

Adoption of Information Communication Technology (ICT) in Distance Education: A Retrospective Analysis

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In recent times, the Information Communication Technology (ICT) in educational settings has gained much attention in research. Thus, the author examined the use, accessibility and effect of ICT in Distance Education (DE) in Ghana's first public university since ICT plays a critical role in enhancing teaching and learning processes of DE programmes.

Using a cross-sectional design, the author adopted both interview and questionnaires as instruments for collecting data from the management staff and distance learning students respectively. The main findings of the study were that; inaccessibility and inadequacy of ICT facilities had affected students' academic work especially in the areas of research, learning and even library services. Moreover, the findings confirmed that a strong relationship existed between 'adequacy of ICT facilities' and teaching, learning and research'. The regression analysis found that there is a significant positive relationship ($r = 0.814$, $p < 0.01$) between adequacy of the facilities/resources and academic performance.

Keywords: ICT, distance education, distance learning, Technology-Organization-Environment (TOE)

INTRODUCTION

Despite Information and Communication Technology (ICT) taking over every sphere of life and contributing greatly to the development of advanced countries, emerging economies still lag behind and struggling to catch up with the first world nations. Technology has had an immense influence on education and has taken over education (Boateng, 2012). Daniel (2008) argued that promoting DE to absorb continuing demand for higher education was an alleviating measure for the high intake of students. Furthermore, DE allows most students to stay off campus and yet achieve the agenda of quality education. This method of instruction reduces the pressure on the limited facilities and resources available. It is almost impossible to achieve the best of DE when ICT is relegated to the background in universities, hence the motivation for this study.

Summer (2000), posited that DE traced its origin to mid-19th century Europe and the United States. The pioneers of DE used the best technology of their day, the postal system, to open educational opportunities to people who wanted to learn but were unable to attend conventional schools. He noted that educators used these new technologies to broadcast educational programs to millions of learners, thus extending learning opportunities beyond the walls of conventional teaching institutions. Technology has for long been the trusted medium or channel for running DE programmes. Almost every African country, including Ghana, make use of DE programmes in their educational systems. This method of education is especially valuable in developing countries in reaching a large number of students with relatively few teachers and providing a cost-effective way of using limited academic resources.

Many organizations use DE programmes to train employees or to help update employee skills or knowledge. Employees can join such programmes in the workplace or at home in their spare time (Komba, 2009). ICT plays a major role in DE and it is one of the most important tools, if properly developed, could dramatically improve the quality of service delivered. Tinio (2002) reiterated that ICT ensures effective support for faculty and students. It equips students with 21st-century skills as well as providing effective communication among various institutions for improved academic performance. This is the time for developing economies like Ghana to embrace and deploy the full benefits of technology in its educational curricula. Conversely, the continuous reliance on outmoded methods will not assist these economies to catch-up or equal the developed economies. The issue of incorporating technology into education will definitely go a long way in im-

proving the learning outcomes of individuals by personalizing the learning experience.

With reference to research conducted approximately a decade ago, the Accra Learning Centre (ALC) for example, has a multi-media learning facility, equipped with high-speed Internet access via satellite connectivity, to assist in its distance learning (DL) programme (Martey, 2004). Oduro-Mensah (2007), noted that the DE of University of Ghana (UG), Legon is still dependent on print modules. It has taken a long time for ICT to be integrated into the academic structure. Statistics from the UG Basic Statistics Annual Report showed that 1,128 and 7,008 students were admitted to 2007/08 and 2014/15 respectively. There appeared to be a significant increase in admissions, within the period, without any corresponding increase in the facilities and resources of the institution. In other words, the facilities did not match the growing population. Given the pressure of the demand for tertiary education in Africa, while having less on-campus space, DE was motivated to close the huge gap by expanding off-campus sites.

DE in emerging economies like Ghana is faced with inadequate information technology (IT) infrastructure as well as lack of skilled human resources to man the centers (off-campus sites). An investigation in the University of Ghana, Legon revealed that there are inadequately trained information technology professionals to man the ICT facilities at the institute and most disturbingly a lack of full implementation of learning management software. Furthermore, there is a challenge of inaccessibility of computer hardware. In the University of Ghana, Legon, the DE institute lacks the ICT resources required to guarantee quality teaching, learning, and research. Though authorities of the university have invested capital in areas of building libraries and research facilities, minimal financial resources have been committed to ICT infrastructure development. It is against this backdrop that the study aims to examine how ICT has affected the academic activities of distance learners after its inception in 2007.

