that of the institution. This means that there is a lot of concern to be raised in the use utilization of ICT Akatsi College of Education. The main objective of this study is to examine the role of public tertiary institutions in the usage of ICT in education. In this view, Akatsi College of Education would be used as a case study. It is hoped that this study would provide the needed solutions to the identified problems.

Statement of the problem

Most educational institutes today have adopted the use of ICT systems in their operations to enable the institution offer quality services to students. This indeed has increased the efficiency and effectiveness of such organisations. The conflict, however, is that the development and maintenance of these new technological infrastructures are both costly and time consuming (Holohan, 2010). Historically, institutions stored information on paper. This paper information was processed manually (Martinsons, 2014). By 1961, most organisations had taken a significant step to introduce computers into their operations. These early computer systems were programmed in machine code and required information to be manually inputted via punched cards. These systems were limited by the method of inputting information and the computer system's process power. Today's computer systems are mostly on - line, that is, information is automatically updated.

Today, Learning Management System (LMS) plays a very important role in Akatsi College of Education. The range of services provided by institutions has increased as a result of improving Information Communication Technology. Tertiary Institutions now use Learning Management System (LMS) to transmit information, receive instructions and transact business. The quality, range and price of electronic services are an important part of any institution's competitiveness in the global market place of today's environment. The impact of ICT on institutions is immense and most of the private tertiary institutions rely on ICT for most of its operations and transactions. Organisations are totally dependent on the use of ICT for its delivery of cost effective service and therefore, ICT has become an integral part of every organization's operations.

The tangible and intangible benefits ICT provides to tertiary institutions cannot be over emphasized. However, the investment in ICT is continuous and tertiary institutions are concerned that students may have born the full or at least a sizable proportion of ICT cost. The rapid pace at which Information Communication Technology is developing mean that the management and staff of Akatsi College of Education need to be constantly re-trained properly to meet this change; the organisation has to keep up with this pace to stay competitive with private tertiary institutions. In the earlier studies done, a model of ICT use in private tertiary institutions was assessed. Ein-Dor and Segev's (2014) suggested that ICT used in a private tertiary institution can be characterized by a two-factor model, which considers the degree to which tasks have been automated and the sophistication level of the resulting Information Systems (IS), was utilized. Using this model, DeSanctis (2019) and Martinsons (2014) reported that unsophisticated

applications predominate the efficiency and effectiveness of operations, however, when not applied very well can hamper the development of the institution. The use of Learning Management System (LMS) in public tertiary institutions like Akatsi College of Education is critical for the development of the institution. However, major constraint that really affects the use of Learning Management System (LMS) in the College includes inadequate ICT systems and the application of the Learning Management System (LMS) in teaching.

Purpose of the study

The use of Learning Management System (LMS) usage in education is one development that has been adopted by many tertiary institutions in the past decade in Ghana. It used to be that Learning Management System (LMS) had not been given much attention and that most processes in tertiary institutions were done manually. However, the adoption of Learning Management System (LMS) in tertiary education has brought about many benefits to tertiary institutions. This study is therefore purposed to examine the effect of Learning Management System (LMS) usage in education in public tertiary institutions using Akatsi College of Education as case study organization.

Objectives of the study

The specific objectives to be included are:

1. Identify the Learning Management System (LMS) currently in use to support teaching and learning at Akatsi College of Education
2. Identify the extent of the adoption of Learning Management System (LMS) by Akatsi College of Education in teaching and learning.
3. Identify major challenges that the management of the university is encountering in the use of Learning Management System (LMS).

Research questions

In pursuance of the objectives of the study, the following research questions would be examined:

1. What is the current Learning Management System (LMS) in use to support teaching and learning at Akatsi College of Education?
2. To what extent has Akatsi College Education Adoption Learning Management System (LMS) in its teaching and learning?
3. What are the challenges that the management of Akatsi College of Education is encountering in the use of Learning Management System (LMS)?

Significance of the study

The use of ICT in enhancing the quality of education in tertiary institutions cannot be over emphasized. Most tertiary institutions have used Learning Management System (LMS) such as MOODLE, Sakai, Sparks, Google Classroom, WhatsApp, Telegram etc.as platforms to improve on the quality of services that they offer for teaching and learning during covid-19 era. This study is very necessary to unearth major problems that underpin the development of teaching and learning in the institutions. In this light recommendations made will be extremely beneficial to the management of the institution. It will also help provide mechanisms to enhance the ICT infrastructure in the institution.

This research work will also be of benefit to the academia, educational policy makers, lecturers, university administrators and students.

To the lecturers, the use of Learning Management System (LMS) can help ensure effective teaching practices. This can be done through quality research practices by lecturers and having updated information on various academic disciplines. The university faculties will enhance the impact of knowledge in their teaching emphasizing concept learning leading to the application of knowledge and critical analysis with ICT.

To students, this study will help them identify the role that Learning Management System (LMS) plays in quality education thereby enable them to use Learning Management System (LMS) in the institution effectively. It will help students to appreciate web resources which they use to arrive at answers to their problems

This study would again add to current literature on ICT in education. It will help in the spreading of the use of ICT in education at various levels and different disciplines in Ghana's universities.

Delimitation of the study

The study would be limited to Akatsi College of Education in Akatsi. This is because of its adaptation of Learning Management System (LMS) applications in enhancing and teaching practices. The management, staff, lecturers and students were used as the population of this study. Literature on this study looks at what Learning Management System (LMS) is about, the use of Learning Management System (LMS) at Akatsi College of Education, the effectiveness and efficiency of Learning Management System (LMS) applications at the Akatsi College of Education, and the impact that Learning Management System (LMS) is making on the teaching and learning practices at the institutions. Also, challenges that are being encountered by the management of the institution with respect to Learning Management System (LMS) usage were considered.

Limitation of the study

The study was limited by:

Time: In fact, the time that this study was to be completed is limited and that many public institutions were not considered. The study was conducted while the researcher was in school studying his program and because the time is limited, other orgnaisations would not be considered.

Inadequate Information: another challenge was the limitation in information as not all lecturers and students of Akatsi College of Education were sampled.

Bureaucracy: Also, high level of bureaucracy affected the delivery of the research chapters for approval.

Organisation of the study

The study was organised in five chapters. Chapter one is the introduction of the study and it includes: the background of the study, statement of the problem, objectives of the study, research questions, and significance of the study, scope and limitation as well as organization of the study. Chapter two is the literature review and looks at what other learned people have said about the topic. Chapter three is the organisation profile of Akatsi College of Education and the research methodology. Chapter four focuses on data presentation and analysis. Chapter five presents the summary of findings, conclusion and recommendations from the findings of the study to the management of Akatsi College of Education.

LITERATURE REVIEW

Introduction

The chapter two of this study on assessing the effect of Learning Management System (LMS) usage in education in public tertiary institutions using Akatsi College of Education examines the literature review of the study. It looks at both theoretical and empirical review of the study.

