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APPLICATION OF INFORMATION AND COMMUNICATION TECHNOLOGY (ICT): A COMPARATIVE ANALYSIS OF MALE AND FEMALE ACADEMICS IN AFRICA

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A research article

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Abstract:
This study aims to investigate or verify whether gender affects the use of Information and Communication Technology (ICT) facilities among academics. The study used a survey approach that involved questionnaires to solicit data from 154 academics. For the past few years, an assortment of ICT facilities such as computers, laptops, projectors, printers and many others have been available to academics for accessibility and use in collaboration, teacher-student communication, online assignment, research, teaching and learning.

Using the t-test analysis, access rates and use of ICT among male and female academics was observed to be insignificant. Again, the findings revealed a significant difference between male and female academics on 'ICT increasing collaboration with other tertiary faculty members', 'performing information/data management activities' and 'accomplishing tasks more quickly'. Strategies have been suggested to utilize ICT in educational institutions include improving on ICT infrastructure, provision of a policy environment, increasing Internet bandwidth, providing alternative power supply, improving on ICT infrastructure, enhancing ICT training programs, recruiting more ICT personnel and collaboration between academics and industry.

Keywords: Academics; gender; Gender; Information and Communication Technology; ICT Policy; Africa, University of Ghana, Legon.

BACKGROUND TO THE STUDY

Knowledge is power and education is fundamental to the development of a dynamic labour force capable of accessing and integrating knowledge into social and economic activities and participating in today's global economy. With the evolution of Information Communication Technology (ICT), the delivery of education and training is changing rapidly. ICT is affecting university education and how research is conducted. It is currently being used effectively in higher education for information access and delivery in libraries, for research, development, for communication, teaching and learning (Jacobsen, 1998).

In the last few years, the extent of ICT usage in the world at large has increased dramatically. For instance, the web is used for various purposes; from surfing for pleasure to finding information. The availability of ICT, its ease of use and the numerous immediate needs it can meet, have turned it into a key player culturally and socially in the 21st Century (Beno, 2009).

ICT is seen as a diverse set of technological tools and resources used to communicate, create, disseminate, store and manage information (Tinio, 2003), which include radio, television, video, digital versatile device (DVD), telephone, radio, satellite systems, management information systems, computer and network, hardware and software, as well as the services associated with them, such as videoconferencing and electronic mail.

Mbakwem (2008) observed that ICT is all about the technologies that aid in the communication process of passing messages from the sender to the receiver. Also, Okenwa (2008) concurs that technologies have advanced the development of communication and multimedia equipment that are capable of accepting data, processing data into information and storing both the data and

information for future use and reference purposes. He noted that computer-based technologies include: teleconferencing machines, computers, electronic books (e-books), computer graphics technology, instructional satellite, video conferencing and web television. Nevertheless, innovation in teaching and learning, especially in view of the changing context of higher education, is inevitable (Clarke, 2003). In this research, ICT means availability, accessibility and use of ICT facilities like computers, information systems, computer networks (Internet), by academic staff in University of Ghana (UG), Legon.

The twenty-third (23^{rd}) special session of the United Nations (UN) General Assembly held in June 2000 to review progress made in the implementation of the Platform for Action recognized the increased opportunities created by ICT for Academics to contribute to knowledge sharing, networking and electronic commerce activities. It also noted that poverty, lack of opportunities, illiteracy, including computer illiteracy and language barriers prevented some women from using ICT, including the internet. Steps were proposed to ensure that Academics benefited fully from ICT, including equal access to ICT-related education and training.

Academic staffs are a core user group who play a vital role in the successful implementation of ICT projects and initiatives in universities. While considering the use of ICT by Academics, a lot of studies (La Valle and Blake, 2001; Selwyn, 2003; Sorenson and Stewart, 2004; Gombachika and Kanjo, 2008) have noted that there is a disparity between science, engineering and humanities Academics in the use of ICT.

With the exponential growth in e-learning (distance learning) practices in higher education, of which UG, Legon is no exception, it is suggested that engagement in innovative educational practices has tended to render faculty members undoubtedly very significant benefits. More

importantly, in the event of unavailability, inaccessibility and less usage of ICT, the potential of hindering Academics from the pursuit of teaching, research and other academic-related activities (Bower, 2001). According to McKenzie *et al*. (2000), many of the reasons for this vulnerability include the concerns about poor access to the network, faculty members' dispositions to change, innovation adoption and general unwillingness to move out of their comfort zones and develop new skills and competencies in order to be able to cope with new phenomena.

Problem Statement

In the era of ICT, it is expected of every academic staff in universities to be computer literate and to use ICT to facilitate teaching, learning and other academic activities. In Europe and America, a vast majority of academics now use ICT in universities. Biggs (2008) observes that access to ICT facilities have increased rapidly during the last decade. Virtually, all academics in the universities in Europe and America access and use ICT facilities, however there is a perception or belief that women are lag behind men when it comes to the use of ICT.