The study was guided by these objectives, to

- i. examine the adequacy of ICT facilities on the DE programme.
- ii. ascertain how the introduction of ICT, as part of the DE programme, has affected academic activities (research and learning) of students.
- iii. examine the challenges faced by DE students when using the ICT facilities.

THEORETICAL FRAMEWORK

The Technology-Organization-Environment (TOE) framework is used to help analyze the adoption of ICT in DE for this study. The TOE frame-

work was developed by Tornatzky and Fleisher (1990). It describes factors that influence technology adoption; technological context, organizational context, and environmental context. TOE describes the process by which a firm (distance learning) adopts and implements technological innovations. As postulated by this theory, adopting and implementing technological innovations is influenced by technological, organizational and environmental contexts of the institution (Tornatzky and Fleisher, 1990).

The technological context includes the internal and external technologies that are relevant to the firm. Technologies may include both types of equipment as well as processes. The organizational context refers to the characteristics and resources of the firm, including the firm’s size, the degree of centralization, the degree of formalization, managerial structure, human resources, amount of slack resources, and linkages among employees. The environmental context includes the size and structure of the industry, the firm’s competitors, the macroeconomic context, and the regulatory environment (Tornatzky and Fleisher, 1990).

These three elements present both constraints and opportunities for technological innovation of users of ICT and by extension distance learners in University of Ghana, Legon. Thus, these three elements influence the way a firm or university, in this case, sees the need for and adopts new technology.

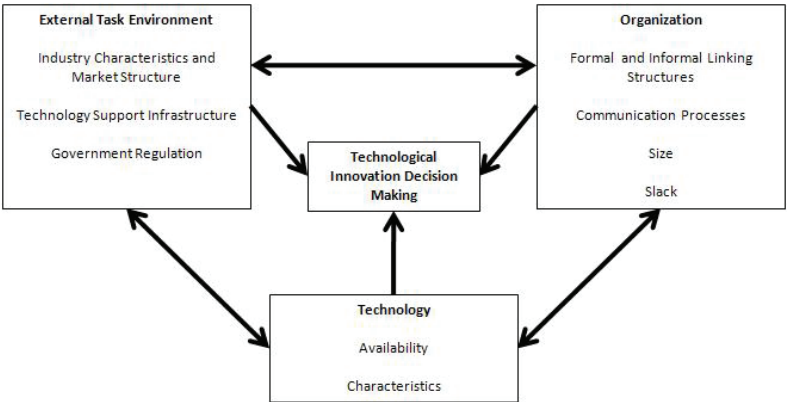


Figure 1. Technology-Organization-Environment (TOE).
Source: Tornatzky and Fleisher (1990)

REVIEW OF LITERATURE

Concept of ICT

ICT, which include radio and television as well as newer digital technologies such as computers and internet, have been touted as potentially powerful enabling tools for educational change and reform. Many scholars have defined the subject in several ways. ICT refers to all forms of technology applied to the processing, storing and transmitting information in electronic form. The physical equipment used for this purpose includes computers, communication equipment and networks, fax machines and even electronic pocket organizers (Adeya, 2002). Today, computers are used extensively for communications as well as for their traditional roles of data storage and computation.

Many computers are connected together using various kinds of communication lines to form networks. Through a network, individuals and organizations are linked together and those linkages are affecting our education today. Bartlett (2002) indicates that IT can be defined as the creation, dissemination, storage, and delivery of information and all devices that make all this possible. Without the basic functions of creation, dissemination, and storage through the use of technology, IT was not complete in itself. These technologies include computers, internet, telephony and broadcasting technologies (radio and television).

ICT creates information when data is fed into the computer. To save the data or information for a later date, it needs to be stored on devices like the hard disc, CD's, DVDs. Chisenga, (2006) noted that IT is comprised of seven building blocks. Together these building blocks are called an IT system and there is no doubt that IT systems can enhance and facilitate DE programmes. The building blocks include input and output, software, communication devices, the processing engine (CPU, memory), storage devices (discs, CD-ROM), information and people.