Overview of education

Education or teaching in the broadest sense is any act or experience that has a formative effect on the mind, character or physical ability of an individual. In its technical sense education is the process by which society deliberately transmits its accumulated knowledge, skills and values from one generation to another (UNESCO Report, 2018). The report further continued that teachers in educational institutions direct the education of students and might draw on many subjects, including reading, writing, mathematics, science and history. It also added in the UNESCO report that this process is sometimes called schooling when referring to the education of teaching only a certain subject, usually as professors at institutions of higher learning (Chen & Soliman, 2012). There is also education in fields for those who want specific vocational skills, such as those required to be a pilot. In addition there is an array of education possible at the informal level, such as in museums and libraries, with the Internet and in life experience. Many non-traditional education options are now available and continue to evolve (Ein-Dor & Segev, 2014). Higher education, also called tertiary, third stage, or post-secondary education, is the non-compulsory educational level that follows the completion of a school providing a secondary education, such as a high school, secondary school (DeSanctis, 2019). Tertiary education is normally taken to include undergraduate and postgraduate education, as well as vocational education and training. Colleges and universities are the main institutions that provide tertiary education. Collectively, these are sometimes known as tertiary institutions. Tertiary education generally results in the receipt of certificates, diplomas, or academic degrees (Schofield, 2017).Schofield reiterated the fact that higher education includes teaching, research and social services activities of universities, and within the realm of teaching, it includes both the undergraduate level (sometimes referred to as tertiary education) and the graduate (or postgraduate) level (sometimes referred to as graduate school) (Chen & Soliman, 2012). Schofield adds that higher education generally involves work towards a degree-level or foundation degree qualification. In most developed countries a high proportion of the population (up to 50%) now enters higher education at some time in their lives. Higher education is therefore very important to national economies, both as a significant industry in its own right, and as a source of trained and educated personnel for the rest of the economy (Ein-Dor & Segev, 2014).

In one of Blurton's (2017) online deliveries, he acknowledged that technology is an increasingly influential factor in education. Computers and mobile phones are used in developed countries both to complement established education practices and develop new ways of learning such as online education (a type of distance education). Blurton (2017) adds that this gives students the opportunity to choose what they are interested in learning. The proliferation of computers also means the increase of programming and blogging. Technology offers powerful learning tools that demand new skills and understandings of students, including Multimedia, and provides new ways to engage students, such as Virtual learning environments. Blurton (2017) further continued that technology is being used more not only in administrative duties in education but also in the instruction of students. The use of technologies such as PowerPoint and interactive whiteboard is capturing the attention of students in the classroom. Technology is also being used in the assessment of students. One example is the Audience Response System (ARS), which allows immediate feedback tests and classroom discussions (Ein-Dor & Segev, 2014).

According to Blurton (2017) Learning Management System (LMS) are a diverse set of tools and resources used to communicate, create, disseminate, store, and manage information. Blurton (2017) noted that these technologies include computers, the Internet, broadcasting technologies (radio and television), and telephony. Blurton (2017) said that there is increasing interest in how computers and the Internet can improve education at all levels, in both formal and non-formal settings (Holohan, 2010). Older ICT technologies, such as radio and television, have for over forty years been used for open and distance learning, although print remains the cheapest, most accessible and therefore most dominant delivery mechanism in both developed and developing countries (Holohan, 2010).

Taghioff (2013) was of the view that the use of computers and the Internet is in its infancy in developing countries, if these are used at all, due to limited infrastructure and the attendant high costs of access. Taghioff (2013) indicated that usually, various technologies are used in combination rather than as the sole delivery mechanism. For example, the Kothmale Community Radio Internet uses both radio broadcasts and computer and Internet technologies to facilitate the sharing of information and provide educational opportunities in a rural community in Sri Lanka (Taghioff, 2013). The Open University of the United Kingdom (UKOU), established in 1969 as the first educational institution in the world wholly dedicated to open and distance learning, still relies heavily on print-based materials supplemented by radio, television and, in recent years, online programming. Similarly, the Indira Gandhi National Open University in India combines the use of print, recorded audio and video, broadcast radio and television, and audio conferencing technologies (Holohan, 2010). The term "computer-assisted learning" (CAL) has been increasingly used to describe the use of technology in teaching.

Learning Management Systems

Learning Management System (LMS) is defined as an online system or software which is used to plan, execute, and assess a specific learning process. Software used in e-Learning programs and which helps in administration, documentation, tracking, and recording. Learning Management Systems are used to maintain online collaboration over the internet. According to Oliveira, P. C., Cunha, C. J. C. de A., Nakayama, M. K(2016)it is necessary that the institution take into account criteria such as the need to restrict access so that only the students enrolled in the course can access the content and activities. The

evaluation of an LMS is essential to ensure its effective implementation and positive impact on the delivery of e-learning (Almrashdeh et al., 2011).

According to Silva (2013), the best LMS choice for an institution depends on its characteristics and objectives. Coutinho (2009) points out that several researchers and users have been devoted to investigate what the necessary elements for choosing an LMS are. In 2004, for example, a team of the Information Technology, Education and Society Group at the Federal University of Rio de Janeiro (UFRJ), identified seven main categories of tools in an educational platform. These categories are: Interface, Navigation, Evaluation, Didactic Resources, Communication / Interaction, Coordination and Administrative Support. According to Araújo Júnior and Marquesi (2009) a Learning Management System, widely spread as LMS and, hence the use of this acronym in this study may be defined, in the user perspective,as a virtual environment that aims to simulate face-to-face learning environments with the use of Information Technology. In an LMS, the interaction happens through devices that enable communication either synchronously or asynchronously, allowing the creation of different strategies to encourage a dialogue and active participation of students. According to Lonn and Teasley (2009) Learning Management Systems are web-based systems that enable teachers and students to sharematerials, to submit and return assignments and to communicate online. Meanwhile Almrashdeh et al. (2011) point out that an LMS is software used to plan, implement and evaluate a specific learning process. In LMS, mediation involves both the acquisition of competences and communication skills of all teachers and students, and a greater concern to create interaction moments and practical application possibilities of collaborative work, with that learning process happening in a participatory manner. For that, the teacher relies on communication devices, such as chat rooms, forums, blogs, video blogs (Souza, 2005;Sartori & Garcia, 2009; Rosini, 2013). To these authors, it is necessary to consider that an LMS must seek to get the best advances in technology available today, for reasons of efficiency and for enabling the maximum degree of interactivity and communication among users. Learning and collaborative work have become fundamental and technological advances should lead to the achievement of high interaction levels. The first LMS appeared in the nineties, along with the first web browsers. According to Silva (2013), Learning Management Systems are often criticized, due to the belief that these technologies simply virtualize non-virtual classrooms. However, according to the author, they are not the main problem, but the way they are designed, structured and crafted. Furthermore, the use of an LMS requires careful studies particularly in relation to educational and financial aspects.

Primary Goal of ICT in education

When used appropriately, Aikins et. al., (2013) were of the view that the primary goal of different ICTs are said to help expand access to education, strengthen the relevance of education to the increasingly digital workplace, and raise educational quality by, among others, helping make teaching and learning into an engaging, active process connected to real life.

Modes of ICT in Education

Bates (2015) admitted that ICT applied to education could be deployed in modes of e-learning, blended learning, mobile learning, distance education and online learning. E-learning though, seems to be a bigger umbrella over distance learning, online and mobile learning.

E-Learning

E-learning is learning mediated by an open set of all kinds of technology. The set is open because new technologies are yet to come. It is the use of ICT which includes computer, networks, communication and mobile technologies to enhance and extend learning. These technologies help deliver and make education and information accessible to whoever needs it (Weill & Broadbent, 2019). In the traditional education setting, the students' assimilation of knowledge, excluding other factors, always depend on how well the teacher or lecturer passed the knowledge. With e-learning, the focus is no longer on the teacher, but both teacher and student especially, who takes advantage of technology to varied resources of knowledge made available by existing technology (Brown et. al, 2017).

