UNIVERSITY OF CAPE COAST

AN ASSESSMENT OF THE ADEQUACY AND UTILIZATION OF INFORMATION AND COMMUNICATION TECHNOLOGY IN UNIVERSITY OF CAPE COAST

BY

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EDUCATIONAL MANAGEMENT

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DECLARATION

Candidate's Declaration

I hereby declare that this dissertation is the result of my own original work and that no part of it has been presented for another degree in this university or elsewhere.

Signature..... Date.....

Candidate's Name: ALEXANDER ASANTE

Supervisor's Declaration

I hereby declare that the preparation and presentation of the dissertation were supervised in accordance with guidelines on supervision of dissertation laid down by the University of Cape Coast.

Signature..... Date.....

Supervisor's Name: STEPHEN BAAFI-FRIMPONG

ABSTRACT

Information and Communication Technology (ICT) has the 'tools' to facilitate the core tasks of a higher educational institution like a University in the areas of teaching, learning, research, management/administration and for library services. However not much can be gained from the technology in that respect if an assessment is not made into how the technology is currently being used, its adequacy and accessibility, as well identifying the problems hampering the development and use of ICT in the University of Cape Coast and offering recommendations to offset the challenges. This therefore was what the study sought out to achieve.

To carry out such a study necessarily required a detailed evaluation of what pertained on the ground. To achieve this, three different types of questionnaires were used to solicit information from the three categories of target groups, namely: lecturers, senior administrators and students. Random sampling was used to select 100 and 500 respectively of lecturers and students respondent groups. However the census method was employed for the senior administrators because their population size was only 66. Further information were also gathered through interviews from some senior officers. Statistical Package for Social Sciences (SPSS) version 14 was employed in analyzing the data, and frequencies, percentages and cross tabulations were used in the presentations of the results.

It was established from the study that all the stakeholders in the University vouched for the indispensability of ICT in the educational enterprise and highly

advocated for ICT deployment in all the facets of the University. However, ICT use or penetration in the University of Cape Coast as a whole was inadequate or low and needs to be improved extensively, although there were isolated cases where the use of ICT was encouraging. Also, inadequate ICT facilities and infrastructure hampered ICT use in the performance of the University's core functions of teaching, learning, research and management. Furthermore, the ICT knowledge-based for staff and students was at a low level to enable them adopt and harness the mass of academic resources that ICT avails.

Based on the findings it was recommended that the management of the University should as a matter of urgency inject the necessary resources such as hardware, software, communication equipment and not overlooking tailored training for lectures, senior administrators, IT staff and students that would radically transform the development and use of ICT in the University.

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Finally, to God Almighty, without whose mercies this research would not have been possible, I say may honour, glory and praises be yours forever.

DEDICATION

To my dear wife, Cecilia and my lovely son, Papa Kwadwo Asante.

TABLE OF CONTENTS

PAGE

LIST OF TABLES

PAGE

LIST OF ABBREVIATIONS

AAU	Association of African Universities
ACCA	Association of Chartered Certified Accountants
BECTA	British Educational Communications and Technology Agency
CAD	Computer Aided Design
CAN	Campus Area Network
CD-ROM	Compaq Disk Read Only Memory
CT	Communication Technology
Email	Electronic Mail
ERNWACA	Educational Research Network for West and Central Africa
GIGO	Garbage In Garbage Out
HP	Hewlett Packard
HRM	Human Resource Management
ICT	Information and Communication Technology
ISP	Internet Service Provider
IT	Information Technology
Kbps	Kilobits per second
KWS	Knowledge Work Systems
LAN	Local Area Network
Mbps	Megabits per second
MIS	Management Information Systems

NOC	Network Computer Centre
OAS	Office Automation Systems
OPAC	Online Public Access Catalogue
TPS	Transaction Processing Systems
UCC	University of Cape Coast
WWW	World Wide Web

CHAPTER ONE

INTRODUCTION

Background to the Study

If there is any tool that has revolutionalized the way things are done in this era, then it is undoubtedly the Information and Communication Technology (ICT). This is so because of its versatility and application in almost all endeavours of life, with the following core functions of higher educational institutions not being an exception- teaching, learning, research, extension service and administration. Indeed, the convergence and emergence of computer and communication technologies have dramatically changed the landscape of doing things. The exciting possibilities opened up by this integration are enormous.

According to Adubifa (2001), "Information and Communication Technologies (ICTs) are a diverse set of technological tools and resources used for creating, storing, managing and communicating information". He further went on to say that "the new digital ICTs are combinations of hardware, and software, multimedia, and delivery systems." (p. 1).

Infact, ICTs have formidable capabilities and can be cost effective as development tools. Because of this, the importance of ICT as a tool for development particularly in Universities cannot be underestimated. In general ICT can be applied in the following core areas in a University: Teaching and Learning;

Research; Academic Information Services (Library); Administration and Management.

Some areas where ICT can be applied in the University

Teaching and Learning

Teaching and Learning are some of the essential processes of higher education. Adubifa (2001) indicated that ICT can be used to:

1. Provide basic computer skills.
2. Provide basic computer literacy skills specific to respective academic disciplines.
3. Improve student motivation.
4. Improve access to remote resources.
5. Provide teaching and learning materials on Compact Disk Read Only Memory (CD-ROM) or on the web.
6. Collaborate in online teaching and learning functions with other faculties and students from around the world.

Research

Research is another important business of a University. Traditionally, ICT was used in this area to analyze data. These days the use of the Internet to locate, exchange, and disseminate data between researchers is becoming increasingly important. According to Adubifa (2001), Universities are expected to use ICT for research in the following areas:

1. As a research tool (Statistical packages).
2. To collect academic information.
3. To disseminate academic information.
4. To collaborate with other researchers worldwide.

Academic Information Services (Library)

The traditional library is gradually giving way to cheaper and more up-to-date academic information available on the internet. However, Adubifa (2001) revealed that libraries in African Universities are faced with an immense challenge of having the state-of-the-art ICT facilities that would give users undisrupted access to the numerous academic materials on the net. Adubifa indicated that Universities can deploy ICT in library services for the following:

1. Online Public Access Catalogue (OPAC).
2. To link libraries onto the campus network.
3. To link libraries onto the campus Internet.
4. To facilitate academic information services of the library. This should involve providing academic information through CD-ROMs, Intranet, Virtual libraries.
5. For academic information-collection services of the library. This means assisting students and faculty members in collecting information on the web, and academic information-dissemination functions of the library. For example electronic publishing of research outcomes or thesis on the Intranet or Internet.

6. To provide training for academic information retrieval on the web for students, faculty members and the Public.

Administration and Management

Although technology application in education is mostly focused on the teaching-learning aspects, the contribution of technology to effective management is equally important. The above is supported by Phatudi et al (1997) as quoted in Riekert (n.d.) when they indicated that an important use of technologies, which is often neglected in policy statements, is in support of management and administration of education and training.

Adubifa (2001) again suggested that administrators need to be strengthened in their ability to use ICT to maximize efficiency and accuracy in the following areas:

1. Personnel/human resource management.
2. Students' administration.
3. Financial system.
4. Assets and maintenance.
5. Communication (e.g. email).
6. Office automation.
7. Support management decisions makings.

The areas of application of ICT in education identified by Adubifa (2001) is in line with those earlier identified by Wongsothorn (1997) who also recognized that ICT plays important roles in the following areas:

1. Teaching
2. Continuing and life-long education
3. Library services
4. Support services

The University of Cape Coast having the afore mentioned applications of ICT in mind, and also because ICT issues are at the very heart of every educational process, has since long been worried about the worsening lack of access and growing isolation of students and faculty members to ICT facilities. To avert further decline and make the University competitive, some ICT developments have been implemented to address some of the concerns.

The University is being guided by the fact that ICT initiatives which emanated from an overall strategic plan for the University's development flourished while those that were ad-hoc and not integrated into the institutional development framework only achieved limited objectives that were not sustainable. To this end, the development of ICT infrastructure as well as training in ICT for faculty members and students featured prominently and is ranked high in the University's five-year strategic plan which was launched in January, 2003. The 4th thrust of the University's strategic agenda is "to provide integrated and modern information and communication technology facilities." (University of Cape Coast, 2003). Indeed, to demonstrate its commitment to ICT, the University even has an ICT development plan which it is implementing in phases in accordance with the ICT strategic blueprint.

To really demonstrate her seriousness, the University has fibre and radio backbone that links the various Local Area Networks (LANs) located within the faculties and the other supporting units to form a Campus Area Network (CAN). Additionally, the University has set up an ultra modern 200 capacity ICT centre for students. The centre is also meant to facilitate faculty members' teaching, research and extension. The students thus have at their disposal a myriad of online academic materials on the net that enhance the quality of learning and research. It is also meant to make all graduates of the University computer literate so as to make them fit into the competitive labour market.

Further, the management of students' records has been improved with the coming into being of an on-line registration and score processing. The students' record systems have greatly improved the registration, examination processing, graduation and the issuing of transcripts for students. The delays and errors associated with the issuance of students' results and academic transcripts now belong to the past. Also, the systems have facilitated access to timely and accurate information on students for research and management decision purposes.

The University has installed a satellite dish to give improved Internet access at the speed of 1.5 Megabits per second (Mbps) downlink and 512 Kilobits per second (Kbps) uplink. This has relatively improved Internet access to users in terms of reliability (stability) and speed.

The University continually increases its built-up of computers with modern ones for academic and administrative purposes. However, if the estimated number of computers which is put at 1000 compared to the number of users (staff

and students) which is about 20,000 can be used as the basis for establishing adequacy or accessibility, then the ratio of users to computers is very low.

In terms of utilization of ICT facilities, presently, usage is centered on Internet access, administrative computing and Management Information Systems (MIS). The nagging question however, is to what extent are the ICT facilities being effectively utilized in the University of Cape Coast?

Statement of the Problem

Although some modest achievements have been chalked so far as the development of ICT infrastructure is concerned in the University of Cape Coast, what is yet to be measured is the adequacy and the extent to which these facilities are being harnessed by students, faculty members and administrators for their chores.

Moreover, there seems to be no attempt to integrate ICT 'tools' in teaching and learning in the University of Cape Coast, although various studies of the effectiveness of computing as an instructional tool indicate that it brings varied but general positive results. Bell (1978) as cited in Asante (2000) hinted that there have been some impressive successes in many places where computers are being used to help people learn mathematics. He said that during the period of 1965 to 1975 many students, mathematics teachers, curriculum developers and researchers successfully used computers to enhance teaching and learning in many different ways.

Moreover, it appears the availability and use of ICT in the University is low. faculty members, administrators and students, only use ICT for some few applications such as word processing and spreadsheet, despite its immense potentials. There is also little or no documentation on what is available. Currently, there is no information on the availability and utilization of the ICT facilities, thus necessitating the need for this study. This goes to support what Getachew (2001) wrote in his article on the access and utilisation of ICTs: the case of distance education in Ethiopia that the increasing use of ICTs in distance education in the last decade is a major contributor to the dramatic transformation in distance education. He went on to say however that making sound investment decisions about ICT is a major challenge facing educational policy planners because the information needed to make appropriate decisions on the use of ICTs in distance education are limited (Bates, 1995; Romiszowiski, 1998; Sparks, 1984) cited in Getachew (2001).

In view of the dramatic increase in students' enrolment in the past four years from 9,822 in 2001/2002 to 15,028 in 2004/2005 (University of Cape Coast, 2005) which may put pressure on the ICT infrastructure, there is the need to evaluate and assess the adequacy of the ICT facilities on campus. This is to enable the University ascertain its ICT status so that remedial measures can be put in place. It is therefore the motivation of the researcher to find out how adequate ICT facilities are in the University of Cape Coast and the extent to which these facilities are utilized.

Purpose of the Study

The main purpose of the study is to assess the availability, adequacy or accessibility of, and the extent to which the University of Cape Coast is using ICT to improve teaching methods, enhance learning, strengthen research, manage library and other academic information services as well as the management of the institution in general.

The specific objectives are to:

1. Examine the accessibility of ICT facilities and services.
2. Examine the adequacy of ICT facilities and services.
3. Find out the extent of usage or level of utilization of ICT facilities and services.
4. Identify the various ways to which the ICT facilities are put to use by students, faculty members, the library, and administrators.
5. Determine the types of hardware and software being used.
6. Identify factors that inhibit the use of ICT equipment.
7. Explore the parameters that University could use to assess how effectively an institution is able to harness the potential of ICT.
8. Identify where further work is needed to promote and embed the effective use of ICT in teaching, learning, research, administration and for library services.

Research Questions

In pursuance of the study, answers would be sought for the following research questions:

1. What is the degree of availability and adequacy of ICT facilities and services?
2. What is the extent of proficiency of faculty members, staff and students in ICT?
3. What is the extent or level of ICT usage in teaching?
4. What is the extent or level of ICT usage in research?
5. What is the extent or level of ICT usage in learning?
6. What is the level of ICT usage in the management and administration of the University?
7. How has ICT improved or enhanced the quality of management and administration of the University?
8. What is the degree of ICT usage in academic information services (Library)?
9. What are the ICT constraints and needs at the University?
10. What is the type and extent of ICT organizational support available to users in the University?

Significance of the Study

The significance of the study is as follows:

The study is to help identify current ICT profile and set goals for the future as part of the institution's strategic planning. Such findings can be used to set benchmarks and goals which can be useful to the management of the University.

It would also provide a guide for the University to conduct a self-assessment of its general capacity to use ICT effectively to enhance teaching, promote learning, conduct research and manage the institution.

Also, there is no doubt that the outcome of this study could lead to increase in knowledge acquisition in general, especially if the findings from the study reveal certain information concerning the deployment of ICT on Universities that hitherto were unknown.

Additionally, it is intended that this work would serve as a starting point for the recognition of the need to regularly and critically assess ICT infrastructure and usage in University of Cape Coast.

Other researchers interested in the same or related topics would find this work relevant as a basis for further research.

Delimitation

The study assessed the adequacy, accessibility and utilization of ICT at University of Cape Coast. The scope of the study was to identify the availability, adequacy and deployment of ICT in the University in the core areas like teaching,

learning, research, library and in the management of the University. Service areas such as the hospital, halls of residence were excluded. The survey was also limited to the afore-mentioned University only.

Definition of Key Terms

Accessibility as used in this work refers to ease of access, ease of use and availability of ICT facilities and services.

Adequacy is concerned with the sufficiency of the ICT facilities.

Administration and Management are used interchangeable within the context of this study to mean sequence of coordinated events used to achieve the desired outcome or goals in the fastest and most efficient way. Simply, the act or process of administering, especially the management of the University.

Assessment as used here means evaluation or appraisal.

Availability is concerned with the number of ICT facilities and services that are present and ready for immediate use.

Information and Communication Technology (ICT) as used within this study means computers (either standalone or networked) and their associated peripherals such as printers, digital cameras, scanners, telejectors and

communication technologies. Indeed, it incorporates the whole of computing, multimedia, and telecommunication technologies that facilitate the processing, storage and disseminating of information.

Lecturer and Faculty Member are also used exchangeable in this study to refer to a teaching staff of the University who holds at least a second degree in his or her area of discipline. He or she may teach undergraduate and/or post-graduate students.

Senior Administrator refers to a non-faculty member at the University who holds at least a second degree in his or her area of specialization. Such a person performs administrative, managerial and organizational functions.

Student as used in the context of this research refers to someone who is pursuing a prescribed undergraduate or post-graduate programme in the University.

Utilization refers to the frequency and intensity to which ICT is employed for instructional, learning, research or administrative purposes.

CHAPTER TWO

LITERATURE REVIEW

The purpose of this chapter is to undertake both theoretical and empirical review of literature that are related to the topic. It is organized under the following headings:

1. Meaning of Information and Communication Technology.
2. The Relevance of ICT in the University.
3. Factors Affecting the Adequacy and Utilization of ICT.
4. Guidelines for Institutional Self-assessment of ICT maturity.
5. Empirical Studies.

Meaning of Information and Communication Technology (ICT)

As the name suggests, ICT is a technology that merges computing with high-speed communication links carrying data, sound and video. Information and Communication Technology is a combination of two previously unrelated concepts, Information Technology and Communication Technology. Information Technology (IT) is the term used to describe the equipment and software elements that allow users to access, retrieve, store, organise, manipulate and present information by electronic means. Communication technology (CT) is the term used to describe equipment, infrastructure and software through which information can be received and accessed, for example phones, faxes, modems,

digital networks. ICT is thus the result of the convergence of IT and CT technologies. ICT is therefore made up of computer hardware, their associated peripherals and software; in-building network infrastructure; backbone infrastructure; external Internet connectivity; and other communication devices.

