EFFECTS OF INFORMATION AND COMMUNICATION TECHNOLOGY ON STUDENTS' LEARNING: A CASE OF GULU UNIVERSITY

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DECLARATION

I Geoffrey Opira, declare that this is my original work and it has never been submitted in any University for any award.

.....

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DATE.....

APPROVAL

This thesis entitled "Effect of Information and Communication Technology on students learning: A case of Gulu University" was done under our supervision and has been submitted to the School of Graduate Studies for examination with our approval as supervisors.

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DEDICATION

This work is dedicated to my son Elijah Bongomin, my daughter Daniela Aber Jovana and my dear wife Lucy Achiro.

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This work has been successful due to the assistance and cooperation of so many personalities. First I thank the almighty God, whose wisdom, ability and divine provision has enabled me to complete my studies. May his name be glorified forever. Special thanks go to my supervisors! Dr.David Onen and Dr.Beatrice Sekabembe for all the support, guidance, encouragement and important ideas which have made this research report have the value it is worth.

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LIST OF ACRONYMS

BECTA	British Education Communication and Technology Agency	
CD-ROM	Compact Disk Read Only Memory	
ESCAP	United Nations Economic and Social Commission for Asia and the	
	Pacific	
E-MAIL	Electronic Mail	
ICT	Information and Communication Technology	
MED-ICT	Master of Education Information and Communication Technology	
MS Office	Microsoft office	
MoWHC	Ministry of Works Housing and Communications	
NCCA	National Council for Curriculum and Assessment	
RENU	Research and Education Network of Uganda	
SNASI	Swedish national Agency for School Improvement	
SPSS	Statistical Package for Social Sciences	
UNESCO	United Nations Educational Scientific and Cultural Organization	

ABSTRACT

The study investigated the effect of ICT on students' learning by taking the case of Gulu University. It sought to establish the relationship between ICT and students' learning particularly looking at the availability, accessibility and user-ability of the ICT resources in Gulu University. The study was prompted due to the persistent report that students in Gulu University are getting difficulties in their studies due to limited access and use of ICT resources. It was conducted through cross-sectional survey design; data was collected during the month of March 2009 using questionnaires, interview techniques from a sample of 275 respondents out of a parent population of 1173 . In verifying the hypotheses, the researcher used Pearson correlation analysis method to find out whether students' learning was linearly correlated with ICT.

The study established that the availability of ICT resources in the University is still very much wanting and very inadequate for the students to use. Because of the limited number of functional computers and the computer laboratory, accessibility is timetabled. It was found out that training was mainly limited to introduction to basic concepts of information technology, some application programs notably Ms office suit and internet; contextual training of students on how to use ICT in learning was not in practice.

The researcher concluded that availability, accessibility and user-ability of ICT resources significantly affect students learning in Gulu University. Based on the above, the researcher recommends that there is need for the University to invest more in computers and related technology. Access to ICT tools should not be limited only in labs and library but expanded through establishment of ICT resource centre. ICT training should not be limited to Ms Office

suites but rather aim at training students with the contextual skills to use ICT for their learning.

CHAPTER ONE

INTRODUCTION

1.0 Background

This chapter articulates the background of the study in to four perspectives, namely: the historical, theoretical, conceptual and contextual perspectives. It goes on to give the problem statement, purpose, objectives, research hypothesis, significance and the scope of the study.

1.1.1 Historical perspective

Teaching is becoming one of the most challenging professions in our society today where knowledge is expanding so rapidly that modern technologies demand the use of Information and Communication Technology (ICT). ICT has become within a short time one of the basic building blocks of a modern society. Many countries now regard understanding ICT and mastering its basic concepts as part of the core of education (UNESCO, 2002b). In Uganda, Government has established a fully-fledged ICT Ministry since 2006 to stress the importance of ICT in promoting economic growth and development.

Observers and proponents of ICT suggest that our use of increasingly sophisticated and enabling technologies will continue, to the extent that technological literacy will become a basic functional requirement for our work, social and personal lives. The National Council for Curriculum and Assessment, UK (2004), notes that as the pace of technological development continues to grow, children in our schools today will live in a world where ICT will be increasingly embedded in their daily lives.

The use of computers in education is not a new phenomenon. In the 1970's, its promoters claimed that it would transform and save education (Lockard & Abrams, 1994). The late 1980's saw a growing shift towards computer integration which emphasized the curriculum and not the tool. Its proponents felt that students would learn new skills as they needed them in order to make the computer work for them. The computer could now be viewed more as a partner as opposed to a competitor and could be treated in a more natural manner (Lockard & Abrams, 1994). The 1990's saw a heightened focus on increasing the use of computer technology in the classroom, and not just by the evangelists. Growing attention and pressure to implement technology in education is coming from many directions, including parents and the business sector, not just departments of education. One of the most significant features of the technological or digital era of much relevance to education is the Internet. Hargittai (1999) defines the Internet technically and functionally as a worldwide network of computers and people interacting together.

To enhance and streamline the developments in the ICT sector, the government of Uganda formulated an ICT Policy Framework in 2003 to meet the challenges and the harnessing of the underlying potentials and opportunities of the system (National ICT Policy Framework, 2003). Government recognizes that ICT has a big role to play in stimulation of national development, in particular, modernization and globalization of the economy. In recognition of the need of ICT for the development process, government undertook several initiatives to promote the development and application of ICT. The telecommunication sector was liberalized in 1996 by a policy framework, which provided for the introduction of competition and licensing for multiple operators (National ICT Policy Framework, 2003). The liberalization of the acquisition, use and

application of ICT led to a rapid expansion of the ICT industry in Uganda over the last ten years. The Ministry of Education and Sports has approved a curriculum for ICT training for secondary schools. These schools are being equipped under various programmes, including the Schoolnet and ConnectEd Projects. However, only a very small percentage of secondary schools are offering ICT training, and in almost all cases the facilities are awfully inadequate for reasonable hands-on experience (National ICT Policy Framework, 2003). The Ministry of Education and Sports has formulated an ICT Policy for Education that it hopes to adopt so as to drive ICT training in schools and other institutions under its mandate.

More and more studies now support the claim that technology has great potential to provide new kinds of instructional opportunities and to enhance the knowledge and learning experiences of both the teachers and students (O'Connor & Polin, cited in Fleming-McCormick, et al., 1995). However, the effect of ICT in teaching and learning is not yet fully established. Yet the need to prepare students for the information age is a recurring educational theme worldwide since today's students are to spend their career life in a very dynamic technological environment (Mbwesa, 2003).

1.1.2 Theoretical perspective

The study employed the theory of Cognitive Flexibility (Spiro & Jehng, 1992), emphasized by Kirkpatrick's four levels of evaluation (Kirkpatrick, 1994). The theory of Cognitive flexibility suggests that learners grasp the nature of complexity more readily by being presented with multiple representations of the same information in different contexts. It emphasizes the ability to spontaneously restructure one's knowledge in many ways, in adaptive response to radically

changing situational demands. The theory largely concerns itself with transfer of knowledge and skills beyond their initial learning situation. Skills transfer can be described as learner's desire to use the knowledge and skills mastered in the training program on the job (Noe & Schmitt, 1986 in Yamnill & McLean, 2001). Behavioral change would likely occur for learners who learn the material presented in training and desire to apply that new knowledge or skills to work activities.

For the teachers and students to use and develop ICT materials that facilitate teaching and learning they should be in position to demonstrate high cognitive flexibility (Spiro, Feltovich, Jacobson, & Coulson,1992). This puts emphasis on transfer of learning. Transfer of learning refers to the extent to which performance in one situation such as multimedia lesson is reflected in another situation such as working on the job or in a subsequent lesson (Allessi & Trollip, 2001). Therefore teaching is often a precursor to apply or use that knowledge in the real world for students in the classrooms.

1.1.3 Conceptual perspective

The World Bank (2003 citing Rodriguez & Wilson, 2000) opines that ICT is the set of activities which facilitate by electronic means the processing, transmission and display of information. According to United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP, 2001) ICTs refer to technologies people use to share, distribute, gather information and to communicate, through computers and computer networks. In this study ICT is viewed as set of tools that can be used to process, avail and access, information and communication services or products. The services and products may include hardware and software; Internet, telephones/mobile phones, telefax, type writer, calculators, radios, televisions, hydraulic

machines used in industries among others. Bakkabulindi (2002; 2000) observes that ICTs are of two major types namely; ICTs for converting or processing data into information such as adding machines, calculators, typewriters and computers; and ICTs for communication of data and or information from one place to another: These include telegraph, telephone, telefax and computer networks. These gadgets offer the possibility for an interactive approach. Interaction refers to the relation between the user and these gadgets. In this study, ICT further refers to the availability, accessibility and user-ability of these gadgets. Availability implies the presence of these ICT resources, accessibility means the degree to which these ICT resources are easily accessible by as many people as possible .User-ability refers to the capability of the students and teachers to use these resources to achieve specified goals.

Learning refers to concerted activity that increases the capacity and willingness of students to acquire and productively apply new knowledge and skills, to grow, mature and to adapt successfully to changes and challenges (Warschaure, 1996). Such learning empowers students to make wise choices, solve problems and break new grounds. Learning certainly includes academic studies and occupational training through high school and beyond. In this study, learning will refer to the process whereby learners acquire and master knowledge and skills imparted in them by the instructor and through interaction with technological tools in relation to their academic performance, work place preparedness and application of the acquired skills and knowledge.

1.1.4 Contextual perspective

Gulu University, being a young and newly established University, was set up in the year 2002 to

serve as a launch pad for equitable development in Uganda by providing knowledge, skills and stimulating innovations in education, technology, economic advancement and social development (Research and Education Network of Uganda, 2003). However, the University faces many challenges in regards to the teaching and learning processes. Classical instructional methods have been and continue to be used in the teaching and learning process with their limitations in different circumstances varying depending on student and instructor needs. Little emphasis is being put on the embracement of educational technology, yet if properly used, ICT can provide an array of powerful tools that may help in transforming the present isolated teachercentered and text bound classroom into rich, students focused interactive knowledge environment. If not well addressed, investment in development of ICT in the University will be wasteful and the teaching and learning process shall continue to be very slow limiting the University from achieving the development it is hoped to bring in the University mission.

1.2 Statement of the problem

Students' learning remains central in any academic achievement debate. ICTs provide a window of opportunity for educational institutions and other organizations to harness and use technology to complement and support the teaching and learning process. However, despite the enormous advocacy of ICT aided teaching and learning, investment and donation of ICT equipment to Gulu University, the University still faces the challenge of how to transform students learning process to provide students with the skills to function effectively in this dynamic, information-rich, and continuously changing environment.

The cause of concern is that unless this problem is addressed, investment in the development of

ICT in the University is going to be put to waste and improvement in the quality of teaching and learning is going to be sluggish. This may make the University fail to achieve its mission and to produce graduates who are ready for the world of work which is increasingly reliant on ICT aided generation and dissemination of knowledge. In view of this discrepancy, there is need to examine the particular effects of availability, accessibility and user-ability of ICT resources on students learning in Gulu University.

1.3 Aims /Purpose

The main purpose of the study was to identify the perceived effect of the availability, accessibility and user-ability of ICT resources on student's learning in Gulu University using cross-sectional survey design with a view to provide relevant recommendations.

1.4 Objectives

The specific objectives were:

- To examine the effect of the availability of ICT resources on student's learning in Gulu University.
- To assess the effect of the accessibility of ICT resources on student's learning in Gulu University.
- To investigate the effect of the user-ability of ICT resources on student's learning in Gulu University.

1.5 Research hypothesis

The study was guided by the following hypothesis:

- 1. Availability of ICT has effect on students' learning in Gulu University.
- 2. Accessibility of ICT resources affects students' learning in Gulu University.
- 3. User-ability of ICT resources affects student's learning in Gulu University.

1.6 Scope

The study on the Effect of ICT on students learning was carried out in Gulu University, Laroo Division, Gulu District between January 2009 and July 2009. The study specifically sought to determine the effects of the availability, accessibility and user-ability of ICT resources on students learning in Gulu University.

1.7 Significance

The study should be of great importance to the policy makers and University administrators of Gulu University helping them to appreciate the usefulness of ICT in learning so as to come up with policies that promote ICT in learning.

The findings and recommendations of the study should be of importance to Gulu University lecturers and other lecturers of higher institution of learning on the use of ICT to aid learning.

The researcher hopes that result of the study may be useful to future researchers with interest in examining further the effects of ICT on students learning. This should lead to the generation of new ideas for the better implementation of ICT into learning process.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter presents the theoretical framework, the conceptual framework and review of related literature.

2.1 Theoretical Review

The research was based on the theory of Cognitive Flexibility (Spiro, et al, 1992), emphasized by Kirkpatrick's four levels of evaluation (Kirkpatrick, 1994). Kirkpatrick emphasizes reactions, learning, transfer and results. Level one is reactions and just as the word implies, learning at this level measures how participants in a training program react to it. It attempts to answer questions regarding the participants' perceptions - did they like it?, was the material relevant to their work?. In addition, the participants' reactions have important consequences for learning (level two), although a positive reaction does not guarantee learning; a negative reaction almost certainly reduces its possibility (Winfrey, 1999).