According to Bates (2015) e-learning has many benefits which include the enhanced and consistent mode of delivery of knowledge; easy and regular administration of individual and group assessments; awareness of the institution; unhindered interaction among teachers and students; collaboration with other institutions like universities. This collaboration decreases the digital divide between institutions in developing countries and developed countries. A 2008 updated article on "E-learning Epic" indicates that E-learning, needless to say, makes learning self-paced for the student, and puts the student on the driving seat on the highway of learning. The student in other words has a better control over the learning method. Learning is personalised.

Learning when it is online or distance learning removes the geographical barriers of learning for the students and teachers. They might be no need for study leave for workers running a program in school. Browne et al argued out that e-learning makes knowledge available on demand anytime, anywhere and anyhow (Weill & Broadbent, 2019). Though implementation of e-learning in any institution is costly, however, it is cost-effective to the students and staff when implemented, and of great benefit to the institution on the longer run. It is evident that e-learning has a lot of advantages, but, there could be a few drawbacks such as the time consuming preparation of lecture materials for lecturers; a lack of motivation in learning especially in asynchronous modes; cultural rejection and isolation. These drawbacks are highly minimized when e-learning is made a flexible and blended learning.

Although most commonly associated with higher education and corporate training, e-learning encompasses learning at all levels, both formal and non-formal (Yeh, 2017), that uses an information network—the Internet, an intranet (LAN) or extranet (WAN) whether wholly or in part, for course delivery, interaction and/or facilitation. Others prefer the term online learning. Web-based learning is a subset of e-learning and refers to learning using an Internet browser (such as Netscape or Internet Explorer) (Collis, 2012).

Blended learning

Brown et al (2017) noted another term that is gaining currency is blended learning. This refers to learning models that combine traditional classroom practice with e-learning solutions. For example, students in a traditional class can be assigned both print-based and online materials, have online mentoring sessions with their teacher through chat, and are subscribed to a class email list. Or a Web-based training course can be enhanced by periodic face-to-face instruction. "Blending" was prompted by the recognition that not all learning is best achieved in an electronically-mediated environment, particularly one that dispenses with a live instructor altogether. Instead, consideration must be given to the subject matter (Yeh, 2017), the learning objectives and outcomes, the characteristics of the learners, and the learning context in order to arrive at the optimum mix of instructional and delivery methods. Brown et al emphasized that blended learning is a flexible form of learning that constitutes a proper blend of all the components of technological enabled learning and face-to-face teaching and interaction. Blended learning incorporates models that enhance the delivery of e-learning for the students and teachers involved in learning (DeSanctis, 2019). The proper variation and blending of resources made available by technology, including face-to-face interactions makes e-learning a blended learning. E-learning that is well blended easily adapts to the students' needs and obviates student adaptation to e-learning against their convenience. Hence, it can be said that the delivery of e-learning is flexible and well blended with face-to-face learning.

Open and distance learning

Open and distance learning is defined by the Commonwealth of Learning as "a way of providing learning opportunities that is characterized by the separation of teacher and learner in time or place, or both time and place; learning that is certified in some way by an institution or agency; the use of a variety of media, including print and electronic (DeSanctis, 2019); two-way communications that allow learners and tutors to interact; the possibility of occasional face-to-face meetings; and a specialized division of labour in the production and delivery of courses (Bates, 2010).

Learner-centered environment

The National Research Council of the U.S. defines learner-centered environments as those that "pay careful attention to the knowledge, skills, attitudes, and beliefs that learners bring with them to the classroom." The impetus for learner-centeredness derives from a theory of learning called constructivism, which views learning as a process in which individuals "construct" meaning based on prior knowledge and experience (DeSanctis, 2019). Experience enables individuals to build mental models or schemas, which in turn provide meaning and organization to subsequent experience. Thus knowledge is not "out there", independent of the learner and which the learner passively receives; rather, knowledge is created through an active process in which the learner transforms information, constructs hypothesis, and makes decisions using his/her mental models (Ein-Dor & Segev, 2014). A form of constructivism called social constructivism also emphasizes the role of the teacher, parents, peers and other community members in helping learners to master concepts that they would not be able to understand on their own. For social constructivists, learning must be active, contextual and social. It is best done in a group setting with the teacher as facilitator or guide (Haddad et al, 2012).

Status of ICT in Educational Institutions: A Case Study in Nigeria

From the 2012 UNESCO report, the goals of ICT in education should embrace these four approaches; emerging, applying, infusing and transforming approaches. The last three phases are functional approaches. The report acknowledged that there are few sectors within the Nigerian economy that have progressed beyond the emerging phase (Ein-Dor & Segev, 2014). It is estimated that 90% of Nigerian educational institutions are in the emerging phase, 7% in the applying phase, and 3% in the infusing and transforming phases. ICT is therefore in its infancy in Nigeria. The amount of work to be done in these aspects is enormous (Holohan, 2010). Nigeria, though, has a great advantage because there are many Nigerian ICT experts in the Diaspora. But no concerted and win-win efforts have been made to harness this potential to accelerate and sustain ICT development in Nigerian educational settings. Ogunsola and Agoyade (2017) explained the status of ICT in tertiary institutions in Nigeria as follows;

Governmental Aids to Secondary and higher institutions

Several governmental and non-governmental organizations, banks and individuals have funded the implementation of ICT in Nigerian educational institutions at all levels and strategic plans and projects are always ongoing to revisit targets in area of ICT (Holohan, 2010). Some of these organizations include the Nigerian Communications Commission (NCC) and Education Trust Funds (ETF) geared towards Universities and polytechnics. There is a great need for government, industry and philanthropists to partner to provide the needed ICT tools and infrastructure for the nation's educational institutions.

Online payments and registrations

There has been a lot of development in using ICT in tackling the administrative problems of higher and secondary educational institutions in Nigeria. In the past six years, payment of tuition, hostel and other sundry fees which were normally paid in cash or bank draft are largely carried out online (Luftman, Lewis, & Oldach, 2013). Online payments and registrations have now eliminated the nightmare of long queues for payments, loss of uncollected revenues by dubious means and a better fit between published and achieved time table of academic events. Although there is great scope for improvement, the modest efficiencies recorded represent great achievements.

Broad ICT penetration

A survey of the web presence of 70 higher institutions in Nigeria, carried out in 2009, showed that 46 of the Nigerian universities have a web presence online, and 24 are not online. A few universities have a significant web presence like the National Open University of Nigeria, Lagos State (NOUN), private universities and the University of Jos, Plateau State (Luftman, Lewis, & Oldach, 2013). The National Open University is a Distance Learning university with adequate means for online learning via the web and for e-learning in general using dedicated television channels. The University of Jos has an online library (eGranary) and some infrastructure on campus to support basic forms of ICT in Education. The rest of the university websites basically welcome visitors to their sites; portray the history, goals or mission and give recent news and events in the university (Martinsons, 2014). Some of these sites have online-learning portals with some downloadable tutorials and provision for online chatting; however, they do not support virtual classrooms, tele-conferencing and other synchronous forms of online-learning, other than online chatting. The penetration of ICT in Nigerian tertiary institutions is broad and shallow. There are

islands of deeper ICT penetration particularly in libraries that in addition to online libraries provide cyber café services in an atmosphere consistent with library environments.

