



Use of Information & Communication Technology (ICT) in Tertiary Education in Ghana: A Case Study of Electronic Learning (E-Learning)

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ABSTRACT

Population growth and the increasing number of people seeing the relevance of education as well as demand for tertiary education in Ghana have been on the rise yearly. Tertiary institutions in Ghana have been unpleasantly turning away large numbers of qualified applicants due to lack of facilities. To solve some of these problems in the tertiary educational sector of Ghana, the use of ICT through E-Learning have a major role to play. This paper discusses and elaborates the importance of E-Learning in the tertiary educational sector of Ghana as well as the different issues concerned in the implementation of an E-Learning System. The study also shows how ICT through E-Learning has helped or can help people access tertiary education by not necessarily being on the campus of the respective tertiary institutions. E-learning can be seen as a solution to the various factors that affect access to tertiary education such as lack of facilities to meet increasing educational demand due to population growth. It can also help workers or working people who want to attain higher education but cannot opt for residential tertiary education for one reason or the other. The researchers recommend that every tertiary institution in Ghana should make E-learning part of its structure, so as to facilitate and speed up the development of education and the country as a whole.

Keywords: *Education, ICT, E-Learning, Distance Learning*

1. INTRODUCTION

There is a growing clamour in Ghana's public universities and polytechnics to be run as businesses. These tertiary institutions are usually assessed in terms of business models and measures. Consistent with these models, universities and polytechnics are now required to justify their existence based not on criteria such as quality of faculty or resources alone, but on whether they satisfy current demands; anticipate future demands; continuously increase product offering i.e. programmes and sales (enrolment).

1.1 Definition of ICT and E-Learning

Information and Communication Technology (ICT) can broadly be defined as the tools, facilities, processes, and equipments that provide the required environment with the physical infrastructure and the services for the generation, transmission, processing, storing and disseminating of information in all forms including voice, text, data, graphics and video. From the definition, ICT has a role to play in any country's educational development.

The idea and plan of using the computer as a learning tool has been around since the advent of computers. E-Learning is known to be a product of this idea and plan. E-Learning has been defined by different people and organizations depending on the environment and circumstances they find themselves. E-Learning refers to the provision of quality and flexible

education through the use of ICTs to extend access to education to those who are unable to attend lectures/classes on-campus, due to a particular reason [1].

E-Learning opportunities are usually accessed via the internet and facilitated by different types of Information and Communication Technologies (ICTs) which offer new opportunities for teaching. E-Learning builds on the same principles and opportunities of teaching many individuals at each learner's own rate compared with teaching to a class of students meeting at the same place at the same time. According to [2] what is foundational to the strategy of E-Learning is an understanding that educational institutions are based on systems.

1.2 E-Learning and Distance Learning

It must be noted that E-Learning and Distance Learning are not the same. Distance Learning involves teaching or lecturing of students at a distance away from the institution. The lack of distinction between E-Learning and Distance Learning accounts for the misunderstanding of the role ICT plays in E-Learning. It was observed by [3] that because of their interchangeability as synonyms, there is continuous blurring of boundaries between e-learning and distance learning. What most universities and polytechnics in Ghana practice is distance learning. E-learning involves the use of ICT and is currently being employed and adopted by a few institutions.



Distance Learning can be done without the use of ICT. Moreover, distance alone cannot be a necessary condition for the application of E-Learning, although one of the most important advantages of E-Learning is the flexibility it offers with regard to distance. According to [3] Distance Learning and E-Learning do overlap in some cases, but are by no means identical.

In the traditional lecture-based education typically found in large tertiary institutions, lecturers and students are at the same place (often a lecture room) at the same time. Teachers are the principal source of knowledge delivered to students in this approach. Teachers can call upon ICT support, such as audio/video materials, slides or films. Students can use

supplementary means to obtain knowledge, such as books and manuals; here the Teacher or Lecturer is the key to learning.

Instruction in an E- Learning system is different, if for no other reason than the teacher not being physically present to keep students awake. The teacher as the centre of learning is replaced by E-Learning Systems.

In E-Learning Systems, the principal source of knowledge is not the teacher, but knowledge-bases collected, assembled and sequenced by the teacher, along with links to other sources of information, typically accessible via the internet. Here, the teacher’s role shifts from that of a teacher to that of course developer, and once a course is in session, the course facilitator. The main differences between these two models of education are shown in **Table 1**.