At level two, teaching moves beyond learner satisfaction and attempts to assess the extent to which students have advanced in skills, knowledge, and attitude to determine the amount of learning that has occurred. Level three is transfer; this level looks at the transfer that has occurred in learners' behavior due to the teaching program. Teaching at this level attempts to answer the question - are the newly acquired skills, knowledge, or attitude ready to be used in the everyday environment of the learner? Cognitive Flexibility means the ability to spontaneously restructure one's knowledge in many ways, in adaptive response to radically changing situational

demands. The Theory largely concerns with transfer of knowledge and skills beyond their initial learning situation. Skills transfer can be described as students desire to use the knowledge and skills mastered in the training program on the job (Noe & Schmitt, 1986 in Yamnill & McLean, 2001). Behavioral change would likely occur for students who learn the material presented in training and desire to apply that new knowledge or skills to work activities. Two different types of transfer have been proposed, near transfer and far transfer. Near transfer is applying the learnt information or skills in a new environment that is very like the original one. Teachers need to design ICT instruction that teaches the steps of a task that are always applied in the same order. The advantage of this is that the skills and knowledge are easier to train and transfer of learning is usually a success.

Far transfer is being able to use learned knowledge or skills in very different environments (Allessi and Trollip, 2001). With far transfer teachers need to design ICT instruction where learners are trained to adapt guidelines to changing situations or environments. Thus once the skills and knowledge are acquired, the learner is able to make judgments and adapt to different situations. This is most ideal for the dynamic ICT evolution in the world today. To support the degree of transfer of knowledge desired, it is important to understand that it is every learners wish to apply the trained skills acquired in doing their work. But this applies only when the learner acknowledges the relevancy of the skills to his/her nature of work expected of him in the field. Level four is results, frequently thought of as the bottom line, this level looks at the success of the program in terms that managers and executives can understand -increased production, improved quality, reduced frequency of accidents, increased enrollment, and even higher profits or return on investment.

According to Holton 1996 (in Yamnill and McLean, 2001), one cause of failure to transfer is that sometimes the training rarely provides for transfer of learning. That is, cognitive learning may well occur, but program participants may not have an opportunity to practice the training in a job context or may not be taught how to apply their knowledge on the job. So the training itself can have a direct influence on transfer of trained skills.



2.2 Conceptual framework



Source: Adapted from Spiro et al., 1992

The presence and use of the ICT resources by the students and lecturers provides an avenue of

interaction. These interactions provide feedback which acts as a reinforcer towards the learning process. Multimedia applications like games, drills, animation and other graphical applications provides practices that take the form of questions (stimulus) and answers (response) frames which exposes the students to the subject in gradual steps consequently generating more interest in the subject matter which in the long run affects their academic performance and gives them the desire to try and use these acquired knowledge in a different setting.

2.3 Related Literature

This section presents the literature related to the objective of the study.

2.3.1 Availability of ICT resources and Student's learning

For teachers and their students, the availability of modern computers, peripherals, networking and resources within an increasingly diverse range of technologies is an essential part of learning and teaching in the 21st century. ICT constitutes an input in the student learning process that should help produce better learning output. The availability of ICT resources can enhance learning by making education less dependent on differing teacher quality and by making education available at home throughout the day (Mbwesa, 2002). Bonnet (1997) argues that the use of ICT can positively transmit knowledge to students. Furthermore, the availability and use of ICT can help students exploit enormous possibilities for acquiring information for schooling purposes and can increase learning through communication (Riel, 1998).

According to the Swedish National Agency for School Improvement (2008), ICT provide a positive impact on learning and student performance when it becomes an integrated element in

the classroom and teaching. Bonnet (1997) argues that the availability of visual digital technology (such as animation, simulation and moving images) involves students and reinforces conceptual understanding. ICT use also encourages development from a teacher-focused or teacher-led model to a more student-focused model in which students work together, make their own decisions and take an active role in learning (Swedish National Association for School Improvement, 2008).

Davis (2000) asserts that increased availability of ICT is especially useful for students who suffer from learning disabilities since ICT use allows teachers to prepare suitable tasks for individual needs and each individual more effectively. However, authors like Cox (1999) believe that allowing certain students to use computers distracts them from focusing on the task at hand.

Central to the argument of availability are the issues of whether or not the teachers and students have ample and convenient access to computers and their accessories let alone the software that is necessitated in the context of their day-to-day research, collaboration, teaching and student evaluation (Fabry, et al., 1997). Furthermore, students and teachers should have confidence in these facilities, which is in turn reliant on the facilities' reliability or degree to which the teachers and students are sure that they will have access to them at all expected times and utilise them predictably to the betterment of their academic work, an issue on which consensus is enormous as is clear from ICT in education scholars like Russell (1997), Ross (1997), Guha (2000), Mumtaz (2000) and Pelgrum (2001).

The lesson here is that computers are but a subset of the information communication technology

facilities necessitated in schools and that even then, they have to be furnished with quality accessories, installed with appropriate software and linked to necessary networks to allow access to rich resources beyond the school rather than serve as a resource for minor typesetting and other word processing activities. Whilst the above studies attempted generally to explain how the availability of ICT affects learning, it does not look at how particular ICT tools clearly affects students learning.

2.3.2 Accessibility of ICT resources and students learning

Effective integration of ICT in schools would call for a whole institution to be networked to ensure access to multimedia and learning- rich resources via the school's Intranet and the Internet wherever students and teachers are, in or out of school. The computer labs and classroom computers need to be sufficient in number to allow ready access by students and staff in most subjects across the school. A wide range of peripheral and remote working devices, including video-conferencing, is provided and integrated into the curriculum. Large and small group presentation facilities are readily available (school net Africa, 2004). Despite the above desired situation, most Institutions in Africa face barriers to effective integration of ICT in the teaching and learning process; limited infrastructure in terms of satisfactory physical conditions of laboratories and the subsequent accessibility of the resources (ICT) to the learners (Singh, 1993).

Many commercial and academic developers of educational multimedia have focused primarily on information access and presentation (Singh, 1993). However, it is easy to see that multimedia has tremendous potential to enhance the vividness with which information can be presented and ease with which it can be accessed, the main barriers to learning are not generally that appropriate information is difficult to access or badly presented. The problem has more to do with that information (Shank & Kass, 1996).

Accessibility and use of ICT allows students to investigate more thoroughly the real world (Reginald Grégoire inc., Bracewell & Laferriére, 1996; Riel, 1998). They can more readily access information sources outside the classroom and can use tools to analyze and interpret such information. Information may be accessed through online systems or through data logging systems (Riel, 1998). The technologies allow them to receive feedback, refine their understanding, build new knowledge and transfer from school to non-school settings (Committee on Developments in the Science of Learning, 2000). In the past this has been difficult to provide in schools due to logistical constraints and the amount of material to be covered all of which can now be addressed with ICT. What can be learned is broadened and deepened (Réginald Grégoire inc. et al., 1996).

Barriers, associated with ICT integration that fall within the physical realm are beyond the direct control of the teacher (Loveless, 1996). These barriers centers around accessibility and infrastructure and include decisions about purchasing, locations of wiring drops, and decisions regarding the placement of computers in centralized labs verses placement of computer pods in classrooms. Placing computers in centralized labs may provide students with equitable and efficient exposure to technology but severely limit the technology's accessibility for classroom instruction (Loveless, 1996). Labs deny teachers the flexibility of deciding when technology should be incorporated into instruction and may send the message to students that computers are not central to learning or the activities in their classrooms. In addition, physical limitations of the

classroom including size and location of desks, often limit choices of room arrangement and do not provide the space that is necessary to add pods of computers to be used as technology centres.

The researcher agrees with the developers of Makerere University ICT policy 2002, that overall, governments and training institutions seem to recognize the importance of introducing ICT in education and training. Much as students and staff need training on a continuous basis with modern requisite skills to fully exploit the ICT environment in their different functions (Makerere University ICT Policy, 2002), awareness skills only may not be sufficient enough but rather continuous accessibility to ICT resources would do much better. Continuous access to computers helps teachers feel more secure in their ICT use during lessons and gives them the courage to experiment more and thus helps them integrate ICT into lessons effectively. Many studies also indicate that the impact on learning will increase over time as teachers and students become more experienced in continued practice on using computers (Swedish National Association for School Improvement, 2008).

Dewey (1989) argues that information that is accessed but never put to use during that process, may be difficult to retrieve and use when need arises in the real world. Equal attention must be paid to ensuring that the technology is actually being used by the target learners and in ways that truly serve their needs (Salomon, 1994). Whereas the above studies looked at the accessibility of ICT resources in institutions of learning, key information in regards to access points like library, laboratory, and halls of residence were not explored and the frequency of access by the students and staff was never looked at.

2.3.3 User-ability of ICT resources and student's learning

Teaching is becoming one of the most challenging professions in our society where knowledge is expanding rapidly and much of it is available to students as well as teachers at the same time. Modern developments of innovative technologies have provided new possibilities to teaching professions, but at the same time have placed more demands on teachers and students to use these new technologies in the teaching and learning process (Jung, 2005).

Owing to the above, there is widespread change across the world to infuse ICT into education. Recent research by British Education Communication and Technology Agency (BECTA) has highlighted user-ability of ICT resources as one of the five key pillars of successful integration of ICT in schools (National Council for Curicullum and Assessment UK, 2004). In developed countries, teachers are fully using ICT in all aspects of their professional life to improve their own learning and the learning of their students (Davis, 2000). They use ICT to assist students assess their own learning in completing specific personal projects. It is natural for teachers to collaborate with other colleagues in sharing experiences to solve problems. ICT becomes a stimulus for exciting new teaching and learning opportunities (UNESCO, 2002a).

It is the skill and attitude of the students and teachers that determines the effectiveness of technology integration into the curriculum (Bitner & Bitner, 2002). Once teachers and students developed skills, they could begin to find ways to integrate technology into the teaching and learning process and demonstrate its use to others. If learning was the impetus that drove the use of technology in the school, teachers and students could be partners in the learning process, altering traditional paradigms of the teacher providing wisdom and the student absorbing

knowledge. Motivation to endure the frustration and turmoil of the process of change needed to be intrinsic.

Newhouse (2002) and Loveless (2002) notes that ICT if used positively enhances learning processes and outcomes. Findings assert that both the learning environment and curriculum pedagogy and content are central to the effective use of ICT. However, teachers and students need to be confident in their subject knowledge as well as in basic ICT literacy's so that they can effectively integrate ICT into teaching and learning programmes. A large number of studies have found that students are often more engaged and motivated to learn when using relevant ICT to support specific intentional learning.

What students generally do on the way to becoming computer literate is how to memorize the components of ICT and their functions. It is a mistake to believe that if students can memorize the hardware parts and software then they will understand and be able to use them. Learners do not acquire a repertoire of learning strategies for successfully accomplishing different kinds of learning tasks. Too often, they apply a memorization strategy and when that fails to work they lack alternative strategies to employ. This is especially problematic with ICT, for which memorization strategies simply do not work (Jonassen, 2000). The researcher believes that the most pandemic, yet most insidious, cause for underachievement in ICT is lower expectations on the part of lecturers, which reduces expectations of students and the entire educational system.

According to Laurillard (1994), there is a persistent discrepancy between the questions asked of evaluation studies in new technology, and the conclusions they come to. In a research into ICT

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and learning, Laurillard (1994) has repeatedly shown that the context of the use of ICT determines any effects that ICT may have on learning, and that it is extremely difficult to separate the uses that new technologies are put to from the context of their use. This is supported by Joy II and Garcia (2000), who suggest that it is not the sole effect of ICT on learning gains which should be studied, but the combination of ICT use with particular pedagogical practices in enhancing much improved students learning, a point which has been echoed elsewhere in Kennewell (2001). Students also learn more quickly, demonstrates greater retention, and are better motivated to learn when they more often use computers (Richmond, 1997). Richmond continues that since technology use is fully integrated into the larger learning system, it is very difficult to isolate the technology variable and determine whether any observed gains are due to technology use or to some other factor or combination of factors. Whilst these studies identifies the user-ability outcome and benefits, the relationship between the form of technology (ICT) and user skills and state of ICT resources in fostering learning were not fully explored.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter shows how the research was carried out. It discusses the research design, population, sampling strategies, data collection instruments, data quality control, research procedure and the data analysis techniques employed in the study.

3.1 Research Design

The study employed a cross-sectional research design. Cross-sectional design allowed for the study of the population at one specific time and the difference between the individual groups within the population to be compared. It also provided for the examination of the co-relationship between ICT and students learning in the context of Gulu University seeking the views of the students and lecturers. The choice of this design was dependent on the nature of the study variables.

3.2 Population

The study was carried out among undergraduate students of Gulu University to find out the effect of ICT on their learning. The University had a total of 166 staff of which 40 are administrative, 56 support and 70 academic staff, with a total student enrolment of about 1007 (Research and Education Network of Uganda, 2003). The students were considered the true representative population and they came from the different faculties, and schools within the University. Lecturers and administrators also formed part of the study because of their roles in the teaching and learning process in the University.