Curricular and extracurricular ICT activities

Also apart from the traditional curricular offerings, a number of universities are broadening their ICT services to fit the new labour force to the challenging ICT environments they will work under (Weill & Broadbent, 2019). For example, some universities contract outside ICT companies to impart hands-on-experience to all enrolled students in their universities irrespective of area of specialization at university cost. Others have established recognised ICT centres where undergraduate and postgraduate students take extracurricular courses and acquire certifications recognised world-wide by industries, while pursuing degree programmes. Such courses are in general very expensive (Weill & Broadbent, 2019). The trend is that many Nigerian industries are reluctant to offer ICT training to their workforce preferring instead to hire those who have invested in themselves in ICT or those trained by their competitors. In general the area where there is the least development in ICT education in Nigeria is the integration of ICT in all aspects of education particularly in the Sciences, Engineering and Technologies.

In some ICT centers in Nigerian universities, efforts are ongoing to accelerate bridging the digital divide by redirecting Nigerian universities to begin contributing to ICT resources rather than being a net consumer. This is the onset of the transforming stage of the ICT cycle. It is barely visible but the outlines are discernable in the few islands of deepest ICT penetration in Nigeria (Martinsons, 2014). One of the major tasks confronting ICT education in Nigeria is how to link or network these islands of ICT competencies.

Impact of ICT Usage in Education

The emergence of ICTs represents high promises for the tertiary education sector (and, more broadly, the post-secondary education sector if one takes into account their impact on non-formal education). ICTs could indeed play a role on three fundamental aspects of education policy: access, quality and cost (Martinsons, 2014). ICTs could possibly advance knowledge by expanding and widening access to education, by improving the quality of education and reducing its cost. All this would build more capacity for the advancement of knowledge economies.

E-learning is a promising tool for expanding and widening access to tertiary education. Because they relax space and time constraints, ICTs can allow new people to participate in tertiary education by increasing the flexibility of participation compared to the traditional face-to-face model: working students and adults, people living in remote areas (e.g. rural), non-mobile students and even foreign students could now more easily participate in education (Weill & Broadbent, 2019). Thanks to ICT, learners can indeed study where and/or when they have time to do so–rather than where and/or when classes are planned. While traditional correspondence-based distance learning has long played this role, ICT have enhanced traditional distance education enabled the rise of a continuum of practices between fully campus-based educations and fully distance education.

More specifically, fully online learning can allow large numbers of students to access education. The constraints of the face-to-face learning experience, that is, the size of the rooms and buildings and the students/teacher ratio, represents another form of relaxation of space constraints. ICTs indeed allow a very cheap cost of reproduction and communication of a lesson, via different means like the digital recording and its (ulterior or simultaneous) diffusion on TV, radio or the Internet (Yeh, 2017). The learning process or content can also be codified, and at least some parts be standardised in learning objects, for example a multimedia software, that can in principle be used by millions of learners, either in a synchronous or asynchronous way. Although both forms might induce some loss in terms of teachers-learners interactivity compared to face to face teaching, they can reach a scale of participation that would be unfeasible via face-to-face learning.

When the needs are huge, fully online learning can be crucial and possibly the only realistic means to increase and widen rapidly access to tertiary education (Holohan, 2010). Some developing countries have huge cohorts of young people and too small an academic workforce to meet their large unmet demand: given training new teachers would take too much time, notwithstanding resources, e-learning might represent for many potential students and learners the only chance to study (rather than an alternative to full face-to-face learning) (World Bank, 2003). E-learning can also be seen as a promising way for improving the quality of tertiary education and the effectiveness of learning. These promises can be derived from different characteristics of ICTs: the increased flexibility of the learning experience it can give to students; the enhanced access to information resources for more students; the potential to drive innovative and effective ways of learning and/or teaching, including learning tools, easier use of multimedia or simulation tools; finally, the possibility to diffuse these innovations at very low marginal cost among the teachers and learners (Holohan, 2010).

Distance E-learning has not only the virtue to be inclusive for students that cannot participate in tertiary education because of time, space or capacity constraints, as it was shown above. It can also in principle offer to students more personalised ways of learning than collective face-to-face learning, even in small groups. Although learning is often personalised to some extent in higher education through the modularity of paths, ICTs allow institutions to give students to choose a wider variety of learning paths than in non-ICT supplemented institutions – not the least because of the administrative burden this would represent in large institutions. This means that students can experiment learning paths that best suit them (Luftman, Lewis, & Oldach, 2013). Moreover, e-learning can potentially allow students to take courses from several institutions, e.g. some campus-based and others fully online. This possible flexibility of individual curricula can be seen as an improvement of the overall student experience, regardless of pedagogical changes. In one word, e-learning could render education more learner-centred compared to the traditional model.

A prestigious university generally has a sizeable library gathering tons of codified information and knowledge. One of the most visible impact of ICTs is to give easier and almost instant access to data and information in a digital form that allows manipulations that are sometimes not otherwise possible. The digitisation of information, from academic journals through to books and class notes, can change (and has changed) the life of students by giving them easy access to educational resources, information and

knowledge, as well as new data processing possibilities (Luftman, Lewis, & Oldach, 2013). But e-learning could also lead to the enhancement of quality in tertiary education by leading to innovative pedagogic methods, new ways of learning and interacting, by the easy sharing of these new practices among learners and teachers communities, as well as by more transparency and easier comparisons and cross-fertilisation of teaching materials and methods.

Finally, e-learning can be seen as a promising way to reduce the cost of tertiary education, which is critical for expanding and widening its access worldwide. It might thus represent new opportunities for students having difficulties with this traditional format. Although ICT investments are expensive, they can then generally be used at near-zero marginal cost (Martinsons, 2014). Where would this cost-efficiency come from: the replacement of expensive brick and mortar campuses by virtual campuses; the digitisation of library materials that would save the cost of keeping huge paper collections; the improvement of efficiency of institutional management; the automation of some of the traditional on-campus activities, including some teaching?

Challenges of ICT in education

Many factors limit the infusion of ICT in educational institutions in Nigeria. These include paucity of ICT infrastructure and lack of access; high enrolments, inadequate funding and absence of funding allocation to technology; high cost of ownership and cost to the consumer and policy implications of the mismatch between the advertised capabilities of ICT technology and the aims of individual educational institutions (Martinsons, 2014). A 2012 UNESCO report discussed the following below as some of the limitations to the infusion of ICT in tertiary institutions;

Paucity of ICT infrastructure and lack of access

The underlying assumption for ICT in education is universal access to the network. Although some progress has been made in this front, there is urgent need to break the crippling access barrier confronting institutions of higher learning in Nigeria (Martinsons, 2014). The profile is vastly different from campus to campus. Some have Campus Area Networks (CAN) backed by wireless narrowband or fibre-optic backbone; some have only internet cafes with grossly insufficient computers for the user base with a 50:1 ratio being typical and others have departmental LANs. The expected quality and performance will correspondingly be low (Luftman, Lewis, & Oldach, 2013). Web based education in the form of online, mobile and distance education requires reliable computer networks, broadband connectivity, fibre-optic backbones for all the bandwidth hungry applications and to interconnect offices, departments and centres to the public internet via the campus area network. High student enrolment, inadequate funding of universities and lack of technology budget exacerbate the problems of ICT infrastructure.