Considering the use of ICT by academics in universities, studies including La Valle and Blake (2001); Selwyn (2003), Sorenson and Stewart (2004) and Olatokun (2007) have noted that there is a disparity in the use of ICT between males and females academics. An empirical evidence by Hafkin and Taggart (2001) have noted that factors which affect the use or non-use of ICTs by men may actually be different from those that affect women and that it is important to study gender differentials in ICT adoption. Thus, this study aims to investigate or verify whether the ICT availability, accessibility and use is moderated by gender status in academic institutions?

Literature about the problem

There are countless publications on the use of ICT. The literature that addresses this issue between the years 2000 – 2010 mainly focuses on ICT have been integrated in education. From 2010-2013, the literature on using ICT mainly focused on usage patterns, gender characteristics, ease of use of ICT, perception and intention of ICT usage and usage difficulties of ICT tools or facilities. In Ghana, there is a noticeable gap in the literature on gender variable. The variable of gender of users influencing use of ICT has generally not been covered adequately by the current body of the literature. Therefore, this paper is aiming at bridging this gap in the Ghanaian scene whereas on the global scene, it is replicating the literature.

Hypothesis

Ho: There is no significant difference between gender and use of ICT by academics in Africa

H1: There is a significant difference between gender and use of ICT by academics in Africa

REVIEW OF LITERATURE

Concept and Evolution of ICT

Abdulsalam *et al*. (2008) postulate that information can be defined as knowledge communicated by others or obtained from investigation of study or instruction. It could be the process by which the form of an object of knowledge is impressed upon by the apprehending mind so as to bring about a state of knowing. Technology, on the other hand, is the science of application of knowledge to practical purposes. Technology determines the quality of life of a people and the

overall status of their nation (Momah, 1999). Information has been the driving force of so many human activities in search of developing one's self, which has created a basis for the need to know.

ICT stands for Information and Communication Technology and is defined as a "diverse set of technological tools and resources used to communicate, and to create, disseminate, store, and manage information." The term ICT refers to forms of technologies that are used to create, store, share or transmit, and exchange information. This broad definition of ICT includes such technologies as radio, television, video, DVD, telephone (both fixed line and mobile phones), satellite systems, computer and network hardware and software; as well as the equipment and services associated with these technologies, such as videoconferencing and electronic mail (UNESCO, 2002).

ICT has been defined by different commentators; many of such definitions focusing particularly on the 'newer' computer-assisted, digital or electronic technologies, such as the internet of mobile telephony. Some, however, do include 'older' technologies, such as radio or television. Others even do include the whole range of technologies that can be used for communication, including print, theatre, folk media and dialogue processes. Some focus only on the idea of information handling or transmission of data. Others encompass the broader concept of tools to enhance communication processes and the exchange of knowledge (Greenberg, 2005; Weigel and Waldburger, 2004).

Academics and students who use ICT gain deeper understanding of complex topics and concepts and are more likely to recall information and use it to solve problems outside the classroom

(Apple Computer, 2002). In addition, through ICT, Academics and students extend and deepen their knowledge, investigation, and inquiry according to their needs and interest when access to information is available on multiple levels (CEO Forum on Education and Technology, 2001).

Babalobi (2010) acknowledges that ICT is the processing and maintenance of information, and the use of all forms of computer, communication, network and mobile technologies to mediate information. Communication technologies include all media employed in transmitting audio, video, data or multimedia such as cable, satellite, fibre optics, wireless (radio, infra-red, bluetooth, and Wifi). Network technologies include personal area networks (PAN), campus area network (CAN), intranets, extranets, local area networks (LANs), wide area networks (WANs), metropolitan area network (MANs) and the internet. Computer technologies include all removable media such as optical discs, disks, flash memories, video books, multimedia projectors, interactive electronic boards, and continuously emerging state-of-the-art PCs. According to him, mobile technologies comprise mobile phones, personal digital assistants (PDAs), palmtops, etc. These technologies have information as their material object. Information is not reserved for use in isolation, but, rather communicated among users.

ICT consists of hardware, software, networks, and media for collection, storage, processing, transmission and presentation of information (voice, data, text, images), as well as their related services. It can be divided into two components; Information and Communication Infrastructure (ICI) which refers to physical telecommunications systems and networks (cellular, broadcast, cable, satellite, postal) and the services that utilize information (internet, voice, mail, radio, and television). In the words of Amenyo (2003), the characterisation of ICT is robust. He purported

that it encompasses automation of the information and meta-information aspects and representations of people, items, goods, systems, tools, equipment, instrument and machinery. It necessarily embraces data capture (gathering, collection, entry, acquisition and measurement), data storage (recording, archiving and logging), data retrieval, data processing (manipulation, calculation, computation, analysis, modelling, representation, presentation and simulation) and data communication (transfer, flow, interchange and exchange).

Categories of ICT facilities

Asiamah (2011) divides ICT into the following groups:

Capturing technologies with input devices that collect and convert information into digital form. Such devices include keyboards, mice, trackballs, touch screens, voice recognition systems, bar code readers, image scanners and palm-size camcorders.

Storage technologies which produce a variety of devices to store and retrieve information in digital form. Among these are magnetic tapes, floppy disks, hard disks, RAM disks, optical disks (such as CD-ROMs), erasable disks and smart cards (credit-card sized cards with memory and processing capacity for financial transactions or medical data). Also, the processing technologies create the systems and applications software that are required for the performance of digital ICT.