Table 1: Types of Educational Models

Source: Interdisciplinary Journal of Knowledge and Learning Objects Volume 2, 2006.

MODEL	Traditional Model of Education	E-Learning System
FEATURE		
<i>Main Knowledge Source</i>	Teacher	Knowledge Bases in Education System; any Knowledge Source Accessed Through the Internet
<i>Additional Knowledge Sources</i>	Books, Manuals, Audio and Video Materials	Traditional Sources, Teacher, Fellow Students
<i>Assessment</i>	Only by Teacher	System and Teacher is Responsible for Final Assessment
<i>Quality of Education</i>	Depends on Teacher Quality, Level of Knowledge and Ability to Share Knowledge	Depends on Quality of Electronic Knowledge Sources and Other Didactic Materials

2. PROBLEM STATEMENT

Demand for tertiary education in Ghana has been increasing over the years, and the expansion of public universities and polytechnics has not been able to meet this increasing demand.

There is a general problem of access to public tertiary education in Ghana. Available statistics indicate that from 1996-2001, only about 32% on the average, of qualified applicants for admission into the universities, and about 54% of same for admission into the polytechnics, were actually admitted. The figures have not changed much over the period. For the 2005/2006 academic year, 55% of qualified applicants were admitted into all the public universities while in the polytechnics it was 78% [4].

The factors that have been identified as reasons for the situation of limited access to tertiary education include the following:

- Existing tertiary institutions are unable to meet the high demand for tertiary education, which has arisen

out of the rapid growth in population and the reduction of the years for pre-tertiary education.

- Disparity between existing academic facilities and physical infrastructure on one hand, and the increasing number of students admitted into tertiary institutions on the other.
- Public universities and polytechnics being originally developed as residential institutions because of their national character and the model adopted.
- The existing structures and facilities that tertiary institutions provide are limited and in some cases, there is no access for people with disabilities and special needs.

3. RESEARCH METHODOLOGY

The researchers adopted exploratory and integrated literature in this study as well as informal interviews with some students of Ghanaian tertiary institutions. They examined current ICT usage in education, distance learning and E-



Learning in order to establish a general overview and implementation strategy for E-Learning in tertiary institutions of Ghana, that rarely practice/adopt E-learning.

4. TYPES OF E-LEARNING

According to the Danish Ministry of Science and Innovation [5], E-Learning operates with four different types of E-Learning methodologies in which a wide spectrum of learning is illustrated. The different types of E-Learning methodologies are namely; *E-Learning Without Presence and Without Communication (Model A)*, *E-Learning Without Presence and With Communication (Model B)*, *E-Learning With Combination of Occasional Presence - Blended Learning (Model C)* and *E-Learning Used as a Tool in Classroom Teaching (Model D)*

The types of E-Learning Methodologies are described below:

4.1 E-Learning Without Both Presence and Communication (Model A)

This model involves an E-Learning process whereby the teacher and the students never meet physically. There is no dialogue or no kind of interaction between students and the teacher.

This type of E-Learning can be done entirely off-line as all information can be stored on a secondary storage device such as a Compact Disk (CD), hard disk (especially external), pen drives or flash disks. Continuous or occasional on-line access will however enable up-date of the teaching material. The student is provided with information on a certain topic or course and may thereafter be given training through a number of exercises. The student may also be tested through a number of multiple choice tests. Guidance can be sought through the use of a help function.

The main advantage of this type of E-Learning is its flexibility. The learning can take place anywhere and at all times, if the requested equipment is available. On the other hand, a disadvantage of this type of E-Learning is that, it is difficult to design the learning process according to the needs of the individual user, and the user cannot seek guidance from the teacher beyond what is included in the E-Learning System beforehand. Users must be able to work independently and solve unexpected problems by themselves without any help since there is no communication.

This type of E-Learning is mainly used for teaching in very specific competences such as the use of a particular IT-system, training in a new sales concept etc. But the method is less suitable for teaching in general competences and is therefore difficult to apply in teaching at universities and polytechnics of Ghana. As a result of the processes involved in this type of E-Learning, it will be difficult for a tertiary

institution in Ghana to use this type, because it is very disadvantageous in terms of effective teaching or lecturing of students.