High cost to the Consumer

The cost to the consumer of ICT services is quite expensive. Staff, students and researchers visit on-campus business cyber cafes to use the Internet. In these cafes, the average cost of browsing is 1.0 USD per hour. As a result of the high cost, student and staff browse only when absolutely necessary (Luftman, Lewis, & Oldach, 2013). One could get a home internet subscription of 100 USD of slow and on and off

internet connectivity to 350 USD of stable and fast access. A fortune could therefore be spent on Internet connectivity.

High cost of ownership

There is a realisation in most developing countries that the government alone cannot adequately shoulder the high cost of quality education in the 21st century. Partnership between government, industry and stakeholders appears to be the preferred option. In Ghana for instance a number of organisations for example, MTN, VODAFONE, AIRTETIGO, GETFUND and many more donate ICT laboratories equipped with over 20 – 50 computers to some tertiary institutions. In Nigeria some organizations in addition to these donations pay for one year of two years internet subscription and mandate the recipient institution to sustain the facility (Martinsons, 2014). Most of these laudable efforts have failed because the recipients were unable to pay for the high cost of equipment renewal, maintenance and bandwidth. This is because network costs in Nigeria consist of not only capital cost but also high operating cost.

Unsteady and inadequate Electrical Power Supply

The irregular supply of electrical power has crippled the economies of developing economies and hindered the progress of research carried out by institutes, groups and individuals in the country. It is maddening for any establishment to start off new projects without addressing the almighty power supply problem. It is even worse to embark on extensive ICT project within an educational institution, without solving power problems first. Alternate sources of power are standby generators, batteries and solar panels (Martinsons, 2014). Some of the premier universities in these developing countries like Ghana cannot foot the bill of maintaining several standby generators that gulp down 10 – 30 litres of diesel per hour at 0.85USD per litre; nor can they purchase enough solar panels to go round the campus. Not all local ISPs can maintain their boosters for 24hrs due to high cost of gas; and many subscribers cannot use the Internet effectively as there is hardly electrical power to do as wished. Sometimes low voltages that do more harm than good is supplied. When power is rarely supplied, the admirable goals of transforming education with ICT and taking a paradigm shift in education is all a dream; having access to educational resources on demand, anytime, anyhow and anywhere is a story; e-learning would not be sustained either (Holohan, 2010).

Expanding education through ICT in education

ICTs are a potentially powerful tool for extending educational opportunities, both formal and non-formal, to previously underserved constituencies—scattered and rural populations, groups traditionally excluded from education due to cultural or social reasons such as ethnic minorities, girls and women, persons with disabilities, and the elderly, as well as all others who for reasons of cost or because of time constraints are unable to enroll on campus. In his book, "Mega Universities and Knowledge Media: Technology Strategies for Higher Education", Daniels (2016) examined how education can be expanded through ICT.

- **Anytime, anywhere.** One defining feature of ICTs is their ability to transcend time and space. ICTs make possible asynchronous learning, or learning characterized by a time lag between the delivery of instruction and its reception by learners. Online course materials, for example, may be accessed 24 hours a day, 7 days a week. ICT-based educational delivery (e.g., educational programming broadcast over radio or television) also dispenses with the need for all learners and the instructor to

be in one physical location (Holohan, 2010). Additionally, certain types of ICTs, such as teleconferencing technologies, enable instruction to be received simultaneously by multiple, geographically dispersed learners (i.e., synchronous learning).

- **Access to remote learning resources.** Teachers and learners no longer have to rely solely on printed books and other materials in physical media housed in libraries (and available in limited quantities) for their educational needs. With the Internet and the World Wide Web, a wealth of learning materials in almost every subject and in a variety of media can now be accessed from anywhere at anytime of the day and by an unlimited number of people (DeSanctis, 2019). This is particularly significant for many schools in developing countries, and even some in developed countries, that have limited and outdated library resources. ICTs also facilitate access to resource persons—mentors, experts, researchers, professionals, business leaders, and peers—all over the world.

Improving education through ICT

Improving the quality of education and training is a critical issue, particularly at a time of educational expansion. ICTs can enhance the quality of education in several ways: by increasing learner motivation and engagement, by facilitating the acquisition of basic skills, and by enhancing teacher training. ICTs are also transformational tools which, when used appropriately, can promote the shift to a learner-centered environment. Carlson and Gardio (2012) explained how education can be improved by:

Motivating to learn

ICTs such as videos, television and multimedia computer software that combine text, sound, and colorful, moving images can be used to provide challenging and authentic content that will engage the student in the learning process. Interactive radio likewise makes use of sound effects, songs, dramatizations, comic skits, and other performance conventions to compel the students to listen and become involved in the lessons being delivered (DeSanctis, 2019). More so than any other type of ICT, networked computers with Internet connectivity can increase learner motivation as it combines the media richness and interactivity of other ICTs with the opportunity to connect with real people and to participate in real world events.

Facilitating the acquisition of basic skills

The transmission of basic skills and concepts that are the foundation of higher order thinking skills and creativity can be facilitated by ICTs through drill and practice. Educational television programs such as Sesame Street use repetition and reinforcement to teach the alphabet, numbers, colors, shapes and other basic concepts (DeSanctis, 2019). Most of the early uses of computers were for computer-based learning (also called computer-assisted instruction) that focused on mastery of skills and content through repetition and reinforcement. (See section below on Computer- Based Learning)

Enhancing teacher training

ICTs have also been used to improve access to and the quality of teacher training. For example, institutions like the Cyber Teacher Training Center (CTTC) in South Korea are taking advantage of the Internet to provide better teacher professional development opportunities to in service teachers. The government-funded CTTC, established in 1997, offers self-directed, self-paced Web-based courses for primary and secondary school teachers. Courses include “Computers in the Information Society, ”Education Reform,”

and "Future Society and Education." Online tutorials are also offered, with some courses requiring occasional face-to-face meetings (DeSanctis, 2019). In China, large-scale radio and television-based teacher education has for many years been conducted by the China Central Radio and TV University,16 the Shanghai Radio and TV University and many other RTVUs in the country. At Indira Gandhi National Open University, satellite-based one-way video- and two-way audio-conferencing was held in 1996, supplemented by print-materials and recorded video, to train 910 primary school teachers and facilitators from 20 district training institutes in Karnataka State. The teachers interacted with remote lecturers by telephone and fax.

RESEARCH METHODOLOGY

Introduction

The chapter three of this research examined the research methods used. It therefore describes the research design, population, sample size and sampling procedure, instruments used for the study and data collection methods as well as data analysis.

Research Design

A research design is concerned with turning a research question into a testing project (Kingsford, 2018). The best design depends on the research questions. Every design has its positive and negative sides. The research design of a research basically deals with four problems: what questions to study, what data are relevant, what data to collect, and how to analyze the results (Kella, 2017). There are two forms of research designs including qualitative and quantitative design. Specific examples are field research design, ex post facto research design, experimental research design, quasi experimental research design etc. The study used the descriptive survey method as the research design. It attempts to describe and explain conditions of the present by using many subjects and questionnaires to fully describe a phenomenon. This is the reason why questionnaires were used as the main research instrument in collecting information from the management, staff and students of Akatsi College of Education.

The Research Population

A population is all the organisms that both belong to the same group or species and live in the same geographical area (Huges, 2017). The population also describes the set of elements that are involved within the same area with the same characteristics for a research work. The selected population for the study was the staff, management and students of Akatsi College of Education in Akatsi.