Communications technologies which produce the devices, methods and networks to transmit information in digital form. They include digital broadcasting, integrated services digital networks, digital cellular networks, LANs, WANs, such as the Internet, electronic bulletin boards, modems, transmission media such as fibre optics, cellular phones and fax machines, and

digital transmission technologies for mobile space communications (the new Low Earth Orbit satellite voice and data services).

Display technologies which create a variety of output devices for the display of digitized information. Such devices include display screens for computers, digital television sets with automatic picture adjustment, set-top boxes for video-on-demand, printers, digital video discs (which might replace CD-ROM drives and audio CD players), voice synthesizers and virtual reality helmets.

ICT has been applied to several facets of our world. These include education (schools), health (hospital), business (trade) and many others. Therefore, it is the purpose of this review to discuss the accessibility, availability and use of ICT by academics in higher education. This enables policy makers, school administrators, and academics to pay the required attention to integrate this technology into the educational system. In so doing, it highlights the levels of accessibility, availability and use of ICT in education, existing promises, the limitations and challenges of ICT integration into the educational system.

ICT accessibility, availability and use by academics

Educational systems around the world are under increasing pressure to use the 'new' ICT (UNESCO, 2002 as cited by Yuen, Lee, Law and Chan, (2008) based on the premise that it is important for bringing changes to classroom teaching and learning. These skills include the ability to become lifelong learners within a context of collaborative inquiry and the ability to work and learn from experts and peers in a connected global community (Law *et al*., 2008).

The information society demands a workforce that can use technology as a tool to increase productivity and creativity. This involves identifying reliable sources of information, effectively

accessing these sources of information, synthesizing and communicating that information to colleagues and associates (Alibi, 2004). Hence, Hawkins (1998) affirmed that information is a key resource for undergraduate teaching, learning, research and publishing. This brings the need for effective methods of information processing and transmission.

Laurillard (2002) highlighted that instructional technology and research initiatives surrounding educational innovation have evolved very quickly over the past hundred years, beginning with the development of the phonograph, radio, film and television and their implementation as teaching and learning tools in tertiary schools. As computer-based innovations were developed, they also became tools in the classroom in many forms (e.g., drill and practice software, simulations, educational games, tutorials, video disks, internet access, email, digital media, personal computers, laptops, etc). Therefore, Lucus and Murray (2002) concurred that the educational system is being challenged to change as innovative technology changes the interaction with information and knowledge and as new generations of students pass through with new expectations and new needs.

According to Debra (1999), today's education world is information and communication intensive, and IT professionals and the entire faculty in the context of this study need to be empowered with the knowledge, skills and abilities that technology offers. Even with the enormous potential and academic advantages that innovation and improvement of communications afford, without the direct participation and support of an institution's leadership, this power cannot be pushed to its full potential. Leadership in IT requires many of the characteristics common to all leaders, but also requires special abilities and insights into technology's impact. Jesse Jackson said "*You can't teach what you don't know, and you can't*

lead where you won't go". This means that the Academics of higher education cannot impact ICT driven education without them acquiring the knowledge.

With the evolution of ICT, the delivery of education and training by faculties/Academics is changing. Rapidly, ICT is affecting the way university education, research are conducted respectively, is delivered. They are currently being used effectively in higher education for information access and delivery in libraries, for research and development, for communication and for teaching and learning (Jacobsen, 1998). The drive for engendering the ICT environment dates back to the Beijing Declaration and Platform for Action (PfA), adopted by the Fourth World Conference on Women in 1995 (UNGASS, 2000).

Much literature described faculties in higher education as comfortable using technologies such as word processing, email, and web searching (Vannatta, 2000), but not comfortable integrating technology into their classroom practices for meaningful learning (Glaser and Hardin, 1999; Ropp and Brown, 2000). The issues of best practices in the innovative use of technology and integration among higher education faculty are not clearly focused and results of research in this area vary widely indicating the need for additional research (Kozma, 2003).

As technological innovation continues in universities, levels of ICT availability, accessibility and use for faculty, schools, students and educational technologists become increasingly important; it is clear that "different technologies are deployed at different rates in different ways at different settings" (Molenda and Sullivan, 2002). Some major questions asked include the elements that would constitute effective professional development programs for faculties. Researchers need to investigate effective ways to help each population successfully work with new instructional technologies.

Thus, effective professional development may require an understanding of the kinds of motivations and psychological resistances that determine how faculties will decide to use new technologies. To what degree, for example, is the adoption of instructional technology related to a faculty's disciplinary affiliation or commitment to high quality instruction? As information technologies become increasingly woven into social expectations, Molenda and Sullivan (2002) opine that the pressure to adopt them in education can only increase. Informing educational leaders and decision makers on the full range of issues concerning development and deployment of technology and innovation is increasingly a critical priority.

The demands on higher education faculties no longer focus solely on content expertise but also on creating active learning environments that integrate technology within content. Faculties can adapt to this role by reflecting, analyzing, observing, implementing, and evaluating successful examples of best practices in technology integration (Ertmer, 1999). Use of an Innovation Component Configuration Map (ICCM) which measures technology integration practices, would also help faculties reflect on their pedagogical practices related to technology integration within their curriculum and allow them to document contemporary exemplary practices in technology integration.