3.3 Sample Selection

The study was conducted in Gulu University. A sample of 275 respondents was targeted with the guide of a Table for sample selection from Sekaran (2003) Tables of sample. The categories and size of the respondents that took part in the study are herein presented in Table 3.1

Categories	Number	Sample	Percentage
Students	1007	249	90.1%
Lecturers	70	17	6.3%
Administrators	40	9	3.6%
Total	1117	275	100.0%

 Table1: Sample selection and categories of respondent involved

Lecturers formed part of the study because they are involved in the teaching and learning process. The administrators were considered policy implementers and closely related to the effect of ICT on learning. The students were considered the true representative population since they were the target of this investigation.

3.4 Sampling strategies

Because the study population was big, sampling was used to come up with a small size which was representative of the study population. The study employed stratified, purposeful and convenient sampling strategies. Stratified sampling was used to identify the stratum in the population. The researcher identified students, lecturers and administrators as the relevant stratum and their actual representation in the population. Sufficient number of subject from each
stratum was then selected. Stratified sampling ensured equal representation in an event where one or more strata in the population had a low incidence relative to the other strata. Purposeful sampling was used to acquire the appropriate number of student's representative in the study. The students represented the widest variety of perspective on the effect of ICT and learning in Gulu University. Convenient sampling was used to identify the lecturers and administrators that formed part of the study. This was because the lecturers and administrators were relatively few in number and most times available.

3.5 Data collection Method

Secondary data was collected by the method of analysis of documents. Such documents included official records, newspaper accounts, reports, as well as the published data used in the review of outstanding literature. Primary data on the other hand was got directly from the field and collected through observation, self administered questionnaires, and interviews.

3.5.1 Questionnaires

Questionnaires were designed (Appendices A and B) such that each question was related to a given research question and the topic. Both closed and open ended questions were used. Open ended questions were to help supplement the information given in the closed ended questions and helped in obtaining more complete data. The questionnaires are preferred because it gives clear and specific responses and enable the respondent to express themselves freely especially lecturers who may not have enough time to attend to personal interview.

3.5.2 Interview Guide

Interview guide was used to collect primary data. Semi-structured face-to-face interview guide (Appendix C) were set up with sets of outlined questions about issues to be explored. The outlined questions were meant to guide and make sure that all the relevant topics are covered. Interview guides permitted the researcher to probe and guide the respondents for detailed information and help keep interaction focused. Interviews were suitable for administrators since they had limited time to respond to questionnaires and verbal interaction with them helped in detecting biased answers.

3.5.3 Observation guide

Observation of participants in the context of a natural scene was made. Observation provided knowledge of the context in which events occurred, and enabled the researcher to see things that participants themselves were not aware of.

3.6 Data quality control

The followings were how data quality control was ensured:

3.6.1 Validity

To establish the validity, the instruments (Appendix A,B) were subjected to the scrutiny of two experts who evaluated the relevance of each item in the instruments to the objectives. The experts rated each item on a scale. Their recommendations were used to finally modify questions and the format of the tools that had the ability to solicit the expected data. Undergraduate students, lecturers, Deans of faculties and heads of departments were the relevant subjects that were given questionnaires, observed and or interviewed to obtain data. Relevant documents were obtained from, library at the University. Once the questionnaires were designed and rated, the content validity index (CVI) was then computed as follows

CVI = Agreed items by both judges as suitable Total number of items being judged

Table3.2: Questionnaires ratings

	Relevant Items	Not Relevant Items	Total
Rater 1	40	6	46
Rater 2	39	7	46
	79	13	92

CVI = <u>79</u> = 0.86

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The established CVI was 0.86 which indicates that the instrument was valid.

3.6.2 Reliability

A pre-test was conducted after establishing the validity. Twenty respondents from Kumi University were used in the pre-test to answer the questionnaire. This was because Kumi University has similar characteristics like Gulu University. Their responses were subjected to a Cronbach's Alpha Coefficient reliability test using the following formula:

$$\alpha = \frac{K}{K-1} \left(1 - \frac{\sum SD^{-2}1}{SDt^2} \right)$$

Where α = Reliability $\sum SDt^2$ = Sum of the variance of individual item in the questionnaire Sdt² = Variance of the entire questionnaire K = Number of the items in the questionnaire

 α was equal to 0.76 which indicated that the questionnaire was very reliable (Appendix E). Further reliability of the instrument was established using computer program of SPSS deploying Cronbach Alpha method of internal consistency to measure instruments consistency.

3.7 Procedure for Data collection

The researcher acquired a written introductory letter from the Dean School of Education, Makerere University Kampala (Appendix J) introducing the researcher to the respondents. The researcher sought appointments from the Deans, heads of departments from the University for interviews. Respondents filled the questionnaires while the researcher conducted observation. The objectives and purpose of the study was explained to the respondents. A Research assistant was employed to help the researcher in data collection.

3.8 Data collection techniques

The questionnaires were administered to the students during classes and at their free time by the help of a research assistant. Those students who could fill them there and then were welcomed but those who opted for more time were granted a one and half week period to return the filled questionnaires to the research assistant. The lecturer's questionnaires were administered and collected after a week. This technique enabled the researcher to approach many respondents more easily.

Interview schedules were set up with administrators who made appointment dates of convenience for the interviews. Guideline questions (Appendix C) guided the interview process and made sure that all the relevant questions were covered. Through the face to face exchange of words in personal interviews with the deans of faculties, and heads of departments, the researcher was able to get what was not mentioned by the students.

The researcher carried out observation of the university visiting the five faculties and library monitoring student's reaction to technology. With the guide of a check list, the researcher could tick as well as write down key features of the observation.

3.9 Data analysis

Data collected was mainly presented by use of quantitative methods. Data from the open ended questions and interviews were analyzed by indicating the magnitude of responses. Expressions like the bigger number, the least number, to a large extent, to a small extent, most respondents' comments and the majority of respondents were applied. In some cases respondents' comments were directly quoted. The responses from the structured questions were computed into frequency counts and percentages, charts. It was summarized and tabulated for easy presentation, assessment, analysis and interpretation. Data from the open ended questions enriched output from the closed ended questions and information from the documentary sources and interviews helped to bring out concrete evidence in the data analyzed. Hypotheses were then tested with the use of Pearson Correlation techniques.

CHAPTER FOUR

PRESENTATION, ANALYSIS AND INTERPRETATION OF RESULTS

4.0. Introduction

This study aimed at assessing the effects of ICT on students' learning: a case of Gulu University. The focus was on three independent variables, namely: availability, accessibility and user-ability of ICT resources and how these affect students' learning. In order to accomplish the above, three hypotheses were formulated and the results are presented in this chapter. The chapter is divided into three sections, namely: section one deals with the demographic characteristics of respondents, section two presents the descriptive statistics of the items relating to particular objectives and section three presents the study's findings according to the hypotheses cited in chapter one.

In the study, a total number of 249 students and 17 lecturers were sampled giving a total of 266 questionnaires that were distributed. A total of 175 (65.7%) fully completed questionnaires were returned of which 164 (65.8%) and 11 (64.7%) were filled by students and lecturers respectively. This gave a response rate of 65.7% as illustrated in Table 4.1 below:

Table 4.1:	Ouestion	maire	return	rate
	X			

Respondent category	Number issued out	Number returned	Percentage
Students	249	164	65.8%
Lecturers	17	11	64.7%
Total	266	175	65.7%

Information obtained was analyzed in terms of tables of frequencies, percentages and graphs. Responses from interviews and discussions with administrative staff were used to supplement responses from the closed ended questionnaires. The response rate was considered reasonable because at least more than 50% of the targeted respondents participated in the study. The researcher felt that the views expressed in the report is therefore representative of the target population.

4.1: Section one: Background information of respondents

4.1.1: Demographic Characteristics

The demographic characteristic illustrates the distribution of respondents' categories in relation to Age, Gender, Year of study, Designation and Duration of service in the University as described in Table 4.2, and 4.3:

Table 4.2:	Distribution	of respondent	s according to	Gender, Ag	e and Year o	of study
		or respondence			,	

	Attributes	Category	Count	Percentage
		Male	114	69.5%
	Gender	Female	50	30.5%
Total			164	100.0%
		<21 years	14	8.5%
		21-25 years	105	64.0%
	Age	26-30 years	34	20.7%
		Above 30 years	11	6.7%
Total			164	100.0%
		First	31	18.9%
		Second	72	43.9%

	Year of	Third	57	34.8%
	Study	Fourth	2	1.2%
		Fifth	2	1.2%
Total			164	100.0%
	Faculty/Inst	Agriculture and Environment	32	19.5%
	itutes	Business and Development Studies	41	25.0%
		Education and Humanities	56	34.1%
		Computer Science and Information Technology	28	17.1%
		Medicine	7	4.3%
			164	100%

The findings in Table 4.2 show that most of the respondents (114, 69.5%) were males while only 50 (30.5%) of them were females. This scenario is associated with the fact that, in the area were this study was conducted, female education is still low and this was clearly translating in their enrolment at university level. This is further supported by the National Council of Higher Education (NCHE, 2005) which shows higher enrolment among male than female students in Uganda's public universities.

From Table 4.2, it can also be noted that majority of the respondents (64%) were aged between 21-25 years. This is associated with the fact that the greater sections of the University population are direct entrants from A- level. About 20.7% and 6.7% were aged between 26-30 years and above 30 years respectively. This forms the bulk of students who enroll for weekend programs and they are mainly people of working classes.

With regards to year of studies, a total of 72 (43.9%) respondents were in second, 57 (34.8%) in

third and about 31(18.9%) in first year. This shows that the majority of the respondents were either in the middle or final year of their studies - a stage which is crucial in the preparation for the employment world and also expected to have had sufficient exposure to ICTs at the University.

The researcher inquired into the designation and duration of service of the lecturer respondents in the University. This was intended to ascertain the respondents' level of responsibilities and seniority in both the decision making processes and the teaching and learning process. The data is as presented in Table 4.3:

		Count	Percentage
Designation	Senior Lecturer	4	18.2%
	Teaching assistant	9	81.8%
Total		11	100.0%
Duration of service	<2 years	1	9.1%
in the University	2-5 years	9	81.8%
	> 3 years	1	9.1%
Total		11	100.0%

Table 4.3: Distribution of respondents' according to designation and duration of service.

The findings from Table 4.3 shows that majority (81.8%) of the teaching staff were Teaching Assistants. This partly was due to the fact that the University is still young and trying to train and recruit junior staff to develop and grow through its ranks. About 18.2% were senior lecturers implying they were more senior in terms of qualification and experience than their teaching assistants counterparts. The above is also supported by the duration of service of which the majority (81.8%) of the respondents have spent between 2-3 years of teaching in the University.

About 9.1% of the respondents have spent less than two years and an equally small number of 9.1% have spent more than three years teaching in the University. The teaching staff are considered central in this study because they are directly involved in the teaching and learning process using ICT.

4.2. Section two: Description of respondents' opinions in relation to the independent variable

In this section, descriptions of respondents' opinions per the items of the questionnaire relating to the objectives of the study are presented. Respondents were requested to react to the items by ticking (checking) the option that best described their opinions on a Likert scale ranging from Strongly Disagree to Strongly Agree or available, not sure and fairly available.

4.2.1. Respondents' opinion on the availability of ICT resources

Several items in the questionnaire were presented to the respondents to rate their availability and the findings are shown in Table 4.4:

ICT Resources	Status	Freq	Percent
Computers/PC in classroom	Not sure	125	71.4%
	Fairly available	26	14.9%
	Available	24	13.7%
Total		175	100.0%
Internet & E-mail	Not sure	100	57.1%
	Fairly available	50	28.6%
	Available	25	14.3%

Table 4.4: Distribution of respondents' by opinion on the availability of ICT resources

Total		175	100.0%
Television set	Not sure	72	41.1%
	Fairly available	69	39.4%
	Available	34	19.4%
Total		175	100.0%
Projector	Not sure	40	22.9%
	Fairly available	82	46.9%
	Available	53	30.3%
Total		175	100.0%
Software	Not sure	52	31.9%
	Fairly available	76	46.6%
	Available	35	21.5%
Total		163	100.0%
Computer laboratory	Not sure	16	9.1%
	Fairly available	88	50.3%
	Available	71	40.6%
Total		175	100.0%
Video conferencing equipments	Not sure	130	74.3%
	Fairly available	31	17.7%
	Available	14	8.0%
Total		175	100.0%

As seen in Table 4.4, computers in classroom seems to be one of the major concerns in Gulu University. This is depicted by majority (71.4%) of respondents who asserted that they were not sure of the presence of PCs in the class room. About 14.9% responded that PCs are fairly available in the class room, while only a small number of respondents (13.7%) consented to the presence of ICT resources in classroom/lecture rooms. The above findings suggests that the

general presence of computers in the lecture rooms in Gulu University is still wanting which directly hinders full integration of ICT in the teaching and learning process as students do not have access to new and different types of productive information. Thus, the process of learning in the class room can become significantly poorer as students do not have access to new and different types of information.

The findings from Table 4.4 also reveal that majority (57.1%) of the respondents were not sure of the availability of internet connectivity in the University. About 28.6% of the respondents stated that internet connectivity is fairly available at the University. Only a small number 14.3% of respondents cited that internet connection were available. Following a discussion with the administrators, it was revealed that the University has not had internet connection for a very long time majorly because of financial constraint in regards to internet subscription thus the difficulty for the students and lecturers to use the internet to access web based learning resources like online journals and general information for research and creation of knowledge.