The Growth of Open and Distance Education

The two terms Open learning (OL) and DE are used interchangeably but they are not the same. It is imperative to clearly distinguish the terms for clarification purposes. Rumble (2009) advocated that distance learning is one means towards the end of open learning and that the individual is responsible for his own learning. Many scholars had reviewed these terms,

Kumba (2009) for instance views DE as “an educational process in which a significant proportion of teaching is conducted by someone removed in space and or time from the learner.” In conventional education, the teacher and the student are found at the same time and place when teaching and learning are ongoing. In DE, an educational institution prepares study material and uses various media (print, audio-visual, CD-ROM, computers and the Internet) for teaching, learning, and research.

Unlike DE, OL was used to qualify DE-emphasizing the “openness” of the teaching-learning process as compared to the “closeness” of learning in the traditional schools. It stressed that access to this kind of learning was easier (“open access”) and that the students were allowed to operate with a degree of autonomy and self-direction. This did not only refer to the decisions with regard to the place, time, duration and curriculum, as the students were free to select from pre-planned curricula or develop curricula of their own (Arkorful & Abaidoo, 2015). As acknowledged by Komba et al. (2006), OL is a much wider concept than DE but it is much more difficult to implement. It encompasses all forms of education and training and can take place within multiple modes. As such it can be conducted parallel to and/or integrated with formal/conventional education and training.

The use of print media was the original mode of teaching and learning, before the introduction of ICT. Not surprisingly, the dominant mode of DE delivery worldwide has traditionally not been electronically based, but rather print-based (APEC/HRD, 1994). These print materials include textbooks, study guides, course syllabi, modules and workbooks (Fung, 2005). Before the introduction of DE, most students were denied access to tertiary education because of inadequate facilities to accommodate and cater for such students. For instance, Dhaka University, Bangladesh, could only enroll 10,000 of the 80,000 applicants in 2000, while in Kenya only 9,000 out of the 40,000 students could be accommodated in the public university system (Kapur and Crowley, 2008). Thus, the majority of students who qualified for tertiary education could not have access because of the limited educational facilities. UG, Legon faces a similar problem of huge student numbers - from 5,000 to over 25,000 in less than ten years with little increase in staff (Daniel et al., 2008). This increase in numbers of students shows the level of pressure on the limited facilities with a correspondent effect on quality of teaching and learning.

Building more brick and mortar institutions to cope with such a demand is not a viable option for most countries (Daniel and Kanwar, 2009). They believe alternative approaches were needed to support formal educational system. However, higher education at a distance was not just about

open universities. In conventional educational institutions, most notably at the university level, adding DE activities to face-to-face teaching these institutions have now become 'dual-mode' institutions.

Currently, the two most prevalent forms of DE delivery in the United States are video conferencing, and more recently, web-based instruction. Zhang (1998) underscored the fact that, technology-assisted methods had become more widespread due to the expansion of DE.

Traditional technologies such as mail, telephone, and fax had evolved into audiovisual-based technology (video conferencing) and computer-based technology (Internet). Since then, the corresponding print media (correspondence study) for teaching and learning has come with some major limitations. These include:

- i. Limited reality: Print had its own view of reality. It could not show motions as illustrations or photos did.
- ii. Passiveness and self-direction: Print was applied mostly for passive learners.
- iii. It was costly: Print materials had a higher cost compared with other instructional resources.
- iv. It could not be easily edited and revised. It was quite difficult and expensive to edit and revise print materials: The same actions for technically sophisticated electronic software would cost less.
- v. Although the capacity for limited two-way communication existed in correspondence study, it was very difficult to achieve because of the slowness of the postal process. Correspondence study is, ultimately, a very individualized mode of learning that tends to isolate and insulate students from group learning processes (Grace, 1994).

ICT has emerged as a new technology to overcome most of the limitations mentioned above. It is, however, important to state that ICT could never entirely overcome all the challenges in the print media, as a model for teaching and learning. This is because ICT itself has its own limitations. Moreover, the growth of ICT facilities (new technologies) integrated with the use of print, provided opportunities for communicative action via two-way communication (Anderson & Dron, 2011). Typically, video conferencing was two-way video, audio, and sometimes data communication, across long distances. It allowed two or more people at different locations to see and hear one another at the same time.

Educators are using technology to increase the distant learner's access to the local classroom, to improve accessibility to make the experience of the remote student comparable to that of the local learner. DE no longer relies as heavily as it used to, on the delivery of print and broadcast media technologies. Recent innovations in hardware, software, and Internet technologies have made telecommunications-based DE systems more available, easier to use, and less costly.