Ertmer (1999) elaborates further between external (first order) and internal (second order) barriers. First order barriers would include lack of access to ICT facilities, support, time constraints, and tenure and promotion guidelines which do not promote innovation. Second order barriers would include beliefs about instructional technology, teaching methodologies, and attitudinal change. Similarly Rockwell, Schauer, Fritz and Marx (1999) reveal specific factors such as time requirements, cost, instructional design, instructor-student relationships, reward structure, degree programs, policy and training. In addition, their study (a survey of 207 faculty

and 30 administrators) revealed faculties do indeed have pedagogical concerns, such as "providing innovative instruction and applying new teaching techniques". However, a scrutiny of their work falls short on how to address these intrinsic concerns of Academics motives regarding availability, accessibility and use of ICT.

Taking a cue from the above, the unavailability and inaccessibility of ICT facilities affects the use of ICT by the academics of higher education. This means that Academics inability to access internet, computers, scanners, video conferencing, emails among others in higher educational institutions, consequently translates to Academics not using these facilities for collaboration, research, teaching, learning, distance learning and improved student-faculty relationship as purported in the objectives of the study. With exponential growth in e-learning or distance education practices in higher education, there is the increasing interest in faculty members' use of and perceptions of ICT. While the innovators and early adopters of e-learning have embraced it enthusiastically, the majority of faculty members seem still disengaged and uninterested in e-learning (Newton, 2003). Access to ICT, point to the heart of faculty members' disposition to change, innovation adoption, and general unwillingness to move out of their comfort zones to develop new skills and competencies in order to be able to cope with new phenomena. It has been suggested that engagement in innovative educational practices has tended to render faculty members vulnerable. Besides, it has the potential to detract them from the pursuit of their research and other reward-related activities (Bower, 2001; McKenzie*et al*., 2000).

Innovation in teaching and research, especially in view of the changing context of higher education, is inevitable (Clarke, 2003). The political, social, economic and educational imperatives for the engagement in e-learning now seem to be clear. However, without institutional sponsorship, support and appropriate rewards for engagement in ICT (e-learning)

and the pursuit of excellence, faculty members are likely to remain disengaged and unenthusiastic about engagement in e-learning or innovative educational practices.

Ease of Access to ICT resources

Pickersgil (2003) found out that the ease of access and ICT facilities allow Academicsto become experts in searching for information rather receiving facts. He claimed that ease of accessibility increases that awareness of the world around them. Lack of access to much needed infrastructure is the result of insufficient funds (Ololube *et al.,* 2007).While ICT continues to advance in western and Asian countries, African countries still experience a lag in its implementation, and that continues to widen the digital and knowledge divides. Kiptalam *et al.* (2011) observed that access to ICT facilities in higher learning institutions is a major challenge facing most African countries, with a ratio of one computer to 150 students against the ratio of 1:15 students in the developed countries.

Use of ICT by academics

In higher learning institutions, ICT facilities can be put into several uses and for various purposes. It was the objective of this study to compare the level of use of ICT between male and females' academics.

Different uses of ICT

Much literature described faculty in higher education as comfortable using technologies such as word processing, email, and web searching (Vannatta, 2000), but not comfortable integrating technology into their classroom practices for meaningful learning (Ropp and Brown, 2000). The

issues of best practices in innovative use of technology and integration among higher education faculty are not clearly focused and the results of research in this area vary widely indicating the need for additional research (Kozma, 2003).

Interestingly, a study by Agbatogun (2006) discovered that with global technological wave that is affecting every sector and every aspect of Academics' life whether male or female, experienced or inexperienced, humanities, science or vocationally oriented need to struggle zealously to be computer literate in order to face the present educational challenges. Not only that, Onasanya, *et al.* (2010) confirmed the findings in this study that, attitude of male academics towards integration of ICT in tertiary institution is higher than female academics. Male academics were rather found to be more interested in the use of ICT facilities/equipment for teaching and research work than their counterparts in the Humanities and Arts.

Chong *et al.* (2005) found out that most academics in higher learning institutions use ICT on regular basis for common computer packages such as word processing, spread sheet, databases and for internet services such as search engine. This is supported by Amanortsu *et al*. (2013) that found Academics used computer slides presentation and reading materials from web sites. Surprisingly, Chong *et al.* only discovered fewer academics using higher level skills activities such as evaluative (e.g. assignments, portfolio, testing), instructional (e.g. drill practice, tutorials, remediation), organizational (e.g. database, spread sheets, record keeping, lesson plans) and creative (e.g. Desktop publishing, digital video, digital camera, scanners, and graphics) as these activities required specialized knowledge and training in order to used it.

Chong *et al.* (2005) claimed that eight aspects of computing purposes were: informative, communicative and expressive, integrating computer technology, evaluative instructional, organizational and creative purpose.

