

**AVAILABILITY, ACCESSIBILITY AND USE OF INFORMATION AND
COMMUNICATION TECHNOLOGY IN MANAGEMENT OF
STUDENTS' ACADEMIC AFFAIRS IN MAKERERE
UNIVERSITY**

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TABLE OF CONTENT

List of figures	iii
List of tables	iv
Declaration	v
Approval	vi
Dedication	vi
Acknowledgement	vii
Abstract	viii
CHAPTER ONE: INTRODUCTION	1
1.0 Introduction	1
1.1 Background	1
1.1.3 Conceptual Perspective	3
1.1.4 Contextual Perspective	4
1.2 Problem Statement	5
1.3 Purpose	5
1.4 Objectives	5
1.5 Research Questions	6
1.7 Scope	6
1.8 Significance	6
CHAPTER TWO: LITERATURE REVIEW	7
2.0 Introduction	7
2.2 Review of Related Literature	11
CHAPTER THREE: METHODOLOGY	21
3.0 Introduction	21
3.1 Research Design	21
3.2 Population	21
3.3 Sampling Strategies	22
3.4 Quantitative Methods	23
3.5 Data Collection Instruments	23
3.6 Validity And Reliability of The Instruments	24
3.7 Procedure	24
3.8 Ethical Considerations	25
3.9 Data Analysis	25
CHAPTER FOUR: DATA PRESENTATION, ANALYSIS AND INTERPRETATION	26
4.0 Introduction	26
4.1 Background Information	26
4.1.2 Current rank / position/ designation	26
CHAPTER FIVE: DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS	61
5.0 Introduction	61
5.1 Discussion	61
5.1.2 Levels of Accessibility of ICT for Examination Management	61

5.1.3	Levels of use ICT for Registration Management-----	67
5.2	Conclusions -----	70
5.3	Recommendations-----	71
5.3	Areas for further research-----	73
REFERENCES-----		74
APPENDIX A: Research Instrument for the Teaching Staff -----		84
APPENDIX B: Research Instrument for Administrators-----		85
APPENDIX C: Interview Questions for the Administrators-----		89

LIST OF FIGURES

Figure 1: Conceptual framework showing levels, accessibility and use of ICT for management of students' academic affairs -----	10
Figure 2 : Access levels of Results Examination Management System considered for successful registration of students for graduation. -----	49
Figure 3: Records Management System -----	51

LIST OF TABLES

Table 1: Sample size -----	22
Table 2: Number of faculties/institutes/schools that responded to the study -----	28
Table 3: Gender response distribution -----	29
Table 4: Positions of respondents -----	29
Table 5: Levels of Availability of ICT-----	31
Table 6: ICT for communication -----	34
Table 7: Respondents' use of computers -----	36
Table 8: ICT for management of examination process -----	37
Table 9: Time saving and ease of using ICT for examination management-----	39
Table 10: ICT accessibility for examination management -----	41
Table 11: Accessibility to ICT for examination management (cont'n.)-----	43
Table 12: Users' opinion on access to ICT facilities in examination management -----	45
Table 13: Operation of the system – technological aspects -----	48
Table 14: Usability of the system in provision of information-----	52
Table 15: Set-up of the system -----	54
Table 16: Effect of ICT on administrators and students -----	57

DECLARATION

I Matovu Moses hereby declare that the work reported in this dissertation is my original work and it has never been submitted for award of any certificate, diploma or degree in this or any other University or institution.

Sign..... **Date**.....

APPROVAL

This dissertation has been done under my supervision and it has been submitted with my approval.

Dr. Betty Ezati

Sign.....

Date.....

DEDICATION

This work is dedicated to all my relatives, teachers and colleagues who greatly supported me to come up with this piece of work.

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ABSTRACT

The study was about availability, accessibility and use of ICT in management of students' academic affairs in Makerere University. This emerged because of the problem that there was mismanagement of students' academic records despite the technological advancement that had advanced in the University. Such problems include loss of marks, miscalculation of marks to mention but a few. The study intended to establish how ICT affected management of students' academic affairs. It applied both correlation and cross sectional survey design. Data were collected using semi-structured survey questionnaires and interviews. Correlations were used to determine the extent to which ICT was related to management of students' academic affairs and a cross sectional survey design was used because data were to be collected at one time from the sample of lecturers and administrators of Makerere University. Findings indicated that internet facilities, computers, management information systems, electronic databases all were available and accessible to administrators, lecturers and students though with restricted access for viewing results, record keeping, setting and marking exams. ICT for registration was used for tracking students' registration progress by administrators and academic progressing. It was concluded that ICT facilities such as computers Management Information System and internet were the most common used for examination management and they were mainly applied for processing examination results, tracking students' academic progress, grading of students according to their performance, communication between lecturers and heads of department, communication to students via emails. It was again noted that ICT was accessed for communication between administrators and other teaching staff members in the University, for returning results to students online, calculating students' GPA and CGPA and processing transcripts.