Improving quality of learning through ICT

ICT enhances the quality of DE in several ways: by increasing learner motivation and engagement, by facilitating the acquisition of basic skills and by enhancing teacher training. ICT is a transformational tool which, when used appropriately, promotes the shift to a learner-centered environment.

Hence, Shelly et al. (2006) argued that faculty must carefully plan for the integration of ICT in classrooms to improve the quality of teaching, learning, and research. Just as planning is essential to effective instruction, it is required for effective use and integration of technology in the classroom. Technology integration is using technology to help meet the curriculum standards and learner outcomes of each lesson, unit or activity. One important consideration is deciding on the appropriate technology to achieve the desired learner outcomes. Teachers, instructors, and educationalists must plan how they will teach the curriculum, what areas they needed to cover for content and where they could use technology to meet curriculum standards that were related learning.

Furthermore, distance students must be motivated by authentic learning experience (ALE). Shelly et al. (2006) indicated that ALE is an instructional activity that demonstrates real-life connections by associating the concepts being taught with real-life events. Teachers must engage students in the process of gathering, analyzing and using the information to make informed decisions that relate to real life. Teachers should promote active learning which is a type of learning that occurs when students became engaged in acquiring, investigating, solving problems and formulating and answering their own question (Ospina & Heeks, 2010). Finally, telecommunication-based DE approaches extended beyond the limits of correspondence study. The teaching and learning experience for both instructor and student occur simultaneously. When ICT is employed and improved, the opportunity for live teacher-student exchanges in real time is possible, thereby permitting

immediate response to students' inquiries and comments. Much like conventional education, students can seek on-the-spot clarification. This promotes greater spontaneity for all parties in the teaching-learning process (Paulson, 1987). Thus, the study hypotheses are that:

H_0 : *There is no significant relationship between adequacy of ICT facilities and academic performance.*

Alternatively:

H_1 : *There is a significant relationship between adequacy of ICT facilities and academic performance.*

ICT use in DE

"Change is good for us...but there is a tremendous amount of energy; physical, mental and emotional, that goes on when we adapt" (Keegan, 1991). With the increased adoption of educational technology intended to support teaching, learning, and research in higher educational institutions, there is an increasing demand on academic users to quickly learn and make effective use of technology at their disposal. To instill the readiness to be on a higher level of using technology as a workforce has become a responsibility and one of the functions of education. This has driven educational institutions to adopt many forms of educational technology. Teaching and learning ought to adapt to traditional teacher-centered style, armed with continuous improved educational technology, lecture-based instruction to student-centered, computer-based instruction.

ICT does not only benefit facilitators but most importantly the distance learner enjoys the direct benefits of his learning process. Evans et al. (2009) argue that the use of ICT (Internet) has obvious advantages in the lecture hall and classroom. It serves as a research tool for students and effective use of the Internet allows teachers to expose students to places otherwise inaccessible physically. There are simulations and instructional software on the web that are incredible learning tools. Teachers could employ these to give students a taste of running a global business or provide the experience of dissection of a human cadaver (Omotosho, Lateef, Amusa, Oyintola, & Bello, 2015).

Furthermore, the use of ICT results in brain drain is minimized. If a nation had ten or fifteen universities then there were ten or fifteen sets of

buildings that had to be maintained. Those wanting the learning processes that were housed in the buildings had to leave their communities and emigrate to these institutions. Here the universities then become a kind of internal brain drain. In an article by Dankwa (2009), Yochai Benkler (Harvard scholar) demonstrated that a networked university allowed faculty and students across Ghana to access teaching, learning and research found only at one university.

The introduction of ICT in education has led to a reduction in the levels of brain drain in the country. Many students now stay in their various communities or regions and yet access education through ICT. Hutchinson and Sawyer (1998) mention that the education and training industry is by far the most active area in multimedia. The benefits of multimedia technology in providing flexibility for students and enhancing learning are well documented. Most people agree that “learners retain about 20% of what they hear; 40% of what they see and hear and 75% of what they see, hear and do”. The interactive nature of multimedia promotes active participation and affords user control over the pace and flow of delivery (Ospina & Heeks, 2010). Multimedia resources related to education include multimedia reference material, electronic textbooks and course supplements, online lecture notes, interactive testing and virtual stimulations.