ICT offers several opportunities in higher education. First, they can be used as a means of preparing the current generation of students for future workplace that is, providing tools for tomorrow's practices. This is underscored in the foreword written by Lemke (2005) in the Milken Exchange on Education Technology commissioned report. Lemke noted inter alia "Today's students live in a global knowledge based age, and they deserve teachers whose practice embraces the best that technology can bring to learning". Through teachers' use of technology (ICT) students can be given the opportunities of becoming a part of the knowledge age and skills imparted to the young people in an increasingly complex world. Academics will need to use ICT in order to equip tomorrow's employees and customers with the requisite competence and knowledge to use ICT within their work (Davis and Tearle, 1999).

Secondly, ICT can make the university more efficient or more productive, engendering variety of tools to support and facilitate teacher's professional activities. Finally, ICT is seen as means to reform and innovate teaching, that is, to stimulate learners to learn actively and independently in a self-directed way and/or in collaboration with others (Kirschner and Woperies, 2003). It can be deduced that ICTs can be used to enhance learning and teaching within a university system.

However, some scholars (McFarlane, 2002; Bransford, Brown, and Cocking, 2000) have raised doubts about the effectiveness of ICTs in education. Others have claimed that the effectiveness

of ICT depends on those who use them. Academics are key to the successful implementation of ICT in higher education. “What we do know, whether from personal experience as teacher or learner, or as the result of 20 years of research is that ICT has an impact on learning, for some learners, under some conditions, and that it cannot replace a teacher” (McFarlane, 2002). McFarlane has placed great emphasis on the key role of the Academic’s skill in integrating ICT.

Abimbade (1998) expressed that one needs to be literate in the use of computers to effectively use them in teaching, learning and research. In this study, the researcher found that computer was attained outside the UG. As observed by Amanortsu et al. (2013), a new society requires skills, thus computer skill can be promoted and put at the service of higher education, provided that policy makers, teachers, and students show and develop the necessary understanding, willingness and preparation to use ICT. Nowadays, most students in developed countries come to university with expectations that in universities ICT will be accessible, available, and effectively used. In Ghana, some students may be less aware of current developments in ICT or may be digitally less literate to have the same level of expectations.

Yusuf and Onasanya (2004) confirmed the findings in the present study by identifying three specific areas of relevance of ICT to Academics in the area of research:

i. It provides opportunities for scholars to communicate with one another through e-mail, mailing lists and new groups and chat rooms. These ICT resources enable communication between scholars as they can post research, assignments, books or journal lists references to on-line materials. Problems and solutions can be discussed

between researchers and scholars can react to the work of others in an electronic manuscript. The use of ICT further provides greater opportunities for research collaboration and networking among scholars spread throughout the world, thus, national and international dimensions of research issues can be studied as they can allow for communication with peers and experts around the world. Through collaborative knowledge building, studies can spotlight trans-national trend analysis through human and instrumentation collaboration.

ii. The use of ICT can facilitate research in any discipline as they provide quicker and easier access to more extensive and current information through digital libraries that provide digitized full-text resources to learners and researchers. Others are the electronic list- a directory of scholarly and professional e-conferences containing relevant topics and articles relevant to researchers and electronic reference desks or virtual libraries. Others include electronic journals and catalogues and image database. Others are Internet resources; gopher and CD-ROM can provide a researcher with current, in depth, first-hand information.

iii. ICT can be used to do complex mathematical and statistical calculations which are important in research. They can be used for data manipulation and analysis. The ICT will facilitate the compilation of data on time, performance of statistical analysis. In fact, complex statistical analysis are not only performed instantaneously but also more accurately than possible manually

To fully tap into the outcomes from the availability, accessibility and use of ICT facilities in UG, Legon, scholars such as Bower (2001) and McKenzie *et al*. (2000) suggested that faculty

members' dispositions to change, innovation adoption and general unwillingness to move out of Academics' comfort zones and develop new skills and competencies in order to be able to cope with new phenomena is most critical. Therefore, they advocated the engagement in innovative educational practices that have tended to render faculty members vulnerable and more importantly, it has the potential to detract them from the pursuit of their research and other academic related activities.

RESEARCH METHODOLOGY

In this study, the research design adopted was survey, thus using a questionnaire as the main data collection instrument. The research scope was University of Ghana, Legon were males and females from the humanity and science faculties participated. In the UG Annual Report (2012), the population size is 760. Using the non-probability sampling technique called stratified sampling method, the researcher selected males (91) and females (63) academics, totaling one hundred and fifty four (154) out of the population.

Responses from the completed questionnaires were coded and analysed on the SPSS. Specifically, the independent samples t-test which is based on the difference between the two sample means was used to determine significant differences between gender groups, which are male and female.

RESULTS AND DISCUSSION

Gender of respondents

In order to determine the gender of the respondents from faculties, Table 4.1 shows the results.

Table 4.1 indicates that the majority of the respondents were males from both humanities (71.4%) and science faculties (74.7%) respectively. However, the t-test results showed that there is no statistical difference between male and female usage of ICT [t (1.252); Df (154) Sig. (0.212)]. Similarly, Onasanya *et al.* (2010) supported the findings in this study by stating that gender has no effects on the attitudes of academics towards integration of ICT into teaching and research in tertiary institutions. Specifically, the calculated t-value (14.56) was higher than the critical t-value (1.94) indicating that there was no statistical significant difference in the attitudes of males and females Academics at 0.05 level of significance (t_{cri} = 1.94, df = 6, p>0.05).