The AAU (2000) defines ICT as a shorthand for the computers, software, networks, satellite links and related systems that allow people to access, analyse, create, exchange and use data, information and knowledge in ways that, until recently were unimaginable. Succinctly put by Herselman & Hay (2003), ICT involves the electronic means of capturing, processing, storing and communicating information.

In this era, computers and their associated communication technologies are not a preserve of any profession. Being versatile equipment, they find application in all spheres of life from simple uses such as word processors to complex process control applications in industries by adapting to different software modes. There is hardly any human activity which is not affected by computer in some way. Computers are used in areas like production, health, education, management, agriculture, defence, crime detection among others to complement the human efforts.

In the field of education, computers have been found to enhance educational process dramatically for traditional students and also open new possibilities for disabled students. In addition to assisting in educational administration, computers can directly assist students in learning and help teachers keep track of students' educational progress.

But perhaps if there is a unique feature of computers that has revolutionalised the world, then it is their uses in communication. ACCA (2002) indicated that one of the achievements of contemporary ICT systems is the ease with which digital information can be transmitted and shared among many users.

Computers have the capabilities of being accurate, being able to make decisions and have large memory capacity that facilitates storage and retrieval. Computers speed up the rate of execution of a job and thereby cut down costs. Computer increases the speed at which tasks are completed by helping conserve time and resources. Computers enable few workers to get more work done than many could without computers, thereby cutting operating cost. Computers are very reliable; hence they increase the quality of goods and services. Mammootty (n.d) collaborated the above when he also pointed out in his article on the impact of computer on society that, computers ensure more effective utilisation of human efforts, thus reducing cost of production.

Not withstanding the capabilities of ICT, like any technology, it has its bad sides. ICT hardware and software are costly to develop and maintain, thus making them not affordable to all. Their uses also require some level of training if maximum benefits are to be derived from their usage. Moreover, the human element involves in any ICT endeavour by way of developing the programs, inputting of data by end-users, etc go a long way to determine the accuracy or otherwise of a system. This is emphasized by a popular truism in ICT environment that 'Garbage in, Garbage out' (GIGO), stressing the point that the quality of the output is directly dependent on the quality of the input data.

Besides, for computers to be useful in teaching and learning, students must be highly motivated and proficient in computer operation. Furthermore, to some extent the capabilities of the computer is dictated by how well the user explores the hardware and software to facilitate his job, thus in situations where there is widespread computer incompetence, then it stands to affirm that not much can be gained from the usage of computers. Other issues like the vulnerability of information on computers to viruses, hacking and cracking are also real. There is also the perception that frequent and prolonged computer sessions may pose physical health risks (BBC, 2005).

The Relevance of ICT in a University

The relevance of ICT in the University cannot be underestimated as it has the tools to enhance teaching, learning, research and the management of the University. This assertion is echoed by Adubifa (2001) that "the use of ICTs in education will continue to grow and recent advances are likely to increase their range and application dramatically." (p. 1). Adubifa further indicated that:

> Access to these tools thus become a matter of critical importance for any African University that seeks to become viable and effective in training its students, producing and disseminating knowledge, and preparing the next generation of citizens with adequate skills (pp. 1-2).

Given the fact that ICT has tools for repository of electronic books and journals, communication, teaching/learning, maintenance of students' records and personnel and financial records, among others, it becomes an indispensable tool in the educational enterprise. It is therefore not surprising when the University of Michigan President's Information Revolution Commission Report indicated that the traditional ways of doing things in the University by way of teaching, learning, research, library and the management of the University are all gradually giving way to computer-based approaches and therefore made pragmatic recommendations to advance the course of ICT in their University. The influx of online teaching and learning materials, CD ROM based academic materials, and software to manage students' records are all cases in point. Also the report further indicated that not only are these innovations necessary to facilitate the management of the University, but they are also required to make the graduates of the University fit well into the employable pool capable of moving their country's economy ahead.

The policy statement for the realization of the vision to transform Ghana into an information-rich knowledge-based society and economy through the development, deployment and exploitation of ICT within the economy and society did not mince words about the importance of ICT in education when it indicated that "the government is committed to a comprehensive programme of rapid deployment, utilization and exploitation of ICT within the educational system from primary school upwards." (Republic of Ghana, 2003, p. 32). The policy statement further specified that, to this end, government, the key

implementation agencies, players and stakeholders have come out with pragmatic objectives, strategies, policy measures, instruments and initiatives towards the realization of its mission.

The importance and applications of ICT tools in an institution of higher learning cannot be over emphasized. It is also to a large extent a measure or yardstick of an institution's maturity. No wonder at a seminar on the use of ICT in the administration of the University in May 2003, the management of the Ghanaian Public Universities underscored the importance of ICT as a vehicle to achieve accelerated development in teaching, learning, research and the management of the Universities.

- **Factors Affecting the Adequacy and Utilization of ICT**

Wongsothorn (1997) identified commitment by management, availability of ICT and training of staff as critical success criteria in the role of ICT for distance higher education development in the knowledge-based society. The assertion by Wongsothorn cannot be underestimated as to a greater extent the adequacy and how well a technology is adopted is a function of many factors including those he identified. Okuni (2000) also did not digress from what Wongsothorn said when he held that Specialists agree that communication and information opportunities available on the World Wide Web (WWW) can spur development under two conditions, namely: the user has to have access to the necessary technical equipment and infrastructure, and he/she has to understand how to implement the technology.

The number of users in relation to the number and state of the ICT infrastructure also to a large extent determines adequacy and utilization of ICT facilities. In another dimension, Thomas and Kobayashi (1987), as mentioned in Bosu (2000) explained that when a new technology is on a rather massive scale, the underlying motivation is often if not always political. Teale (1997) expressed similar sentiment when he wrote that it is unlikely that academic and administrators are going to develop the skills required to integrate information technology into the administrative, management and teaching and learning process without a visible commitment from management. Support from the top is very crucial since they have power to determine where finances should be allocated. Ghanaians therefore expect to see a massive leapfrog in ICT infrastructure development and applications because of the President's special initiative in ICT. Support from the top executives is very crucial in a capital-intensive venture like ICT.

User friendliness and ease of use of a system is also a pulling factor to use a system. The easier a technology is, the more people adopt and use it or are motivated to use it. This is amply demonstrated by the dexterity with which students use email and other computer applications because of their simplicity, user friendliness and ease of use.

For a technology to be adopted and adapted, users of all types in an educational institution need to be trained religiously and proactively on their application so that its potency can be tapped. Without requisite skills to use information technology, the University community will not be able to exploit the

opportunities it offers. Teale (1997) pointed out that the gaps that prevent information technology from being fully utilised, both at management and at academic levels relate to knowledge, skill and desires. Wongsothorn (1997) endorsed the importance of training when he asserted that Teachers, Professors, Technical staff and Administrative staff must be given training that enables them to integrate new information and technologies into their teaching programmes, and to examine the multiplier effect with regard to their use.

The number of users, in the case of this study; faculty members, staff and students is also a critical factor in determining the adequacy and availability of an ICT facility. Given the fact that the students population of University of Cape Coast stands at 15,028 (University of Cape Coast, 2005), coupled with the craze to use ICT facilities compared with the seemingly limited ICT infrastructure on campus, one can infer that there is extreme pressure on the existing facilities, thus making its accessibility and adequacy limited.

A state of the art cutting-edge technology with a bigger Internet bandwidth will naturally invite and motivate users, whilst an outdated one will obviously be uninviting and frustrating to use. Adequate bandwidth is therefore essential for ICT use.

Several studies such as those of (Keegan, 1990; Gagne, 1989; Garrison 1987) as indicated in Getachew (2001) underscored the importance of technology when they contended that the crucial national condition that determine the possible use of ICT in distance education for instance is the status of the communications infrastructure that exist in the country. Unfortunately Daly

(2000) as cited in Adubifa (2001) has given a gloomy picture about the obsolete and limited nature of ICT technology in African Universities which does not augur well for ICT development and deployment when he declared that:

> In Africa, computers are scarce, and many of the units are older models using 386 and 486 processors. In 1998, an AAU survey found that only 52 of the 232 African academic and research institutions responding to its questionnaire had full Internet connectivity, whiles the 180 others had access that was inadequate. Growth of the Internet was limited by low levels of telephone connectivity, and telephone costs were high relative to those in the United States and to African budgets. Bandwidth serving universities was limited (p. 6).

Institutional Self-Assessment of ICT Maturity

People have talked about institutional self-assessment of ICT maturity. According to Adubifa (2001) ICT maturity is defined as:

> the ability of an institution to identify its current ICT profile: to define its objectives for integrating ICT in teaching, learning and research, for providing academic information services, and for efficiently carrying out institutional administration and management; and to plan for ICT resources accordingly (p. 18).

Adubifa (2001) further came out with ICT maturity assessment tool or guideline. The guideline suggests nine (9) sets of variables under five (5) stages of ICT development. The stages are entry, adoption, adaptation, appropriation and invention. The entry stage is where the institutions create awareness and teach staff and students to use technology. At the adoption stage, the institutions use technology to enrich curriculum. During the appropriation stage, institutions integrate technology and use it for its unique capabilities. The invention stage is where the institutions develop entirely new learning environments that use technology as a flexible tool; learning becomes collaborative, interactive and customized. Here technology is used to support traditional instruction.

The variables which are used in accessing an institution's capacity at each of the afore-mentioned stages are:

1. Planning and monitoring tools such as the availability of University strategic plan.
2. Application of ICT in teaching and learning.
3. Application of ICT in research.
4. Application of academic information services (Library).
5. Application of ICT in administration and management.
6. ICT infrastructure: Type as well as accessibility and usage patterns.
7. ICT organizational (support) infrastructure.
8. ICT financing.
9. Training, Research and Development in ICT.

The ACCA (2001) Business Information Management textbook used the Nolan six-stage growth model which was an extension of the Gibson and Nolan four-stage growth model to represent the path or stages of organizational learning about data processing and its uses within the corporation. The stages which bear resemblance to stages in maturity identified by Adubifa (2001) are initiation, contagion, control, integration, data administration and maturity.

Initiation stage is the automation of clerical operations where some technically minded employees use technology because they are keen, rather than use it for cost effectiveness. At the contagion stage, there is rapid growth of ICT usage as users become more familiar with applications, and wider benefits of technology are perceived by staff. Planning and methodologies are introduced in order to assert control over development and investment in technology takes place in a planned manner. During the integration stage there is the assimilation of the various computing functions within the organization. At the data administration stage emphasis is placed on information requirements rather than just processing requirements. Finally at the maturity stage, the information technology is brought into line with the business planning and development. During this stage, the information flows mirror the real-world requirements of a business.

Some Empirical Studies of ICT in Education

In order to establish how this study fits into others, it is imperative to examine some related studies.

Addo (2003) limited his study to the impact of ICT on University of Cape Coast's administrative planning only. Though his study revealed that some pertinent issues like lack of funding for ICT, and inadequate bandwidth among others hampered ICT use and development, since administrative duties is just but a small aspect of the University's core duties, it is difficult for one to make generalizations from his study. In another study Getachew (2001) focused on the access and utilization of ICTs in distance education and identified some possible problem areas in the use of ICT in distance education as the accessibility of the ICTs to students, cost-related problems, the inappropriateness of the ICT to the teaching-learning process and user unfriendliness of some ICT facilities and software, among others. Though the scope of that research was on distance educations, it has some semblance with the research understudy since both are about evaluating the access and utilization of ICT for educational purpose.

On her studies on the availability and utilization on educational technology in University of Cape Coast, Bosu (2000), found out among others that lecturers were not motivated to use electronic audiovisual equipment because the lecture halls were not fully equipped with things that facilitated their usage such as functioning sockets and screens. These, she contended, contributed to the occasional use of the various electronic audiovisual equipment. Bosu further revealed that "access to audiovisual media in the University was difficult because

they were not available at the right time, they were not sufficient or adequate and the complementary software for the equipment was not always available" (p. 57). According to her findings, the low level of the usage of audiovisual materials was not due to lecturers' attitudes, but primarily because the audiovisual media were inadequate. She hinted also that the level of utilization would increase if more audiovisual equipment and information about their availability were available to lecturers. A very important revelation of her study was that lecturers maintained that the use of audiovisual resources had a positive impact on teaching, and that they supported the idea of having in-service training on their usage.

Adubifa (2001) underscored the relevance of evaluating the state and use of ICT when he articulated that "each institution must be able to assess its current situation with regard to its capacity to use ICT in teaching and learning, research outreach and professional services, as well as to achieve administrative efficiency." (p. 11).

The use of computers in education has never been underestimated. For instance Hooper (1976) cited in Asante (2000) identified four main characteristics of the computer which reinforce its importance within education as follows:

First, it is a versatile technology, with its uses ranging widely across many areas of academic research, administrative, and growing uses in the classroom. The second important characteristic of the computer in education is its 'academic respectability'. Thirdly, computer derives power from its abilities as a simulator. Finally he wrote that computing in education would be affected in ways one

cannot properly imagine by computing's fast growing status in the world industry and dominant role in communications, education, and control application.

Cuban (1996) used the following statistics to illustrate how computers and their use in the classroom have increased astronomically in the United States since the early 1980's because of their importance as a facilitator in teaching and learning:

> In 1981, 18 percent of schools had computers; in 1991, 98 percent had them. In 1981, 6 percent of schools used computers for instruction; by 1991, 98 percent did so. In 1981, there were on average 125 students per computer, in 1991, there were 18. In 1985, students used computers in school labs just over 3 a day; in 1989, it was 4 hours a day (p. 8).

Extrapolation from the above statistics could suggest that the usage of ICT in the classroom is now ubiquitous.

Investigations has since long been conducted into the use of computers in education. For instance, Bowen (1985) as cited in Raven & Welton (1988) commented that the roles of microcomputers in agricultural education have increasingly become visible. Bowen further expressed that agricultural education is moving beyond the awareness and literacy stages in adopting microcomputers to the classroom.

In their work on an assessment of microcomputer utilization on Kansas Vocational Agriculture Programs, Raven et al. (1988) said previous studies had reported differing results in the usage of microcomputers in educational programs.

They said the heterogeneity in the findings of these studies illustrated the variation in microcomputer adoption by vocational agricultural studies and indicated the continuing need for research in the area of microcomputer usage in vocational agricultural education programmes both at regional and national levels.

The role of microcomputers and their communication accessories in education is changing rapidly as technology continues to grow. Some 20 years ago, Borke (1985) quoted in Raven et al. (1988) asserted that computer use in education is a highly dynamic technology. He further stated that 25 years from that time computers will become the dominant delivery in education. Present applications of ICT in the field of education have vindicated Borke's prediction. As the use of computers in education continues to evolve as is evident now, it is important to know the stages in the evolutionary process so that strategies may be planned for future ICT applications.

In a study of microcomputers in Kansas's vocational education, Seeber (1993) cited in Raven et al. (1998) indicated there was heavy involvement of microcomputers in Kansas's vocational agriculture institute. However there were no data available on the extent of this involvement or the present role of microcomputers in Kansas vocational agriculture programs. To plan for changing role of microcomputers in education Raven et al. held that an assessment was therefore needed. In addition, identification of factors inhibiting microcomputers use were needed to be addressed to ensure the availability of this technology.

Assessing ICT in tertiary education is very important for strategic planning purposes as it helps to reveal the state of affairs, so that needs are known

to facilitate planning. In this direction, a paper presented by Educational Research Network for West and Central Africa (ERNWACA) in March, 2003 on ICT in education in Ghana reported that the National Council for Tertiary Education carried out a survey that was instituted to develop a tertiary education ICT strategy to help address the ICT infrastructure requirements of the sector ERNWACA(2003).

CHAPTER THREE

METHODOLOGY

This chapter discusses the techniques and procedures of collecting data. It specifically discusses the research design, the choice of the population, the sampling method and the research instrument used for the collection of data. The chapter ends by discussing the data administration and collection, as well as the data analysis and processing.

Research Design

This study, which sought to determine the availability, accessibility and utilization of ICT infrastructure and services at the University of Cape Coast was a descriptive survey. The researcher found descriptive survey design appropriate since this study involves collecting data to answer questions concerning the current status of the subject of the study. According to Gay (1992), "a descriptive study determines and reports the way things are." (p. 217). To analyse the problem under study therefore questionnaires were used to elicit information to determine and assess the state and applications of ICT in the various core functions at the University.

This study mainly used quantitative techniques to elicit information for the topic under study, though some elements of qualitative techniques cannot be ruled

out. The choice of both techniques was to ensure that each method complemented the inadequacies that existed in the other.