Investigation about the level of use of ICT for registration management in Makerere University established that ICT facilities were used for provision of information easily on registration of students, easy monitoring of students' registration progress, easy comparison of registration status with other data such as students' academic progress and enhanced time management. So ICTs were reliable compared to the previous manual system. However ICT had not effectively improved collaboration between University administrators, students and the university outside community. Electronic Registration System was more It was recommended that the University authorities should adequately train and acquaint users with ICT skills such as database management, typing and printing, online examination management, skills in management information systems and internet and facilitate them with ICT facilities and University authorities should make it a policy for lecturers to use ICT facilities for examination management. It was also suggested that University authorities should train administrators and provide them with the required facilities like computers, computer software, internet facilities and reliable databases and there must be a formal procedure to be followed to enforce strict use of ICT structures in the University. It was also recommended that a framework of guideline be provided for prior to purchasing an e-registration system, that is, a list of the required specifications be made after consultation with users (administrators) to enable purchase of a reliable ICT structure and initial ICT training for administrators must be undertaken to engender commitment to e-registration initiative and support for new ICT skills acquisition for effective implementation of online registration.

CHAPTER ONE

INTRODUCTION

1.0 Introduction

This chapter explains the background, purpose, objectives, research questions, scope and the significance of the study

1.1 Background

1.1.1 Historical background

Uganda developed its initial ICT national policy in 2003, Tanestik (2007). The policy framework document that delineated the need for a national ICT policy recognized that Uganda would need to embrace the goal of lifelong education for all. One of the recommendations that were executed early in 2006 resulted into the establishment of a Ministry of ICT to address the convergence of ICT and to provide coordination of policy development (ICT4DGUYANA, 2006). However, before the Government of Uganda embraced ICT in education, Makerere had already started its way to promote technology in education (Nakanyike, and Nansozi, (2003)

The Makerere University Kampala (MUKLA) network was initiated; MUKLA was an isolated project dependent on donor funding and, largely, the efforts of one individual. It was not part of a University-sponsored approach to connectivity. After a short while the network collapsed and was replaced by the use of expensive private Internet Service Providers (ISPs) that were springing up in Kampala. Again, however, the approach was piecemeal. Some faculties made their own efforts to adopt information technology and the Faculty of Law was the pioneer in 1998 of this innovation followed by Faculty of

Forestry in 1999 with Norwegian Agency for Development (NORAD) funding, and others followed. Since 1999, the University as a whole has then adopted ICT as an integral part of its rebuilding strategy.

In late 2000, the University developed an ICT Policy and Master Plan, which was approved by the University Council. The policy and plan provided a framework for academic and administrative departments to increase their ICT capacity and utilization within a University-wide system. ICT in education was viewed as an intervention to streamline education management issues such as record keeping, examination management and registration management.

1.1.2 Theoretical perspective

The theory that guided the study was Adaptive Structuration Theory (AST) of DeSanctis and Poole, (1994). Adaptive Structuration Theory is based on Anthony Giddens'(1984) structuration theory. (AST) Adaptive structuration theory (AST) has been used for a number of years in the information systems discipline to study the use of new technologies in organizations, West, & Turner (2000). Proponents of AST contend that developers and users of these systems (ICT) hold high hopes for their potential to change organizations for the better, but actual changes often do not occur, or occur inconsistently. AST examines the change process from two vantage points: (1) the types of structures that are provided by advanced technologies, and (2) the structures that actually emerge in human action as people interact with these technologies.