Current rank of Academics

The table below ascertained the ranks of Academics (Table 4.2).

In Table 4.2, a higher proportion (42.3%) of academics was within the category of senior lecturer rank (42.3%) as against the lecturer rank (28.8%). Therefore, it could be suggested that most of the academics were at least in the rank of lecturers.

Source of ICT knowledge

The subjects of the study responded to questions on their source of computer literacy or training (Table 4.3).

The result from Table 4.3 shows clearly that most (78.0%) of respondents with the male status acquired computer knowledge or literacy through their personal effort. This confirms that academics computer literacy was often times acquired by personal means and not through the university's effort.

Use of ICT

As an objective of the research, subjects were again asked to state the effect of using ICT on their work performance in UG, Legon.

Use of ICT for academic purposes

Most instructors or educators believed that ICT can be used to foster effective teaching and learning environments, regardless of their teaching technique (Chowdhury, 2009). This was a promising and a solid foundation upon which to build programs to promote the expanded use of ICT in higher learning institutions. In this respect, the researcher required academics to rate statements by using strongly disagree, slightly disagree, neutral, agree and strongly agree.

Participants of the study were asked about their agreement or disagreement with various motivators for their use of ICT facilities in UG, Legon. Female and male academics had very similar responses for all motivators except the list, namely 'ICT increases my collaboration with other tertiary faculty members', 'performing information/data management activities' and 'accomplishing tasks more quickly', which were observed to be significant.

The results shows that amidst perception on the different uses of ICT in UG, Legon, what academics perceived as highly significant was 'using ICT enables in accomplishing tasks more quickly' with highest Mean (M).

From the value of means generated in Table 4.4, it can be concluded that 'Using ICT enables me to accomplish tasks more quickly' scored the highest mean (4.53) per each academic. This is followed by 'using ICT increases my collaboration with other tertiary faculty members' (mean=

4.46), using ICT facilities ensures accuracy, timeliness and effectiveness of academics' output (Mean= 4.21).

However, the males reported significantly higher importance than females on uses of ICT thus 'increasing collaboration with other tertiary faculty members, accomplishing tasks more quickly and useful in teaching, learning and research (Table 4.4).

The issue of ICT affecting lecturer-student relationship/communication in UG, Legon was identified by the researcher as a situation that needs further elaboration especially with the inception of distance education (learning) (DE) in 2007/2008 academic year. As claimed by proponents of distance learning (Shelly *et al*., 2006; Matey, 2004), where ICT is the core tool for collaboration among Academics and students, the situation appears to be different in UG, Legon. Indeed, this situation was found unacceptable because during the launching of the programme in 2007/08 (six years from now), Tagoe (2007) emphasized that ICT would be a core tool for the course delivery.

Therefore it was regrettable that the use of ICT in DE has proved to be very slow till date. The implication here was that Academics of UG, Legon were not compelled to seek ICT which could otherwise help in effective collaboration with other Academics and lecturer-student communication and this indeed became a barrier to effective learning on the DE programme. The phenomenon was expressed by Newton (2003) that with the exponential growth in e-learning or distance education practices in higher education, there is increasing interest in faculty members' use of, and perceptions of ICT. While the innovators and early adopters of e-learning have embraced it enthusiastically, the majority of faculty members seem still disengaged and uninterested in e-learning and that appears to be the case in UG, Legon.

Teaching, learning and research using ICT facilities

The table below showed the responses for the extent of ICT usage for teaching, learning and research. The responses ranged from low to very high.

It could be observed from Table 4.5 that 25 (39.7%) and 35 (38.5%) of the respondents from females and males respectively rated ICT facilities for teaching, learning and research as high as against the others. The result indicates that academics in UG, Legon that used ICT facilities for teaching, learning and research was 'high'.

The general perception on using ICT facilities for teaching, learning and research was high in the university. The majority (33.1%) of the academics accessed computers and the Internet at their faculties for the purposes of increasing teaching, learning and research effectiveness. Most computers and internet were highly accessible in the offices and not residences, commercial places, ICT laboratory, lecture halls and the Balme library. It was therefore also interesting to note that majority of the academics had computers at home, with fewer academics having access to the Internet. In this study, it appears academics have fewer access points thereby compelling most academics to use the office as the only point for accessing computer (internet) systems.

Thus, UG, Legon could enhance the level of accessibility by implementing faculty development policies and increasing the necessity of access points to academics for enhancing academic productivity. This would provide the academics with greater opportunities to research, collaborate, learn and many more, without the need to be physically present at the office or UG,

Legon. Besides, a higher level of accessibility will enhance academics level of convenience in that; academics could work from home or any location.

Testing the Hypothesis

Ho: There is no significant difference between gender and use of ICT by academics in Africa.

H1: There is a significant difference between gender and use of ICT by academics in Africa.

The t-test tool was used to assess the significant difference between gender of academics and frequency of ICT use.