Motivating students to learn is one area educators are trying to improve on and achieve. ICT has the potential of increasing student motivation and class attendance. Using ICT tools, students with varying abilities are assisted to adapt to different learning styles and this reaches diverse learners. With the right approach, educators could integrate technology such as computers, CD's, DVDs, e-books, the World Wide Web (www), electronic references and digital media applications into almost any classroom situation. Although this process sounds simple, complete integration of ICT in all subject areas is complex and takes a great deal of planning. You then begin to develop innovative ways to teach a diverse population of learners with drift learning styles. By engaging students in different ways, technology encourages them to be more active in the learning process (Shelly et al., 2006).

Shelly et al. (2006) have advocated for the integration of technology in the learning process. Technology motivates distance students and encourages them to become problem solvers or orients new avenues to explore information. Teachers also found that using computer/ ICT could capture and hold students' attention (Ospina & Heeks, 2010). Interactive technology such as software applications, digital media, reference guides, tutorials, animations, simulations and the web are especially engaging as they allow students to determine the flow of information, review concepts, practice skills,

do in-depth research and much more. When these tools are used properly, technology is extremely beneficial to the learning process.

Another benefit of ICT is the adequate preparation of students for life and work today. Dankwa (2009) postulated that ICT could keep potential workers continuously aware of the newest technology in their own field. To train competent and large numbers of scientists, entrepreneurs, engineers, to mention a few, there was the need to support the new global businesses and industries. Africa would have to move in the direction of networked ICT. Lemke further indicates that this will have a drastic effect on their preparedness towards the job market (Lemke, 2002).

Challenges of integrating ICT in DL

With ICT, perceived as a strong facilitator in achieving the goal of building a knowledge-based economy, the drive towards this end has brought with it several challenges. One of the many challenges faced by developing countries like Ghana today is an inadequate preparation for globalization and the information and communication revolution (Bates and Kern, 2007). Policy makers, business executives, academic institutions, and ordinary citizens are now increasingly concerned with the need to make this society competitive in the emergent information economy. Authorities must remember that technology is only a tool to enhance or support instructional strategies. Educators have taken steps to integrate technology throughout classroom experiences and found ways to use technology to teach curriculum-specific content (Shelly et al., 2006).

Evans et al. (2009), indicates that teachers in this modern era have the responsibility or need to be at least as computer savvy as their students. ICT has been integrated into the curricula of schools, colleges, and higher educational institutions. The distance learner cannot communicate outside the class, take quizzes online and find class materials easily without the requisite knowledge. Moreover, the teacher cannot effectively integrate computer technology without a working knowledge of information technology. Both the teacher and student lack adequate training.

The biggest challenge faced by DE is the inaccessibility of ICT. All forms of learning bump up against this major obstacle: the digital divide. The digital divide is defined as the lack of access to ICTs by segments of the population. Even if the electronic equipment (a CD-ROM or DVD) is only a small part of the course, the student who cannot access appropriate equipment is disadvantaged in many ways. This is the fundamental challenge for

the introduction of electronic media into distance education, especially in developing countries (Daniel, 2009).

Buttressing the above challenges was the cost of acquiring, installing, operating, maintaining and replacing ICTs. Omotosho, et al. (2015) mentioned that the cost of establishing and maintaining interactive ICT tools for instructional purposes is very high and varies significantly between the types of technology used and the size of the network desired. Microcomputers are among the less expensive systems while interactive satellite and two-way interactive TV are much more costly. As with the entire ICT industry, costs have been and are continuing to drop. As individual networks grow, costs will continue to decrease as expenses are distributed among several users (Bates and Kern, 2007).

Potentially of great importance, the integration of ICT into teaching in Africa, specifically Ghana, is still in its infancy. Introducing ICT systems for teaching in developing countries like Ghana has a particularly high opportunity cost because installing them is usually more expensive in absolute terms than in industrialized countries whereas, in contrast, alternative investments in, for example, buildings are relatively less costly.

RESEARCH METHODOLOGY

The study adopted survey research design, so as to have a larger population sample and thus, obtain findings which are representative of the larger population, where the self-administered questionnaire was used to collect data. The target population was the Level 400 distance learners (since final year students would have a better understanding of ICT-related issues) at UG, Legon. In the UG Annual report (2013), the population size for the Level 400 DE students was One thousand one hundred and twenty-eight (1,128) and the population of the management staff for the CCDL was eighteen (18). Since the study adopted quantitative analysis, it selected 95 students as respondents.