Table 4.4 also reveal that television set as a tool for learning in the University was lacking with a majority (72,41%) of respondents responding that they are not sure, about 69 (39.4%) consented it was fairly available while a small number (34,19.4%) of respondents said TV was available. The researcher's discussion with the students exposes that the University has only two TV sets on campus and these are mainly used for students' entertainment rather than for academic purposes. This suggests that, the University doesn't utilize Television as a learning tool and as such important television based educative programs like national geographical channel, discoveries etc which may be very useful source of information for the students are missed out.

Table 4.4 further show that projectors for presentation of course materials were present in the University as supported by a majority (82, 46.9%) of respondents who acknowledged it is fairly available. About 53 (30.3%) responded that projectors are available while only 40 (22.9%) respondents were not sure. During the process of data collection, the researcher saw several students of Information Technology using the projector to present their course works. Besides, discussion with the students revealed that the class coordinators are responsible for picking and connecting the projector both for teachers and students use. The above finding shows that projector for presentation of student's course materials and teaching were relatively available in the University, besides one projector can serve a whole class at once.

From Table 4.4, majority (88, 50.3%) of the respondents responded that computer laboratories in the University were fairly available, closely supported by 71 (40.6%) respondents who consented that computer laboratories were generally available. A small number (16, 9.1%) of respondents were not sure of the availability of computer laboratory in the University. In the open ended questionnaire, the students noted that there is a good computer laboratory in the faculty of computer science; they however echoed the difficulty to get easy access to computers for use especially for the non IT classes. They also said that some computers did not have all programs they could use and others were faulty. This suggests that though limited in number, computer laboratories in the University are available. The biggest challenge being that students should compete to access the laboratories which competition may hinder their interest in accessing and using the laboratories.

Table 4.4 also reveals that video conferencing equipment in the University is still lacking as supported by a majority of respondents (130, 74.3%) consenting that they are not sure. About 31(17.7%) respondents said it is fairly available, while a small number (14, 8.0%) of respondents said it is available. The discussion with the administrators revealed that it is true the University does not have and use video conferencing equipments because it called for bigger network band widths which the University could not afford said dean faculty of Education and Humanities.

4.2.1.1: Respondents' opinions on adequacy of ICT resources

One of the major factors affecting integration of ICT in education is the adequacy of the ICT tools. If the available ICT resources are not adequate enough for both the students and lecturers, full utilization of these tools may never be realized. In view of this, respondents were requested to rate the adequacy of ICT resources and the findings are presented in Table 4.5:

 Table 4.5: Distribution of respondents with their opinions on adequacy of ICT resources

ICT Resources	Status	Freq	Percent
Computers/PC in classroom	Inadequate	114	65.5%
	Fairly adequate	49	28.1%
	Adequate	11	6.3%
Total		174	100.0%
Internet & E-mail	Inadequate	105	60.0%
	Fairly adequate	49	28.0%
	Adequate	21	12.0%
Total		175	100.0%
Television set	Inadequate	96	55.5%
	Fairly adequate	59	34.1%
	Adequate	18	10.4%

Total		173	100.0%
Projector	Inadequate	68	38.9%
	Fairly adequate	82	46.9%
	Adequate	25	14.3%
Total		175	100.0%
Software	Inadequate	85	48.6%
	Fairly adequate	67	38.3%
	Adequate	23	13.1%
Total		175	100.0%
Computer laboratory	Inadequate	100	57.1%
	Fairly adequate	43	24.6%
	Adequate	32	18.3%
Total	· · · · · · · · · · · · · · · · · · ·	175	100.0%
Video conferencing	Inadequate	133	76.4%
equipments	Fairly adequate	33	19.0%
	Adequate	8	4.6%
Total		174	100.0%

From Table 4.5, one of the major aspects affecting integration of ICT in learning in the University is the inadequacy of computers in the classroom which was cited by a majority of respondents (65.5%). This was closely followed by at least 105 (60%) of the respondents who cited inadequacy of internet services in the University. About 49 (28.1%) of the respondents said computers in classroom was fairly adequate and about the same number 49 (28.1%) responded to internet services as fairly adequate. A small number of respondents (21, 12.0%) said internet service was generally adequate in the University. This suggests that computers in the classroom were inadequate and in some faculties nonexistent and lacking internet connection. With the increasingly growing student population in the University, the students and the teaching staff all

have to use the available computers and internet services in turn which time of use may never be sufficient to carry out constructive academic work like searching for information, online course among others.

From Table 4.5, projectors for learning purposes was seen as fairly adequate supported by a majority (82, 46.9%) of respondents while 68 (38.9%) respondents said projectors were not adequate. This implies that students can fairly have projectors for academic purpose, since one projector can serve the whole class at once.

Table 4.5 also shows that the majority (100, 57.1%) of respondents responded that computer laboratories are in adequate. About 43 (24.6%) respondents said that they are fairly adequate, while a small number (32, 18.3%) of respondents acknowledge they are adequate. This finding reveal that where as computer laboratories do exist in the University, several faculties do not have their own computer laboratories, priority is always given to students of computer science and Information Technology but not students from other courses which frustrate them in their effort to use ICT for their learning purposes.

Table 4.5 further shows that majority (133, 76.4%) of the respondents responded to video conferencing equipment as being inadequate in the University. This is supported by the views of the administrators who concurred that such equipments do not even exist in the University which means that they are never used in the University for the teaching and learning process. The finding suggest that distance education so often supported by video conferencing to link up participants in learning centres and help facilitate instruction, provide distant learners with a host of resources and access to content providers, teachers, librarians and more is not catered for.

4.2.2. Respondents' opinions on accessibility of ICT resources

The respondents were asked how often they access ICT resources in various locations in the University and the results are given in Table 4.6:

ICT resources location			
Category	Response	Freq	Percent
Library	Never at all	41	23.4%
	Not sure	8	4.6%
	Some times	107	61.1%
	Always	19	10.9%
Total		175	100.0%
Computer lab	Never at all	10	5.7%
	Not sure	9	5.2%
	Some times	104	59.8%
	Always	51	29.3%
Total		174	100.0%
Lecture rooms	Never at all	75	43.1%
	Not sure	3	1.7%
	Some times	50	28.7%
	Always	46	26.4%
Total		174	100.0%
Resource centre	Never at all	70	40.2%
	Not sure	38	21.8%
	Some times	54	31.0%
	Always	12	6.9%
Total		174	100.0%
Halls of residence	Never at all	117	67.2%

Table 4.6: Distribution of respondents by opinions on accessibility of ICT resources

	Not sure	13	7.5%
	Some times	28	16.1%
	Always	16	9.2%
Total		174	100.0%
Internet kiosk	Never at all	65	37.4%
	Not sure	20	11.5%
	Some times	67	38.5%
	Always	22	12.6%
Total		174	100.0%

Table 4.6 shows that the University library and computer laboratory are the most popular places for students to access ICT for general use notably 29.3% of the students always accessed ICT resources in the computer laboratory and 59.8% of the respondents accepted that sometimes they do access ICT resources in the computer laboratory. This result is echoed by a majority (61.1%) of respondents responding to sometimes accessing ICT from the library. The researcher's discussion with some respondents revealed that this access was not frequent. This was further confirmed by the Dean Faculty of Education who asserted that access to the few computer laboratories for non IT students was dependent on the laboratory being free which is not frequent. Only 5.2% of the respondents were not sure, yet 5.7% responded that they never accessed any kind of ICT resources in the computer laboratory and library tends to deny students exploration of ICT resources for acquisition of information, and knowledge necessary for their academic pursuits.

Results from Table 4.6 indicates that only 26.4% of the respondents claimed to always access

ICT resources in the lecture rooms, about 28.7% responded that sometimes they access ICT resources in the lecture rooms. A small number (1.7%) of the respondents were unsure of any existence of ICT resources in the lecture rooms, while majority (43.1%) of the respondents responded that they never access any ICT resources in the lecture room. The findings reveal that access to ICT resources in the lecture rooms is still limited and if the lecture room is a typical learning environment, then access to ICT resources should be improved to allow both student's and lecturer's access to and production of, resource materials associated with the processes of learning and teaching .

Responses as to how often students access ICT resources from resources centres were as follows; At least 6.9% of the respondents said that they always access ICT resources from the resource centres. About 31.0% said that sometimes they access ICT resources from the resources centres and 21.8% of the respondents were unsure. Majority of the respondents (40.2%) said that they never accessed any ICT resources from the resource centres. The above response revealed to the researcher that students and lecturers were not aware of ICT resource centers meaning that the University did not have ICT resource centres were students go for research and practice on various ICT application. Even during the data collection process and observation, the researcher did not identify any resource centre in the University.

From Table 4.6, only 9.2% of the respondents consented that they always access ICT resources in the hall of residence, while 16.1% of them said sometimes and 7.5% of the respondents were unsure. Majority of the respondents (67.2%) never accessed any ICT resources from the hall of residence. The researcher's discussion with some students revealed that most students are non-

residents coming from their homes. But even those who are accommodated in the hostels affiliated to the University said that the internet access points were in place but you have to pay to access it. The finding suggests that the students are limited in their access to ICT resources from their various places of residence hindering their use of these facilities for communication and searching for information which duly affects their learning.

Results from Table 4.6 further show that very few students (12.6%) always accessed ICT resources in internet kiosk. But a good number (38.5%) of them agreed that sometimes they accessed ICT resources in the internet kiosk. Only 11.5% were unsure and quite a number (37.4%) articulated that they never accessed ICT resources in the kiosks. The students mentioned that it is very expensive to go to commercial internet kiosk and this cost seems to hinder student's ready access of ICT resources for communication and learning purposes. Beside, the researcher observed that the University does not have an internet kiosk where students could access internet services for free.

4.2.2.1. Challenges affecting students' accessibility of ICT resources

The respondents were asked to give their views on the challenges affecting students in accessing ICT resources and their response are illustrated in Figure 2:



Fig 2: Distribution of respondents by their views on the challenges affecting students' accessibility of ICT resources

From Fig 2, the findings in the open ended question revealed that few ICT resources in the University remains the most serious challenge affecting accessibility of ICT facilities in the University as a majority of respondents (61%) expressed. The respondents stated that students are given limited time to practice since the computer laboratory are always competed for by students from the different faculties. Since most faculties in the University do not have computer laboratories, priority is always given to the students of computer science and information Technology. This is further supported by 10% of the respondents who consented that limited access to the computer laboratory remains the biggest challenge of accessing ICT in the

University. As a result, students continually have limited access and use computers for their academic purposes.

The results in figure 2, also revealed that financial constraints on the part of the University as one of the major challenge to accessibility of ICT resources. One respondent exclaimed that "Gulu University is still a young University, finances cannot allow it to meet all its demands and computers in the lecture rooms are secondary". Sentiments of this nature have made students not to realize the place of ICT in their education. The researchers discussion with the administrators reveals the need for increament in ICT facilitation so as to increase on the number of technology accessories in the University.

About 7% and 6% of respondent looked at unreliable internet and poor management respectively as challenges affecting accessibility while 3% thinks its power load shedding. The above findings reveal that accessibility of computers still remains a very serious hindrance to the students to engage the various technological tools to improve on their learning.

4.2.2. User-ability of ICT resources and students learning

Respondents were requested to rate their knowledge and skills in the various ICT tools. In Table 4.7, their responses are summarized.

ICT tools	Level of skill	Freq	Percent
Word processing	Very poor	11	6.3%
	Poor	10	5.7%
	Fair	39	22.3%
	Good	73	41.7%
	Very good	42	24.0%
Total		175	100.0%
Spreadsheets	Very poor	13	7.4%
	Poor	14	8.0%
	Fair	59	33.7%
	Good	61	34.9%
	Very good	28	16.0%
Total		175	100.0%
Presentation	Very poor	18	10.3%
	Poor	24	13.8%
	Fair	65	37.4%
	Good	41	23.6%
	Very good	26	14.9%
Total		174	100.0%
Online instruction Blackboard	Very poor	41	23.6%
	Poor	39	22.4%
	Fair	52	29.9%
	Good	30	17.2%
	Very good	12	6.9%
Total		174	100.0%
Video conferencing	Very poor	52	30.1%
	Poor	59	34.1%
	Fair	38	22.0%

 Table 4.7: Distribution of respondents by rating of students skills in various ICT tools

	Good	15	8.7%
	Very good	9	5.2%
Total		173	100.0%
Publication software	Very poor	40	23.1%
	Poor	50	28.9%
	Fair	46	26.6%
	Good	27	15.6%
	Very good	10	5.8%
Total		173	100.0%
Projectors	Very poor	30	17.1%
	Poor	35	20.0%
	Fair	47	26.9%
	Good	42	24.0%
	Very good	21	12.0%
Total		175	100.0%
Internet and E-mail	Very poor	8	4.6%
	Poor	15	8.6%
	Fair	38	21.7%
	Good	51	29.1%
	Very good	63	36.0%
Total		175	100.0%

Results from Table 4.7, show that majority of the respondents (73, 41.7%) emphasized that their skills to use MS word is good. In the same vein, 42 (24.0%) respondents claimed that their skills were very good whereas 39 (22.3%) rated their skills as fair. While 5.7% and 6.3% of respondents rated their skills as being poor and very poor respectively in using Ms word. The finding reveals that the student's capabilities to use Ms Word for their academic purpose like preparation of course work is relatively good which suggest that ICT can influence learning.