Wikipedia, the free encyclopedia defines qualitative method as a research method that deliberatively gives up on quantity in order to reach a depth in analysis of the object studied. Qualitative method uses different techniques such as focus groups, text analysis, participant observation and participation (Qualitative, 2005).

Quantitative method on the other hand, according to the wikipedia is concerned with numbers and anything that is quantifiable. They are therefore to be distinguished from qualitative methods (Quantitative, 2005). Counting and measuring are common forms of quantitative methods. With Quantitative method the result of the research is a number, or a series of numbers. These are often presented in tables, graphs or other forms of statistics.

The use of one or the other type of method has become a matter of controversy and even ideology, with particular schools of opinion within each discipline favouring one type of method and pouring scorn on the other. Therefore the modern tendency is to use an eclectic approach where quantitative methods are used in conjunction with qualitative methods. Using qualitative methods, it is often possible to understand the meaning of the numbers produced by quantitative methods. In other words, using quantitative methods, it is possible to give precise and testable expression to qualitative ideas.

Population

The study population was the faculty members, totalling 303; senior Administrative staff, numbering 66; as well as the level 200 to level 400 students of the University of Cape Coast adding up to 9,939 (University of Cape Coast, 2005). The researcher decided not to use level 100 students as respondents due to the fact that they have not spent one year on campus, and that they would not be in a position to respond to the questionnaire objectively.

Sample and Sampling Techniques

Since it was practically impossible to allow all the members of the three different population types respond to the questionnaire due to inadequate resources and time constraint, samples were selected for the study. For all three different population types, simple random sampling was used to select the sample. Dillon, Madden & Firtle (1993) justified the unbiased nature of simple random sample when they wrote that it guarantees that every sample of a given size as well as every individual in the target population has equal chance of being selected. According to Gay (1992), a point in favour random sampling is that it is required by inferential statistics, which is very important since inferential statistics permit the researcher to make inferences about populations based on the behaviour of the samples.

The various target populations were faculty members totalling 303; senior administrators numbering 66; and level 200 to 400 students constituting 9,939. Of

the 303 faculty members, the researcher decided to use 100 (33%) of them as sample. With regard to the senior administrators, because they were just 66 in number the researcher employed the census method. For the students, the researcher used a sample of 500 (5%) of the population of 9,939. The variations in the percentages used in determining the different samples were due to the fact that there were differences in the population sizes. The size of the samples was based on Krejcie and Morgan (1970) table for determining sample size from a given population.

The following process was used to get the samples for the lecturers and students. The researcher identified and the defined the population groups. Within the population group, sample size of 100 for the lecturers, and 500 for the students was used. For each of the population group, the researcher listed all members of the population and assigned consecutive numbers to them. The numbers representing the subjects were then placed in a covered box and mixed well. A number was picked at a time and this was recorded and the corresponding subject ascertained. The picked number was not put back into the box again to avoid being picked again. This process was repeated until the required number of sample for the study was attained. It was expected that the responses, views and answers to the questionnaire of the sample would be true and fair representative of the entire population they represented.

Instrumentation

The main research instrument used was questionnaire which was complemented with interviews and analysis of documents. Three types of questionnaires were used, namely; faculty members' questionnaire (Appendix A), senior Administrative staff questionnaire (Appendix B), and students' questionnaire (Appendix C).

Faculty Members' Questionnaire

A 27-item questionnaire for lecturers was designed. Section A sought biographic information such as the respondent's age, rank, faculty and department. Section B was meant to gather information relating to availability, adequacy and location of ICT facilities. Section C mainly sought answers about the respondent's level of proficiency in ICT. The items in sections D, E, and F related to assessment of the quality and extent of the use of ICT in teaching and learning, research and academic information services (Library) respectively. Section G solicited questions with regard to ICT organizational support. Finally section H enquired about ICT constraints and needs in University of Cape Coast.

Senior Administrative Staff Questionnaire

The questionnaire for the senior Administrative staff consisted of 24 items grouped under 6 sections. Section A asked about respondent's biographic information. The items in section B solicited information regarding the

availability, adequacy and location of hardware and software. Section C sought to get answers about respondent's proficiency in ICT among others. Sections D enquired from the respondents the extent and quality of ICT in administration, whilst Section E solicited questions with regard to ICT organizational support. Finally section F enquired about ICT constraints and needs in University of Cape Coast.

Students' Questionnaire

A 22-item questionnaire was designed to solicit information from students. Section A consisted of biographic questions such as the age, sex, and faculty the respondent belongs. Section B asked questions relating to the availability and adequacy of ICT facilities. The items in Section C sought information about respondents' proficiency and frequency of use of ICT. Sections D and E enquired from the respondent an assessment and extent of how ICT is being applied with regard to the core functions of the University like teaching, learning, library services, etc. Lastly section F asked about ICT constraints and needs from the students' perceptive.

Data Administration and Collection

The data for the study were obtained mainly from primary sources and supplemented with those from secondary sources.

Allen (1999) wrote that primary data collection is necessary when a researcher cannot find the data needed in secondary sources. The primary data

was collected within 3 weeks in May, 2005. Three different sets of questionnaires as earlier mentioned were used as the research instrument for the data collection. They consisted mainly of close-ended pre-coded questions. Sarantakos (1998) has it that pre-coded questions have the advantage of being easy to administer, to code and to answer. The response sets were made up of numerical responses, Likert scales and ranking scales. Altogether 94 lecturers out of the 100 sample size responded to the questionnaire. In the case of the senior Administrative staff, 31 out of the sample size of 66 answered the questionnaire. For the students, the researcher got 384 out of the 500 sample size to respond to the questionnaire.

Besides the primary data, secondary data was also used for the study. Secondary data is pre-existing data, collected for another purpose. Since the information was collected for some other purpose, it may not satisfy the current needs of the researcher, either because the data needed by the researcher do not exist, or the data are not relevant to the current study. The secondary data were mainly gathered from the Internet, literature, and journal articles.

Prior to the collection of the primary data, the questionnaires were pre-tested with some lecturers, senior Administrative staff and students in the University of Cape Coast. This was done to enable the researcher ascertain how the respondents understand the questions, accept suggestions for improvements, and fine-tune the instrument where necessary.

Gay (1992) has it that, validity is the degree to which a test measures what it is supposed to measure. Therefore, in order to achieve high degree of content validity, the researcher made his Supervisor and some ICT experts in the

University of Cape thoroughly reviewed the questionnaires. This was to make sure that the questionnaire items were necessary for the topic under study, and also in their correct proportions.

To make sure that the questionnaires consistently measure what they should measure, the researcher did his best to make the questionnaire items as unambiguous as possible. Furthermore, the questionnaires were administered at times when the respondents were not tired or feel unmotivated. The afore-mentioned reduced errors of measurements and thus ensured high reliability.

Data Processing and Analysis

After pre-testing the instrument, the researcher administered the questionnaires to the various categories of respondents. The responded questionnaires were coded and subsequently inputted into a Statistical Package for Social Sciences (SPSS version 14) template that had been designed in consistent with the research instrument. The descriptive nature of the study made the researcher use descriptive statistical tools for the analysis of the data. The analysed data were then critically interpreted in relation to the research questions.

CHAPTER FOUR

RESULTS, FINDINGS AND DISCUSSIONS

This chapter provides analysis of the field data. The lecturers' questionnaires were analysed along the following areas: biographic data, accessibility or adequacy of ICT facilities, location of ICT facilities and reliability and speed of the University's Internet. Proficiency of lecturers in ICT, extent of the application of ICT in teaching, learning, research and library services were also looked into. Finally, the extent of usage of ICT in teaching, research, for library services as well as lecturers' appraisal to the quality of ICT organizational support, ICT constraints, and needs in the University were also examined.

The analysis of the administrators' questionnaires was done along the lines of the following: biographic data, availability or adequacy of ICT facilities, location of ICT facilities and their assessment of the speed and reliability of the University's Internet. Proficiency of administrators in ICT, extent of the application of ICT in administration and management were also analyzed. administrators' evaluation of the quality of ICT organizational support and ICT constraints and needs in University of Cape Coast were also examined.

The examination of the students' questionnaires was constituted as follows: biographic data, availability and adequacy of ICT facilities, and their assessment of the speed and reliability of the University's Internet. students' proficiency in ICT, application of ICT in teaching, learning and library services

and the extent to which ICT was being used in teaching and learning were also analyzed. ICT constraints and needs in the University were also evaluated.

Biographic Data

Lecturers' Biographic Data

The personal data of lecturers involved in the study have been presented in Tables 1, 2 and 3. Frequencies and simple percentages were used in representing the biographic data of the respondents.

Distribution of Lecturers by Sex

Responses with regard to the sex of the respondents are presented in Table 1.

Table 1: Distribution of Lecturers by Sex

Sex	Freq	%
Male	86	91.5
Female	8	8.5
Total	94	100.0

Source: Fieldwork, 2005

As shown in Table 1, 86 (91.5%) of the respondents were male lecturers whilst the remaining 8 (8.5%) were female lecturers. These figures correspond to the percentages of male and female lecturers at the University which was 90% and 10% respectively (University of Cape Coast, 2006).

It was important that there was proportionate random sampling to include female lecturers. This was because considering their number, even with simple random sampling it was possible no female would be selected. The inclusion of females was vital because as indicated by Hall (1984), women guess more accurately whether they are criticizing someone or discussing their divorce. Their perception of the availability and use of ICT facilities and services in the University of Cape Coast is therefore very crucial for this study since the University is making efforts to mainstream gender in its activities.

Rank of Lecturers

Responses about rank of respondents are shown in Table 2.

Table 2: Distribution of Lecturers by Rank.

Rank	Freq	%
Associate Professor	3	3.2
Senior Lecturer	25	26.6
Lecturer	66	70.2
Total	94	100.0

Source: Fieldwork, 2005

Musaazi (1977) observes that status strongly influences people's behaviour in organization. Results from Table 2 reveal that 3 (3.2%), 25 (26.6%) and 66 (70.2%) of the respondents were Associate Professors, Senior Lectures and Lecturers respectively. This was not so much at variance with what pertained

at the University of Cape Coast where 3.1%, 12.5%, 18.4% and 65.9% of the faculty members were Professors, Associate Professors, Senior Lecturers and Lecturers respectively (University of Cape Coast, 2006). This distribution shows that the questionnaires were responded to by University lecturers with varying degrees of years of service, experience and responsibilities.

Distribution of Lecturers across Faculties

The distribution of lecturers across the faculties is depicted in Table 3.

Table 3: Distribution of Lecturers across Faculties

Faculty	Freq	%
School of Agriculture	9	9.6
Faculty of Arts	14	14.9
Faculty of Education	32	34.1
Faculty of Science	21	22.3
Faculty of Social Sciences	18	19.1
Total	94	100.0

Source: Fieldwork, 2005

Table 3 reveals that 32 (34.1%) of the respondents representing the majority were from the Faculty of Education, whilst 9 (9.6%) being the least were from the School of Agriculture. Again, this trend was in line with what pertained on the ground so far as faculty members' strength relativities were concerned. The Faculty of Education had about 25% of the lecturers being the largest as

compared to the School of Agriculture which has 12% being the least. (University of Cape Coast, 2006).

It was important that the sample of lecturers cut across faculties and departments. This is because some of the faculties or departments through their own efforts were able to secure more computers than others, thus accessibility may vary from faculty to faculty. It is also vital to note that some faculties and departments were likely to make more use of information and communication technology by the nature of programmes or courses they offered. For instance lecturers in the Faculty of Science who teach students offering the computer science programme were more likely to be exposed to the information and communication technology than other lecturers elsewhere.

Senior Administrators' Biographic Data

Distribution of Senior Administrators by Sex

Table 4: Distribution of Senior Administrators by Sex

Gender	Freq	%
Male	25	80.6
Female	6	19.4
Total	31	100.0

Source: Fieldwork, 2005

From Table 4 it is observed that 25 (80.6%) of the respondents of the senior administrators were males and the remaining 6 (19.4%) females. The

sample was a true reflection of the male-female relativity of senior administrators on the ground where 81.2% and 18.8% of the staff were males and females respectively. (University of Cape Coast, 2006). For the findings of the study to be all encompassing, there was the need to have both males and females senior administrators as respondents.

Distribution of Senior Administrators across the Administrative Departments.

Distribution of respondents across the administrative departments is presented in Table 5.

Table 5: Distribution of Senior Administrators across the Administrative Departments.

Admin. Dept.	Freq	%
Registrar's Offices	27	87.0
Finance Office	2	6.5
Development and Estate	2	6.5
Total	31	100.0

Source: Fieldwork, 2005

As seen from Table 5, 27 (87.0%) of the respondents being the majority, worked directly under the Registrar's office, with 2 (6.5%) each from the Finance, and Development and Estates sections. It was no coincidence that the majority of the respondents were from the Registrar's offices as it was true reflection of what pertained in reality at the University where over 80% of the senior members who

were non-faculty members work under the Registrar's offices. (University of Cape Coast, 2006).

It is important that the respondents were randomly selected from the various administrative departments and sections. This is because some departments by the nature of their job were more likely to be exposed to computers and ICT. For instance the Data Processing Unit (DPU) which deals with the electronic processing of students' academic records would as a matter of necessity be more knowledgeable in the application of ICT for students' records and allied purposes.

Students' Biographic Data

Distribution of Students by Sex

Table 6 portrays the sex of the students who were surveyed.

Table 6: Distribution of Students by Sex

Gender	Freq	%
Male	233	60.7
Female	151	39.3
Total	384	100.0

Source: Fieldwork, 2005

The data in Table 6 shows that 233 (60.7%) males and 151 (39.3%) females students were involved in the study. The sample was not skewed in favour of males as it seems. It was in tune with the male and female students

relativity of the University which stood at 67% and 33% respectively. (University of Cape Coast, 2006). As a study which was carried out in a co-educational institution, it was important that the students' sample were constituted of both males and females so that the findings can truly be generalised as fair reflection of the state of affairs.

Distribution of Students across Faculties

The distribution of students based on their faculties has been presented in Table 7.

Table 7: Distribution of Students across Faculties

Faculty	Freq	%
School of Agriculture	51	13.3
Faculty of Arts	108	28.1
Faculty of Education	76	19.8
Faculty of Science	106	27.6
Faculty of Social Sciences	43	11.2
Total	384	100.0

Source: Fieldwork, 2005

Table 7 describes the percentages of respondents across the faculties. The faculties of Arts and Science which did not constitute majority of the students' population ironically had greater part of the respondents being; 108 (28.1%) and 106 (27.6%) correspondingly, with Faculty of Education, School of Agric and Faculty of Social Sciences each having 76 (19.8%), 51 (13.3%) and 43 (11.2%) in that order.

It is important that students involved in the study were drawn from all the faculties of the University, this is because students' exposure to ICT to some extent is influenced by the kind of programmes or courses they pursue. Those offering computer science and ICT related programmes for instance are likely to be more exposed and conversant in ICT than others.

Table 8: Distribution of Students across Levels

Level	Freq	%
Level 200	174	45.3
Level 300	134	34.9
Level 400	76	19.8
Total	384	100.0

Source: Fieldwork, 2005

Table 8 lays bare the distribution of the respondents across the levels. In all, 174 (45.3%), 134 (34.9%) and 76 (19.8%) were from levels 200, 300, and 400 respectively. This is an indication that the questionnaires were answered by students who had spent varying years on campus and therefore they were in a position to express their candid opinions from varying perspectives about the development, quality and use of ICT facilities on campus.

The Degree of Availability and Adequacy of ICT Facilities and Services

In an attempt to answer the above question, the researcher exposed the respondents to a series of questions, specified in the section B of the various categories of the research instruments. Among the parameters the researcher used were respondents' access to computers, the connectivity of the computers to the Internet, and the brand of computers respondents had access to. Respondents were further asked questions relating to their proximity to ICT facilities like the Personal Computer, Printer, Email and even how close they were to Information Technology Professionals who attended to them when they faced technical problems be it in the form of software or hardware. Their responses are presented in Tables 9, 10 and 11.

Accessibility to Computers

The responses of lecturers, senior administrators and students concerning their access to computers are presented in Table 9.

Table 9: Access to Computers

Responses	Lecturers		Senior Administrators		Students	
	Freq	%	Freq	%	Freq	%
Yes	90	95.7	30	96.8	161	41.9
No	4	4.3	1	3.2	223	58.1
Total	94	100.0	31	100.0	384	100.0

Source: Fieldwork, 2005

Table 9 reveals the responses from the respondents from the various samples when they were asked about their accessibility to computers. In all, 90 (95.7%), 30 (96.8%) and 161 (41.9%) of the Lectures, senior administrators and students respectively responded in the affirmative. Whilst majority of lecturers and senior administrators, had access to computers the same could not be said of the students as less than half of the students (41.9%) indicated they had access to computers.