Conceptual perspective

ICT stands for Information and Communication Technologies and it can be defined as a diverse set of technological tools and resources used to communicate, create, disseminate, store, and manage information (Tinio, 2003). Examples of ICT include radio, television, video, digital versatile device (DVD), telephone, radio, satellite systems, management information systems, computer and network, hardware and software, as well as the services associated with them, such as videoconferencing and electronic mail. In this research ICT will mean availability, accessibility and use of ICT facilities like computers, computer networks (internet), in management of students' academic affairs in Makerere University. Management refers to organizing and managing resources in such a way that the task is completed within defined scope, quality, time and cost constraints (Taylor, 1911). In respect to this study, it will mean organizing and managing students' academic affairs like examination records and registration records as a means of achieving efficiency. Management of students' academic affairs meant examination management at two levels, that is management by teaching staff (lower level) and academic registrars (top level) and registration. Examination management considered how examination exercises like setting, directing exam /invigilation, assessment, grading, reporting, accessibility of exam results were managed. And registration of students considered how students' bio data, financial payments, communication with students and collaboration with other agencies like administrators and parents were carried out electronically.

1.1.4

Contextual Perspective

Academic Records Information System (ARIS) was started in 2004 (from the Systems Administrator ARIS, Makerere University) and was developed to support student and education related administrative and managerial processes, that is, management of student personal records, student academic performance registration and analysis, student admission/ registration, examinations, management of data related to academic programs and courses, allocation of facilities and staff, class scheduling. However despite such innovations, some information is still processed and kept in non electronic form as it used to be before ARIS installation. For example, students' data are still kept in folder files, students' line up for registration yet registration could be done online. And still in the examination and registration management related activities, there are a number of challenges leading to loss of marks, examination malpractices, statistical problems; where the cumulative grade point averages of students are wrongly calculated, delayed registration, delays in issuing and getting transcripts. In many of the universities' departments, students' data are still processed manually, making the production of reports, transcripts and degree certificates slow and prone to error, (Nakanyike and Muwanga, 2003). So, regardless of ICT initiative in management issues of exams and registration the challenges have remained persistent. Yet it was assumed that with a computerized system in place, it would lead to effective rapid processing of results and certificates, (Nakanyike and Muwanga, 2003). This therefore called for a thorough investigation of the levels of availability, accessibility and use of ICT for both examination and registration in Makerere University.

1.2 Problem statement

Despite ICT innovations in management related activities of examination and registration of students in Makerere University, still the process faces a number of problems, Byaruhanga, (2002). It was anticipated that with a computerized system in place, it would result into effectiveness and efficiency in the processing of results and certificates and registration, (Nakanyike and Muwanga, 2003). The causes of such problems remain uncertain. One wonders whether it emanates from the way the system was introduced; users' attitudes; lack of equipment; inadequate skills of users; complexity of the system; to mention. This therefore necessitated for immediate researcher to establish the reality of the matter. Otherwise, with persistent escalating problems in examination and registration management, Makerere University was bound to loose its reputable image publicly and world over and students were likely to abandon the University in favor of other institutions, where they would be free from such aforementioned problems.

1.3 Purpose

The study intended to establish how ICT affected management of students' academic affairs in Makerere University.

1.4 Objectives

1. To find out levels of availability of ICT for exam management in Makerere University.
2. To find out levels of accessibility of ICT for exam management in Makerere University
3. To find out level of use of ICT for registration Management in Makerere University

1.5 Research questions

1. At what levels is ICT available for examination management in Makerere University?
2. At what levels is ICT accessible for examination management in Makerere University?
3. What are the levels of use of ICT for registration management in Makerere University?

1.7 Scope

This study was conducted in Makerere University, Kampala Uganda. The content of the study was confined to establishing the level of accessibility, availability and use of information and communication technology in the management of students' academic affairs in Makerere University. The target population was lecturers (teachers) and academic registrars of Makerere University.

Significance

1. The study will provide examination administrators and registrars of Makerere University with information about the levels of availability of ICT facilities.
2. It would also benefit Makerere University administrators with data about the levels of accessibility of ICT and its use for exam management.
3. The study would help the future researchers to make future references on this work with the aim of building more knowledge in the field of ICT and education administration.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

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

2.1 Theoretical perspective

Adaptive Structuration Theory (AST) of DeSanctis and Poole, (1994) is based on Anthony Giddens' (1984) structuration theory. AST was viewed appropriate for this study because it examines the change process from two vantage points: (1) the types of structures that are provided by advanced technologies, that is, management information systems, internet and electronic databases; and (2) the structures that actually emerge in human action as people interact with these technologies (efficiency, quality, consensus, commitment and effectiveness). Proponents of AST contend that developers and users of these systems (ICT) hold high hopes for their potential to change organizations for the better, but actual changes often do not occur, or occur inconsistently. Likewise, for the case of Makerere, the University has invested greatly in technology to ensure widespread access to their networks, applications and productivity for examination and registration process but the actual impact has not greatly been realized.