The probability sampling method called “simple random sampling” was used to select the sample size of ninety-five (95) students. Therefore, each student had the same chance as any other student selected. However, the non-probability sampling method was used to sample two management staff at the CCDL. The Reliability test was conducted on the dependent and independent variables. The instrument used in this study had a total of 30 items. The alpha value of the reliability of the instrument is 0.85 which is satisfactory and statistically acceptable for data collection by virtue of the

Cronbach Alpha. Using the Epi-Data and Statistical Package for Social Science (SPSS), descriptive (frequency count, percentage, mean and standard deviation) and inferential statistics (Regression model) was used to analyze the results. The data collected from the questionnaire was analyzed using SPSS.

DATA ANALYSIS

The section reports data gathered from the questionnaire and interview from distance students and the management of DE.

Background of the respondents

From the findings, 94 students (98.9%) offered B.A as a programme whilst 1 (1.1%) offered BSc. The majority of students (98.9%) offered B.A because from the introduction of the DE programme in 2007/08, only Arts courses were introduced whilst the BSc was introduced later on. Data from the study showed that 58 respondents (representing 61.1%) were in the Social Studies faculty whilst 37(representing 38.9%) were in the Arts faculty.

Statistics on gender showed that 63 respondents (66.3%) were males whilst 32(33.7%) were females. The study revealed differences in gender distribution. There were more males than females on the DE programme. This may be as a result of the reflection of the students admitted to the DE programme. The research findings of Mensah (2003) confirmed that the number of males was found to be more than the females among the undergraduate level of the UG, Legon. This data was a reflection of the fact that more males apply to institutions of higher learning.

Awareness and access to ICT facilities

The students responded to the questions about the awareness of the ICT facilities on the DE programme.

Table 1
Awareness of ICT facilities in DE programme

Awareness of the ICT facilities	Frequency	Percent
Aware	90	94.7
Do not know	5	5.3
Total	95	100.0

As seen in Table 1, 94.7% of the respondents stated their awareness of the existence of ICT facilities in education. In extending DE to developing countries like Ghana, the provision of accessible ICT (Internet connectivity) to distance learners and ICT laboratories at various learning centers should be prioritized, in order to help students acquire skills for academic work. Hillman et al. (1994) corroborate the earlier findings stating that users understanding and use of technology is important for effective interaction.

Distance learners’ examined the accessibility of facilities/resources for students’ academic work. The results are captured in Table 2.

Table 2
Availability of facilities/resources

Adequacy of the facilities	St. Deviation	Mean	Rank
eBooks/ Journals	0.23	3.69	2
User education	0.36	2.04	6
Tutorials	0.11	4.35	1
Emails	2.67	3.46	5
Library facilities	0.78	3.70	3
Internet access	0.45	3.58	4
Video Conference	0.20	1.34	7

It can be concluded from the value of means generated that, ‘Tutorials’ scored the highest mean of (4.35) per students among other facilities or resources available to distance learners. However, the statement ‘Video Conference’ was rated the lowest with a mean score of 1.34. Thus, the distance students were in disagreement that video conference was available for enhancing the DE programme.

Table 3
Access to ICT facilities in DE programme

Access to the ICT facilities	Frequency	Percent
No	5	5.3
Yes	84	88.4
Do not know	6	6.3
Total	95	100

In Table 2, the majority (88.4%) indicated that ICT facilities of the DE institution were accessible. On the other hand, 5.3% of the distance students stated that ICT facilities of the institute were not accessible to them.

Respondents were asked to state where the ICT facility is usually accessed.

Table 4
Accessibility of the ICT facilities

Place of Accessibility	Frequency	Percent
Institution/Learning centre	53	57.6
Library	29	31.5
Workplace	10	10.9
Total	92	100

Most students, 57.6% to be exact, specified that the ICT resources of the institute were accessible at Institution/Learning center. About (31.5%) of distance students indicated the Library as a place of accessing the ICT resources for academic work.

As an objective of the research, subjects were again asked to state ICT facilities normally used by the institution for teaching and learning.