Sample and Sampling Procedure

A sample size of 120 was used. This was made up of 5 Heads of Department, and 15 lecturers and 100 students. By this the sampling method that was used in selecting the lecturers and staff is convenience sampling technique, while the simple random sampling technique was used in selecting the students. The convenience sampling technique was used because the respondents would be made to answer the questionnaire in their various offices and in their own convenience. The simple random sampling technique was used because the staff respondents would be sampled without any specific grouping (age, gender, educational grouping etc.)

The Research Instruments

The main instrument that was used for the collection of data is the questionnaire. The designed questionnaire would be administered as a means of obtaining information from respondents of College. In the designing of the questionnaire, care would be taken. This is to avoid difficult questions having regard to the various levels of educational background of the respondents. Two types of questionnaires were administered with one type to the staff and management and the other type for the students. In the design of the questionnaire both the close-ended and open-ended questions were used. This was to allow the respondents to choose from the list of alternative questions as well as giving the opportunity to express their views on the topic. With the close-ended questions, respondents are expected to give simple direct answers such as "YES" or "NO" or are required to select the answer from a given set of options that apply in their case. The open-ended type of questions provides no possible answers and so respondents are supposed to supply their answers (as brief as possible) to the questions.

Observation

The researcher also made personal observations in the organisation to observe the staff, management and students' relationship whether it helps to enhance the corporate image as well as enhancing education with the students with respect to the usage of ICT.

Interview

A face to face interview would take place between the researcher and the staff of College to ascertain the effectiveness of the ICT systems in the school. This is to solicit for more information ion from the respondents to buttress the information obtained from the administration of the questionnaire.

Data collection and data analysis procedure

Two types of data collection sources were used namely, primary data and secondary data.

Secondary data

The secondary data source that was used includes newspapers, test books, internet, journals and other literature publications in relation to the topic. Secondary data was used to support the primary data. Apart from the newspapers, text books, internet, journals and magazines, secondary sources of data were assessed from organisation policy and report from Akatsi College of Education.

Primary data

Primary data was solicited from the questionnaire, interviews and personal observations. The primary data helped to assess the use of ICT in adult education in Public Tertiary Education in Ghana since it would be opinions of the respondents who are in charge of the day to day activities of the organisation.

Data analysis

In analyzing data obtained from the administration of the questionnaire, MS Excel and SPSS was used. By that, data was analysed using descriptive and statistical analysis in the form of tables, charts and graphs. Each questionnaire in the questionnaire was analysed separately.

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RESULTS AND DISCUSSIONS

Introduction

The chapter four of this study on assessing the effect of ICT usage in education in public tertiary institutions using Akatsi College of Education as case study organization examines data presentation and analysis. In all, a total of one hundred and fifty (150) respondents were sampled. Out of the one hundred and fifty (150) respondents, one hundred and twenty (120) responses were obtained. This represents 80% of response rate. This included twenty (20) questionnaires for lecturers and one hundred (100) questionnaires for students. The analysis has been presented below:

Biographic data of respondents

Table 1: Gender of Respondents

Gender of respondents	Number of respondents	Percentage of response (%)
Male	95	79.17
Female	25	20.83
Total	**120**	**100.00**

Source: Field data, 2020

Table 1 shows the gender distribution of the respondents. It can be seen that out of the 120 respondents who responded to the questionnaire, 79.17% of the respondents were male while 20.83% of the respondents were females. This shows how dominant males in sampling the respondents. However, the percentage of the female would not make the study gender bias.

Table 2: Age grouping of respondents

Age grouping of respondents	Number of respondents	Percentage of response (%)
18-35	12	10.00
36-45	84	70.00
46-55	10	8.33
Above 55 years	14	11.67
Total	**120**	**100.00**

Source: Field data, 2020

In examining the age grouping of the respondents, table 2 revealed that 10.00% of the respondents were between the ages of 20-35 years, 70.00% of the respondents were between the ages of 36-45y years and 8.33% of the respondents were between the ages of 46-55 years. However, 11.67% of the respondents were above 55 years. This shows that majority of the respondents were above 35 years and this shows very matured respondents. Their level of understanding as a result of their maturity will enhance the findings of the study.

Table 3: Years of being in the university

Period	Number of respondents	Percentage (%)
1 – 5 years	105	88
6 – 10 years	13	11
10 – 15 years	2	1
Above 15 years	0	0
Total	**120**	**100**

Source: Field Data, 2020

The respondents were asked about the number of years they have been in the university to observe or experience the usage of ICT and in response, 88% of the respondents had been in the university between 1-5 years, 11% of the respondents have also been at the university from between 6-10 years but only 1% of the respondents have been at the university for more than 10 years. The majority of the respondents who have been in the university from between 1-5 years were students and shows that all the respondents by virtue of their affiliation with the university, they might have had experience of observed the use of ICT in the university.

Responses by Lecturers

Table 4: Use of ICT systems in the university

Category	Number of respondents	Percentage (%)
Yes	20	100
No	-	-
Unsure	-	-
Total	**20**	**100**

Source: Field Data, 2020

In table 4, the lecturers who were sampled were asked whether the university has ICT system that supports its services and in response, 100% of the lectures noted "Yes". According to the respondents, the university uses all forms of technological devices in providing services for students and the IT devices are used ensure effectiveness and efficiency in the provision of services. Some of the IT devices used include projectors, internet and telecommunication systems, audio and video visual communication systems, telephone, computers, fax machines and many others. To the respondents, these resources enable them to service the university community better.

Table 5: People who mostly use ICT systems in the university

Category	Number of respondents	Percentage (%)
Teaching staff	12	60
Non-teaching staff	1	5
Students	7	35
Total	**20**	**100**

Source: Field Data, 2020

In responding to the people who use ICT in the university in table 5, it came to light that majority of the respondents agreed that it is the teaching staff who mostly use the ICT systems in the university this represent 60% response rate. However, while 5% of the respondents noted that the non-teaching staff are

also involved in the use of ICT, 35% of the respondents noted that the students mostly are the users of the ICT system in the university. From the above, there is a clear indication that it is the university teaching staff that use the ICT systems mostly. On the contrary, all the respondents added that it also depends on what one is using the ICT system for.

Table 6: Effectiveness of the use of ICT systems in the university

Category	Number of respondents	Percentage (%)
Excellent	5	25
Very effective	7	35
Effective	4	20
Fairly effective	4	20
Not effective	-	-
Total	**20**	**100**

Source: Field Data, 2020

Table 6 further assesses the effectiveness of the use of ICT systems in the university and from Table 6 above, it can be seen that 25% of the respondents noted excellent, 35% of the respondents indicated very effective with 20% of the respondents indicating effective. However, another 20% of the respondents were of the view that the ICT system in the university were fairly effective as compared to that of other universities. This shows from the view of majority of the respondents that the ICT systems are very effective.