Table 4.7, recorded only 28 (16.0%) respondents who envisaged their skills to use spreadsheets as very good together with 59 (33.7%) who rated their skills as fair. Majority of the respondents (61, 34.9%) rated their skills of using spreadsheets as good. While 14 (8.0%) rated their skills as poor and 13 (7.4%) rated as very poor. During a discussion with the researcher, some students revealed that the content taught to them is very shallow and even one lecturer consented that "we train them only basic components" which was a further proof of the shallowness of the contents taught.

The findings obtained from Table 4.7 above, show that only 26 (14.9%) of all the respondents' agreed that students skills to use presentation software in performing learning tasks were very good. A total of 41 (23.6%) respondents agreed that their skills were only good. On the other hand a big number of the respondents totaling to 65 (37.4%) believed that their skills to use presentation software in performing learning tasks were fair. About 24 (13.8%) rated their skills as poor and 18 (10.3%) rated their skills as very poor in using presentation software. The above findings suggest that the students were fairly capable and skilled in using presentation soft ware like PowerPoint to present their course materials during discussions and lessons.

Result from Table 4.7 shows that only 12 (6.9%) respondents rated their skills in online instruction to be very good. About 30 (17.2%) respondents said that their skills in using online instruction is good while the majority of the respondents (52,29.9%) rated their skills as fair. A total of 39 (22.4%) rated their skills as poor and forty one (23.6%) agreed that their skills in using online instruction is very poor. The above findings reveal that students are not well equipped to use online instruction like blackboard to share learning materials. Besides,

discussion with the students also reveals that no active online instruction system was in place since the University has not had internet connection for a long period of time.

Table 4.7 spells out very few respondents (5.2%) who accepted that they had very good skills of video conferencing. Again a small number (15, 8.7%) of respondents accepted their skills to be good. At least 38 (22.0%) of the respondents rated their skills as fair. Majority of respondents (59, 34.1%) accepted that they had poor skills of video conferencing. Fifty two (30.1%) of the respondents agreed that their skills were very poor. From the discussions with the administrators they all agreed that the ICT resources for video conferencing were not in place the reason why such technology was not used in the University. It called for bigger network band widths which the University could not afford said dean faculty of Education and Humanities.

Results from Table 4.7, show that only 10 (5.8%) of the total respondents' said students skills to use publication software were very good. About 27 (15.6%) respondents consented that their skills were good. Forty six (26.6%) rated their skills as fair, yet majority (50, 28.9%) said their skills were poor. A total of 40 (23.1%) respondents said their skills were very poor .Discussions with the administrators confirmed that teaching students how to produce documents using PageMaker and publisher like banners, adverts etc were not in place. A lecturer from the faculty of computer science said that time and financial resources doesn't allow for this program thus students are not provided with the knowledge and skills in this packages which affects their learning in this information age.

Results from Table 4.7 further reveal that 47 (26.1%) of the students' had fair skills to use a

projector in presenting their work. At least 35 (20.0%) respondents said their skills to use projectors were very poor and about 30 (17.1%) rated their skills as poor. On the positive side a total of 42 (24.0%) respondents consented having good skills while a small number of respondents (21, 12.0%) said they had very good skills to use projectors. Respondents who agreed of having good, fair and very good skills to use projectors are true because during the researcher's data collection he saw several students of Information Technology using it to present their course works. Besides, discussion with the students revealed that the class coordinators are responsible for picking and connecting the projector both for teachers and students use which clearly suggest that the students were fairly knowledgeable and skilled in the use of projectors for learning purposes.

Table 4.7, recorded only 8 (4.6%) respondents who agreed that their skills to use Internet and online technology were very poor. About 15 (8.6%) respondents said were poor. A total of (21.7%) rated their skills as fair while at least 29.1% said their skills were good. Majority of the respondents (63, 36.0%) agreed that their skills to use internet and online resources were very good. The above finding is indicative that the students rate their skills in using internet and online resources highly and thus should be capable of collaborating with fellow students, downloading academic resources like online journals among others.

4.2.3.1. Factors that affect students' use of ICT tools

The respondents were asked for the factors that affect student's use of the various ICT tools and their responds are summarized in Table 4.8 :

Opinion	Freq	Percent
Inadequate power supply	13.00	8%
Limited time to access the lab	37.00	22%
Inadequate infrastructure	11.00	7%
Bureaucracy	4.00	2%
Limited ICT facilities	62.00	37%
Inadequate internet services	11.00	7%
Lack of hands on experience	25.00	15%
Mismanagement of lab equipments	2.00	1%

 Table 4.8: Distribution of respondents by opinion on factors affecting student's use of

 various ICT resources

From Table 4.8, responses from the open ended questions revealed that majority (37%) of the respondent's emphasized limited ICT resources in the University as the major factor affecting student's use of ICT tools. This was evident where students accessed the computer laboratory to study in three different shifts on different days not for convenience but to share the few computers that were available. Student computer ratios were too high yet many computers were faulty. This view was further supported by 37 (22%) of the respondents who stressed that they have limited time to access the computer laboratory. The Dean Faculty of Education and Humanities raised the issue of lacking a faculty computer laboratory.

From Table 4.8, about 25 (15%) of the respondents indicated that they lack hands on experience and most instruction were theoretical with the students having very little time to practice since the computer laboratory is always competed for. This suggests that the students are not equipped with the practical knowledge and skills that they may so much require during employment. About 13 (8%) respondents raised inadequate power supply, while at least 11 (7%) looked at limited infrastructures with the same number stressing inadequate internet connectivity as the factor affecting students use of ICT resources. A smaller number (2%) and (1%) of respondents pointed at bureaucracy and mismanagement of laboratory equipments respectively as factors affecting their use of the ICT tools in the University.

4.2.4. Responses on students' learning

Respondents were asked to give their judgment on the different tasks and below (Table 4.9) is the summary of their responses.

Learning tasks	Opinion	Freq	Percent
Use the computer to complete course	Strongly Disagree	13	7.4%
works. projects. report e.t.c	Disagree	19	10.9%
	Don't Know	8	4.6%
	Agree	95	54.3%
	Strongly Agree	40	22.9%
Total		175	100.0%
Own learning using computers and	Strongly Disagree	13	7.4%
internet	Disagree	46	26.3%
	Don't Know	7	4.0%
	Agree	68	38.9%
	Strongly Agree	41	23.4%
Total		175	100.0%
Use the computer to type course	Strongly Disagree	8	4.6%
works and assignments	Disagree	11	6.3%

 Table 4.9: Distribution of respondents by opinion on performance of learning tasks

	Don't Know	3	1.7%
	Agree	92	52.6%
	Strongly Agree	61	34.9%
Total		175	100.0%
Apply what has been learnt to the real	Strongly Disagree	6	3.4%
world situation	Disagree	16	9.2%
	Don't Know	20	11.5%
	Agree	94	54.0%
	Strongly Agree	38	21.8%
Total		174	100.0%
ICT improves organizational skills	Strongly Disagree	9	5.1%
	Disagree	12	6.9%
	Don't Know	21	12.0%
	Agree	91	52.0%
	Strongly Agree	42	24.0%
Total		175	100.0%
Total Helps in developing interest in the	Strongly Disagree	175 7	100.0% 4.0%
Total Helps in developing interest in the learning content	Strongly Disagree Disagree	175 7 20	100.0% 4.0% 11.5%
Total Helps in developing interest in the learning content	Strongly Disagree Disagree Don't Know	175 7 20 9	100.0% 4.0% 11.5% 5.2%
Total Helps in developing interest in the learning content	Strongly Disagree Disagree Don't Know Agree	175 7 20 9 101	100.0% 4.0% 11.5% 5.2% 58.0%
Total Helps in developing interest in the learning content	Strongly Disagree Disagree Don't Know Agree Strongly Agree	175 7 20 9 101 37	100.0% 4.0% 11.5% 5.2% 58.0% 21.3%
Total Helps in developing interest in the learning content Total	Strongly Disagree Disagree Don't Know Agree Strongly Agree	175 7 20 9 101 37 174	100.0% 4.0% 111.5% 5.2% 58.0% 21.3% 100.0%
Total Helps in developing interest in the learning content Total Use the internet/computer to look for	Strongly Disagree Disagree Don't Know Agree Strongly Agree Strongly Disagree	175 7 20 9 101 37 174 3	100.0% 4.0% 11.5% 5.2% 58.0% 21.3% 100.0% 1.7%
Total Helps in developing interest in the learning content Total Use the internet/computer to look for information	Strongly Disagree Disagree Don't Know Agree Strongly Agree Strongly Disagree Disagree	175 7 20 9 101 37 174 3 8	100.0% 4.0% 11.5% 5.2% 58.0% 21.3% 100.0% 1.7% 4.6%
Total Helps in developing interest in the learning content Total Use the internet/computer to look for information	Strongly Disagree Disagree Don't Know Agree Strongly Agree Strongly Disagree Disagree Don't Know	175 7 20 9 101 37 174 3 8 9	100.0% 4.0% 11.5% 5.2% 58.0% 21.3% 100.0% 1.7% 4.6% 5.1%
Total Helps in developing interest in the learning content Total Use the internet/computer to look for information	Strongly Disagree Disagree Don't Know Agree Strongly Agree Strongly Disagree Disagree Don't Know Agree	175 7 20 9 101 37 174 3 8 9 99	100.0% 4.0% 11.5% 5.2% 58.0% 21.3% 100.0% 1.7% 4.6% 5.1% 56.6%
Total Helps in developing interest in the learning content Total Use the internet/computer to look for information	Strongly Disagree Disagree Don't Know Agree Strongly Agree Strongly Disagree Disagree Don't Know Agree Strongly Agree	175 7 20 9 101 37 174 3 8 9 99 99 56	100.0% 4.0% 11.5% 5.2% 58.0% 21.3% 100.0% 1.7% 4.6% 5.1% 56.6% 32.0%
Total Helps in developing interest in the learning content Total Use the internet/computer to look for information Total	Strongly Disagree Disagree Don't Know Agree Strongly Agree Strongly Disagree Disagree Don't Know Agree Strongly Agree	175 7 20 9 101 37 174 3 8 9 99 56 175	100.0% 4.0% 11.5% 5.2% 58.0% 21.3% 100.0% 1.7% 4.6% 5.1% 56.6% 32.0% 100.0%
Total Helps in developing interest in the learning content Total Use the internet/computer to look for information Total Use the internet to collaborate with	Strongly Disagree Disagree Don't Know Agree Strongly Agree Strongly Disagree Don't Know Agree Strongly Agree Strongly Agree	175 7 20 9 101 37 174 3 8 9 9 99 56 175 12	100.0% 4.0% 11.5% 5.2% 58.0% 21.3% 100.0% 1.7% 4.6% 5.1% 56.6% 32.0% 100.0% 6.9%

	Don't Know	9	5.1%
	Agree	99	56.6%
	Strongly Agree	34	19.4%
Total		175	100.0%
Acquired some of the pre-requisite	Strongly Disagree	7	4.0%
skills for workplace preparedness	Disagree	21	12.0%
	Don't Know	21	12.0%
	Agree	94	53.7%
	Strongly Agree	32	18.3%
Total		175	100.0%
Linking academic subjects to work	Strongly Disagree	7	4.0%
place demands	Disagree	14	8.0%
	Don't Know	7	4.0%
	Agree	93	53.1%
	Strongly Agree	54	30.9%
Total		175	100.0%

Table 4.9 shows that students have a very positive attitude towards information technology. The respondents use computers to complete course works, projects and reports to which a majority (54.3%) agreed, while about 40 (22.9%) respondents strongly agreed that they use computers to complete course works. A total of 19 (10.9%) and about 13 (7.4%) respondents disagreed and strongly disagreed respectively on their use of computers to complete course works and assignments. A small number (4.6%) of respondents were not sure. The finding implies that despite the difficulty in accessing computers, students were putting enough effort to use computers in their learning processes.

From Table 4.9, it can be noticed further that, at least 41 (23.4%) respondent strongly agreed to own learning using computer and internet. A majority (68, 38.9%) of respondents agreed to own

learning using computers. They are willing to use computers as a supplement to other teaching activities. About 46 (26.3%) respondents disagreed and a small number (13, 7.4%) of respondents strongly disagreed to using computers and internet for own learning. The above finding suggest that ICT offers tools for thinking more deeply, pursuing curiosity and exploring and expanding intelligence as students build mental models with which they can visualize connections between ideas on any topic. These finding is consistent with Bataineh and Baniabdelrahman (2005) who pointed out that computers can be used as a supplement but cannot fully replace the teacher's job.

Table 4.9 further reveals that majority (52%) of the respondents agreed that ICT improve students organizational skills. About 24% strongly agreed while a small number (12%) disagreed .A total of 5.1% strongly disagreed to IT improving students' organization skills. The finding suggest that interactive educational technologies help students to learn to organize complex information, recognize patterns, draw inferences, communicate findings and learn better organizational and problem solving kills.