It should however be noted that information plays a distinctly social, interpersonal roles in organizations, Felman and March, (1981). Perhaps for this reason, development and evaluation of technologies in supporting the exchange of information among the organizational members and its productivity is paramount. DeSanctis and Poole, (1994)

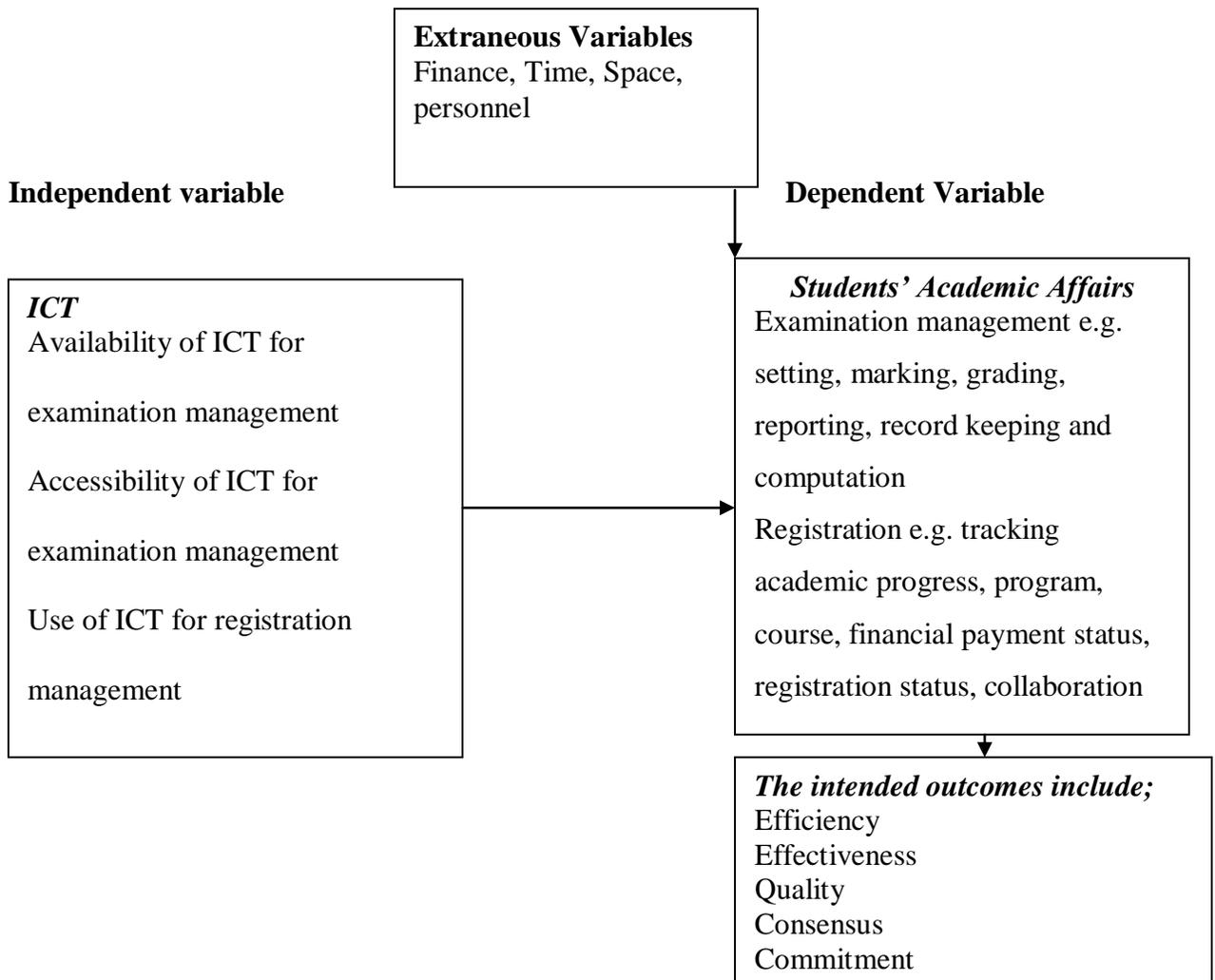
add that the past decade has brought advanced information technology, which include electronic messaging systems, executive information systems, collaborative systems, group decision support systems, to mention to enable multiparty participation in organizational activities through sophisticated information management and this has seen Makerere also embracing technology for management issues.