Table 7: The extent of adoption and usage of ICT systems at the College

Statement	N	Mean	Std. Deviation	Std. Error Mean
I have knowledge about the use of ICT facilities	20	4.3586	2.25877	.15749
The ICT facilities used in my institution are quality.	20	3.8406	1.61311	.13732
Most of the students and the lecturers use ICT facilities.	20	4.3406	1.94750	.08066
ICT facilities are used very often in the institution	20	2.2609	1.77652	.06610
I have benefited in my academic works with the use of ICT facilities	20	2.7319	1.27032	.10814
The ICT facilities in my institution offers quality security	20	3.9855	1.88728	.16066
The use of ICT has enhanced my knowledge.	20	3.3623	1.72124	.14652
The use of ICT by lecturers enhance the quality of teaching and learning in my institution	20	3.6377	1.69990	.14471
There are adequate ICT facilities in my institution	20	3.3406	1.71935	.14636

Source: Field Data, 2020

Table 7 further examines the extent of adoption and usage of ICT systems in the university. Accordingly, with a mean value of 4.3586 and deviation of 2.25877, the respondents noted that they have knowledge about the use of ICT facilities and also believe that the ICT facilities used in my institution are quality (m=3.8406, dev=1.61311). Again, the respondents with a mean of 4.3406 and deviation of 1.94750, the respondents strongly agreed that most of the students and the lecturers use ICT facilities. They further agreed that the ICT facilities in my institution offers quality security, the use of ICT has enhanced my knowledge¸ (m=3.3623, dev=1.72124) the use of ICT by lecturers enhance the quality of teaching and learning in my institution (=3.6377, dev=169990) and that there are adequate ICT facilities in my institution (m=3.3406, dev=1.71935). From the above, it can be seen that majority of the respondents strongly agree that the university's adoption of ICT systems and usage have been very significant and beneficial to the users.

Table 8: Challenges being encountered in the use of the ICT systems

Statement	N	Mean	Std. Deviation	Std. Error Mean
ICT facilities in my institution are very easy to operate	20	4.5942	1.21209	.10318
No education is offered to students for the use of ICT	20	2.1014	1.44993	.29368
Every students and lecturer have easy access to ICT facilities	20	4.5894	1.68415	.14336
I use ICT because I want to be effective	20	4.3188	0.93579	.07966
ICT facilities in my institution has enhanced communication in my school	20	4.3478	0.87672	.07463
Most lecturers use ICT in lecturing	20	4.4203	0.91070	.07752
I sometimes have problems using ICT in my institution	20	4.3841	0.89052	.07581

Source: Field data, 2020

In examining the challenges on the usage of ICT systems in the university, table 8 with a mean value of 4.5942 and deviation of 1.21209, the findings showed that the respondents strongly agree that ICT facilities in the institutions are very easy to operate. The respondents further strongly agreed that every students and lecturer have easy access to ICT facilities, ICT facilities in my institution has enhanced communication in my school, most lecturers use ICT in lecturing and use ICT because I want to be effective. On the contrary, the respondents being indifferent noted that the university does not offer education to students for the use of ICT. It can be seen from table 8 that majority of the respondents also strongly agree that they have problems using the ICT systems. Some of the challenges mentioned include

poor network systems, systems failure, high traffic on the internet services, inadequate ICT resources to serve the entire university and poor procedural systems.

Table 9: Assessing the quality of ICT in your institution

Category	Number of respondents	Percentage (%)
Excellent	13	65
Very good	6	30
Good	1	5
Fair	1	5
Total	**20**	**100**

Source: Field Data, 2020

In assessing the quality of ICT in the university, 65% of the respondents according to table 9 indicated excellent, 30% of the respondents also noted very good but 5% each of the respondents noted good and fair. This is an indication that the ICT systems used at the College are excellent in the view of the lecturers who responded to the questionnaires.

Responses of students

Table 10: Availability of ICT in the institution

Category	Number of respondents	Percentage (%)
Yes	100	100
No	-	-
Unsure	-	-
Total	**100**	**100**

Source: Field Data, 2020

The students also responded to some questionnaires and table 10 shows that all the students agreed that there are ICT system at the Akatsi College of Education. This confirms the position of the lecturers. They further agreed that the ICT systems used include projectors, internet, audio and video visual communication gadgets, telephones, computers, fax machines and others.

Table 11: Those who mostly use ICT in the institution

Category	Number of respondents	Percentage (%)
Teaching staff	18	18
Non-teaching staff	2	2
Students	80	80
Total	**100**	**100**

Source: Field Data, 2020

In responding to those who use ICT systems in the university, table 11 revealed that 18% noted teaching staff, 2% of the respondents also noted non-teaching staff but 80% of the students indicated it is rather the students who mostly use the ICT systems in the university. From the above, it can be seen that the students strongly agree they mostly use the ICT systems. This shows that all the people in the university community use ICT systems.

Table 12: Effectiveness in the use of ICT in the institution

Category	Number of respondents	Percentage (%)
Excellent	10	10
Very effective	12	12
Effective	40	40
Fairly effective	30	30
Not effective	8	8
Total	**100**	**100**

Source: Field Data, 2020

In assessing the effectiveness in the use of ICT systems in the university, table 12 showed that 10% of the respondents noted excellent, 12% of the respondents also indicated very effective with 40% of the students indicating effective. However, while 30% of the respondents noted fairly effective, 8% of the respondents noted not effective. This means that majority of the respondents agree that the ICT systems in the university are effective. This means that majority of the students efficiently use ICT systems in the university and they achieve the purpose for which they use it.

Table 13: Adoption of ICT systems by students

Statement	N	Mean	Std. Deviation	Std. Error Mean
I have knowledge about the use of ICT	100	3.3400	1.43341	.172
I use ICT mostly for lecturing, research and other purposes related to my course	100	3.7300	2.51370	.172
The use of ICT makes me efficient and effective	100	3.4256	1.28767	.174
I am very satisfied with the use of ICT than other manual means	100	3.2010	1.39978	.172
I become confident in using ICT facilities	100	3.2150	1.38142	.172
ICT usage has enhanced the quality of teaching and learning	100	4.3650	1.24883	.172
I get easy access to ICT facilities in the institution	100	4.4950	1.26411	.172
The ICT facilities offers quality security for data storage	100	4.4171	1.27204	.172
ICT facilities has enhanced communication between lecturers and students	100	4.5126	1.25473	.172
ICT facilities has enhanced data processing in the institution	100	4.8600	1.11269	.172
ICT has encouraged research and effective studies for bother lecturers and students	100	3.5650	1.19705	.122
I have benefited from using ICT facilities	100	3.6734	1.23454	.122
I face challenges in using ICT in the institution	100	3.6900	1.24162	.122
Management is still solving problems related to the use of ICT	100	3.6650	1.25325	.122
I recommend the use of ICT in tertiary institutions	100	3.5600	1.27850	.122

Source: Field data, 2020

Table 13 also shows the extent of adoption and usage of ICT systems as well as the challenges that come with the use of ICT systems. The respondents in this respected agreed that they have knowledge about the use of ICT, they use ICT mostly for lecturing, research and other purposes related to my course, they use of ICT makes me efficient and effective, and that they are very satisfied with the use of ICT than other manual means which makes them become confident in using ICT facilities. Again with average mean of

4.3456 and deviation of 1.3230, the respondents strongly agreed that ICT usage has enhanced the quality of teaching and learning, they also get easy access to ICT facilities in the institution and offers quality security for data storage. Besides, the ICT facilities have enhanced data processing in the institution and have enhanced communication between lecturers and students. The respondents further agreed that ICT has encouraged research and effective studies for bother lecturers and students and have benefited from using ICT facilities.