Besides, the soaring students' population in relation to the existing ICT facilities, one obvious basis for the students' low access can be attributed to the fact that in some instances access to ICT facilities in the University was not free as sometimes it is on pay-as-you-use basis. Thus the ability to pay determines access to ICT service which does not augur well for an educational institution

such as the University because research undertaken by Vaa (n.d.) on ICT use in Education in Tonga disclosed that cost of access impedes ICT development.

Accessibility can also be evaluated from the computer-staff ratio, as well as computer-student ratio. Crude estimate of computers for non-teaching (administrative) purposes is put at 400, whilst that for students use is also approximated to be 1000. If the number of computers for administrative use and those for teaching purposes are compared with their corresponding users being the senior administrators on one hand and over 17,000 students on the other hand, it can be easily deduced that computer-staff ratio is comparatively encouraging where as computer-student ratio is very low.

This disclosure about students' low access to computers is obviously disturbing but it is no news as it confirms a study conducted by Association of African Universities in 1998, which found out that computers are scare in African Universities (Adubifa, 2001). The implication is that students are being denied access to such an important educational tool which is a sine qua non in teaching and learning. Thus the situation at University of Cape Coast should be a clarion call to management to put in place the necessary mechanisms to get more ICT facilities for lecturers and students so that the University can truly promote effective teaching and learning. As noted by Adubifa (2001), because the use of ICT tools is important in education, access to them become a matter of critical importance for any African University that seeks to become viable and effective in training its students.

Again, the relevance of accessibility to ICT cannot be underestimated as Okuni (2000) hinted that it is agreed that one of the conditions that spur the usage of ICT is that users should have access to the necessary equipment and infrastructure. This assertion was further supported by the Science Council of Japan when they echoed in a report that effective use of ICT varies depending upon the availability of infrastructures of a given society. All these are suggestive that access which invariably determines availability of ICT facilities is critical for their adoption and use.

Location of Computers for Respondents

To be able to have a truly objective view about the adequacy, accessibility and availability of ICT, the researcher also sought to find out the proximity of the ICT facilities to the respondents. The responses are presented in Table 10.

Table 10: Location of Computers

Location of Computer	Lecturers		Senior Administrators		Students	
	Freq	%	Freq	%	Freq	%
One's Office/ Dept	72	76.6	29	93.5	21	5.5
Another Office/ Location	22	23.4	2	6.5	363	94.5
Total	94	100.0	31	100.0	384	100.0

Source: Fieldwork, 2005

The responses in Table 10 further confirm lecturers and senior administrators' high access to computers as 72 (76.6%) and 29 (93.5%) of the respondents respectively had computers right on their desks, which was encouraging. The same, however, cannot be said for the students as just 21 (5.5%) of the students surveyed had computers located within their departments. Significantly this goes to support the students' claim that they did not have access to computers. The students indicated that they relied on computers at different departments such as the Computer Centre and the University's ICT centre for their computer needs.

The responses also revealed that though most lecturers had computers right on their desk, they had to rely on facilities and services like printers, digital cameras, scanners and Internet access which were located outside the premises of their offices. The respondents also indicated that help desk and technical support were even not available within their faculties but located outside their faculties.

These situations elaborated above are not very ideal since as a teaching-learning tool, ICT facilities should be as close to lecturers and students as possible. A prime implication on relying on ICT facilities and their accessories outside ones close proximity is that it undoubtedly leads to delays in producing ones output or results. Location of computer in terms of access seem important to students. It was thus not surprising that in a survey conducted by Tim Leamy at University of California, Davis in 1998, students indicated that they wanted and needed access to ICT in location which were close and convenient to use (Leamy, 1998).

Reliability and Speed of Internet

The researcher taking cognisance of the fact that the determinants of accessibility and availability are multifaceted, further asked users to appraise the reliability and speed of the University's Internet along a given continuum. The results are presented in the Table 11.

Table 11: Reliability and Speed of Internet

Responses	Lecturers		Senior Administrators		Students	
	Freq	%	Freq	%	Freq	%
Very Poor	4	4.3	1	3.2	62	16.5
Poor	21	22.3	9	29.0	91	24.1
Good	66	70.2	19	61.3	178	47.2
Very Good	3	3.2	2	6.5	46	12.2
Excellent	-	-	-	-	-	-
Total	94	100.0	31	100.0	377	100.0

Source: Fieldwork, 2005

Table 11 clearly shows that 4 (4.3%), 1 (3.2%) and 62 (16.5%) of the lecturers, senior administrators and students respectively indicated that the Internet services were 'Very Poor' whilst 3 (3.2%), 2 (6.5%) and 46 (12.2%) of the lecturers, senior administrators and students did say that the Internet services were 'Very Good'. No one vouched that the reliability and speed of the Internet was 'Excellent'. This was obviously due to the inadequate bandwidth size at the University which goes to confirm what Adubifa (2001) remarked that bandwidth serving African Universities is limited. However, this was not suggestive that the

services were horribly bad, as on the whole, over 60% of each of the three categories of respondents pointed out that the Internet services were 'Good' and 'Very Good'. This brings to light that contrary to perception, University of Cape Coast Internet users were 'some how' satisfied with the quality of Internet services. This disclosure is significant since the quality of Internet services to a larger extent determines how users adapt and adopt it as was informed in a survey at University of California, Davis in 1998 when the respondents who were students identified fast network access as one of the factors to improve overall ICT access (Leamy, 1998).

Additional information from the study within the context of accessibility and adequacy of ICT facilities indicated among others that not all computers in the University were hooked onto the Internet. A fair mix of Yes' and 'No' were recorded when respondents were asked to indicate whether their computers were hooked on the Internet. In today's era when the Internet has become an indispensable 'utility', next to water and electricity, it will be desirable if the University can put measures in place so that most computers on campus could be connected to the net to enhance their usefulness. This is because computers on the net afford users access to countless wealth of academic information. Such academic information may relate to new methods of teaching as well as emerging knowledge in the various disciplines as a result of research. It is important to note that even the findings of on-going researches are at times put on the net for the benefit of users. This undoubtedly can keep lecturers and students abreast with time.

Furthermore it was uncovered that there were myriad of computer brands such as Dell, Toshiba, Compaq, Hewlett Packard (HP), HP Compaq, Apple Macintosh, to mention but a few, in use at the University. This is to say that unlike some institutions, the University has not tied itself to any specific brand of computers. The implication is that the University is not benefiting from advantages such as economies of scale, ease of support, transferable of parts, and standardization that using the same brand computer gives. A study conducted by Lassiter (1996) revealed that though computer systems are basically alike, data gathered from the study showed there was a significant difference in the benefits provided by the systems especially as they related to cost control. This therefore gives credence to why computer users may have taste and preferences for different brands of hardware.

The following general deductions can be made about access to University of Cape Coast ICT infrastructure in general.

1. The type University of Cape Coast ICT infrastructure was made of fair mix of stand alone and networked computers. The networked ones were hooked onto the campus–wide backbone connecting various Local Area Networks (LANs), thus putting the University's type of infrastructure within the category of the appropriation stage, if it is graded along the criteria proposed by Adubifa (2001).
2. The University's type of carrier is made up of combinations of wired, wireless, fibre and VSAT technologies and other emerging technologies. Going by the yardstick proposed by Adubifa (2001), the University's type

of carrier can be placed at the invention stage, which happened to be the most desired stage.

3. The University's ICT infrastructure provides functionalities such as email, Internet, World Wide Web (WWW) access and video conferencing. This also puts the University's type of functionality into the invention stage, though the quality of the services may not be satisfactory as was indicated by the respondents in Table 11.

4. Accessibility for students to ICT infrastructure can be said to be just at the adoption stage given the low computer-student ratio. On the other hand that for the faculty members and senior Administrator can be put at the invention stage since the computer-staff ratio is comparatively encouraging.

Thus it can be inferred from the summary of the findings above that whilst the ICT infrastructure and technology were in place, their actual accessibility to students in particular was very low. This is most likely due to high students' numbers, coupled with limited ICT facilities as well as inadequate bandwidth.

The Extent of Proficiency in ICT by Faculty Members, Senior Administrators and Students

Tables (12 -15) have been generated from the respondents' responses to get a clue to the extent of proficiency in ICT by faculty members, senior administrators and students.

Table 12: The Extent of Proficiency in ICT by Faculty Members, Senior Administrators and Students

Category of users	Lecturers		Senior Administrators		Students	
	Freq	%	Freq	%	Freq	%
Beginner	18	19.1	11	35.5	146	38.5
Ordinary	68	72.4	19	61.3	201	53.1
Expert	8	8.5	1	3.2	32	8.4
Total	94	100.0	31	100.0	379	100.0

Source: Fieldwork, 2005

The answers from the respondents when they were asked about their level of ICT knowledge are summarized in Table 12. More than 50% from each of the samples graded themselves as being 'Ordinary', whilst 18 (19.1%), 11 (35.5%) and 146 (38.5%) of the lecturers, senior administrators and students respectively classified their knowledge in ICT as just 'Beginners'. Less than 10% within each category of the respondents identified themselves as 'Expert' ICT users, at least for the purpose of teaching, administration and learning as the case may be. The low figures recorded for 'Expert Users' is not ideal for the development and use of ICT in the University because research by Chifwepa (2003) as quoted by Watts

(2004) divulged that ICT know-how of staff stimulate the interest of users. Bosu (2000) also did not diverge when she observed that among the factors that propel the use of technology is the skill one has in it.

Cross Tabulation of Frequency of Respondents' use of ICT and their Proficiency in ICT

Tables 13, 14 and 15 show cross tabulations of respondents' frequency of use of ICT and their proficiency in ICT for lecturers, senior administrators and students respectively.

Table 13: Cross tabulation of Lecturers' Frequency of use of ICT and Proficiency of ICT

	Proficiency of ICT			Total
Responses	Beginner	Ordinary	Expert	
Rarely	4	3	-	7
	(4.2%)	(3.2%)		(7.4%)
Often	12	47	-	59
	(12.8%)	(50.0%)		(62.8%)
Very Often	1	11	16	28
	(1.1%)	(11.7%)	(17.0%)	(29.8%)
Total	17	61	16	94
	(18.1%)	(64.9%)	(17.0%)	(100%)

Source: Fieldwork, 2005

Table 14: Cross tabulation of Senior Administrators' Frequency of use of ICT and Proficiency of ICT

Responses	Proficiency of ICT Beginner	Ordinary	Expert	Total
Rarely	-	1 (3.2%)	-	1 (3.2%)
Often	10 (32.3%)	14 (45.2%)	-	24 (77.5%)
Very Often	1 (3.2%)	4 (12.9%)	1 (3.2%)	6 (19.3%)
Total	11 (35.5%)	19 (61.3%)	1 (3.2%)	31 (100.0%)

Source: Fieldwork, 2005

Table 15: Cross tabulation of Students' Frequency of use of ICT and Proficiency of ICT

Responses	Proficiency of ICT Beginner	Ordinary	Expert	Total
Rarely	120 (31.9%)	128 (34.1%)	17 (4.5%)	265 (70.5%)
Often	21 (5.6%)	58 (15.4%)	3 (0.8%)	82 (21.8%)
Very Often	3 (0.8%)	11 (2.9%)	15 (4.0%)	29 (7.7%)
Total	144 (38.3%)	197 (52.4%)	35 (9.3%)	376 (100%)

Source: Fieldwork, 2005

Tables 13, 14 and 15 reveal one common characteristic, that is, people who were beginners in computers rarely used the ICT facilities whilst conversely those who professed that they were well-versed in ICT used them often. The implication of this finding is not good for the development and use of ICT in the

University where the majority of the respondents graded their ICT skills as 'Beginner' and Ordinary'. Thus the University has to put in place proactive and pragmatic training programmes to sharpen the ICT skills of faculty members and students. They should also organize seminars on the importance of ICT in education to encourage those who are beginners in ICT to use it regularly and thus embrace it as an important tool.

Formal training in the use of ICT

Table 16 summarises the reply when the respondents were quizzed if they had ever received any formal training in the use of ICT, and if so whether the training was adequate in terms of their ICT needs.

Table 16: Training and the Adequacy of the Training in ICT

	Training on ICT Usage			Adequacy of Training		
	Lecturers	Senior Administrators	Students	Lecturers	Senior Administrators	Students
Yes	53 (56.4%)	28 (90.3%)	184 (47.9%)	5 (9.4%)	4 (14.3%)	44 (23.9%)
No	41 (43.6%)	3 (9.7%)	200 (52.1%)	48 (90.6%)	24 (85.7%)	140 (76.1%)
Total	94 (100.0%)	31 (100.0%)	384 (100.0%)	53 (100.0%)	28 (100.0%)	184 (100.0%)

Source: Fieldwork, 2005

From Table 16, though 53 (56.4%), 28 (90.3%) and 184 (47.9%) of the lecturers, senior administrators as well as students admitted that they had some sort of training on ICT, majority of them constituting 48 (90.6%), 24 (85.7%), and

140 (76.1%) were fast to add that the training that they had was grossly inadequate for them to be able to harness the ICT to facilitate their roles as lecturers, senior Administrators and students. The gap between respondents' ICT skills and ICT needs is a wake up call for the University to give regular training to both faculty members and senior Administrators on ICT skills as well as how they can integrate ICT in their jobs. With regard to the students, aspects of ICT both as a course and how students can tap its tools for learning should also form an integral part of the training at the University.

Training is indeed a prerequisite to the deployment and assimilation of any technology as was reiterated by Teale (1997) who observed that the gaps that prevent information technology from being fully used relate to knowledge, skill and desires. Thus if lecturers, Administrators and students are to be proficient in the use of ICT, then they need to avail themselves for training. It is gratifying to note that in reality lecturers of the University had always opted for training whenever they felt insufficient in some technology. According to Bosu (2000), lecturers at the University of Cape Coast supported the idea of training on the use audiovisual resources to facilitate their use and enhance teaching.

The fact that some of the respondents said that they had not received any training in ICT at all is a recipe for retardation in the use and development of ICT in University of Cape Coast. This inference goes to support what was identified by Veen (1993) which was referenced in a research carried out by BECTA (2004) that lack of training differentiated according to teachers' existing ICT skills level, constituted a barrier to the use of ICT in teaching.

The issue of education in ICT, availability and accessibility when put together takes a social dimension as spelt out by the Science Council of Japan when they said that the digital divide was not only drawn between the rich and poor but also educated and not-educated, and proposed that education in ICT, accessibility and availability have the inherent potential to narrow the imbalance due to the gap in income and infrastructure of the society. On the basis that the level of knowledge in ICT, availability and accessibility was not at its optimum in the University as depicted in some of the tables discussed earlier, the University should resolve to sit up in its quest to help bridge the digital gap by adopting and adapting ICT in its chore functions.

The Extent or Level of ICT Usage in Teaching and Learning

Table 17 depicts the breakdown of the responses from the lecturers about the extent of ICT usage in teaching and learning. lecturers were made to measure the degree of use of ICT for some specific purposes related to teaching and learning along a given continuum.

Table 17: The Extent or Level of ICT usage in Teaching and Learning

Rating	ICT to present Lectures	ICT to Receive Assignment	On-line Teaching and Learning	ICT to Dev. Curriculum	ICT to Provide Feedback
High	4 (4.3%)	-	-	28 (29.8%)	-
Fair	25 (26.6%)	4 (4.3%)	1 (1.1%)	30 (31.9%)	1 (1.1%)
Low	29 (30.8%)	7 (7.4%)	12 (12.7%)	23 (24.5%)	7 (7.4%)
Not at All	36 (38.3%)	83 (88.2%)	81 (86.2%)	13 (13.8%)	86 (91.5%)
Total	94 (100.0%)	94 (100.0%)	94 (100%)	94 (100.0%)	94 (100.0%)

Source: Fieldwork, 2005

It is visible from Table 17 that the application of ICT in teaching and learning was abysmally low. For instance ICT was not used by lecturers to present lectures, submit and receive assignment in the University of Cape Coast, a situation which is regrettable in this ICT-driven era given the numerous intrinsic worth gained when ICT is used to present lectures, submit and receive assignments. This suggests that the University was not fully taping ICT for teaching and learning, consequently the numerous merits associated with such approaches such as reaching wider audience, fast, interactive, convenience and personalised learning were all being lost.

The Extent or Level of ICT usage in Research

The responses with regard to lecturers' use of ICT in research are presented in Table 18.