Table 4.9 also reveals that majority (56.6%) of the respondent's agreed that they use the internet to collaborate with others. About 19.4% strongly agreed while a small number 12% and 6.9% disagreed and strongly disagreed respectively to using internet to collaborate with others. About 5.1% of the respondents were unsure. The findings imply that the students have the ability and work co-operatively with others and apply a variety of skills to communicate with and understand others. This is supported by the fact that clusters of students working together on computers learn more than individual students working alone (Ames, 1999).

Table 4.9 also reveals that majority of the students are familiar with technology and are usually able to judge its potential as 53.7% of respondents agreed and 19.3% strongly agreed to acquiring some of the pre-requisite skills needed for workplace preparation. This is further supported by 53.1% of the respondents who consented that technology can help students link academic subject to work place demands. Only a small number (12.0%) of respondents disagreed and 4.0% strongly disagreed to technology providing pre-requisite skills to students for work place preparedness. The findings suggest that technology provides students with knowledge-based and skillful intellectual work required in industrial, professional and business occupation since a workers ability to use ICT is a necessity in more and more occupations.

Table 4.9 further shows that a majority (53.1%) of respondents agreed to ICT linking academic subjects to work place demands. About 30.9% of the respondents strongly agreed while 8% and 4% disagreed and strongly disagreed respectively. Only 4% were not sure. The evidence in this finding suggest that students use ICT for personal growth by analyzing subject context critically and using it productively in preparation for the real employment world.

4.2.4.1. How often students perform various tasks using computer/ICT

The respondents were asked to rate how often students perform different tasks using the computer and Table 4.10 shows there response.

 Table 4.10: Distribution of respondents on opinion regarding how often students perform

 various tasks using computer/ICT

Learning tasks	Times	Freq	Percent
Look up ideas or	Never	5	2.9%
information	A few times	19	11.1%
	Once/twice a month	32	18.7%
	At least a week	90	52.7%
	Everyday	25	14.6%
Total		171	100.0%
Write reports	Never	30	17.5%
	A few times	27	15.8%
	Once/twice a month	50	29.2%
	At least a week	52	30.4%
	Everyday	12	7.0%
Total		171	100.0%
Process and analyze	Never	35	20.3%
data	A few times	25	14.5%
	Once/twice a month	31	18.0%
	At least a week	57	33.1%
	Everyday	24	14.1%
Total		172	100.0%

When it comes to performing the different tasks using a computer, students tend to see ICT as something which is primarily there to help them with course administration. Being able to look up for course ideas or information was felt to be the most frequent with a majority (90, 52.6%) of respondents responding to look up for ideas or information at least once a week, about 25 (14.6%) respondents said they look for information everyday and at least 32 (18.7%) look up for information once or twice a month. A small number (19, 11.1%) use the computer to look up for

ideas and information just a few times.

From Table 4.10, majority (52, 30.4%) and (57, 33.1%) responded to using the computer for writing reports and processing and analyzing data respectively on a weekly basis. This was closely followed by those who use the computer once or twice a week for writing reports (50, 29.2%). About 27 (15.8%) respondents said that they never use the computer for writing reports and 30 (17.5%) respondents mentioned that they use it a few times for writing reports. Discussions with the administrators revealed that, whereas majority of the students write course reports, it is not compulsory to every courses, to some it is optional. This explains why only 12 (7.0%) indicated that they write reports every day.

Table 4.10 also reveals that about 31 (18.0%) of the respondent approved to students using the computer once or twice a month to process and analyze data. A total of 35 (20.3%) respondents consented to never using the computer for data analysis and processing while 25 (14.5%) do it a few times. An equally small number (24, 14.0%) of respondent's processes and analyses data with a computer every day. This suggest that where as majority of the students do not use computers for data analysis, at least a small population engages the computer in data analysis as a means to derive meaning in their data.

4.3. Section three: Verification of the Hypotheses

To test the hypothesis, composite indices for the independent and dependent variables were computed by summing up all valid responses intended to obtain respondents' opinions per each of the four variables (i.e. Availability, Accessibility, User-ability of ICT resources and students learning). The reason for aggregating these responses was that the method of analysis (i.e. Pearson correlation) necessitated data which is continuous. In verifying the hypotheses, the researcher used a Pearson correlation analysis method to find out whether students' learning was linearly correlated with each of the three independent variables. Thus, the categorical data was transformed into quantitative forms. In view of this, Extreme positive responses (i.e. strongly Agree, Very good) were assigned the value of 5 and the extreme negative responses (i.e. Strongly Disagree, very poor) were assigned the value of 1. Composite scores were computed for the independent and the dependent variable for statements of the questionnaire dealing with each of the four independent variables and the dependent variable. Consequently, the analysis entailed the verification of the null hypotheses at 0.05 level of significance.

4.3.1 Test of the first hypothesis: The first null hypothesis was stated as: "availability of ICT resources is not correlated with students learning in Gulu University". The null hypothesis was tested using a Pearson product moment correlation index to find out whether there is a relationship between the two variables. The result of the finding is presented in table 4.11:

		Students'	Availability of
		learning	ICT resources
Students' learning	Pearson Correlation	1	.586
	Sig. (2-tailed)		.000
	N	175	175
Availability of ICT resources	Pearson Correlation	.586	1
	Sig. (2-tailed)	.000	
	N	175	175

Table 4.11: Correlation between availability of ICT resources and students' learning
The results of this analysis show a positive linear relationship between availability of ICT resources and students learning as given by the positive value of the computed correlation index (.586). The p-value (.000) being less than the level of significance alpha .05 implies that the results were statistically significant. This suggests that availability of ICT resources plays a significantly positive role towards students learning in Gulu University hence the null hypothesis that "availability of ICT resources is not correlated with students learning in Gulu University" was rejected and the alternative hypothesis upheld which means that the availability of ICT resources influence students learning in Gulu University.

4.3.2 Hypothesis two: The second null hypothesis was stated as: "Accessibility of ICT resources are not correlated with students learning". A Pearson product correlation coefficient was used to test this hypothesis and the results are summarized in the Table 4.12 below:

Table 4.12: Correlation between accessibility of ICT resources and students' learning

		Students'	Accessibility of
		learning	ICT resources
Students' learning	Pearson Correlation	1	.548
	Sig. (2-tailed)		.000
	N	175	175
Accessibility of ICT resources	Pearson Correlation	.548	1
	Sig. (2-tailed)	.000	
	N	175	175

The results of the analysis show a positive correlation (.548) between accessibility of ICT resources and students learning. Accordingly, the null hypothesis that "Accessibility of ICT resources is not correlated with students learning" was rejected in favour of the alternative

hypothesis. The findings suggest that as student's accessibility to ICT resources improves there is a likely improvement in students learning in Gulu University.

4.3.3 Hypothesis three: Null hypothesis three stated that: "User-ability of ICT resources is not correlated with students learning". A Pearson product correlation coefficient was used to test this hypothesis and the results are summarized in the Table 4.13 :

Students' User-ability of learning ICT resources Students' learning Pearson Correlation 1 .713 Sig. (2-tailed) .000 Ν 175 175 User-ability of ICT Pearson Correlation .713 1 resources Sig. (2-tailed) .000 Ν 175 175

Table 4.13: Correlation between user-ability of ICT and students' learning

The results of this analysis show a positive linear relationship between user-ability of ICT resources and students learning as given by the positive value of the computed correlation index (.713). The p-value (.000) being less than the level of significance alpha .05 implies that the results were statistically significant. This suggests that user-ability of ICT resources plays a significantly positive role towards students learning in Gulu University hence the null hypothesis that "User-ability of ICT resources is not correlated with students learning" was rejected and the alternative hypothesis upheld.

CHAPTER FIVE

DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS 5.0 Introduction

The findings reported in chapter four are discussed in relation to research questions earlier formulated and outlined. The chapter is divided into five sections: Introduction, discussion, conclusions and recommendations for improvement in ICT integrations in the teaching and learning process in Gulu University. The chapter concludes with recommendations for further research.

5.1 Discussions

The following is the discussion according to the research objectives

5.1.1. Discussion on the effect of the availability of ICT resources on students' learning

The study established that the availability of the different ICT resources in the University is still very much wanting. About 71% of the respondents were not sure of the presence of computers in the lecture rooms, 57.1% of the respondents stated that they were not sure of internet connection in the University and about 50.3% consented to computer laboratory being fairly available. For proper and thorough integration of ICT into the teaching and learning process, technology gadgets and their accessories should be made available for use to yield the intended benefits. According to Mbwesa (2000), the availability of ICT resources can enhance learning by making education less dependent on differing teacher quality and by making education available at home throughout the day. Furthermore, Riel (1998) stressed that the availability and use of ICT can help students exploit enormous possibilities for acquiring information for schooling purposes and can increase

learning through communication.

Jonassen (1996) explains that when computers and related technology are made available in schools and institutions, students are compelled to use databases, spreadsheets, multimedia, email, and network search engines to complete their projects, such processes provide greater potential to promote cognitive development. Also according to Jackson, D., B. Edwards and C. Berger (2003), computers raise the potential to equip students with higher-order skills such as inquiry, reasoning, problem solving and decision making abilities, critical and creative thinking and learning how to learn. Research also showed that using computers has a positive effect on students achievement compared to traditional methods (Sterling and Gray, 1991 in Means, Barbra (ED.) (2004

The study further reveals that ICT resources in the University are inadequate. About 65.5% said computers in lecture rooms were inadequate, 60% of the respondents consented that internet and email is inadequate and about 57% looked at computer lab as being inadequate yet according to Jonassen (2001), availability of computers and related technologies without being made adequate in regards to students needs may make no difference in the teaching and learning processes. Greenleaf (1994) further explained that inadequacy of ICT facilities translates into lack of skills in the use of ICT equipment and software which results in a lack of confidence in utilising ICT tools among the students. This is consistent with Herman and Joan (1994) who concluded that lack of enough ICT tools to be key inhibitor to the use of ICT in classroom.

5.1.2. Discussion on the effect of the accessibility of ICT resources on students' learning

Learning using ICT is hindered by accessibility to different ICT resources. Bardwell (2002)

emphasized the issue of accessibility as a feature of ICT integration into teaching and learning process. The study reveals that, because of the limitation in the numbers of functional computers and laboratories, the computer laboratories are timetabled and time for accessibility is limited. Lecturers and students from the different faculties are supposed to adhere to time schedules which do not promote accessibility at convenience. Nonetheless, timetabling is aimed at better organization and management of the few resources and most respondents agreed that there is access though insufficient in the University.

The study indicates that easy access of ICT facilities was a problem in all the University's sector. According to the findings majority of the students hardly accessed ICT facilities from halls of residence. Resource centers were not in place and in public libraries there were no ICT facilities for students use. No time was allocated for students practice in the computer lab. Besides, the lecturers also compete for facilities in the computer lab with students. However, the study also shows that computer lab and University library remains the two most popular places to access ICT resources. It is worth noting that accessibility to the internet which is one of the major indicators of ICT in learning in an institution is not fully implemented in every sector especially, the halls of residence, lecture rooms and resource centre. Alessi and Trollip (2002) precisely hint that the internet will transform many activities including teaching and learning. This makes ICT in learning to manifest and be limited to computer lab and the library only. Learning on the internet conforms to constructivist approach to instruction (Jonassen, 2002) so the limit to places is not an ideal practice.

UNESCO (2000b) points out that the success of ICT in teaching and learning process in higher

education shall base on the degree with which students and teaching staff access ICT facilities. Findings from respondents echoed limited ICT resources as the biggest challenge affecting students' access to ICT facilities (61%). This was closely followed by financial constraints cited by 13% of the respondents. The researcher's discussion with the administrators reveals the need for increment in ICT facilitation so as to increase on the number of technology accessories in the University. Limited time to access the computer lab (10%), Internet connectivity (7%) and power fluctuation (3%) were some of the other reasons cited as affecting students access to ICT resources.

5.1.3. Discussion on the effect of the user-ability of ICT resources on students' learning

According to UNESCO (2002), the safe way to bring computers to institutions is teaching students skills of how to use word processors, spread sheets, data bases and graphic tools. These are the productive tools required later on in life. The developments of appropriate strategies to use these tools productively are through identifying and developing the level of user-ability skills. The study has shown that 41.7% of respondents rated their skill as good in Ms Word, about 34% rated as good in Spreadsheets. Although the respondents scored high on ICT user-ability skills, this does not mean that they use ICT effectively. Only what can be inferred is that the respondents rate their skills highly and rating the user skill is not based on any standard measure. It is just a way one perceives his or herself. However, perceiving oneself positively is a very important basis on which to judge the ability to participate effectively in an activity.

The study reveals that computer user-ability skills influence learning. Students and lecturers with

such skills were seen to be more comfortable in their application of the various computer programs, meaning that those who rated their ICT user-ability skills high also have high skills to gage ICT into learning processes. This was also observed in practice where learners with good user-ability skills were more proficient than their colleagues who had rated themselves low.