Table 5
ICT usage for teaching and learning

ICT usage for teaching and learning	Mean	Rank
Learning Management Software (SAKAI)	3.78	3
Internet	3.95	2
Video conferencing	2.05	6
Power presentation	4.05	1
Emails	2.01	7
Text message (SMS)	2.23	4
Telephone	2.06	5
Total	94	100

The descriptive analysis showed that most respondents viewed Microsoft Powerpoint presentations as an ICT support tool in the institute frequently used. This was followed by the Internet and ‘SAKAI’; the ICT support facility used for teaching and learning. It can be inferred that video conference, text message, telephone, and emails were not often used for teaching and learning.

Respondents specified the frequency of using the ICT facilities.

Table 6
Frequency of ICT facilities usage

Frequency of ICT facilities usage	Frequency	Percent
Daily	40	42.1
Weekly	9	9.5
Monthly	16	16.8
Residential stay	30	31.6
Total	95	100

The majority (42.1%) indicated “Daily” as the period for using ICT facilities. Again, distance learners observed that ICT facilities were used during their residential stay (time for meeting Lecturers on campus).

Reliability of ICT facilities

Responses by the DE students revealed the following illustrated in Table 7 below.

Table 7
Reliability of ICT facilities

Reliability of ICT facilities	Frequency	Percent
Reliable	7	7.4
Very reliable	1	1.1
Fairly reliable	19	20.0
Not reliable at all	67	70.5
None	1	1.1
Total	95	100

The majority (70.5%) of students indicated that ICT facilities of the institute were not reliable at all. On the other hand, 20% of the responses indicated that ICT facilities of the institute were fairly reliable and few (7.4%) stated that ICT facilities were reliable.

As of part of the objectives of the paper, the researchers wanted to ascertain which ICT facilities were normally used by students

Table 8
ICT facility normally used

ICT facility normally used	Frequency	Percent
Emails	16	16.8
Internet	53	55.8
Video conferencing	1	1.1
Telephone contacts	25	26.3
Total	95	100

Table 8 indicates that most students 53(55.8%) used the internet as an ICT facility normally used while 25 (26.3%) indicated that telephone contacts were normally used. Moreover, 16 (16.8%) stated the use of emails normally for daily activities. These responses suggest that the use of video conferencing amongst the students was very limited while the internet was used mostly.

The relationship between adequacy of the facilities/resources and its resultant impact on students’ academic performance is found by using the simple regression test.

Table 9
Regression test

Adequacy of the facilities/resources	R	R ²	Beta	F	P-Value
	0.024	0.791	0.814	0.663	0.000

Table 9 shows that R (co-relation coefficient) has a value of 0.024 while the regression coefficient R² is 0.791 which mean that 79.1% variation in the DV is due to IV and the rest of the variation in academic performance can be attributed to other factors. Beta is 0. 814 or 81.4% which means that if there is one unit increase in Independent Variable then the Dependent Variable will increase by 0.814 units and vice-versa. The results indicate that there is a highly significant relationship ($r = 0.814, p < 0.01$) between adequacy of the facilities/resources and academic performance and consequently the alternative hypothesis is supported. This proves that the more the distance learners are exposed to ICT facilities/resources, the more the usage of ICT resources for learning and research and the better the performance of DE students

ICT affecting academic work

Table 10
Effect of ICT on academic work

Effect of ICT	Frequency	Percent
Teaching	7	7.4
Learning	35	36.8
Research	41	43.2
Group discussion	12	12.6
Total	95	100

In Table 10 the greater proportion of respondents 41(43.2%) indicated that research was the aspect of academic work that ICT influenced most. The result suggests that instructors and authorities appeared to do less in the area of teaching using ICT as a tool.

West (2008), makes mention of the impact of ICT on academic work of higher education. He indicates that application of ICTs is particularly powerful and uncontroversial in higher education as a research function. The application of ICTs in academic research has grown steadily in the past 10 to 15 years in both developing and developed countries. In his work, he indicates that the combination of communication and digital libraries is equalizing access to academic resources and greatly enriching research possibilities.

ICT skill/ knowledge

The respondents gave their view on their knowledge of ICT. The majority 76 (80%) indicated that they were knowledgeable on the use of computers but 19 (20%) indicated that they had no knowledge whatsoever on use of a computer as an ICT facility.

The researcher wanted to identify how students acquired IT skills or training.