However many researcher believe that the effect of advanced technologies are less a function of the technologies themselves than how they are used by people (Huber, 1990, Huseman and Miles, 1988, Rice, 1984). I concur with Huber et al argument, the impact of technology can only be realized the interaction between technological tools and the human are effective; it is not only technology itself that brings change in the organization. In this context of advanced technology, the actual behaviors of technology users often differ from the intended impact of the technology and consequently technology fails to yield any effect or the effect unnoticeably happens (Kiesler, 1986, and Siegel, Dibrovsky kiesler and McGuire, 1986). Upon such an argument, it therefore requires for research to carry out to establish the actual levels of technology application and its use in examination and registration management in Makerere University. This will help to realize technological effects in management of students' academic affairs.

In Adaptive Structuration Theory (AST) it is pointed out that people adapt systems to their particular work needs, or they resist them or fail to use them at all; and there are wide variances in the patterns of computer use and consequently their effects on decision making and other outcomes. The set up of the information systems to be used in examination and registration management was meant to cut across all

faculties/schools/institutes and all departments of the university at all levels; that is from the lecturers' to the administrators. However, it not clear whether people use technology to their particular needs of the fail it or just resist it because the intended impact since its inception has not greatly been realized-for example there are delayed production of transcripts, certificate, missing results, miscalculations of CGPA to mention. Some schools of thought such as 'the decision-making school' that have studied information technology and organizational change emphasize 'system rationalism' (Perrow, 1986); they have a view that technology should consist of structures (data processes and decision model) designed to overcome the human weaknesses. Once applied, the technology should bring productivity, efficiency, and satisfaction to the individual and the University

Figure 1: Conceptual framework showing levels, accessibility and use of ICT for management of students' academic affairs



Adopted from: DeSanctis and Poole, (1994), Capturing the complexity in advanced technology use: Adaptive Structuration Theory, Organization Science

The above conceptual frame work shows that with availability of ICT facilities such as computers, networks, management information systems and having access and use of such facilities affect the management of examination and registration process. It is assumed that use of computer based examination and registration management systems can offer many advantages over traditional paper based methods of examination and

registration. The MIS (ARIS) would allow effective management of exams and registration and accessibility by the examination/registration officers and students respectively. ICT influences registration in a way that data can be stored, retrieved and disseminated online with the use of MIS provided availability and accessibility of ICT facilities is possible. Administrators can easily 'login' from a distance to access information concerning a particular student and too students can login to access registration forms and register online after processing payments.

2.2 Review of related literature

2.2.1 Levels of Availability of ICT for examination management in Makerere University

Any modern institution of higher learning is critically dependent on the smooth operation of the new innovations of Information and Communication Technology, (Tusubira, 2005). It is this trend that Makerere University has embarked on for the past period. Supported in its entirety by the communication technology, information spread vastly become faster and cheaper. It should however, be noted here that if ICT facilities like word processors, electronic databases, e-mail and management information systems are put in place, they can result in more efficient communications and reduction of fraud in exams (Sibangani, 2006). However ICT application depends on the existence of ICT infrastructure, people's skill and knowledge and for the case of Makerere University, at all levels; that is, faculties, departments, and individual offices at least have got a computers and most of them are connected to the internet-these computers are either individually provided by the particular users of the university. However their level of applicability in facilitating examination exercise need to be examined

Kirsti (2005) observed that students today find it easy to pick up any available new electronic device and learn how to communicate with it easily. This is however somewhat contrary to what is happening in Makerere University where such ICT electronic devices are inadequate. Taking an example of school of education where am well versed with, many students are computer illiterate, it is very surprising that majority students who join for a Masters' Degree in ICT often do not know how to use computers and internet (a computer lab administrator from school of education revealed). Though if results could be uploaded on the University website with a fully functional MIS, students would find it easier to access them unlike today where they have to flock lecturers' offices and others learn the missing of their marks at the end of the semester. Recording data electronically, storing it centrally, and sharing it with colleagues are vital to reducing workloads through available ICT structures (Devon, 2004). As seen above, this would have a big impact because it was indicated that most of university lecturers' offices, they have some ICT facilities and therefore, ICT would have impact on the management of education institutions; it increases efficiency and accountability to institutional resources. For cases of missing marks in the registrars' departments, if efficient MIS is developed and fully put to utilization, such problems would be eliminated.