It was found out that emphasis was put on training students basic concepts of ICT. The introductions were based on students' identification and use of computer terminology appropriately such as hardware and software. Students were trained to identify the main components of the hardware in use (i.e. Central Processing Unit (CPU), input devices, output devices and storage devices); students demonstrated an understanding of the functions of the main components of the hardware in use; identified various peripheral devices (e.g. printers, scanners, plotter, scanner, digital camera); and use of email, demonstrated an understanding of the functions of the functions of the various peripheral devices which was in agreement with UNESCO's module one for skills in ICT curriculum (UNESCO,2000b). Just like Jonassen, emphasis was put on this section because it formed a rich examinable area for ICT assessment

Like Tearle (2003), Drenoyianni (2004) agrees that variations in the ICT skill base of individuals can impede the use of ICT for teaching and learning. Drenoyianni (2004) advocates a phased approach where students are required to complete a mandatory initial introduction to ICT and this in turn leads on to training in the more complex ICT packages. In this way the introduction to ICT is a preparatory stage allowing students to build their ICT confidence where they later learn to utilize ICT in the learning context. Minimum standards of expertise are maintained and standards met but not ending on the Microsoft office suite like what the University was doing

(Mbwesa 2002).

The study reveals that limited ICT facilities remained the major factor affecting students' use of ICT resources with a majority (37%) emphasizing it. This was evident where students accessed the computer laboratory in different shifts not for convenience but to share the few computers. This was further supported by 22% of respondents who stressed that they have limited time to access the computer lab. The researcher agrees with Davis (2003) that the need exists for a policy that will outline minimum standards of ICT competency for students and teachers but that that competency must be grounded in use of ICT for learning and this can only be achieved when ICT tools are adequately available (Drenoyianni, 2004). Also there is a need for change in the type of training offered to students. Clearly a basic level of ICT skill must be achieved but this should be followed by an integrated approach to ICT and learning. The aim should be for embedding ICT firmly into the teaching and learning process so that it is no longer considered a separate and discrete element (Tearle, 2003; Davis, 2003).

5.2. Conclusion

From the discussions, the following conclusions are drawn:

- The ICT infrastructure of the University is poorly developed, unevenly distributed and inadequate. However, some ICT resources like computer lab, projectors and television sets were considered to be fairly available. Though not fully adequate, the University recognizes the need for ICT resources in its academic endeavors and as such there is already something to build on.
- 2. ICT access in the different University sector for both lecturers and students was not well

attended to. The biggest challenge still affecting easy access to ICT facilities in the University remains the limited number of ICT resources which does not match with the ever increasing student population. But there was at least something in place to build on though still was limited to computers.

 To a large extent, students training in ICT in the University was mainly limited to Ms Office suits but not skill acquisition that led to ICT skill transfer to use ICT both for learning and in other settings.

5.3. Recommendations

Basing on the findings of this study, in order to improve on ICT and learning, the following recommendations may be considered.

- There is need for the University to invest more in computers and related technology as means of not only solving accessibility problem but improving on the presence of the facilities especially computers in the classroom and computer lab. More infrastructures: printers, computers, projectors should be put in place for more practice and utilization.
- 2. There is a need to maintain internet connection in the University and connect more computers to the internet. The University should then liberalize accessibility of internet and e-mail in the institution in form of establishment of ICT resource centers where all software can be accessed, students' packages and all versions of technology. All in all, the University shall take time and even not get there to afford a 1:1 ratio of Student ICT access to facilities thus students should also endeavor to acquire themselves what can be afforded or visit commercial ICT providers like internet café to access ICT facilities.

3. Training in ICT skills should not be limited to Ms Office suits; the University should go ahead to integrate the other programs and packages as recommended by UNESCO (2000, a) curriculum for schools. Clearly a basic level of ICT skill must be achieved but this should be followed by an integrated approach to ICT and learning. The aim should be for embedding ICT firmly into the teaching and learning process so that it is no longer considered a separate and discrete element. Such changes may offer the potential to improve on teaching and learning using modern technology.

5.4 Possible areas for further research

Since ICT is relatively a new in the teaching and learning process a lot of research is needed to be carried out. This study has exposed many things that could not all be covered. The researcher thus recommends the following possible research areas.

- 1. The link between technology and authentic learning in higher institutions of learning
- 2. Students' perception and use of the internet as a hub for learning
- 3. The effect of modern technology on students' performance

REFERENCE

Amin, M.E. (2005).<u>Social Science research: conception, methodology and analysis</u>. Kampala: Makerere University Press.

Alessi, S.M. & Trollip S.R. (1985). <u>Computer based instruction, methods and</u> <u>development</u>. New York: Englewood Cliffs, Prentice Hall.

Bakkabulindi, F.E.K, (2007). <u>Social Correlation of innovation adaption in Education</u> <u>organization: A case study of ICT in Makerere University</u>. An unpublished PHD thesis.

BECTA. (2000). The Impact of Information and Communication Technologies on Pupil

Learning and Attainment. (ICT in Schools Research and Evaluation Series - No.7): DfES.

Bitner, N. & Bitner, J. (2002). <u>Integrating technology into the classroom: eight keys to</u> <u>success</u>. Journal of Technology and Teacher Education, 10(1), 95-100.

Bonnett, N., & Dunne, E. (1997). <u>The nature and quality of talk in co-operative</u> <u>classrooms groups</u>. Learning and Instruction J. 103-118.

Cox, M.J. (1999). <u>Motivating pupils through the use of ICT.</u> In: Leask, M. and Pachler, N. (Eds) Learning to Teach Using ICT in the Secondary School. London: Routledge.

Committee on Developments in the Science of Learning. (1999). <u>Technology to support</u> <u>learning</u>. In J. Bransford, A. Brown, & R. Cocking (Eds.), How people learn: Brain, mind, experience, and school. Washington, DC: National Research Council. [On line] Available <u>http://books.nap.edu/html/howpeople1/ch9.html</u>

Davis, N. (2000). <u>International contrasts of information technology in teacher education:</u> <u>multiple perspectives on change</u>. Journal of Information Technology for Teacher Education, Vol. 9, No. 2, 2000 Available at <u>http://www.triangle.co.uk</u>

Davis, N. (2003). Technology in Teacher Education in the USA: what makes for

68

sustainable good practice? Technology, Pedagogy and Education, 12(1).

Dewey, J. (1989) The Development of American Pragmatism' in Pragmatism: The

Classic Writings, Thayer, H S, ed, (Indianapolis, Indiana: Hackett). First published 1931

Drenoyianni, H. (2004). Designing and Implementing a Project-Based ICT Course in a

Teacher Education Setting: Rewards and Pitfalls. Education and Information Technologies, 9(4).

Fabry, D. & Higgs, J. (1997) <u>Barriers to the effective use of technology in education</u>. Journal of Educational Computing, 17, 385-395.

Fleming-McCormick, T., Nyre, G., Schwager, M. and Tushnet, N. (1995). <u>District</u> <u>Response to the Demonstration: The Practice of Technology</u>. San Francisco, CA: Far West Lab. for Educational Research and Development. (ERIC_NO- ED388311)

Greenleaf F, C. (1994) <u>Technological Indeterminacy : The Role of Classroom Writing</u> <u>Practices and Pedagogy in Shaping Student Use of the Computer</u>. Written Communication, 11 (1), 85-130.

Grégoire, Réginald, Bracewell, Robert, & Laferrière, Thérèse.(1996) <u>The Contribution of</u> <u>New Technologies to Learning and Teaching in Elementary and Secondary Schools</u>. Available online: <u>http://www.tact.fse.ulaval.ca/fr/html/impactnt.html</u>. Accessed May 26, 2009.

Gunter, H. (2001). Leaders and leadership in education. London: Paul Chapman Publishing.

Hannafin, R. D., & Savenye, W. C. (1993). <u>Technology in the classroom: The teacher's</u> <u>new role and resistance to it</u>. Educational Technology, 33(6), 26-31.

Hargittai, E. (1999). <u>Weaving The western web: Explaining differences in internet</u> <u>connectivity among OECD countries.Telecomunication policy</u>.23 (10/11) 701-718

Herman, Joan, L. (1994) <u>Evaluating the Effects of Technology in School Reform</u>. See below Means, Barbara, p. 133-167

Jackson, D., B. Edwards and C. Berger (2003) The Design of Software Tools for

69

<u>Meaningful Learning by Experience : Flexibility and Feedback</u>. Journal of Educational Computing Research, 9 (3), 413-443.

Jonassen, D. (2000). <u>Designing hypertext on transfusion medicine using cognitive</u> <u>flexibility theory.</u> Journal of Educational Multimedia and Hypermedia, 1(3), 309-322.

Joy, E. H., & Garcia, F. E. (2000). <u>Measuring learning effectiveness: A new look at no-</u> <u>significantdifference</u>findings. Journal of Asynchronous Learning Networks, 4(1), 33-39

Jung, I. S. (2005). <u>A comparative study on the cost-effectiveness of three approaches to</u> <u>ICT teacher training.</u>Journal of Korean Association of Educational Information and Broadcasting, 9 (2). 39-70.

Kennewell, S., Parkinson, J., & Tanner, H. (2000). <u>Developing the ICT capable school</u>. London:RouteledgeFalmer.

Kirkpatrick, D.L. (1994). <u>Evaluating Training Programs: The Four Levels</u>. San Francisco, CA: Berrett-Koehler.

Laurillard, D. (1993). <u>Rethinking University Teaching: A Framework for the Effective</u> <u>Use of Educational Technology.</u> New York and London

Lockard, J., Abrams, P. & Many, W. (1994). <u>Microcomputers for the 21st</u> century <u>educators</u>, 3rd ed., New York, Harper Collins.

Loveless A. (2004). <u>The interaction between primary teachers' perceptions of ICT and</u> <u>their pedagogy</u>.Education and Information Technologies, 8(4), pp. 313-326.

Makerere university ICT policy (2002): downloaded on the 14th June 2008 Available at: http://www.makerere.ac.ug/makict/documents/policydoc/contents.htm

Mbwesa, J. (2002). <u>A Survey of students' perception and utilization of the web as a</u> <u>learning resource</u>: A case study of department of extra mural studies, an unpublished master dissertation, university of Nairobi, Kenya. Downloaded on 16th July 2008.Available at <u>http://www.interaction.nu.ac.za</u>

Means, B., & Olson, K. (1994). <u>The link between technology and authentic learning</u>. Educational Leadership, 51(7), 15-18.

Means, Barbra (ED.) (2004) <u>Technology and Education Reform. The Reality Behind the</u> Promise. San Francisco, CA : Jossey-Bass. XXIV et 232 p.

Mumtaz, S. (2000). <u>Factors affecting teachers' use of information and communications</u> <u>technology: a review of the literature</u>. Journal of Information Technology for Teacher Education,, 9(3), 319-342.

Musisi, M., Nansozi, K. Muwanga, and Nakanyike, B. (2003). <u>Makerere University in</u> <u>transition 1993-2000: opportunities and challenge</u>s. Kampala: Fountain publishers

National Information and communication Technology policy framework (2003): downloadedonthe27thJune 2009.Available at <u>http://www.MoWHC.gov.ug/documents/policy/ICT</u>

National Council for Curicullum and Assessment, UK. (2004). <u>Curriculum assessment &</u> <u>ICT in the Irish context</u>: A discussion paper

Newhouse, C.P. (2002). <u>A framework to articulate the impact of ICT on learning in</u> <u>schools</u>. Western Australian journal of Education 10(2),200-215

Papert, S. (1998). <u>Technology in Schools: To support the system or render it obsolete.</u> <u>http://www.milkenexchange.org/feature/papert.html</u>

Pelgrum, W. J. (2001). <u>Obstacles to the integration of ICT in education: results from a</u> worldwide education assessment. Computers & Education 37: 163-178.

Research and Education network of Uganda (2003). A discussion paper

Rose, S. A. and Phyllis M. F. (1997). <u>Using Technology for Powerful Social Studies</u> <u>Learning.</u> Social Education, 61 (3), 60-66

Riel, M. M. (1998). <u>Just-in-time learning or learning communities.</u> (pp. 18). Abu Dhabi: The Fourth Annual Conference of the Emirates Center for Strategic Studies and Research.

Russell, M., Bebell, D., Dwyer, L and O'Connor,K. (2003) <u>Examining teacher</u> <u>technology use implications for preservice and inservice teacher preparation</u>, Journal of Teacher Education, 54(4) September/ October, 297 – 310.

Salomon, G. (1994). <u>Differences in patterns: Studying computer enhanced learning</u> <u>environments.</u> In S.Vosniadou, E. DeCorte, & H. Mandl (Eds.), Technology-based learning environments (pp.79-88). Heidelberg: Springer-Verlag.

Schoolnetafrica, (2002). Emerging trends in ICT and challenges to Educational planning:
downloaded on 17th Aug 2008. Available at http://www.schoolnetafrica.net/index.php?id=283
Sekaran, U. (2003). Research Methods for Business. New York: John Wiley & Sons, Inc.
Schank R.C. and Kass A., (1996) <u>A Goal-Based Scenario for High Scool Students,</u>
<u>Communications of the ACM</u>, 39, 2, 28-29.

Singh, R. P. (1993). Challenges of tomorrow: profile of future teacher education. New Delhi: Sterling Publishers Private Limited

Spiro, R.J., Feltovich, P.J., Jacobson, M.J., & Coulson, R.L. (1992). <u>Cognitive flexibility</u>, <u>constructivism and hypertext: Random access instruction for advanced knowledge acquisition in</u> <u>ill-structured domains</u>. In T. Duffy & D. Jonassen (Eds.), Constructivism and the Technology of Instruction. Hillsdale, NJ: Erlbaum

Swedish National Agency for School Improvement (2008). <u>Teachers' ICT skills and</u> knowledge needs, Available at http://www.sweden.gov.