4.2 E-Learning Without Presence and With Communication (Model B)

With this model of E-Learning, the teacher and the students never meet physically, but there is dialogue between the course participants and the teacher through the support of ICT based communication services, tools and facilities. This type of model demands some type of technical connectivity. Communication can either be asynchronous (e.g. e-mail communication) or synchronous (e.g. chat rooms). Communication can either be with a tutor or with fellow students. The model is almost as flexible as model A. As a tutor is involved in the learning process, the use of this type of E-Learning System will often demand the user to register as a participant, if he wants to receive advice from the tutor or teacher.

This model can therefore be used for teaching, where reflection and dialogue is important for the learning process. Model B is often used in situations, where flexibility in time and space is important. For instance it is used for offering cross-border teaching by American universities. It can be suitable for some tertiary institutions depending on the facilities and costs available for the proposed E-Learning System.

4.3 E-Learning with Combination of Occasional Presence: Blended Learning (Model C)

Another model of E-Learning involves parts of the learning process taking place in a class room and other parts being done elsewhere (e.g. at home or at work) using ICT based learning facilities and tools. In this model, E-Learning is combined with traditional class room teaching. A wide spectrum of models is possible here. The 'electronic' part can be with or without communication, and it can either be a minor supplement to the traditional teaching, or the traditional teaching can be a minor supplement to the 'electronic' part of the course. Use of classroom teaching adds to the economic costs, but it also helps to make E-Learning more efficient, as it facilitates a dialogue between students and lecturer – also outside the classroom.

Currently, through Model C, Ghana Telecom University College, Ghana in collaboration with Aalborg University, Denmark runs a Master of Information Communication Technology (mICT) programme. In most cases, E-Learning is used to supplement traditional classroom teaching [6].

Model C is suitable for implementation in Ghanaian tertiary institutions since it has advantages over Models A and



B and is more suitable and convenient for a tertiary institution's teaching and learning environment.

4.4 E-Learning Used as a Tool in Classroom Teaching (Model D)

This type of E-Learning involves all teaching being done in a classroom, and where computers are used as a learning tool.

E-Learning can also be used as a tool in the traditional classroom teaching. The major advantage here is that it enables the use of modern pedagogic teaching methods. For instance use of games and scenarios in realistic settings. This model of E-Learning is very expensive, due to the fact that computers are used by the students as a learning tool. If a lot of students are admitted, it means a lot of computers have to be procured to meet the requirements of this model which will be very costly for the institution involved.

It is more appropriate to use this model if the participating students are not many, and each of them can afford to have a computer (laptop). In any other case apart from this, too much cost will be incurred by the tertiary institution, if this model is implemented.

5. E-LEARNING EXPERIENCES IN GHANA

For about ten years, the universities and polytechnics in Ghana have had the unpleasant duty of turning away a large number of qualified applicants every year as a result of their inability to admit not even half of the qualified applicants [4, 7].

As a result of the above and many other reasons some tertiary institutions have adopted distance education and e-learning as a viable complement to the conventional face-to-face education. This step is inspired by the vision that all Ghanaians should have access to all forms of education and training regardless of where they live.

Some institutions outside the shores of Ghana especially in the UK offer different programmes of study in Ghana through distance education and E-Learning. Some institutions practicing E-Learning in Ghana include:

The *E-learning center* at KNUST [8] offer programmes such as MSc in Information Technology, ICT professional courses and MBA in Finance through ICT usage for the Ghanaian public. The *Institute of Distance learning* also at KNUST [9] offer programmes to the general public through e-learning and distance education. The programmes involve both undergraduate and graduate programmes. Examples of these programmes are BSc. Building Technology and BSc. Actuarial Science for undergraduates as well as MSc. Environmental Science and MSc. Industrial Mathematics. Lectures for these programmes are facilitated in Accra (Trust Towers or Merton International School). The lecturers travel from Kumasi to Accra on Weekends to facilitate and deliver the

lectures. Most students of the programme stay in Accra so this mode of education becomes advantageous to them since they need not travel to Kumasi, so travel and accommodation costs are not an issue because the lecturer comes and meet them in Accra. However, students involved in the programme that do not reside in Accra but in different cities of Ghana and still want to pursue one of the programmes are disadvantaged in terms of travel arrangement and costs at the weekend.