Devon (2004) points out that in respect to management of students' affairs; there are various types of information systems that can be available in making informed decisions at all levels and in improving efficiency of operations, such as executive decision making management information system, collaborative information systems, electronic messaging systems, group decision support system. These would enable multiparty

participation in the University activities through sophisticated information management (Huseman and Miles, 1988). For this case Makerere University developed ARIS to handle students' academic and personal records, so a call for research to establish at what levels are such ICTs applied in supporting University activities.

Considering the transcript section, which determines the ability of students to get job opportunities, the department is a disaster. After graduation, many students look forward to getting employed in the nearby future but their dreams get shattered most times (Auma, 2006). This is the purpose, for which ARIS was designed, was to handle similar problems, however, due to some deficiencies such huddles remain eminent. If ICT is applied there effectively, speed in processing such documents will become easier.

In addition, marks for assessed work can be recorded within the virtual learning environment (VLE). JISC (2001) puts across the fact that assessment marks recorded at the module level may be automatically transferred to departmental or institutional level without rekeying. Institutions that provide well-integrated facilities for providing online information about programs, modules and assessed results in which VLEs for individual modules are embedded can be said to provide a Managed Learning Environment (MLE) (JISC, 2001).

2.2.2 Level of Accessibility of ICT for examination management in Makerere University

Accessibility to ICT facilities ensures accuracy, timeliness and effectiveness of managing the whole process of examination, that is, it allows easy flow of information and risk monitoring systems that are appropriate (BECTA, 2000). Makerere University being a model leading University in ICT would greatly be benefiting from the fruits of investing in ICTs if what (BECTA, 2000) put forward was mandatory. It has however been observed contrary to that, the level of accuracy, timeliness, efficiency and effectiveness has not been fully realized despite the existing structures of ICT. Bearing in mind the tasks of manning a big number of students in small examination rooms, the exercise becomes tedious and at times marred with examination malpractices, consequent loss of exam marks yet with application electronic set exam, there could an be easy monitoring of students and marking coupled with security for results-with electronic databases. Software for managing examinations in School has been developed for use by administrators to play examination roles for administrators, teacher and students. However the level of accessibility to the possible platforms need to established, thus a necessity for this study.

For example a teacher can make question banks (also upload them) and can assign tasks to students in their particular groups or individuality for a particular semester. A student can login take the assignment. The automatic timer submits the responses after the time is over and displays the score (this is very possible with the application of electronic blackboard).

However, in discussing the assessment of learning, it is valuable to consider the types of learning which can be measured, and particularly, which types currently lend them to computer assisted assessment. There has been a growth of computer-aided assessment over recent years. It is widely accepted that Bloom provides a sensible taxonomy of educational objectives that apply to most academic subjects (Bloom, Englehart, Fwest, Hill, Krathmohl, 1956). In current practice, e-assessment can be applied to test the so-called lower order skills (knowledge, comprehension, and application) (Korabinski, 2005). However possible this would be, it not clear whether all Makerere University teaching staff have got the required skills to apply ICTs in assessment, it also not clear whether they can all have access to the software that can perform such a function and whether all individual lecturers could have access to required platforms to put to use the e-assessment, so the level of accessibility of ICTs for examination management need to be ascertained.

While attempts are already appearing to provide automatic testing for the higher order skills or extended competencies of analysis, synthesis, and evaluation have not gained much attention, (Beevers & Paterson, 2003). It is not certain however, in Makerere University whether according to frequent trainings by DICTS, higher order skill testing has been put into practice. In some institutions, this development is now under scrutiny for its possible use by national Examination Boards, as an alternative to traditional pen and paper tests (Harding and Raikes, 2002). Likewise some faculties in Makerere University have embarked on the trend, such as, Schools Education, Department of Higher education has started it (Head of Department, Higher Education, revealed) but

pointed out the facilities could be accessible but students' skills to apply it stand as the biggest challenge.