Tearle, P. (2003). <u>Enabling Teachers to Use Information and Communications Technology</u> <u>for Teaching and Learning through Professional Development</u>: influential factors. Teacher Development, 7(3).

UNESCO. (2002b). <u>Information and communication technology in education: a</u> <u>curriculum guide for schools and programs of teacher development</u>. Division of Higher Education. Available online at http://unesdoc.unesco.org/images/0012/001295/129538e.pdf.

UNESCO. (2003). <u>Manual for Pilot Testing the Use of Indicators to Assess Impact of</u> <u>ICT Use in Education [online]. http://www.unescobkk.org/education/ict/resource</u>

Warschauer, M. (1996) <u>Computer- assisted language learning. Intro-ductions.</u> In S. Fotos (Ed) Multimedia language teaching. Tokyo: Logos International, pp. 3 – 20

Winfrey, E.C. (1999). <u>Kirkpatrick's Four Levels of Evaluation</u>. In B. Hoffman (Ed.), Encyclopedia of Educational Technology. Retrieved June 27, 2008.

Yamnill, S. & Mclean, G. N. (2001). <u>Theories supporting transfer of learning</u>. Human Resource Development Quarterly, 12(2), summer 2001.Available at http://www.fsu.educ/

APPENDIX A

QUESTIONNAIRE ON EFFECTS OF ICT ON STUDENTS' LEARNING: A CASE OF GULU UNIVERSITY

STUDENT QUESTIONNAIRES

Dear Student,

You have been randomly chosen as a respondent in the above titled survey which is being undertaken as part of an educational research in partial fulfillment of the Master of ICT in Education of Makerere University. Your cooperation in filling this questionnaire will ensure success of the study. Please feel free to give your views on the items given by answering all the questions and indicate your choice by putting a tick in the checkbox before the answer you feel most appropriate, or Fill in the gaps by giving reasons or information in relation to a particular question. The responses will be for academic purposes only and will be treated with utmost confidentiality.

SECTION A

Background information of the respondent

Please provide information regarding yourself by ticking the appropriate boxes

- 1. Your Age:....
- 2. Your Sex:

Male	
Female	

3. Year of study:

a)	First year
b)	Second year
c)	Third year
d)	fourth year
e)	Fifth year

- 4. Faculty/School/Institute (optional).....
- 5. Course of study (optional).....

Independent variable

Availability of ICT resources

6. How do you agree or disagree on the availability of the following ICT resources in your

University

	Not available	Fairly available	Available
i) Computers/PC in classroom			
ii) Internet & E-mail			
iii) Television set			
iv) Projector			
v) software			
vi) Computer laboratory			
vii) Video conferencing equipments			
Others (specify)			

7. In your opinion, do you think that these resources are adequately available? Please rate

the adequacy of the following ICT resources

	Inadequate	Fairly adequate	Adequate
i) Computers/PC in classroom			
ii) Internet & E-mail			
iii) Television set			
iv) Projector			
v) software			
vi) Computer laboratory			
vii) Video conferencing equipments			
Others (specify)			

Accessibility to ICT resources

8. At the university, how often do you access ICT resources in the following locations?

	Never at all	Not sure	Sometimes	Always
a) Library				
b) Computer lab				
c) lecture rooms				
d) Resource centre				
e) Halls of residence				
f) Internet kiosk				
Others (specify)				

9. In your own opinion, what do you regard as the biggest challenge affecting accessibility

of ICT resources in your university?.....

.....

User-ability of ICT resources

10. How do you equate your knowledge and skills to use the following ICT tools

	Very poor	Poor	Fair	Good	Very good
a) Word processing					
b) Spreadsheets					
c) presentation					
d) Online instruction Blackboard					
e) video conferencing					
f) publication software					
g) Projectors					
h) internet and E-mail					
Others (specify)					

11. What factors may affect your use of these ICT tools?.....

Dependent variable : Students learning

12. How do you agree or disagree with the following statements about ICT

	Strongly Disagree	Disagree	Don't know	Agree	Strongly agree
Academic performance					
I use the computer to complete my projects, reports					
I learn on my own using computers and the internet					
I use the computer to type my course works and assignments					
Acquisition of knowledge and skills					
I CT helped me apply what have learnt to the real world situation					
ICT has improved my organisational skills					
ICT made me develop interest in the learning content					
Access of information					
I use the internet/computer to look for information					
I use the internet to collaborate with others/team					
Work force preparation					
I have acquired some of the pre- requisite skills for workplace preparedness					
Technology can help me link academic subjects to work place demands					

	Never	A few times	Once or	At least	Everyday
		a year	twice a	once a week	
			month		
Look up ideas or					
information					
Write reports					
Process and analyse					
data					

13. How often do you perform these tasks with a computer

End

Thank you

APPENDIX B

QUESTIONAIRE ON : EFFECTS OF ICT ON STUDENTS' LEARNING: A CASE OF GULU UNIVERSITY

Lecturer's questionnaire

Dear Respondent

You have been randomly chosen as respondent in a survey which is being undertaken as part of an educational research in partial fulfillment of the Master of ICT in Education of Makerere University. Your co-operation in filling this questionnaire will ensure success of the study. Please feel free to give your views on the items by answering all the questions and indicate your choice by putting a tick in the checkbox before the answer you feel most appropriate or fill in the gaps by giving reasons or information in relation to particular questions. The information provided is purely confidential and to be used for academic purpose only.

Section 1.Background Information.

Please provide information regarding yourself by ticking/checking the appropriate box

1. Name of Faculty /School/Institute (optional)

Medicine
Business & Development studies
Education
Computing

2. How long have you been teaching in the university?

Less than 2 year Between 2-5 years More than 5 y
--

3. What is your designation?

	Professor	Senior lecturer	Lecturer	Teaching Assistant
4.	What is your a	dministrative position	(optional)	
	Dean	Head of depart	ment	

Availability of ICT resources

5. How do you agree or disagree on the availability of the following ICT tools in your university?

	Not Available	Fairly Available	Available
i) Computers/PC in classroom			
ii) Internet & E-mail			
iii) Television set			
iv) Projector			
v) On and off shelf software			
vi) Computer laboratory			
vii) Video conferencing			
viii) Scanner			
ix) others, specify			

6. In your own opinion, do you think that these tools are adequate enough for the

students	, please rate t	the adequacy	of the	following ICT
----------	-----------------	--------------	--------	---------------

	In adequate	Fairly Adequate	Adequate
i) Computers/PC in classroom			
ii) Internet & E-mail			
iii) Television set			
iv) Projector			
v) On and off shelf software			
vi) Computer laboratory			
vii) Video conferencing			
viii) scanners			
ix) others, specify			

Accessibility of ICT resources

7. Where are most of the ICT resources concentrated in the University for students Use?

	Never at all	Not Sure	Sometimes	Always
a) Library				
b) Computer lab				
c) lecture rooms				
d) Resource centre				
e) Halls of residence				
f) Internet kiosk				
Others (specify)				

8. In your own opinion, what do you regard as the biggest challenge affecting students accessibility of ICT resources in the teaching and learning process

.....

User-ability of ICT resources

9. Please rate your students expertise in the use of the following

	Very poor	Poor	Fair	Good	Very good
a) Word processing					
b) Spreadsheets					
c) presentation					
d) Online instruction Blackboard					
e) video conferencing					
f) publication software					
g) Projectors					
h) internet and E-mail					
Others (specify)					

10. Why may the students encounter problems in using some of the above ICT resources?

.....

Dependent variable : Students learning

12. How do you agree or dis agree with the following statements

	Strongly Disagree	Disagree	Don't know	Agree	Strongly agree
Academic performance					
Students use the computer to complete their projects, reports					
ICT allows students to learn independently					
Students use the computers to type course work and assignments					
Acquisition of knowledge and skills					
I CT helped students apply what have been learnt to the real world situation					
ICT improves students organisational skills					
ICT makes students develop interest in the learning content					
Access of information					
Students use the internet/computer to look for information					
Students use the internet to collaborate with others/team					
Work force preparation					
ICT provides students with some of the pre-requisite skills for workplace preparedness					
Technology can help students link academic subjects to work place demands					

15 How often do your students perform these tasks with a computer						
	Never	A few times a	Once or	At least once a	Everyday	
		year	twice a	week		
			month			
Look up ideas or information						
Write reports						
Process and analyse data						

13 How often do your students perform these tasks with a computer

End

Thank you for your time

APPENDIX C

INTERVIEW GUIDE FOR ADMINISTRATORS

These Interview guide is about the effects of ICT on student's learning, A case of Gulu University.

Particulars	Responses
Sex	
Age	
Designation	
Department	

- 1. Comment on the presence of ICT facilities in your university
- 2. How adequate are these facilities for students use?
- 3. Do staffs and students across academic discipline have access to ICT tools for academic purposes? How often?
- 4. What factors could affect student's access of ICT tools for academic purposes?
- 5. What are some of the ICT skills you train to your students?
- 6. How are those skills (trained) relevant to your students after school?
- 7. What is your vision for ICT in students learning?

The End

APPENDIX D

CHECKLIST: EFFECT OF ICT ON STUDENTS' LEARNING:A CASE OF GULU

UNIVERSITY

1= Not available $2 = poor \quad 3 = Very poor \quad 4 = Good \quad 5 = Excellent$

		1	2	3	4	5
1	ICT training					
2	Exhaustiveness of content					
3	Availability of basic ICT tools					
4	Students access to ICT facilities					
5	Students technophobia					
6	Students interest in ICT course					
7	State of ICT facilities					
8	Internet connectivity					
9	Availability of ICT textbooks					
10	ICT Resource centers					

APPENDIX E

RELIABILITY STATISTICS

	Cronbach's Alpha	Number of Items
Availability	.857	14
user-ability	.869	8
Accessibility	.470	6
students' learning	.849	12
Overall	.76	40

APPENDIX F

LINEARITY BETWEEN AVAILABILITY OF ICT RESOURCES AND STUDENTS LEARNING



APPENDIX G

LINEARITY BETWEEN ACCESSIBILITY OF ICT RESOURCES AND STUDENTS' LEARNING



APPENDIX H

LINEARITY BETWEEN USER-ABILITY OF ICT RESOURCES AND STUDENTS' LEARNING



APPENDIX I

ITEM STATISTICS

		Std.	
	Mean	Deviation	Ν
Computers/PC in classroom	1.69	.695	158
Internet & E-mail	1.72	.706	158
Television set	1.80	.727	158
Projector	2.04	.717	158
Software	1.90	.724	158
Computer laboratory	2.28	.629	158
Video conferencing equipments	1.35	.629	158
Computers/PC in classroom	1.44	.613	158
Internet & E-mail	1.64	.679	158
Television set	1.56	.672	158
Projector	1.76	.691	158
Computer laboratory	1.91	.652	158
Video conferencing equipments	1.29	.545	158
Library	2.54	.981	158
Computer lab	3.10	.742	158
Lecture rooms	2.38	1.285	158
Resource centre	2.06	1.017	158
Word processing	3.72	1.070	158
Spreadsheets	3.45	1.080	158
Presentation	3.21	1.140	158
Online instruction Blackboard	2.62	1.176	158
Video conferencing	2.31	1.145	158
Publication software	2.54	1.176	158
Projectors	2.96	1.264	158
Internet and E-mail	3.84	1.154	158
Use the computer to complete course works. projects.	2 72	1 150	159
report e.t.c	5.75	1.139	150
Own learning using computers and internet	3.41	1.321	158
Use the computer to type course works and assignments	4.08	1.019	158
Apply what has been learnt to the real world situation	3.80	.993	158
ICT improves organizational skills	3.79	1.065	158
Helps in developing interest in the learning content	3.78	1.044	158
Use the internet/computer to look for information	4.13	.853	158
Use the internet to collaborate with others/team	3.71	1.130	158
Acquired some of the pre-requisite skills for workplace	3.68	1.036	158
Linking academic subjects to work place demands	3.08	1 025	158
Look up ideas or information	3.90	069	150
Write reports	2 0/	.900	150
Process and analyse data	2.74	1.227	150
i rocoss and analyse data	5.00	1.30/	138



UNIVERSI

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> DEAN'S OFFICE SCHOOL OF EDUCATION lemitteel to Conduct the Research - please the Research bin Cooperate with bin GULU UNIVERSITE AL Exams) CULU UNIVERSITE OS 03 2009 * 03 FFR 2000

Date: 26. 9. 2009

TO WHOM IT MAY CONCERN

Mr./Mrs./Ms./Rev./Fr. OPIRA GEOFFREY

Is our Ph.D, M.A. (Educational Policy Planning)/M.A. (Ed.Mgt.)/M.Sc. (HRM)/ M.Ed. (ICT) Degree student who is collecting data for his/her Dissertation titled:

Students leaving: A Case The effect ICT hely

We shall be grateful if you could render assistance to him/her in collecting the necessary data for his/her Dissertation.

Thank you in advance for your assistance.

1-DATA

Assoc. Prof. C.M. Ssebbunga Dean, School of Education