Table 18: Rating for Areas where ICT was used for Research

Rating	ICT in Research	Statistical models & simulation	To collect academic information	To disseminate academic information	To collaborate research
High	38 (40.4%)	25 (26.6%)	35 (37.2%)	12 (12.8%)	14 (14.9%)
Fair	45 (47.9%)	49 (52.1%)	42 (44.7%)	37 (39.4%)	30 (31.9%)
Low	10 (10.6%)	14 (14.9%)	14 (14.9%)	38 (40.4%)	39 (41.5%)
Not At All	1 (1.1%)	6 (6.4%)	3 (3.2%)	7 (7.4%)	11 (11.7%)
Total	94 (100.0%)	94 (100.0%)	94 (100.0%)	94 (100.0%)	94 (100.0%)

Source: Fieldwork, 2005

Unlike the low penetration rate of ICT in teaching as exposed by the lecturers, it was encouraging to know from the lecturers that they were imbibing ICT in their research activities. This was indicated by the relatively high percentages recorded for the use of ICT in activities such as data analysis, collecting of information from the net and collaborating research worldwide which facilitates research. The comparatively low figures recorded for the extent of ICT to collect and disseminate academic information was not without a reason. It could be attributed to the fact that the University had not yet put in place a facility like a web server that would enable faculty members to publish their

research online. It is expected that with time when such a facility is availed to faculty members, more lecturers will use ICT to disseminate their academic works world wide.

The Extent of ICT Usage in the Management and Administration of the University

In order to know the extent of ICT usage in the management and administration of the University, senior Administrators were asked series of questions, the responses of which have been summarized in Tables 19 and 20. Table 21 displays some of the major applications or ICT tools that senior Administrators were using to facilitate their work.

Table 19: Major Administrative software in use

Freq.	Word process-Ing	Spread sheet	CAD	E-mail	Tel.	Fax	Photo-copy
Yes	31 (100.0%)	23 (74.2%)	2 (6.5%)	29 (93.5%)	31 (100.0%)	22 (71.0 %)	31 (100.0%)
No	-	8 (25.8%)	29 (93.5%)	2 (6.5 %)	-	9 (29.0%)	-
Total	31 (100.0%)	31 (100.0%)	31 (100.0%)	31 (100.0%)	31 (100.0%)	31 (100.0%)	31 (100.0%)

Source: Fieldwork, 2005

Table 20: The Extent of use of some Administrative Software and Facilities

Rating	Extent of ICT in HRM	Extent of ICT in Student Admin.	Extent of ICT in Financial Mgt .	Extent of ICT use in Assets Mgt	Extent of ICT use for Internal communication	Extent of ICT use for MIS
High	1 (3.2%)	27 (87.1%)	19 (61.3%)	-	1 (3.2%)	14 (45.1%)
Fair	7 (22.6%)	2 (6.5%)	8 (25.8%)	1 (3.2%)	2 (6.5%)	12 (38.7%)
Low	16 (51.6%)	1 (3.2%)	3 (9.7%)	4 (12.9%)	9 (29.0%)	3 (9.7%)
Not at All	7 (22.6%)	1 (3.2%)	1 (3.2%)	26 (83.9%)	19 (61.3%)	2 (6.5%)
Total	31 (100.0%)	31 (100.0%)	31 (100.0%)	31 (100.0%)	31 (100.0%)	31 (100.0%

Source: Fieldwork, 2005

Table 19 indicates the percentage of Administrators who were using some of the general ICT tools and applications for their job. As could be expected majority of the respondents indicated that they were using word processing, spreadsheets, emails, photocopiers, among others, to augment their duties. This is because today's desktop hardware and personal productivity software such as those afore mentioned have profound capabilities that are vital to Administrators.

The analysis of the data collected as exhibited in Table 20 reveals that as both data and knowledge workers, the University's Administrators use the types of ICT tools and information systems that fall into one of the following categories: Transaction Processing Systems (TPS), Office Automation Systems (OAS), Knowledge Work Systems (KWS) and Management Information Systems (MIS). According to ACCA (2002), a transaction processing systems is an

operational level systems that perform and record the daily routine transactions necessary to conduct business. Transaction processing systems routinely captures, processes, stores and outputs the low-level transaction data. Its processing method is either batch, on-line, or real time processing. These capabilities about transaction processing systems make them ideal and a handy tool to capture data and process words and documents. In the University for instance, the payroll system, registration system, and the assessment processing system are examples of batch, on-line and real time processing respectively.

Table 20 again indicates that 27 (87.1%) and 19 (61.3%) of the respondents were convinced that ICT usage or deployment in students administration and financial management respectively was high. The table however reveals that, ICT was virtually not used in the University's human resource management, assets management and for local internal communication. Besides the use of telephone, internal communication was mainly done in the conventional hardcopy mode and not electronically via University of Cape Coast's intranet. To ensure expeditious communication, the University should promote exchange of administrative memos, letters and notices through its Local Area Network (LAN).

Office Automation Systems (OAS) serve the needs of data workers at the knowledge level of the organization. A data worker is any staff that uses, manipulates and distributes information, and greater number of the University staff fall under this category. Typically, office automation create, handle and manage documents through word-processing, manage workflow and scheduling

through electronic calendars, communication through electronic mail, electronic bulletin boards, voice mail or teleconferencing. Spreadsheets, presentation packages like Microsoft PowerPoint are all part of office automation systems and are designed to increase the productivity of data workers in the office. Table 19 indicates that office automation systems were used intensively in the University as 31 (100.0%), 23 (74.2%) and 29 (93.5%) of the respondents said that they used word processing, spreadsheet and email services respectively as integral part of their chores. The high usage and integrating of the office automation systems into the day-to-day running of the University is an important development which cannot be underestimated because no organization can function effectively and efficiently without the deployment of some sort of office automation systems in this modern technological world.

Other categories of the staff also used knowledge work systems like Computer Aided Design (CAD) software to complement their work. Though from Table 19 only 2 (6.5%) answered that they use CAD, the small percentage recorded can be explained to mean that as a specialized system, CAD is mainly used by those in the construction industry, thus in places such as the University, it is only those knowledge workers such as Architects and Engineers in the field of construction in the development office who will have use for such systems.

The analysis (Table 20) also disclosed that ICT's application in Human Resource Management (HRM), and Assets Management was virtually non-existent in the University. It is unfortunate that the University has not automated its Human Resource Management and Assets Management. These

undoubtedly have implication on the duration and the accuracy of reports produced from those departments. Certainly delays and inaccuracies will affect management decisions.

With regard to the application of ICT in students administration, 27 (87.1%) of the respondents ranked it 'High'. This was true on the ground because the University has automated its students records right from admission, through to registration, assessments and examination, graduation, and issuing of transcripts. Thus ICT penetration in students' administration in the University was very high as evident from the way the respondents scored it. The implication is that students' accurate and timely reports of various dimensions for management decision purposes can be generated by the press of a button.

Also 19 (61.3%) of the respondents (a little above average) indicated that the extent of ICT in financial management was high. This perception about the extent of automation at the University's Finance Directorate was a true reflection of what was happening on the ground as truly not all the financial records had been automated. An interview with a senior Accountant revealed that most accounting issues were still recorded manually in books as against a fully desired integrated accounting systems that automatically does the postings to the appropriate accounting books once the transactions are captured at the source from their underlying transaction processing systems. It is unfortunate that the University still operated some manual accounting systems since such systems are slow in producing reports to management and also lend themselves to a number of abuses as compared to a fully automated accounting systems.

Pertaining to Management Information Systems (MIS), and the extent of ICT usage for MIS, 14 (45.2%), 12 (38.7%), 3 (9.7%) and 2 (6.5%) of the respondents indicated 'High', 'Fair', 'Low' and 'Not Used At All' respectively. An MIS according to Lucey (2004) is defined as:

> A system to convert data from internal and external sources into information, and to communicate that information, in an appropriate form to managers at all levels in all functions to enable them to make timely and effective decisions for planning, directing and controlling the activities for which they are responsible (p. 2).

This seemingly fair penetration of MIS does not augur well for the University, in the sense that the full benefits of MIS were being lost due to the absence of an integrated MIS that would have provided accurate, timely, summarised and relevant information that would assist management in their decision making processes. A plausible reason for the low penetration of MIS to assist in management decision making was the absence in the University of a fully-integrated information systems that had functions for all the core areas of the University and runs on the University's intranet.

From the analysis one can conclude that on the whole the extent of ICT in administration and management could be considered as being at the adaptation stage which is the stage of isolated automation of processes and functions in administration. Also what pertained at the University of Cape Coast could be described as non-integrated (standalone) information systems for

students records and some aspects of financial accounting. It is gratifying to note that plans were afoot to have an integrated information systems with functionalities for students' records managements, accounting, human resource management, management of digital information resources for digital library, as well as a hospital management systems, among others in place. This would enable the University meet the challenges that confronts its administration and management due to the complexities and demand of this epoch as well as soaring students and staff numbers.

Rating of ICT Applications in the Library

The critical roles libraries play in educational environments and the transformation they are undergoing in today's ICT driven epoch, propelled the researcher to know the extent of diffusion of ICT usage in the activities of the University library. Thus the lecturers and students were made to rank in their estimation how some ICT applications in library operations such as CD ROMs, digital information and Virtual Libraries were accessible in the library. The results are as displayed in Table 21.

Table 21: Rating of ICT Applications in the Library by Lecturers and Students

	Lecturers			Students		
	Library thro CD ROM	Virtual Libraries	Assist from Lib. Staff in the use of the facilities	Library thro CD ROM	Virtual Libraries	Assist from Lib. Staff in the use of the facilities
High	3 (3.2%)	2 (2.1%)	4 (4.3%)	28 (7.3%)	36 (9.4%)	30 (7.8%)
Fair	2 (2.1%)	2 (2.1%)	3 (3.2%)	63 (16.4%)	81 (21.1%)	73 (19.0%)
Low	26 (27.7%)	8 (8.5%)	32 (34.0%)	94 (24.5%)	79 (20.6%)	75 (19.6%)
Not at All	63 (67.0%)	82 (87.3%)	55 (58.5%)	199 (51.8%)	188 (48.9%)	206 (53.6%)
	94 (100.0)	94 (100.0%)	94 (100.0%)	384 (100.0%)	384 (100.0%)	384 (100.0%)

Source: Fieldwork, 2005

The application of ICT in contemporary libraries when the traditional libraries are giving way to virtual libraries is indispensable. ICT enlarges the scope of acquisition, processing, organization and dissemination of information. It was along this premise that Science Council of Japan remarked that virtual libraries accessible online were highly effective to provide knowledge with least cost. Unfortunately, Table 21 depicts low responses to the usage of CD ROMs, virtual library and other digital facilities available at the University of Cape Coast's Library. The low patronage of such important services was unfortunate given the fact that these services enable one to have electronic access to books

and journals that are outside the premises of a library. Though one was tempted to believe that probably users were not aware of such services, the truth is that enough publicity had been given to the members of the University community about the availability of such facilities at the library. Besides attitudinal factors and the fact that most students only read handouts given by their lecturers and thus do not read or consult many supplementary materials, the low patronage of those services could be attributed to the low proficiency in ICT by the users of the library which in a way does not propel them to use those ICT-based facilities. This is supported by a research undertaken by Williams, Wilson, Richardson, Tuson, & Coles (1998) which has proven that there is significant correlation between perceived level of competence and level of use of ICT. Therefore it is the view of this researcher that when ICT knowledge based of students and staff are enriched by training and retraining, it will evidently show and transcend in the way students and staff use and adopt ICT applications to support and facilitate their academic chores.

The research also sought to determine the level of support that users of the library received in their quest to use the available electronic facilities. Given the low level of proficiency of the respondents as discussed in earlier tables, it can be reasoned that not all users of the library had the basics for using the ICT facilities at the library, thus necessitating the need for the users to be assisted when they desire to use the ICT facilities at the library.

The reality is that user support in the use of the library has become paramount now than ever because according to Watts (2004) the use of ICT skills

spills over into all aspects of library work, and the explosion of electronic information library has resulted in the need for electronic user support. It is therefore unfortunate that majority of the respondents indicated that the support or assistance they receive from the library staff was low or such assistance was non-existence. One may be tempted to infer that that the low support users received from the staff of the library was a contributing factor to the low patronage of the electronic services available at the library. Thus a lot needs to be done by the library in the area of user support in their quest to increase the patronage of the electronic services.

Among the findings from this investigation was that the University's library had no Online Public Access Catalogue (OPAC) in place, but card catalogue, an unfortunate situation in this electronic age. Given the fact that there is an intersection between libraries and research capacities in Universities, there is an urgent need to have OPAC in place to facilitate easy access to the materials in the library to enhance research. The baseline truth is that the ability of a library to make its holdings easily accessible to researchers is very essential, thus necessitating the need for a facility like an OPAC.

To complement and supplement the information gathered from the respondents with regard to the use of ICT in the library, the researcher interviewed the Acting Librarian and sought from him how ICT was deployed in the activities at the library. He said the library was being automated in phases to meet the demands of the time. To this end he hinted that the library will take delivery of a software for management of digital information resources for digital

library. The acting librarian also revealed that some of the reading materials at the library are being digitized to make them more and easily accessible. The library is further enhancing its services to take care of the visually impaired, low vision, physically challenged students and students pursuing distance education programmes in the University.

It was gathered from the interview that the library subscribed to remote scholarly databases, but the Acting Librarian lamented that patronage was not encouraging except for some few postgraduate students who accessed them in the course of writing their thesis. The Acting Librarian also indicated that the Library had computers that were connected to the net and that they afforded users the opportunity to access information anywhere.

The Acting Librarian again said that because of the changing nature of information acquisition, training programmes had been organized for faculty members and post graduate students on the new ways of seeking information. In the same vein, the information retrieval courses for undergraduate students had been revised to reflect changing times, and that practical sessions had also been included to add meaning to the theoretical concepts taught.

It was also learned that the library had facilities such as Braille embossers, printers, scanners and digitizers. These equipment enable the library to transform and digitize scholarly information into a form accessible to the visually impaired students. ICT facilities that enable the blind to access the Internet were also available at the library.

It was also gathered from the interview that the library has well-trained supporting staff who give assistance to end-users who use the services. Given the low ICT knowledge base of staff and students as revealed by some earlier tables, the presence of such supporting staff and help desk staff should go a long way to encourage the patrons of the library to use the electronic facilities without anxiety.

ICT Organizational Support

Table 22 depicts the summarised responses of lecturers and senior Administrators to the question as to the availability or the absence of ICT organizational support in the University. ICT organizational support can mean the sum total of availability of help, assistance, managerial, operational and technical support in the use of ICT facilities as well as the provision of technical advice on hardware, software solutions and ICT technologies. It also encompasses the availability of adequate and competent IT staff for systems administration, database administration, webmaster, among others. Furthermore, it denotes the existence of accessible and working committees that define and monitor ICT policies and standards, committees responsible for the management and maintenance of ICT infrastructure and above all committees that consider ICT users needs. Organizational support is vital for institutions to enable promotion and extension of ICT development and use. Responses on the existence of organizational support are provided in Table 22.

Table 22:Responses on the Existence of Organizational Support by Lecturers and Senior Administrators

	Lecturers			Senior Administrators		
Freq.	Committee that define and monitor ICT policies and standards	Responsible for management and maintenance of ICT infrastruc-ture	Committee that consider ICT user's needs	Committee that define and monitor ICT policies and standards	Responsi-ble for managem-ent and maintena-nce of ICT infrastruc-ture	Commit-tee that consider ICT user's needs
Yes	49 (52.1%)	60 (63.8%)	51 (54.3%)	28 (90.3%)	26 (83.9%)	23 (74.2%)
No	45 (47.9%)	34 (36.2%)	43 (45.7%)	3 (9.7%)	5 (16.1%)	8 (25.8%)
Total	94 (100.0%)	94 (100.0%)	94 (100.0%)	31 (100.0%)	31 (100.0%)	31 (100.0%)

Source: Fieldwork, 2005

From Table 22, it can be deduced that whilst only average number of lecturers were aware of the existence of a committee or committees that support users in the development and use of ICT, majority of senior administrators were aware of the presence of such committees. One implication for this revelation is that most lecturers do not know where to express their concerns and suggestions on issues pertaining to the development and use of ICT. It is time that the University community are regularly informed about the existence of such support systems and additionally notified that they have faculty representatives on such committees through whom they can channel and express their concerns as well as suggestions on matters concerning ICT for attention.

Rating for Organizational Support

Knowledge about the existence of such committees alone was not enough, it was rather how far the committees were contributing towards the development and the use of ICT that mattered. It was against this background that the respondents were further quizzed to rank how far their expectations about the organizational support were met. The results are shown in Table 23.