Educational institutions are under increased pressure to do more with less and optimize management through the use of innovative technologies. It is thus unfortunate that in the world of ICT-led innovation, assessment usually fails to raise much enthusiasm, (Harding and Raikes, 2002). However in Makerere University ICT is much in teaching than testing and managing exams, yet testing and examination management is a vital component of education as a whole.

It is therefore believed that with the use of ICT, testing and assessment can be more effective. However, Sangwin, (2002) observed that computer aided assessment only takes certain form of questions. Computer aided assessment (CAA) is widely used in higher education. According to Sangwin, the vast majority of current computer aided assessment systems provide only the following question types: multiple choices, multiple response, numeric answer, text string, "hot spot" (or other graphic/mouse responses).

Such question types have been criticized on many fronts. Only certain questions are suitable for these formats, other questions need to be rewritten to fit into the format, or worse distorted. In addition, there is consensus that such "objective tests" promote surface and strategic, rather than deep, learning. However, this is limited by inadequate skills. With the technical use of education platforms like blackboard, KEWL all types of question can be administered. But even such objective and structured questions can be used to test higher level understanding. Questions can be designed in a way that prompts

a student to think. For example Sangwin, (2002) suggests that students can be requested to generate examples of objects that are required to satisfy certain pre-specified properties - which are beneficial activities and which promote the use of higher level skills.

Many instructional applications provide an objective means of assessment. They can also maintain records of individual progress of each student and can assist teachers in identifying students' weaknesses and in determining measures that can be taken to address such weaknesses, (Earnest, Plummer, Bertin, 2003).

Modules of management information systems enable electronic transfer of examination entries and results to and from examination boards. Bulk photocopying can be replaced by linking computers to photocopiers or laser printers, enabling staff to produce copies of documents as required (BECTA, 2000)

2.2.3 Levels of use of Information and Communication Technology for registration Management in Makerere University

UNESCO (2000:12) defines ICTs as the "scientific, technological and engineering disciplines and management techniques used in information handling and processing." The use of ICTs provides quality services to users. Moreover, ICTs have revolutionized activities in all spheres of life, especially in management and information services in institutions of higher learning, Earnest, Bertin and Plummer, (2003). However, the application of ICT is not a matter of being imported and used. Instead, it requires a specific level of knowledge and skills before one would be able to operate the equipment

properly and it will depend on a specific level of applicability. This research therefore rose to establish the levels of usability of ICTs in registration management exercise.

The proliferation of technology especially that of the ICT has significantly changed the social order and interpersonal relationship, Bertin (2006). Bertin adds that the flexibility and advance of this technology has proved its role as the supportive measures in human's life activities in the quest to promote productivity. This therefore is line with the intent of the Makerere University's introduction of ICTs in management issues; it was to support individual human activities and increase productivity. Unlike such an idea, the University has not significantly benefited from the same as it has been observed that many registrars could not have adequate skills to use the software for registration and others could not get access to some facilities like computer thus failing full operation of ARIS.

Faulkner (1998:4) asserts that the use of ICTs builds a strong and effective information system. For years, academic institutions such as Makerere University used manual systems to gather, manage, process, and disseminate information to users. The advent of ICTs, however, has changed this practice and made information management services, as well as information access, much faster and easier. Due to the diffusion of ICT innovations in education institutions, work radically changed, ICTs offered tremendous possibilities in improving and developing administrators' professional capability (Plummer, 2003). This strengthens institutional capacity to handle administrative work since tasks can be accomplished effectively and efficiently.

In Makerere University, registration is one of the tedious exercises but considering the ICT infrastructures like management information systems, internet and intranet, and computers available, work would be made simpler to make it easy for all students to register from different corners of the University or the world where similar structures exist. ICT is helpful in supporting management functions, for example E-registration enables management of attendance via analysis of data and can be supported by automatic communication to parents via SMS messaging and email (BECTA, 2000).

Some institutions outside Uganda have tried similar systems to offer similar services and have realized better improvement. For example Utrecht University developed a system called OSIRIS; it is a student registration web based system offering students' information and allowing them to register for courses (Student Support and Student Affairs 2006-2007).

With OSIRIS, students can access and change their personal information, check for their course schedule and register for courses and exams and it can be accessed at from any computer with an internet connection. Effective management information systems (MIS) provide a tool for leaders to achieve their institutional vision, (Walsh, 2002). Similar results can be realized even here at Makerere University if the concerned people are acquainted with the skills required to use those innovative ICT structures.