Accra and Ho Polytechnics, Ghana [10] in conjunction with Liverpool John Moores University (LJMU) have set up a programme in which LJMU will organize top-up courses in (BSc Civil Engineering and BSc Construction Management) at Accra and Ho Polytechnics for qualified HND Building Technology and Civil Engineering graduates from Ghanaian Polytechnics. The programme was ratified by a Memorandum of Understanding (MOU) and a Memorandum of Agreement (MOA), which were both signed by both Polytechnics, and the Liverpool John Moores University (LJMU). The programme, validated on October 27th 2009, is a top-up course which is to be delivered in three modules. The first of the three modules involves lecturers/professors (Flying Faculty) travelling from LJMU to Ghana from January 2010 to deliver lectures at Accra and Ho Polytechnics. The mode of education involves the use of LJMU's E-Learning platform (Model C). The BLACKBOARD, in Accra and Ho Polytechnics is the second module. The third module is a summer school to be run in LJMU from May to September 2010.

The MOU and MOA would also pave way for collaboration in research, staff training and access to the e-library resources of LJMU by staff of Accra and Ho Polytechnics.

The *Resource Development International (RDI)* [11] founded in the year 1990 is a provider of high-level management development interventions that are interrelated and focused on the provision of skills development and performance enhancement for individuals and organizations, specializing in distance learning. RDI is the world's largest independent provider of UK University qualifications by e-learning and distance learning and comprises an international group of companies with its headquarters in Coventry, UK. RDI partners with a number of UK universities to provide its Professional Pathways portfolio of related higher education programmes. RDI markets and delivers these programmes worldwide through offices and partners across Asia, North America, Africa and Europe enrolling and supporting more than 3,000 new students each year.

In Ghana the RDI office is located in Accra and it partners with various UK Universities for delivery of education through distance learning and e-learning. The universities in the UK in partnership with RDI Ghana include: The University of Warwick, Bradford School of Management, University of Birmingham, University of East London, University of



Sunderland, University of Wales, University of Derby, Teesside University, Sheffield Hallam University and Birmingham City University. Students in Ghana apply for admission to the Universities mentioned above through the RDI office in Accra. The RDI office helps students with admission procedures and serves as an intermediary between the student and the University being applied for. Upon successful admission to the University, the students pursue their programmes through distance learning and e-learning modes. A student that encounters problems in his/her studies with the University can approach RDI for help.

6. DRIVERS OF E-LEARNING IN GHANA

Pressures have emerged from various stakeholders to implement E-Learning technologies in mainstream tertiary education. The interest in putting in place E-Learning technologies in tertiary educational institutions in Ghana is influenced by a number of factors, one of which is the high demand for tertiary education. E-Learning strategies are being aimed to meet the needs of a high number of workers and people who desire to upgrade themselves and meet the needs of lifelong learning, up skilling and quality improvement.

7. CHALLENGES OF E-LEARNING IN GHANA

Lack of access, particularly in the rural communities of developing countries such as Ghana poses a significant challenge in realizing the full potential of ICT worldwide [12]. Deploying traditional wired infrastructures in remote, sparsely populated areas has been commercially unfeasible and has created a huge financial barrier to getting these communities connected to the internet. This limitation has created a “digital divide” a gap between those able to benefit from digital technology and those who cannot. Although socio-economic factors are the primary cause of the digital divide, additional factors including differing levels of literacy and technical skills, social and legal constraints, as well as access to relevant high-quality content. Poor infrastructure can lead to unsavoury experiences that can cause more damage than good to teachers, students and the learning experience. A community’s inability to use ICT effectively also contributes to the digital divide. Location, culture, age and background significantly influence the likelihood that users will embrace ICT and E-Learning. For example, usage models that assume learners own their own PC’s.

8. ADVANTAGES AND DISADVANTAGES OF E-LEARNING TO GHANAIAN

TRAINERS, INSTITUTIONS AND LEARNERS

8.1 Advantages of E-Learning to the Trainer and Institution

The following are some of the advantages of E-Learning to the Trainer or Institution [13]:

- **Overall Cost Reduction** is the single most influential factor in adopting E-Learning. The elimination of costs associated with instructor's salaries, meeting room rentals, and student travel, lodging, and meals are directly quantifiable. The reduction of time spent away from the job by employees may be the most positive offshoot.
- **Consistent Delivery** of content is possible with asynchronous, self-paced E-Learning.
- **Expert Knowledge** is communicated, but more importantly captured, with good E-Learning and knowledge management systems.