Table 23: Rating for the Organizational Support by Lecturers and Senior Administrators

Rating	Lecturers		Senior Administrators	
	Freq	%	Freq	%
Very Satisfactory	-	-	-	-
Satisfactory	22	44.9	11	47.2
Not Satisfactory	27	55.1	12	52.8
Total	49	100.0	23	100.0

Source: Fieldwork, 2005

From Table 23, it is seen that only 49 of the lecturers and 23 senior administrators who claimed they were aware of the existence of organizational support responded to this question, with none of them indicating that the quality of organizational support was 'Very Satisfactory'. However, 22 (44.9%) and 11 (47.2%) of the lecturers and senior administrators respectively rated the services of the organizational support as 'Satisfactory' whilst the remaining relatively majority 27 (55.1%) and 12 (52.8%) of the lecturers and senior administrators

correspondingly appraised organizational support as 'Not Satisfactory'. The rating of the organizational support as only 'Satisfactory' and 'Not Satisfactory' was not surprising given the frustration lecturers and senior administrators said they were facing to get problems about their computers and networks issues resolved when they were confronted with one. This was so because the departments did not have IT technicians within their departments, and thus timely first line support services was lacking. They had to rely on the services of those at the Computer Centre or the Data Processing Unit who for genuine reasons may not be in a position to respond promptly to their request. It is therefore no wonder most of the users commented that there was the need to employ additional ICT technical staff and deploy them at the departments so that users' problems can receive swift attention, a suggestion the University management cannot disregard.

ICT Constraints and Needs in University of Cape Coast

The successful integration or otherwise of ICT in the teaching, research, learning, administration and for library services in a University is a function of several factors. Thus the researcher subjected the respondents to series of questions meant to find out the constraints inhibiting the use and development of ICT. The responses are summarized in Table 24.

Table 24: Constraints in the use and Development of ICT

Constraints	Lecturers		Senior Administrators		Students	
	Yes	No	Yes	No	Yes	No
Telecommunication and other relevant infrastructure	74 (78.7%)	20 (21.3%)	27 (87.1%)	4 (12.9%)	298 (77.6%)	86 (22.4%)
Low Bandwidth	80 (85.1%)	14 (14.9%)	31 (100.0%)	-	312 (81.3%)	72 (8.7%)
Electricity Supply	86 (91.5%)	8 (8.5%)	27 (87.1%)	4 (12.9%)	323 (84.1%)	61 (15.9%)
ICT Human Resources	60 (63.8%)	34 (36.2%)	22 (71.0)	9 (29.0)	273 (71.1%)	111 (28.9%)
Enabling Environment	59 (62.8%)	35 (37.2%)	19 (61.3%)	12 (38.7%)	290 (75.5%)	94 (24.5%)
Unreliable ISP	72 (76.6%)	22 (23.4%)	25 (80.6%)	6 (19.4%)	333 (86.7%)	51 (13.3%)
Telecomm or ICT policy matters	71 (75.5%)	23 (24.5%)	23 (74.2%)	9 (25.8%)	289 (75.3%)	95 (24.7)
Lack of awareness about the ICT	69 (69.1%)	25 (30.9%)	16 (51.6%)	15 (48.4%)	201 (52.3%)	183 (47.7%)
Funding	83 (88.3%)	11 (11.7%)	24 (77.4%)	7 (22.6%)	345 (89.8%)	39 (10.2%)
Cost of Equipment	82 (87.2%)	12 (12.8%)	26 (83.9%)	5 (16.1%)	331 (86.2%)	53 (13.8%)

Source: Fieldwork, 2005

Users identified the factors in Table 24 as some of the constraints and needs that affected the application and use of ICT in the University. Telecommunication and other relevant infrastructure, electricity supply,

unreliable internet services provider (ISP), funding, and cost of equipments, among others scored high as constraints.

Telecommunication and other Relevant Infrastructure

With the fusion of information technology and communication technology, telecommunication and other relevant infrastructure have become the engine on which ICT runs. Thus the state of the telecommunication infrastructure has an effect on the development and the use of ICT. The above statement makes telecommunication one of the core ICT infrastructure prerequisite. However the state of telecommunication infrastructure in Ghana and for that matter within institutions such as the University of Cape Coast cannot be said to be ideal. It was not therefore questionable that telecommunication was identified by a significant 74 (78.7%), 27 (87.1%) and 298 (77.6%) respectively of the lecturers, senior administrators and students as a need and constraint in the use of ICT in the University. A solid telecommunication services is sine qua non for Information and Communication Technology. That is why Professor Mike Oquaye, Minister of Communications hinted in the Saturday, February 17, 2007 edition of the Daily Graphic that the government of Ghana was to secure a $30 million Chinese loan towards the construction of a national fibre communication backbone. The minister said the government's quest to hook the entire country to the information superhighway would not be achieved if telephone services were not available in the remote areas, thus justifying the need for the loan.

In their paper on expansion of the Internet backbone in Ghana, Quaynor, Tevie & Bulley (1997) identified the lack of advanced infrastructure as a major problem to the development and use of Internet. These revelations thus have implication for the University since the state of telecommunication infrastructure in the University is intrinsically determined by the state of the national telecommunication infrastructure. Thus there is little that Universities in Ghana including University of Cape Coast can do if we do not have a government which has the political will to promote the development of ICT by putting in place the needed ICT telecommunication infrastructure.

Low Bandwidth

According Jensen (2006), bandwidth is valuable and costly resource, and demand for it usually exceeds the supply. Bandwidth has been described as the life blood of the world's knowledge economy, but it is scarcest in developing countries where it is most needed. The above depiction about bandwidth by Jensen in a paper entitled 'Open Access - Lowering the costs of international bandwidth in Africa' points to the fact that bandwidth is simply scarce in Africa. Its scarcity has been attributed primarily to the high cost of international connections to global telecommunication backbone. Jensen revealed that the cost of bandwidth for schools and institutions in developing countries is usually many times higher than their counterparts in the developed world. This situation continues to widen the digital divide and has serious implication for the

development and use of ICT in institutions of higher learning in developing world.

The University's current Internet bandwidth of 1.5Mbps downlink and 0.5Mbps uplink was not optimum for the over 3000 staff and over 17,000 students. Unfortunately the University was constraint by financial resources thus making the Internet connectivity slow during prime times. This background information accounted for the high percentage of lecturers, senior administrators and students recording 85.1%, 100% and 81.3% respectively who identified bandwidth as a constraint. The simple truth is that without sufficient bandwidth and its effective management, Universities cannot meet their objectives and provide an appropriate environment for teaching, learning, research, management and administration as well for library services because limited bandwidth leads to Internet traffic congestion or saturation. Thus, there is the need for the University to increase and manage its bandwidth. A survey on information communication technology in Malta schools carried in 2003-2004 and published by the National Statistical Office observed, that a faster bandwidth connectivity service will satisfy innovative ICT needs and applications within schools (Malta National Statistics Office, 2004). All said, low bandwidth is a deterrent to the use of ICT, it will also not support increased use and application of ICT in the University.

Electricity Supply

Electricity supply was also identified as a big constraint in the development of ICT apparently due to the frequent power outages. Unstable

power also results in power surges and spikes that often led to the breakdown of ICT equipment that eventually results in the unavailability of ICT services. Erratic power supply and the absence of long backup power systems such as generators are a bane to ICT growth, that was why respondents with one big voice identified it as a major limitation. This goes to support what Rama Rao (2004) observed that power supply was a serious constraint because it leads to systems up time not being available.

ICT Human Resource

The ICT Human Resource base for Ghanaian Universities is low and the University of Cape Coast was no exception. The reason for such a situation is not far fetched, it has to do with the poor nature of remuneration and other conditions of services at the state-owned Universities, which do not attract quality ICT staff to the Universities, thus making quality and number of ICT staff inadequate at the Universities. This situation accounted for the 60 (63.8%), 22 (71.0%) and 273 (71.1%) of lecturers, senior administrators and students respectively indicating that lack of ICT human resource was a major constraint, which invariable affected the development and use of ICT in the institution. Lim (1999) also attested to the fact that ICT human resource was scarce and thus a barrier to ICT development. Lim further observed that too much emphasis had been placed upon the development of ICT infrastructure in developing countries, and not enough consideration had been given to human resource development, thus causing imbalance. Adubifa (2001) also identified ICT human resource as

critical constraint and attributed the ICT human resource deficit in the African Universities to the inadequate external and internal training programmes for critical skills to manage and support ICT functions.

Unreliable ISP

The phenomenal high numbers of 72 (76.6%), 25 (80.6%), and 333 (86.7%) of lecturers, senior administrators and students correspondingly who maintained that unreliable Internet Service Providers (ISPs) was as an impediment was not a sham but a true reflection of the state of affairs. Unreliable Internet Service Providers can be attributed to multifaceted factors such as poor state of the telecommunication infrastructure, unreliable power supply, and most of all, the high fee charged by the ISPs. Besides these setbacks, a major problem was that most of the ISPs mainly operated from Accra. Probably the fact that each ISP connected to the international Internet links independently in Ghana as there was no local Internet exchange or peering, (meaning local Internet exchange traffic had to reach the international link before it dropped back to Ghana) could also be a contributing factor to the unsatisfactory quality and high cost of services rendered by some of the ISPs.

Lack of awareness about ICT

According to Leeming (2003), awareness is an integral part of the process of motivating members of a community to use ICT. The inference from this statement is that lack of awareness could be a curse to the development of ICT. It

was therefore not surprising that 69 (73.4%), 16 (51.6%), and 201 (52.3%) of the lecturers, senior administrators and students surveyed respectively thought lack of awareness was also a constraint and saw it a barrier to the development of ICT in the University. Lack of awareness about the potentials of a tool hinders the appropriation of useful technology. In a paper submitted by David Leeming in 2003 during a round table discussion on developing countries access to scientific knowledge, at the Abdus Salam ICTP, Trieste, Italy, Leeming identified lack of awareness about ICT as a major obstacle to development and use of ICT. Chifwepa (2003) also collaborated with Leeming when he observed in his investigation that lack of awareness of users were important impact factor in the use of internet in the University of Zambia.

Funding

Universities face a lot of funding constraints that often deter or prohibit them from investing heavily in ICT. Lack of guaranteed recurrent funding makes sustainability of ICT solutions remains an issue that threaten or deter Universities from making strategic investment in ICT. It is therefore not surprising that a high percentage of lecturers, senior administrators and students made up of 88.3%, 77.4% and 89.8% respectively indicated that lack of funding was a major constraint to ICT development. The graveness of lack of funding is that it affects all facets of the development and use of ICT such as the development of infrastructure, procurement of hardware and software. Lack of funding may even result in the denial of training for both technical supporting staff and users of ICT

facilities, which consequently has detrimental effects on the development and use of ICT.

It is important to divulge that this research is not the first to disclose that funding is a major constraint in the development and use of ICT. This finding only collaborates other works as literature is replete with such findings such as those of Adubifa (2001) and Vaa (n.d.). Vaa in a paper on the use of ICT in education in the Tonga Island revealed that computer training programmes were not implemented due to lack of funding.

Cost of Equipment

The fact that majority of the respondents constituted by 82 (87.2%), 26 (83.9%), and 331 (86.2%) of the lecturers, senior administrators and students respectively identified cost of equipment as a constraint points to the reality that it was a major impediment to the use and development of ICT. This finding supports the work of Cox, Preston, & Cox (1999), which equally identified cost of acquiring, using and maintaining ICT resources as barrier in the use of ICT.

Although the prices of ICT and their related accessories are nose diving at the international level, the economic situation in a developing country like Ghana and the high national import tariff level make them expensive to procure locally. The cost of equipment also becomes a major problem because most institutions do not have ICT strategic plan they follow. This means ICT equipment are not even budgeted for, hence ICT developments are carried out in ad-hoc basis.

In summarising the constraints identified in this study, it is important to indicate that most of those revealed by this study had been also pinpointed by other studies such as those of Adubifa (2001), Intsiful, Okyere & Osae (2003) and Saysuliane (2003). These studies thus vindicate and collaborate the viewpoints of the respondents of this research.

The need of ICT for Teaching

The researcher in his attempt to ascertain how the respondents perceive the importance of ICT for teaching, requested them to indicate by rating their responses from 'Very High' to 'Very Low'. The responses are presented in Table 25.

Table 25: Ranking for the need of ICT for Teaching by Respondents

	Lecturers		Senior Administrators		Students	
Ranking	Freq	%	Freq	%	Freq	%
Very High	81	86.2	26	83.9	305	79.4
High	13	13.8	2	6.4	23	6.0
Fair	-	-	3	9.7	32	8.3
Low	-	-	-	-	24	6.3
Very Low	-	-	-	-	-	-
Total	94	100.0	31	100.0	384	100.0

Source: Fieldwork, 2005

Because of the intrinsic worth of ICT in teaching, it is not surprising that high percentages were recorded at the upper continuum of 'Very High' and 'High' for faculty members use of ICT for teaching. As seen from Table 25, over 79% of each of the category of respondents prioritized the need for ICT in

teaching as 'Very High'. This revelation underscores the conviction people have in ICT and its tools when it comes to its application in the art of teaching. In a user story to share her experience in ICT in teaching, Sue Sweet, a firm believer in the importance of ICT in the classroom said it all when she wrote teaching with ICT is terrific (Sweet, n.d.).

It is encouraging that greater percentages of the respondents have high perceptions about the importance of ICT in teaching because teachers and students are more likely to promote ICT in teaching when they have the belief that ICT is a good tool for teaching. The high percentage recorded also underscored the fact that the respondents were aware of the value of ICT in teaching. These high percentages far outweigh that registered in a study conducted by Galanouli and McNair (2001) which disclosed that only a mean 52% of those who were surveyed in a research believed that school teachers were aware of the importance of ICT in teaching. A plausible reason that accounts for such high difference in the awareness of ICT in teaching could be that peoples' perception about the usefulness of the ICT is now very high, whilst their ignorance about it is now low compared to the year 2001 when Galanouli and McNair carried out their research.

The need of ICT for Learning

Respondents were further asked to indicate in their view, the significance of ICT for learning in the University by rating their responses from 'Very High' to 'Very Low'. The responses are presented in Table 26.

Table 26: Ranking for the need of ICT for Learning by Respondents

	Lecturers		Senior Administrators		Students	
Responses	Freq	%	Freq	%	Freq	%
Very High	51	54.2	17	54.8	273	71.1
High	39	41.5	14	45.2	55	14.3
Fair	4	4.3	-	-	56	14.6
Low	-	-	-	-	-	-
Very Low	-	-	-	-	-	-
Total	94	100.0	31	100.0	384	100.0

Source: Fieldwork, 2005

Table 26 suggests that respondents put high premium on ICT as an indispensable tool in learning as over 84% of the various category of respondents ranked ICT as 'Very High' and 'High' when they were asked to prioritize how vital ICT was for learning along some given continuum. The answers from the question implied that the respondents believed learning could be enhanced by ICT in higher education. Probably, the increasing importance of ICT in open learning environments and virtual teaching, as well as the fact that ICT software for learning are interactive, can be personalized, giving instant feedback to assist in remedial measures were some of the reasons which might have influenced the respondents' decision to rate the need for ICT in teaching very high.

The need of ICT for Research

Respondents were also asked to indicate in their view, the importance of ICT for research in the University by rating their responses from 'Very High' to 'Very Low'. The responses are presented in Table 27.

Table 27: Ranking for the need of ICT for Research by Respondents

	Lecturers		Senior Administrators		Students	
Responses	Freq	%	Freq	%	Freq	%
Very High	84	89.4	16	51.6	226	58.8
High	10	10.6	15	48.4	38	9.9
Fair	-	-	-	-	51	13.3
Low	-	-	-	-	31	8.1
Very Low	-	-	-	-	38	9.9
Total	94	100.0	31	100.0	384	100.0

Source: Fieldwork, 2005

From Table 27, 89.4%, 51.6% and 58.8% of the lecturers, senior administrators and students respectively attested to the importance of ICT as an indispensable tool for research when they ranked it as 'Very High' when quizzed to prioritize the importance of ICT in research along a given range. It is significant to see that as much as 89.4% of the lecturers ranked the need of ICT for research as 'Very High'. This is because as lecturers, research is one of their core functions. The wealth of scholarly materials accessible on the net, and its capabilities to disseminate academic information make it a handy tool for lecturers for research purposes. It was therefore not surprising when the majority of the lecturers ranked ICT as a tool for research purposes 'Very High'.

The need of ICT for Library Services

Table 28 shows how the respondents advocated for the importance of ICT in library and archival services in the University.