From the above table it was evident that the mean score of academics with male status (M = 2.0877) was greater than that of those with female status (M = 1.8500) on their ability to use ICT for academic output. This was therefore subjected to the independent t-test which shows that there was no significant difference between male and female Academics' [t (154) = 1.252, p = 0. 370> *0.05*]. The findings did not support that academics who were males were more likely to use ICT facilities than female Academics, hence rejecting the alternative hypothesis. The reasons for the insignificant difference between male and female academics' were that use of ICT facilities were necessitated by its inherent opportunities and benefits such as collaboration with other academics, data management, ensuring accuracy, teaching, learning and research.

On whether there was equality of access between female academics and their male counterparts, the study showed that there was no significant difference between male and female Academics'. The results in this study was supported by the findings of Hogarty and Kramer (2000) and Agbatogun (2006). Both researchers concluded that gender and academic qualifications of academics did not affect academics' attitude towards the accessibility and use of ICT facilities. A

similar research was conducted by Olatokun (2007) in Nigeria. Contrarily, Olatokun found a divergent view on gender and accessibility of ICT facilities, positing that on the issue of accessibility of ICT by Nigerian femaleAcademics199 (97.1%) answered in the negative while only 6 (2.9%) respondents confirmed that there was equality of access. Thus, it was evident that the women academics perceived that there was an unequal accessibility of ICT facilities between females and their male counterparts in universities. The study therefore establishes that there was indeed gender imbalance in the accessibility of ICT in the surveyed universities.

This is not surprising given previous research suggesting that male academics have access to ICT than their female counterparts. In fact, the result was also consistent with the findings of Opoku (2004) who conducted a study to ascertain the accessibility of ICT facilities. The findings in UG, Legon might have emerged in the study for several reasons. Specifically, it might be that ICT facilities or resources provided for Science and Humanities faculties were not because of the proportionality of gender but rather the core business of Academics which include teaching, learning and research.

One of the major factors that seem to have accounted for the inconsistency in the results of the current study and that of previously conducted studies could probably be due to overstatement and exaggeration on the part of the male respondents in the understudy. This is in view of the fact that, society places much expectation on males to know more about technology than females. However, as society becomes dynamic, emphasis on female education might have made adequate provision for the females as well as the males, thereby making them to cope with accessibility of technology especially when these facilities/resources are available. Hence, even though the male Academics usually accessed more of ICT facilities, females also do.

Barriers of ICT Application by Academics

The barriers inhibiting the use of ICT facilities in the faculties were ascertained. The result is shown in Table 4.7

A higher proportion of Academics from the Humanities (31.7%) identified time-consuming nature and inflexible time schedule for training as the barriers to using of ICT facilities in UG, Legon. On the contrary, the responses from the Science faculty (41.8%) highlighted inadequate ICT facilities, low maintenance and frequent breakdowns. It could be suggested that most Academics in UG, Legon were affected by inadequate ICT facilities, low maintenance and frequent breakdowns, time-consuming nature of academic work and inflexible time schedule for ICT training.

Satisfaction with using ICT facilities

The researcher again assessed the subjects' views on level of satisfaction and the result has been shown in the table below.

It was observed from Table 4.8 that majority of the respondents 52 (58.4%) with the male status were neither satisfied nor dissatisfied while a few 19 (30.2%) from the females faculty were satisfied with the current state of ICT facilities in UG, Legon. From the result above, this implies that a greater number of academics were dissatisfied with use of the ICT facilities.

Conclusion

Indeed, ICT has brought many benefits to higher learning institutions and it is obvious that any university shunning ICT is imperiling its own survival. The purpose of the research was to

investigate whether gender affects the use of ICT facilities among Academics in University of Ghana (UG), Legon.

Global trends in the application of ICT demonstrate that the power of ICT has transformed several interconnected functions of universities across the world and specifically, developing countries like Ghana. The t-test coefficient values (Table 4.6) gives an insignificant relationship between use of ICT in universities and gender (male and female).

Thus the availability, accessibility and use of ICT offer the potential to strengthen conventional education while rapidly transforming distance education. They would not only expand the research and development opportunities of the higher institutions like UG, Legon but also strengthen the libraries with access to an unlimited body of digital information globally and bring considerable efficiency and effectiveness to university management. The study has demonstrated that ICT, notwithstanding the high initial cost, goes a long way to improve the quality of teaching, learning, research, collaboration, ensuring accuracy and many more.

It appears that most academics surveyed revealed that ICT facilities were not adequately available for accessibility and use. Notwithstanding, ICT offers innumerable benefits in enhancing the quality and quantity of teaching, learning and research in tertiary institutions. In conclusion, the researcher recommends Boosting confidence of academics through training and workshops, improving the ICT infrastructure of universities, providing alternative power supply and increasing internet bandwidth.

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List of Tables

Table 4.1: Gender of respondents

Gender	Humanities (M- 2.3736)		Science (M-2.4127)		**Total**	
	No.	*%*	*No.*	*%*	***No.***	***%***
Male	45	71.4	68	74.7	**113**	**73.4**
Female	18	28.6	23	25.3	**41**	**26.6**
Total	63	100.0	91	100.0	**154**	**100.0**
t (1.252)		**Df (154)**		**Sig. (0.212)**		

Source: Field data, April 2013.