8.2 Disadvantages of E-Learning to the Trainer or Institution

E-Learning is not however, the be all and end all to every training need. It does have limitations, among them are:

- **The Up-front Investment** required for an E-Learning solution is larger due to development costs. Budgets, finance, accounts and cash flows will need to be available and negotiated.
- **Technological Issues** that play a factor include whether the existing technology infrastructure can accomplish the training goals, whether additional technology expenditures can be justified, and whether compatibility of all software and hardware can be achieved.
- **Inappropriate Content** for E-Learning may exist according to some experts, though they are limited in number. The acquisition of skills that involve complex physical or emotional components (for example, juggling or mediation) cannot be augmented with E-Learning.
- **The Cultural Acceptance** is an issue in organizations where student demographics and psychographics may predispose them against using computers at all, let alone E-Learning.

8.3 Advantages of E-Learning to the Learner



Along with the increased retention, reduced learning time, and other aforementioned benefits to students, particular advantages of E-Learning include [13]:

- **On-demand Learning Availability** enables students to complete training conveniently at off-hours or from home.
- **Self-pacing** for slow or quick learners reduces stress and increases satisfaction.
- **Interactivity** engages users, pushing them rather than pulling them through training.
- **Learner Confidence** is achieved because refresher or quick reference materials are available and this reduces burden of responsibility of mastery.
- **Learning Times** are reduced for students because they do not have to attend lectures in the classroom almost every day which causes fatigue as it is with the traditional method of learning.
- **Portability** of training has become the strength of E-Learning with the proliferation of enabled-Wi-Fi notebook computers and laptops.

8.4 Disadvantages of E-Learning to the Learner

The ways in which E-Learning may not excel over other training modules include:

- **Technological Issues** of the learners are most commonly technophobia and the required technologies may not be available for the learner.
- **Reduction of Social and Cultural** physical interaction of students can be a drawback. The impersonality, suppression of communication mechanisms such as body language and elimination of peer-to-peer learning that are part of e-learning with advances in information and communications technologies will lessen social and cultural interaction of students as compared to traditional face-to-face education.

9. CONTEMPORARY TRENDS IN E-LEARNING

The growing interest in E-Learning seems to be coming from several directions. These include organizations that have traditionally offered distance education programmes either in a single, dual or mixed mode setting. They see the incorporation of online learning in their repertoire as a logical extension of their distance education activities. The corporate sector, on the other hand, is interested in E-Learning as a way of rationalizing the costs of their in-house staff training activities [13].

10. FINDINGS AND DISCUSSIONS

By adopting E-Learning the tertiary institutions in Ghana can benefit in various ways enumerated below:

- Students no longer need to spend time travelling after work to a centre to attend lectures of a course; they can now have access to learning when they want it, the time they want it (day or night), wherever they want it – at home, at work, in their local library. For many students this would open up a new, much more flexible and accessible world of learning that was previously closed to them due to disability or family circumstances, or perhaps due to the fact that the university has not got the physical facilities to admit and accommodate on its campus. In other words, there are now no longer any geographical constraints to learning; E-Learning brings learning to people, not people to learning.
- Learning will be more exciting, engaging and compelling. Hard and boring subjects can now be made easier, more interesting and appealing with E-Learning. For example, videos and documentaries of various courses or subjects which will give a better understanding to students can be displayed or shown through the E-Learning system or a videoconferencing centre.

11. CONCLUSION AND RECOMMENDATION

11.1 Conclusion

The expansion of tertiary institutions has not been able to meet the yearly increasing demand for tertiary education though a major policy in the tertiary education reform is to make it possible for all students who satisfy the requirements for admission into tertiary institutions to gain access to the institutions. Although there have been an expansion in enrolment figures over the years, it is not significant when compared with the number of applicants who apply to the various public tertiary institutions. It is in the light of this and the increasing population growth of this country, e-learning can be seen as the way or solution to the various factors that prevents qualified applicants from gaining admission. Also e-learning can help provide avenues for working people and those who for one reason or the other have had to truncate their education for a number of years to re-enter or acquire higher education through other modes. It provides opportunities for lifelong learning.

11.2 Recommendation

This paper recommends that every tertiary institution in Ghana should introduce and implement E-Learning as part of its educational structure, facilitation and delivery in order to sustain educational and economic development in Ghana. To sustain the e-learning system further research should be done on how to develop a business model for it.

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