Table 28: Ranking for the need of ICT for Library Services by Respondents

	Lecturers		Senior Administrators		Students	
Responses	Freq	%	Freq	%	Freq	%
Very High	33	35.1	14	45.1	174	45.3
High	44	46.8	9	29.1	53	13.8
Fair	17	18.1	8	25.8	49	12.8
Low	-	-	-	-	53	13.8
Very Low	-	-	-	-	55	14.3
Total	94	100.0	31	100.0	384	100.0

Source: Fieldwork, 2005

From Table 28, though the figures shown are not as high as those recorded for teaching, learning and research, the respondents by no way demeaned the resourcefulness of ICT for library management and services. This is because over 50% of each category of respondents placed ICT need for library in the upper ranges of 'Very High' and 'High'.

The usefulness of ICT for library services which guided the respondents in their responses cannot be over emphasised because among others, ICT offers virtual libraries and other electronic facilities which extends the accessibility of books and journals beyond the four walls of the physical library.

The need of ICT for Management and Administration

Table 29 represents what the respondents indicated when they were asked to point out the extent of the importance of ICT in the management and administration of the University.

Table 29: Ranking for the need of ICT for Management and Administration by Respondents

	Lecturers		Senior Administrators		Students	
Responses	Freq	%	Freq	%	Freq	%
Very High	33	35.1	16	51.6	201	52.3
High	40	42.6	15	48.4	119	31.0
Fair	21	22.3	-	-	64	16.7
Low	-	-	-	-	-	-
Very Low	-	-	-	-	-	-
Total	94	100.0	31	100.0	384	100.0

Source: Fieldwork, 2005

As with the previous responses when they were asked to indicate the importance or the need of ICT in their core duties of teaching, learning, research and in library services, respondents accentuated the significance of ICT in administration and management by the high figures recorded for 'Very High' and 'High' by all the three categories of respondents. These high responses meant that the respondents were aware of the capabilities of ICT in administration and management and given the opportunity those respondents who have decision making authorities are likely to take decisions that will lead to the development

and use of ICT in the day-to-day administration and management at the University.

Overall Rating of ICT facilities on Campus by Respondents

Table 30 represents users' responses when they were asked to assess the quality of ICT facilities and services in general at the University. This was to enable the researcher know users' impression about the ICT facilities.

Table 30: Overall Rating for ICT Facilities on Campus by Respondents

	Lecturers		Senior Administrators		Students	
Responses	Freq	%	Freq	%	Freq	%
Very satisfactory	1	1.1	1	3.2	9	2.3
Satisfactory	64	68.1	26	83.9	172	44.8
Not Satisfactory	29	30.8	4	12.9	203	52.9
Total	94	100.0	31	100.0	384	100.0

Source: Fieldwork, 2005

Marginal proportions of 1.1%, 3.1% and 2.3% of the lecturers, senior administrators and students respectively rated the services as 'Very Satisfactory', whilst a significant proportion of the users were just satisfied with the ICT facilities on campus. This exposure was not surprising as the respondent's earlier responses expressed their dissatisfaction with most of the parameters that determines quality of ICT infrastructure such as accessibility, availability and speed of the Internet. This is an indication that they were not generally very

satisfied with the quality of ICT services provided. This means that there is room for improvement with regard to the development and use of ICT facilities on campus which needs to be of concern to management if the maximum benefits are to be accrued from the deployment of ICT in the University.

The Extent to which ICT has improved University's Core Functions

In an attempt to know how ICT has improved users' core function of teaching and research, management and administration, and learning for lecturers, senior administrators and students respectively, respondents were asked to indicate their responses along a given scale ranging from 'Excellent' to 'Fair'.

Table 31: The Extent to which ICT has improved core functions at the University

	Lecturers - Teaching/Research		Senior Administrators – Admin/Mgt		Students – Learning	
Responses	Freq	%	Freq	%	Freq	%
Excellent	-	-	-	-	-	-
Very Good	50	53.1	2	6.5	87	22.7
Good	40	42.6	25	80.6	195	50.8
Fair	4	4.3	4	12.9	102	26.5
Total	94	100.0	31	100.0	384	100.0

Source: Fieldwork, 2005

It is satisfying to read from Table 31 that the users responses indicated that ICT had appreciably improved upon their duties as high percentages of the responses fell within the upper ranges of 'Very Good' and 'Good'. This suggests that if some of the underlying challenges such as the seemingly inadequacies of the ICT infrastructure in general and low level of proficiency in ICT skills, among

others are attended to, the extent to which ICT improves users' chores or functions will appreciate significantly for the benefit of the University.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

The main motivation of this study was to investigate into the adequacy and utilization of ICT facilities in the University of Cape Coast. It was largely a descriptive survey aimed at answering the following research questions:

1. What is the degree of availability and adequacy of ICT facilities and services?
2. What is the extent of proficiency in ICT by faculty members, staff and students?
3. What is the extent or level of ICT usage in teaching?
4. What is the extent or level of ICT usage in research?
5. What is the extent or level of ICT usage in learning?
6. What is the level of ICT usage in the management and administration of the University?
7. How has ICT improved or enhanced the quality of management and administration of the University?
8. What is the degree of ICT usage in academic information services (Library)?
9. What are the ICT constraints and needs at the University?
10. What type and extent of ICT organizational support are available to users in the University?

Summary of Research Procedures

Three different types of questionnaires were used to solicit information from the three categories of target groups, namely; lecturers, senior administrators and students. Except for one questionnaire item in each of the three categories of questionnaires, all the questionnaire items were close-ended ones.

In all, 94 lecturers across all the faculties in the University, made up of 86 males and 8 females responded to the lecturers' questionnaire. In terms of ranks, they comprised 3, 25, and 66 representing Associate Professors, senior Lecturers and Lecturers respectively. With regard to the senior administrators, a total of 31 people involving 25 males and 6 females were surveyed, and they were made up of Deputy Registrars and their equivalents, Senior Assistant Registrar and their comparables as well as Assistant Registrars and their counterparts. Pertaining to the students, 384 of them comprising 233 males and 151 females were sampled for the study, and they involved level 200 to level 400 students undertaking various programmes from faculties of arts, education, science, social sciences and school of agriculture.

As a mainly descriptive study, quantitative methods involving largely frequencies, percentages and cross tabulations were used to analyze the data collected. Tables were also used to facilitate the analysis of the data.

Summary of Main Findings

The results of the study were discussed according to the sub-headings which corresponded to the sections of the instrument. Based on the lecturers', senior administrators' and students' responses to the questionnaires the following are enumerated as findings:

1. The degree of availability and adequacy of ICT facilities and services to lecturers, senior administrators and students varies. Whilst lecturers and senior administrators access to ICT facilities could be said to be satisfactory, although in some cases the location of the ICT facilities were outside one's office, the same however, could not be said about the students as they did not have easy access to ICT facilities. In some instances students even had to pay for use of ICT facilities and services.
2. Against the background of low bandwidth and sometimes unavailability of Internet services, some of the respondents ranked the services as 'very poor', though a slight majority graded the services as 'good'.
3. The extent of proficiency in ICT by all the category of respondents indicated that there was room for improvement as largely, all respondents graded their knowledge in the science and art of using ICT as beginners and ordinary.
4. There was low penetration of ICT in teaching and learning. The use of ICT in research was however fairly satisfactory as lecturers were imbibing ICT in their research activities.

5. The lecturers and students who were using ICT for teaching, research and learning were frustrated by the inadequate ICT infrastructure

6. Pertaining to administration and management, it was found that ICT penetration was satisfactory at the operational level of management where transaction processing systems and office automation systems were very applicable. The management of the students' records probably stood out to be the most automated area with regard to the administration and management of the University. The finance office also had a computerised payroll systems in place which however fell short of what could be called a complete integrated accounting package because it was limited to payroll functions.

7. Concerning the library, apart from the provision of Internet services from some few computers and CD ROMs, which were used to facilitate accessibility to electronic materials, the library cannot be said to be automated. It was however, heart warming to know that a major automation of the management, operations and services at the library was underway in phases.

8. The research ascertained the following as the major constraints to the development and use of ICT in the University:

    i. Poor telecommunication and other relevant infrastructure.
    ii. Low Bandwidth.
    iii. Unreliable and stable electricity supply.
    iv. Inadequate ICT human resource personnel.

v. Enabling Environment.

vi. Unreliable ISP.

vii. Telecommunication or ICT policy matters.

viii. Lack of awareness about the ICT in the University.

ix. Funding.

x. Cost of Equipment.

9. The quality of ICT organizational support at the University was not satisfactory. This could be attributed to some reasons among which were the inadequate ICT staff, the absence of ICT help desk, and the centralization of the ICT technical staff at the computer centre and the Data Processing Unit, which all result in delays in attending to users' complaints. Also majority of the faculty members did not know that there existed ICT committee that among others defined and monitored ICT policies and standards as well as considered ICT users' needs.

10. The respondents overwhelmingly advocated for high application of ICT in all facets of the University life, such as teaching, learning, research, management and administration as well as for the library services.

Conclusion

From the findings of the study the following conclusions can be drawn:

1. ICT use or penetration in the University of Cape Coast is inadequate or low and needs to be improved significantly.
2. Lack of adequate ICT facilities and infrastructure hampered ICT use in the performance of the University's core functions of teaching, learning and research.
3. The injection of the necessary resources such as hardware, software, communication equipment and including personnel would help improve the development and use of ICT in the University.
4. The ICT knowledge-based for both staff and students was at a low level to enable them adopt and harness the mass of academic resources that ICT avails.

Recommendation for Practice

In the light of the findings and conclusions of the study, the following recommendations are made to the management of the University to ensure high diffusion of ICT application in the University:

1. There is overwhelming need for the University to set up departmental ICT laboratories that are integral part of campus network and which are equipped with software and peripherals that will facilitate teaching, learning, and research.

2. There is the need to overhaul the University's physical network infrastructure, including the replacement of the obsolete communication equipment at the University's Network Operating Centre (NOC) so as to address some perennial operational problems. There is also urgent need to hook other unconnected areas such as the hospital, development office and the halls of residence (especially the hall libraries) to the University's network so that the desired ICT penetration can be attained.

3. Because bandwidth is probably the single most critical resource at the disposal of modern organizations, the University should make a concerted effort to buy bigger bandwidth to enhance the quality of its Internet speed.

4. Vigorous ICT educational campaign should be organized to drum home the importance of ICT for teaching, learning and research in an educational institution such as University of Cape Coast.

5. The University should facilitate or guarantee for lecturers to purchase their own personal computers through the provision of 'soft' loans as a means of improving ICT access.

6. Training, workshops and seminars should be organised for lecturers regularly so as to augment their knowledge base in ICT so that they will feel motivated and confident to use ICT in their work.

7. Students should be introduced to the wealth of resources and educational software available on the net that will enhance learning.

8. The University should have an integrated information systems in place that will cater for all its major facets of operation.

9. Adequate computers should be made available within the library to facilitate retrieving information from online databases, CD ROMs and also from the net.

10. The library should make concerted efforts to let its patrons patronize its CD ROMs.

11. The library should be accessible on the University's intranet such that the library's online and digitized educational materials could be accessible by staff and students anywhere on campus once their computers are part of the campus intranet. This will go a long way to ease pressure on the few ICT facilities at the main library as well as increase the patronage of the library's electronic materials.

12. The ICT organizational support should be proactive, accommodative and receptive to users' suggestions and respond to users' needs adequately and have an efficient help desk that promptly attends to users' problems.

13. There should be improved access to technical support and expertise by offering some level of support campus-wide and establishing a single point of contact for those seeking information and communication technology resources.

14. All IT support staff should be competent in their areas of responsibility. To this end the University should recruit, train and retrain adequate ICT personnel to operate, maintain, and manage its ICT investments.

15. The University should equip more lecture rooms than at present with network access so that Internet access is within reach to make it possible

for lecturers to visit some web sites during lectures. In this direction, it is passionately suggested that the Local Area Network (LAN) aspects of network are incorporated in buildings under constructing so that when completed, such building are about network ready, thus saving the University from fitting these external retrofits.

16. There should be provision of telejectors and other computer-related projectors in the lecture halls to facilitate the use of presentation software such as Microsoft PowerPoint to enhance and facilitate teaching and learning.

17. There should be provision of stable and reliable electricity supply. To this end there should be availability of power backups that will ensure continuous power supply should the main electricity goes off.

18. Charges for the usage of ICT for students should be free or moderate. This will motivate students to use the facilities for their educational enterprise.

19. ICT user policy should be in place and enforced in the University so that the facilities are used in a regulated manner to achieve maximum benefit. ICT user policies are essential, in that they provide the framework for defining how a network is to be used beneficially.

20. All undergraduate programmes should have ICT as an important aspect of their curricula. Furtherance to this, a course in ICT that will assist students in their studies should be introduced and made compulsory for level 100 students.

21 The University should encourage the development of personal webpage for lecturers where they can publish academic materials such as lesson notes and researches to make them easily accessible to students.

22. The University must have good salary packages to reward excellence and to maintain a degree of parity with industry in recruiting and retaining professional IT Staff.

Suggestions for Future Research

1. The research could be replicated in other Universities in the country so that the findings could be generalised as a true reflection of what pertains in Ghanaian Universities.

2. Future work should extend the target group to cover other stakeholders such as senior staff and junior staff who were not covered in this study.

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APPENDIX A

LECTURERS' QUESTIONNAIRE

AN ASSESSMENT OF THE ADEQUACY AND UTILIZATION OF IINFORMATION AND COMMUNICATION TECHNOLOGY (ICT) IN THE UNIVERSITY OF CAPE COAST

The purpose of this questionnaire is to have an overview of the state of the availability, use and application of ICT in University of Cape Coast as it relates to facilitating teaching, learning, research, library, and management information services support.
You are assured of the confidentiality of your responses, so I would be most grateful if you could answer the questions as candid as possible.
Thank you.

Instruction: Please mark 'X' in the appropriate box.

SECTION A: BIOGRAPHIC DATA

1. Gender: 1 [ ] Male 2 [ ] Female

2. Age (as at last birthday):
   1 [ ] 20-29 2 [ ] 30-39 3 [ ] 40-49 4 [ ] 50-60 5 [ ] 60+

3. Rank: 1 [ ] Professor 2 [ ] Assoc Prof 3 [ ] Snr. Lecturer 4 [ ] Lecturer

4. Department :.....

5. Faculty: 1 [ ] Agric 2 [ ] Arts 3 [ ] Education 4 [ ] Science 5 [ ] Social Sciences

SECTION B: AVAILABILITY, ADEQUACY AND LOCATION OF ICT FACILITIES

6. Do you have access to computer(s) for your job?
   1 Yes [ ] 2 No [ ]

7. If your response to **Q6 is 'YES'**, Are the Computers available to you .....
   1 [ ] Stand Alone
   2 [ ] Networked computer

8. If your response to **Q6 is 'YES'**, Please indicate the type (make) of computers available to you. (Tick as many as applicable)

1 ☐ IBM
2 ☐ Compaq
3 ☐ Hewlett Packard (HP)
4 ☐ HP Compaq
5 ☐ Toshiba
6 ☐ Expert Computer
7 ☐ Del
8 ☐ Others (Specify) _____

9. Which of the following Information and Communication Technology (ICT) tools/ application software do you or your supporting staff use for their work? (Tick as many as applicable)

1 ☐ Word Processing
2 ☐ Spreadsheet
3 ☐ Desktop Publishing
4 ☐ Database Management Systems
5 ☐ Presentation Software (eg. PowerPoint)
6 ☐ E-mail
7 ☐ Internet Access
8 ☐ Others (Specify) _____

10. Using the options provided, indicate by marking 'X' in the space below the location of ICT resources available to you..

RESOURCE	**LOCATION**					
	Your Office	Another Office In the Dept.	Head's Office	Dept ICT Unit	University ICT Centre	N/A
1 Computer						
2 Printers						
3 Productivity Software						
4 Internet						
5 E-Mail						
6 Computer Professionals						

11. How would you rate the reliability and speed of your UCC Internet connection?

1 [ ] Very Poor 2 [ ] Poor 3 [ ] Good 4 [ ] Very Good 5 [ ] Excellent

SECTION C: PROFICIENCY IN ICT

12. Have you received training on the use of ICT facilities available to you?

1 Yes [ ] 2 No [ ]

13. If your response to Q12 is 'YES', do you consider the training adequate?
1 Yes [ ] 2 No [ ]

14. On the whole how would you rate the frequency of your ICT usage?

1 [ ] Rarely 2 [ ] Often 3 [ ] Very often

15. How would you also rate your proficiency in ICT in general?
1 [ ] Beginner 2 [ ] Ordinary 3 [ ] Expert

SECTION D: APPLICATION OF ICT IN TEACHING & LEARNING

	HIGH	**FAIR**	**LOW**	**NOT AT ALL**
16a To what extent do you use ICT to present Lectures?				
16b To what extent do you use Present / Receiving of assignments?				
16c To what extent do you use ICT to do online teaching & Learning?				
16d To what extent do you use ICT to develop Curriculum?				
16e To what extent do you use ICT to provide feedback to students?				