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

Introduction

The chapter five of this study on examining the effects of ICT usage in education in public tertiary institutions using Akatsi College of Education as case study organization looks at the summary of findings, conclusions and recommendations for the management of the institution to implement in order to enhance the usage of ICT systems in the university. Further, the recommendations can be adopted by other tertiary institutions to ensure efficiency and effectiveness in the use of ICT systems.

5Summary of findings

The main objective of this study was to examine the effect of ICT usage in education in public tertiary institutions using Akatsi College of Education as case study organization. However, the specific objectives to be included are identifying the ICTs currently in use to support teaching and learning at Akatsi College of Education, examining the extent of the adoption of ICTs by Akatsi College of Education in teaching and learning and assessing the major challenges that the management of the university is encountering in the use of ICT. In determining the objectives of the study, questionnaires were used as the main research instrument. The findings of the study are as follows:

Objective one: Assessing the ICTs currently in use to support teaching and learning at College.

The first objective was to assess the ICTs currently in use to support teaching and learning activities at College. Accordingly, both the lecturers and students agreed that the university has employed several ICT systems in ensuring the efficiency and effectiveness of teaching and learning. Table 4 and table 10 however revealed that some of the IT devices used include projectors, internet and telecommunication systems, audio and video visual communication systems, telephone, computers, fax machines and many others. To the respondents, these resource enable them to service the university community better. The university has further employed an application that has all students enrolled on. This to them provides the platform for assessing the students and lecturers. Even though majority of the lecturers were of the view that it was the teaching and non-teaching staff who in most cases use the ICT systems, it came to light that the students also strongly agreed they were the most users of ICT systems. It is therefore an indication that almost every person at the College use a form of ICT either for teaching or learning and that it largely depends on what one is using the particular system form. It is also an indication of high usage of ICT devices at the College.

Objective two: Determining the extent of the adoption of ICTs by Akatsi College of Education *in teaching and learning.*

In assessing the extent of adoption and usage of ICTs by Akatsi College of Education in teaching and learning, table 7 revealed that with a mean value of 4.3586 and deviation of 2.25877, majority of the respondents strongly agree that they have knowledge about the use of ICT facilities and also believe that the ICT facilities used in the institution are quality (m=3.8406, dev=1.61311). Furthermore, the respondents revealed with a mean of 4.3406 and deviation of 1.94750, that they strongly agree most of the students and the lecturers use ICT facilities and helps them in their functions at the university. They further agreed that the ICT facilities offers quality security and has enhanced their knowledge. It has further enhanced the quality of teaching and learning in the institution (=3.6377, dev=169990). It can be seen from the above that majority of the respondents strongly agree that the university's adoption of ICT systems and usage have been very significant and beneficial to the users. On the part of the study, the study revealed that the respondents agreed that they have knowledge about the use of ICT and that they constantly use ICT mostly for assignments, research and other purposes related to their course. They agreed that the use of ICT makes them efficient and effective, and that they are very satisfied with the use of ICT than other manual means which makes them become confident in using ICT facilities. The respondents further indicated that they strongly agreed that ICT usage has enhanced the quality of teaching and learning. Besides, the ICT facilities has enhanced data processing in the institution and has enhanced communication between lecturers and students. The respondents further agreed that ICT has encouraged research and effective studies for bother lecturers and students and have benefited from using ICT facilities.

Objective three: Identifying major challenges that the management of the College is encountering in the use of ICT

The last objective was to identify the challenges that the management of the College as well as students encounter in the use of the ICT. It came to light that the findings revealed in table 8 that with a mean value of 4.5942 and deviation of 1.21209, they strongly agreed that the ICT systems are quite difficult to operate sometimes. This is because of some challenges including poor network systems, systems failure, high traffic on the internet services, inadequate ICT resources to serve the entire university and poor procedural systems. In all, the majority of the respondents were of the view that the use of ICT systems in the university has ensured effectiveness and efficiency in the organization. This means that majority of the students efficiently use ICT systems in the university and they achieve the purpose for which they use it.

Conclusions

The importance of ICT systems in ensuring efficiency and effectiveness in organisations cannot be over emphasized. Noticeably, ICT systems are in various forms and that through ICT systems, the university is able to ensure efficient and effective teaching and learning activities. From the findings the respondents' admission of ICT systems at College is an indication of the management preparedness to equip students and lecturers in learning and teaching.

Some of the ICT devices used at the College include projectors, internet and telecommunication systems, audio and video visual communication systems, telephone, computers, fax machines and many others.

These resources enable them to serve the university community better. Besides, the university has further employed an application called SAKAI that has all students and lecturers enrolled on. This to them provides the platform for assessing the students and lecturers. Even though majority of the lecturers were of the view that it was the teaching and non-teaching staff who in most cases use the ICT systems, it came to light that the students also strongly agreed they were the most users of ICT systems. This means every person at the Akatsi College of Education use ICT systems either for teaching or learning or also for administering services. By implication the use of ICT largely depends on what one is using the particular system form.

Also while students use ICT system for learning, researching and accessing it for assignments and other purposes, lecturers also use the ICT systems for teaching and research. Non-teaching staff also use ICT systems to administer services for the university community. This means there is a high level of ICT adoption and usage at the College. To the respondents, the ICT systems has ensured good communication within the university community, created the platform for both students and employees' assessment, provided maximum security and quality systems for the users of the university. They further noted that the usage of ICT provides quality teaching and learning. It was also clear that the use of ICT makes them efficient and effective, and that they are very satisfied with the use of ICT than other manual means which makes them become confident in using ICT facilities. Besides, the ICT facilities has enhanced data processing in the institution and has enhanced communication between lecturers and students. Despite its benefits, the challenges that are encountered with the use of ICT are poor network systems, systems failure, high traffic on the internet services, inadequate ICT resources to serve the entire university and poor procedural systems. In all, the respondents were of the view that the use of ICT systems in the university has ensured effectiveness and efficiency in the organization and that the majority of the students efficiently use ICT systems in the university and they achieve the purpose for which they use it.

Recommendations

Based on the conclusions made, the following recommendations are made to enhance the use of ICT systems at College. Other public tertiary institutions can also adopt the recommendations to enhance the ICT systems usage in the university. The recommendations are:

1. It is important that ICT systems at Akatsi College of Education are made available to every member of the university whether student, lecturer or a non-teaching staff. From the study, ICT systems have been very effective in ensuring the productivity of users including teachers and non-teachers. Significantly, not all the respondents admitted that they use ICT system of the university. However, if the university wants to achieve productivity across the university, then the need to ensure that every member of the university is made to use ICT systems in their functions.
2. It is also important that the university embarks on effective and efficient training programmes for all the students and employees of the university on the use of ICT systems. This is to minimize difficulty in the use of ICT systems by the users. Very importantly, the training must ensure that the respondents appreciate the use of the ICT systems and further put it to efficient usage.
3. Another recommendation is the fact that the university has to ensure that the system have adequate capacity to avoid overload and slowness in the use of the system. The students especially were complaining of poor network and systems failure. This can create challenges in the use of ICT

systems. For that matter, it is important that the university uses the right systems to enhance the efficacy of the network being used.

4. It is further recommended that regular maintenance is done on the ICT system that the university is using. Regular maintenance means ensuring that viruses and "jams" do not affect the system.
5. Further research is important in this area as this study focused on Akatsi College of Education Other researches can look at what the ICT systems are used for in the public tertiary institutions as well as benefits that the Colleges obtain from the use of ICT systems.

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