Table 4.2: Current rank of Academics

Responses	**Female**		**Male**		**Total**	
	No.	*%*	No.	*%*	**No.**	***%***
Professor	1	1.6	4	4.4	**5**	**3.2**
Associate Professor	-	-	2	2.2	**2**	**1.3**
Senior Lecturer	19	30.2	47	51.6	**66**	**42.3**
Lecturer	31	49.2	14	15.4	**45**	**28.8**
Assistant Lecturer	8	12.7	13	14.3	**21**	**13.5**
Teaching Assistant	4	6.3	13	12.1	**17**	**10.9**
Total	63	100.0	91	100.0	**154**	**100.0**

Source: Field data, April 2013.

Table 4.3: Source of computer literacy or training

Source of computer literacy	**Female**		**Male**		**Total**	
	No.	*%*	No.	*%*	**No.**	***%***
University's effort	24	38.1	4	4.4	**18**	**11.7**
Personal effort	35	55.6	71	78.0	**116**	**75.3**
Outside the University	4	6.3	14	15.4	**18**	**11.7**
Others (Professional computer (IT) schools)	-	-	2	2.2	**2**	**1.3**
Total	63	100.0	91	100.0	**154**	**100.0**

Source: Field data, April 2013.

Table 4.4: Use of ICT for academic purposes

Statements	**Gender**	**Mean**	**SD**	**T**	**p**
I find ICT useful in my teaching, learning and research	Female	4.1868	0.71355	0.555	0. 580
	Male	4.0794	1.41765		
Using ICT enables me to accomplish tasks more quickly.	Female	4.5275	0.77947	3.272	0. 002 **

	Male	3.9048	1.36446		
Use of ICT positively affects lecturer-student relationship/communication in UG	Female Male	3.8989 3.6557	0.94201 1.12376	1.435	0. 154
Using ICT facilities ensures accuracy, timeliness and effectiveness of Academics' output.	Female Male	4.2088 4.0317	0.69148 0.86076	1.412	0. 160
Using ICT increases my collaboration with other tertiary faculty members.	Female Male	4.4598 4.0952	0.72824 0.94552	2.667	0.009 **
ICT use increases my chances of collaboration with other Academics on campus	Female Male	3.9540 4.1452	0.87482 1.00567	-1.235	0.219
I easily perform information/data management activities when ICT is used.	Female Male	3.7253 4.1429	1.22080 0.82025	-2.539	0.012 **

Note: 1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree

Table 4.5: ICT facilities for teaching, learning and research

Responses	**Females**		**Males**		**Total**	
	No.	%	No.	%	**No.**	**%**
Very high	11	17.5	21	23.1	**17**	**9.6**
High	25	39.7	35	38.5	**59**	**33.1**
Moderate	20	31.7	26	28.6	**46**	**25.8**
Very low	6	9.5	4	4.4	**30**	**16.9**
Low	1	1.6	5	5.5	**26**	**14.6**
Total	63	100.0	91	100.0	**154**	**100.0**

Source: Field data, April 2013.

Table 4.6: Gender * Frequency of usage

		Frequency of usage				**Total**
Gender		Always	Very often	Sometimes	Rarely	
Male **(M-2.0877)**	Count	41	35	23	14	113
	% within Gender	36.3%	31.0%	20.4%	12.4%	100.0%
Female **(M- 1.8500)**	Count	20	12	4	5	41
	% within Gender	48.8%	29.3%	9.8%	12.2%	100.0%
Total	Count	61	47	27	19	154
	% within Gender	39.6%	30.5%	17.5%	12.3%	100.0%
$X^2 = 3.143^a$ df= 3 sig. = 0.370 t=1.252						

Table 4.7: Barriers affecting use of ICT facilities

Challenges in using ICT facilities	Females		Males		Total	
	No.	%	No.	%	**No.**	**%**
Time-constraint and inflexible time schedule for training	20	31.7	12	13.2	**33**	**21.4**
Lack of state of the art equipment and power outage	18	28.6	20	22.0	**38**	**24.7**
Inadequate ICT facilities, low maintenance and frequent breakdowns	11	17.5	38	41.8	**49**	**31.8**
Few ICT technical supports, difficulty in accessing disciplined-specific journals and lack of ICT skills	3	4.8	12	5.5	**15**	**9.7**
Inadequate softwares for teaching, learning and research	11	17.5	9	9.9	**20**	**13.0**
Total	63	100.0	91	100.0	**154**	**100.0**

Source: Field data, April 2013.

Table 4.8: Level of satisfaction

Responses	Females		Males		Total	
	No.	%	No.	%	**No.**	**%**
Very dissatisfied	3	4.8	4	4.5	**7**	**4.6**
Dissatisfied	14	22.2	17	19.1	**31**	**20.4**
Neither satisfied nor dissatisfied	27	42.9	52	58.4	**79**	**52.0**
Satisfied	19	30.2	16	18.0	**35**	**23.0**
Total	63	100.0	89	100.0	**152**	**100.0**

Source: Field data, April 2013.