SECTION E: APPLICATION OF ICT IN RESEARCH

	HIGH	FAIR	LOW	NOT AT ALL
17a To what extent do you use ICT in Research ?				
17b To what extent do you use research tools like statistical packages, simulations etc?				
17c To what extent do you use ICT to collect academic information ?				
17d To what extent do you use ICT to Disseminate academic information?				
17e To what extent do you use ICT to collaborate research worldwide ?				

SECTION F: APPLICATION OF ICT IN ACADEMIC INFORMATION SERVICES (LIBRARY)

	HIGH	FAIR	LOW	NOT AT ALL
18a To what extent do you use the ICT facilities in the library to provide academic information/journals through CD-ROM's ?				
18b To what extent do you use the ICT facilities in the library to access other virtual libraries?				
18c. To what extent do you use the library Staff to assist you in collecting information on the Internet?				

SECTION G: ICT ORGANIZATIONAL SUPPORT

19. Are you aware if UCC has committees/units that define and monitor institution wide ICT policies and standards?
    1 Yes [ ] 2 No [ ]

20. Are you aware if UCC has committees/units that carry responsibility for management and maintenance of the ICT infrastructure?
    1 Yes [ ] 2 No [ ]

21. Are you aware if UCC has committees/units that consider users' ICT needs?
    1 Yes [ ] 2 No [ ]

22. How would you also rate the quality of the institutions ICT organizational support??
    1 [ ] Very Satisfactory 2 [ ] Satisfactory 3 [ ] Not Satisfactory

SECTION H: ICT CONSTRAINTS AND NEEDS IN UCC

23. What key constraints have you identified in the application and use of ICT in UCC? (Tick as many as applicable)

1 Telecommunication and other relevant infrastructure: 1 Yes [ ] 2 No [ ]
2 Low Bandwidth 1 Yes [ ] 2 No [ ]
3 Electricity supply: 1 Yes [ ] 2 No [ ]
4 ICT Human Resource 1 Yes [ ] 2 No [ ]

5	Enabling environment:	1 Yes [ ] 2 No [ ]
6	Unreliable Internet Service Providers:	1 Yes [ ] 2 No [ ]
7	Telecommunication or ICT policy matters:	1 Yes [ ] 2 No [ ]
8	Lack of awareness about the ICT in the university	1 Yes [ ] 2 No [ ]
9	Funding:	1 Yes [ ] 2 No [ ]
10	Cost of equipment:	1 Yes [ ] 2 No [ ]
11	Others (Specify):.....	

24. Rate the importance of ICT for the following core functions of the University. (Rate from 1 to 5; with 5 being Very High, and 1 being Very Low)

1. Faculty use in teaching: [ ]
2. Student access and use in learning: [ ]
3. Research: [ ]
4. Library and Archives services management: [ ]
5. Management: [ ]

25. On the whole how would you rate the ICT facilities available to you on campus?

1 [ ] Very Satisfactory 2 [ ] Satisfactory 3 [ ] Not Satisfactory

26. To what extent has ICT improved your core function as a lecturer?

1 [ ] Excellent 2 [ ] V. Good 3 [ ] Good 4 [ ] Fair

27. Kindly write in the space provided below any suggestions that can lead to improvement in the development and use of ICT in UCC.

.....

.....

.....

.....

Thank you

APPENDIX B

SENIOR ADMINISTRATOR'S QUESTIONNAIRE

AN ASSESSMENT OF THE ADEQUACY AND UTILIZATION OF INFORMATION AND COMMUNICATION (ICT) IN THE UNIVERSITY OF CAPE COAST

The purpose of this questionnaire is to have an overview of the state of the availability, use and application of ICT in University of Cape Coast as it relates to facilitating teaching, learning, research, library, and management information services support.
The confidentiality of your responses is assured, so I would be most grateful if you could answer the questions as candid as possible.
Thank you.

Instruction: Please mark 'X' in the appropriate box.

SECTION A: BIOGRAPHIC DATA

1. Gender: 1 [ ] Male 2 [ ] Female

2. Age (as at last birthday):
   1 [ ] 20-29 2 [ ] 30-39 3 [ ] 40-49 4 [ ] 50-60

3. Department/Section/Unit: .....

4. Rank:
   1 [ ] Registrar 2[ ] Deputy Registrar 3 [ ]Snr. Asst. Reg 4 [ ] Asst. Reg
   5 [ ] Finance Officer 6 [ ] Snr Accountant 7 [ ] Accountant
   8 [ ] Others (specify) _____

SECTION B: AVAILABILITY, ADEQUACY AND LOCATION OF INFORMATION AND COMUNICATION TECHNOLOGY FACILITIES.

5. Do you have access to computer(s) for your job?
   1 Yes [ ] 2 No [ ]

6. If your response to **Q5 is 'YES'**, Are the Computers available to you .....
   1 [ ] Stand Alone (Not Networked)
   2 [ ] Networked computer

7. If your response to **Q5 is 'YES'**, Please indicate the type (make) of computers available to you. (Tick as many as applicable)

1 ☐ IBM
2 ☐ Compaq
3 ☐ HP
4 ☐ HP Compaq
5 ☐ Toshiba
6 ☐ Expert Computer
7 ☐ DEL Computer
8 ☐ Others (Specify) _____

8. Which of the following Information and Communication Technology (ICT) tools/ Application software do you or your staff use to facilitate work? (Tick as many as applicable)

1 ☐ Word Processing
2 ☐ Spreadsheet
3 ☐ Desktop Publishing
4 ☐ Database Management Systems
5 ☐ E-mail
6 ☐ Telephone
7 ☐ Photocopiers
8 ☐ Facsimile
9 ☐ Internet Access
10 ☐ Others (Specify) _____

9. Please indicate in the space provided below the use to which your department puts computers to use. (Tick as many as applicable)

1 ☐ Secretarial/Administrative Duties
2. ☐ Handling of Accounts
3 ☐ DataBase Management
4. ☐ Statistical Analysis
5. ☐ Desktop publishing
6 ☐ Human Resource Records Management
7 ☐ Student Records Management
8 ☐ Software Development
9 ☐ Others (Specify) _____

10. How would you rate the reliability and of UCC Internet connection?
1 [ ] Very Poor 2 [ ] Poor 3 [ ] Good 4 [ ] Very Good 5 [ ] Excellent

11. Using the options provided, indicate by marking 'X' in the space below the location of ICT resources available to you.

RESOURCE	LOCATION					
	Your Office	Another Office in the Dept	Head's Office	Dept's ICT	University ICT Centre	N/A
1 Computer						
2 Printers						
3 Productivity Software						
4 Internet						
5 E-Mail						
6 IT Professionals						

SECTION C: PROFICIENCY IN ICT

12. Have you received training on the use of ICT facilities available to you?
    1 [ ] Yes 2 [ ] No

13. If your response to Q13 is 'YES', do you consider the training adequate?
    1 [ ] Yes 2 [ ] No

14. On the whole how would you rate the frequency of your ICT usage?
    1 [ ] Rarely 2 [ ] Often 3 [ ] Very often

15. How would you also rate your proficiency in ICT in general?
    1 [ ] Beginner 2 [ ] Ordinary 3 [ ] Expert

SECTION D: APPLICATION OF ICT IN ADMINISTRATION

	HIGH	FAIR	LOW	NOT AT ALL
16a. To what Extent does your Institution apply ICT in Personnel/Human Resource Management?				
16b. To what Extent does your Institution apply ICT in students Administration?				
16c. To what Extent does your Institution apply ICT in Financial Management?				
16d. To what Extent does your Institution apply ICT in Assets and maintenance Management?				
16e. To what Extent does your Institution apply ICT in Internal communication ?				
16f. To what Extent does your Institution apply ICT to support Information Systems Management?				

SECTION E: ICT ORGANIZATIONAL SUPPORT

17. Are you aware that UCC has set up committees/units that define and monitor institution wide ICT policies and standards?
    1 Yes [ ] 2 No [ ]

18. Are you aware that UCC has set up committees/units that carry responsibility for management and maintenance of the shared ICT infrastructure?
    1 Yes [ ] 2 No [ ]

19. Are you aware that UCC has set up committees/units that consider ICT users' needs?
    1 Yes [ ] 2 No [ ]

SECTION F: ICT CONSTRAINTS AND NEEDS IN UCC

20. What key constraints have you identified in the application and use of ICT in UCC? (Tick as many as applicable)

1	Telecommunication and other relevant infrastructure:	1 Yes [ ]	2 No [ ]
2	Low Bandwidth:	1 Yes [ ]	2 No [ ]
3	Electricity supply:	1 Yes [ ]	2 No [ ]
4	ICT Human Resources	1 Yes [ ]	2 No [ ]
5	Enabling environment:	1 Yes [ ]	2 No [ ]
6	Unreliable Internet Service Provider:	1 Yes [ ]	2 No [ ]
7	Telecommunication or ICT policy matters:	1 Yes [ ]	2 No [ ]
8	Lack of awareness about the ICT in the university:	1 Yes [ ]	2 No [ ]
9	Funding:	1 Yes [ ]	2 No [ ]
10	Cost of equipment:	1 Yes [ ]	2 No [ ]
11	Others (Specify):.....		

21. Rate the importance of ICT for the following core functions in the University. Rate from1 to 5; with 5 being Very High, and 1 being Very Low)

1.	Faculty use in teaching:	
2.	Student access and use in learning:	
3.	Research:	
4.	Library and Archives services management:	
5.	Management:	

22. On the whole how would you rate the ICT facilities available to you on Campus?
1 [ ] Very Satisfactory 2 [ ] Satisfactory 3[ ] Not Satisfactory

23. On the whole how would you also rate how ICT has improved your administrative chores?
1 [ ] Excellent 2 [ ] V. Good 3 [ ] Good 4 [ ] Fair

24. Kindly write in the space provided below any suggestions that can lead to improvement in the development and use of ICT in UCC.

.....

.....

.....

.....

Thank you

APPENDIX C

STUDENTS' QUESTIONNAIRE

AN ASSESSMENT OF THE ADEQUACY AND UTILIZATION OF IINFORMATION AND COMMUNICATION TECHNOLOGY (ICT) IN THE UNIVERSITY OF CAPE COAST

The purpose of this questionnaire is to have an overview of the state of the availability, use and application of ICT in University of Cape Coast as it relates to facilitating teaching, learning, research, library, and management information services support.

You are assured of the confidentiality of your responses, so I would be most grateful if you could answer the questions as candid as possible.

Thank you.

Instruction: Please mark 'X' in the appropriate box.

SECTION A: BIOGRAPHIC DATA

1. Gender: 1 [ ] Male 2 [ ] Female

2 Age (as at last birthday):
1 [ ] 10-19 2 [ ] 20-29 3 [ ] 30-39 4 [ ] 40-49 5 [ ] 50-59

3. Faculty:
1 [ ] Agric 2 [ ] Arts 3 [ ] Education 4 [ ] Science 5 [ ] Social Sciences

4 .Level:
1 [ ] 200 2. [ ] 300 3. [ ] 400

SECTION B: AVAILABILITY AND ADEQUACY OF ICT FACILITIES

5. Do you have access to computer(s) provided by the University for your studies?
1 Yes [ ] 2 No [ ]

6. If your response to **Q5 is 'YES'**, Are the Computers available to you .....
1. [ ] Stand Alone (Not Networked)
2. [ ] Networked computer

7. If your response to **Q5 is 'YES'**, indicate the location of the computers available to you.
   1. [ ] Within your department 2. [ ] Another department 3. [ ] ICT Centre

8. If your response to **Q5 is 'YES'**, Please indicate the type (make) of computers available to you (Tick as many as applicable)

   1 ☐ IBM
   2 ☐ Compaq
   3 ☐ Hewlett Packard (HP)
   4 ☐ HP Compaq
   5 ☐ Toshiba
   6 ☐ Expert Computer
   7 ☐ Del
   8 ☐ Others (Specify) _____

9. If your response to **Q5 is 'YES'**, Which of the following do you use the computers for? (Tick as many as applicable)

   1 ☐ Word Processing
   2 ☐ Spreadsheet
   3 ☐ Desktop Publishing
   4 ☐ Database Management Systems
   5 ☐ Presentation Software (eg. PowerPoint)
   6 ☐ E-mail
   7 ☐ Internet Access
   8 ☐ To develop computer programs
   9 Others (Specify) _____

10. Using the options provided, indicate by marking 'X' in the space below the location of ICT resources available to you..

RESOURCE	**LOCATION**					
	Your Office	Another Office In the Dept	Head's Office	Dept ICT Unit	University ICT Centre	N/A
1 Computer	☐	☐	☐	☐	☐	☐
2 Printers	☐	☐	☐	☐	☐	☐
3 Productivity Software	☐	☐	☐	☐	☐	☐
4 Internet	☐	☐	☐	☐	☐	☐
5 E-Mail	☐	☐	☐	☐	☐	☐
6 Computer Professionals	☐	☐	☐	☐	☐	☐

11. How would you rate the reliability and speed of your UCC Internet connection?
    1 [ ] Very Poor 2 [ ] Poor 3 [ ] Good 4 [ ] Very Good 5 [ ] Excellent

SECTION C: PROFICIENCY IN ICT

12. Have you received training on the use of ICT facilities on campus?
    1 Yes [ ] 2 No [ ]

13. If your response to **Q12 is 'YES'**, Is the training adequate to enable you use ICT to facilitate for your studies?
    1 Yes [ ] 2 No [ ]

14. On the whole how often do you use ICT facilities in UCC?
    1 [ ] Rarely 2 [ ] Often 3 [ ] Very often

15. How would you also rate your proficiency in ICT in general?
    1 [ ] Beginner 2 [ ] Ordinary 3 [ ] Expert

SECTION D: APPLICATION OF ICT IN TEACHING & LEARNING

	HIGH	FAIR	LOW	NOT AT ALL
16a. To what Extent does your Institution use ICT to present Lectures?				
16b. To what Extent does your Institution use ICT to present Assignments/project by e-mail				
.16c. To what Extent does your Institution use ICT to provide basic computer literacy skills?				
16d. To what Extent does your Institution use ICT to improve higher order thinking skills?				

SECTION E: APPLICATION OF ICT IN THE ACADEMIC INFORMATION SERVICES (LIBRARY/ARCHIVES)

	HIGH	FAIR	LOW	NOT AT ALL
17a. To what Extent do you use the Library to provide academic information/journals through CD-ROM's?				
17b. To what Extent do you use the Library to access other virtual libraries etc?				
17c. To what Extent do the library Staff to assist you in collecting Information ?				

SECTION F: ICT CONSTRAINTS AND NEEDS IN UCC

18. What key constraints have you identified in the application and use of ICT in UCC? (Tick as many as applicable)

1 Telecommunication and other relevant infrastructure: 1 Yes [ ] 2 No [ ]
2 Low Bandwidth 1 Yes [ ] 2 No [ ]
3 Electricity supply: 1 Yes [ ] 2 No [ ]
4 ICT Human Resource 1 Yes [ ] 2 No [ ]
5 Enabling environment: 1 Yes [ ] 2 No [ ]
6 Unreliable Internet Service Providers: 1 Yes [ ] 2 No [ ]
7 Telecommunication or ICT policy matters: 1 Yes [ ] 2 No [ ]
8 Lack of awareness about the ICT in the university 1 Yes [ ] 2 No [ ]
9 Funding: 1 Yes [ ] 2 No [ ]
10 Cost of equipment: 1 Yes [ ] 2 No [ ]
11 Others (Specify):.....

19. Rate the importance of ICT for the following core functions of the University. (Rate from 1 to 5; with 5 being Very High, and 1 being Very Low)

a. Faculty use in teaching: [ ]
b. Student access and use in learning: [ ]
c. Research: [ ]
d. Library and Archives services management: [ ]
e. Management: [ ]

20. On the whole how would you rate the ICT facilities available to you on campus?

1 [ ] Very Satisfactory 2 [ ] Satisfactory 3 [ ] Not Satisfactory

21. To what extent has ICT improved your core function as a student?

1 [ ] Excellent 2 [ ] V. Good 3 [ ] Good 4 [ ] Fair

22. Kindly write in the space provided below any suggestions that can lead to improvement in the development and use of ICT in UCC.

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Thank you.