Table 11
Acquiring computer training/literacy

Acquiring computer training	Frequency	Percent
University's effort	10	10.5
Personal effort	62	65.3
Outside the university (workplace)	23	24.2
Total	95	100

It can be observed that 62 (65.3%) of the students specified personal effort as the means of acquiring training/literacy. A smaller percentage of respondents, numbering 21 (22.1%), pointed out that training/literacy was acquired outside the University.

Ljubljana (2007)) and Darkwa (2002) assert that computer literacy is a compendium of knowledge and skills which ordinary educated people need to have about computers in order to function effectively at work and in their private lives. This is especially important in learning where having access to electronic resources is important but where training on these resources are crucial. Daniel (2009) indicates in his research that no combination of connectivity, equipment, and software will achieve anything if people are not trained to use it. While training is often built into ICTs, it is still helpful to supplement that process with some formal training.

Students stated challenges such as limited access and unreliability of ICT facility, inadequate IT facilities and insufficient knowledge in ICT, the high cost of access to the internet, poor user training by the institute and unavailability of ICT facilities. Some of the subjects further indicated that DE authorities struggled to raise funds adequately to provide needed ICT facilities. Students mentioned repeatedly that management policy direction was not ICT friendly or focused as authorities claimed DE was still in the budding stage.

The study revealed that all respondents - 95(100%), were not satisfied with the current usage of ICT facilities within the DE. It was their view that the University acquires more ICT facilities for students' use; place the modules on the internet as eBooks or journals and that ICT fully be implemented in the institute. They further felt that the university must implement an introduction of video conferencing facilities as well as the practical teaching of ICT in a computer laboratory.

Responses from Interview with DE management

The study's first objective was to examine the adequacy of ICT facilities in DE programs. In response to the question on what presently were the ICT facilities used for, the interviewees indicated that the *ICT facilities were used for the following: processing of the modules of students, printing out of the modules, uploading modules unto the SAKAI, assignments on the SAKAI, administrative duties, registration processes, word processing and disseminating relevant information to students through emails.*

Some barriers faced by the DE institution in introducing ICT into teaching and learning included the lack of capital to purchase the required ICT facilities and inadequate or limited space at the institute. The interviewees confirmed sponsorship packages were being embarked on by the authorities. Finally, the interviewees strongly agreed to the fact the ICT was a need now for the institute and would surely facilitate important academic work through research. The world is presently in its digital age and ICT facilities readily available will speed up communication and ensure that the DE institution is less reliant on the manual system.

RECOMMENDATIONS

ICT as an emerging technology offers many advantages to education which include anywhere, anytime learning and faster communication.

Learners can pursue their studies at their convenience and are not limited by geography or time constraints.

Distance learners had access to tutorials with tutors or lecturers but no video conference facility existed. Microsoft Powerpoint presentations, Internet and 'SAKAI' were frequently used by the institute. These are the ICT resources often used for teaching and learning. The personal effort was the means of acquiring training/literacy among the distance learners. It was established that adequacy of the facilities/resources positively affected academic performance. The study also confirmed that most of the distance learners who used the available ICT facilities observed that the facilities were not reliable at all.

The policy of introducing different ICT resources into the classroom and other educational settings suggest that the full realization of the potential educational benefits of ICTs are vast but do not just automatically happen. There is the need for effective integration of ICTs into DE, however, observation reveals that given enough capital, getting the right technology, institutional readiness, teacher competency, and long-term financing, among others, are vital for success in academic work. From our analyses, the relevance and benefits of ICT cannot become a reality unless the appropriate authorities, policymakers, and decision-makers are ready to embrace ICT as a change agent. Training is an essential element in the success of the implementation of ICT and it is recommended that distance students and faculty (tutors) be allowed to undergo ICT training. In Ghana, this will be under the auspices of the ICT Directorate.

IMPLICATIONS OF THE STUDY

DE has become an important alternative to the traditional method of education. In recent times the number of people enrolling in distance programmes keeps increasing. There is the need to ensure that the learning experience for distance learners is similar to that of the traditional method (even if not the same). TOE specifies that the more equivalent the technological and learning experiences of distance students to normal students, the more equivalent the educational outcomes (research and learning) for all students. This implies that ICT resources and services available to regular students should equally be available and accessible to distance students.

CONCLUSION

The conclusion reached from this study is that there is a need for the University of Ghana, Legon to make sure that ICT resources which include video conference, internet accessibility, emails, learning management software, are readily available, adequate and accessible to the distance students who are initially trained in their use.

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