In their research (Geoff, Daniel, Dimitra, and Sue, 2006), realized that Electronic registration could play an important role in helping schools with high rates of absence to improve attendance, it saved time, lesson monitoring was particularly beneficial however initially a significant minority of schools experienced substantial difficulties. To my

observation e-registration might be beneficial especially to ICT developed institutions because they have enough facilities, but to developing ICT institutions Makerere University inclusive, it might not be beneficial because a few people can have access to ICT structures like internet and computer. Nevertheless, once well established a lot of benefits can be yielded.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter presents research design, population, sampling strategies, data collection methods and instruments, validity and reliability of instruments, data collection procedure and analysis techniques of the study.

3.1 Research Design

The design used for this study included both correlation and cross sectional survey design. The approach for the study was both qualitative and quantitative methods in collecting and analyzing data. Correlation design was preferred for its ability to establish the relationship between variables (Amin, 2005), so it would establish the relationship between ICT and management of students' academic affairs. On the other hand the researcher also used a cross sectional survey design because data was to be collected at one time from the sampled population which was the lecturers and administrators in charge of exams. For cross sectional surveys, data are collected at one point in time from a sample selected to represent a larger population (Owens, 2002); which was the aim of this study.

3.2 Population

Makerere University community was the target population for the study. The total population under study was 1,161; the sample was the administrators in charge of examination and teaching staff of Makerere University because, they were deemed knowledgeable about the effect of ICT on examination management. Administrators

provided information about the levels of ICT on registration and examination management. The teaching staff provided information about ICT and examination management, that is, in setting, marking, grading and reporting to the administrators.

Table 1: Sample size

Category	Parent size	Sample size
Lecturers	1,161	291
Examination administrators	22	22
Total	1,183	311

Krejcie R.V and Morgan D.W (1970)

3.3 Sampling Strategies

A purposive sampling for the case of administrators was used in this study. This implies that, only the population that was assumed knowledgeable was selected, (Amin, 2005), in this aspect, only academic registrars responsible for managing examination were selected and random sampling was used for the case of teaching staff and in selecting faculties.

3.4 Qualitative Methods

Qualitative methods were used for purposes of explaining in details the levels of availability, accessibility and use of ICT in management of students' academic affairs in Makerere University.

Interview method

Semi-structured interviews were used to gather information from administrators in charge of examination about the effect of ICT and examination administration. The interview intended to investigate how ICT affects examination management and registration of students. Interviews were used because they improve the understanding and credibility of the study (Key, 1997) and they lead to a more understanding of the topic (the effect of ICT on management of students' academic affairs).

Observation

Observation was used because it is recommended for its provision of first hand information and it supplements on other methods, (Amin, 2005). Observation was made on the levels of availability and accessibility of physical ICT infrastructures like internet/intranet connectivity, electronic examination databases and computers in the management of students' academic affairs in Makerere University.

Quantitative Methods

Quantitative data was gathered using semi-structured survey questionnaires. Questionnaires are a useful way of collecting information off a large sample of people (Key, 1997). This technique was basically used to generate information about examination management by both administrators and lecturers.

3.5 Data collection instruments

A Questionnaire was used to collect data; this was due to the fact that questionnaires offer a number of options for respondents to choose from (Amin, 2005). Questionnaire was used because it is very effective for assessing program satisfaction and could easily be administered, (Bouffard and Little, 2004). Questions elicited data regarding the levels of availability, accessibility and use of computers, internet/intranet and management information system on examination management by teaching staff and administrators. So data were collected using an interview guides to o gather information on management information systems, internet/intranet effect on managing students' examination results by administrators.

3.6 Validity and Reliability of the Instruments

Validity is a very vital psychometric property of measurement therefore there was need to establish it before instruments were used. The questions in instruments were subjected to face validity by the supervisor. The questions appropriateness and generalization to the topic were validated by specialists in ICT. Reliability and validity of the objectives of the study were examined by the supervisors to judge their stability, correctness and appropriateness. A pilot test of the instruments was also carried out from selected members of School of Education, Makerere University to improve on clarity and comprehensiveness of the instrument aimed at covering relevant information about ICT and examination management.

3.7 Procedure

The researcher received an introductory letter signed by the Dean School of Education, Makerere University which introduced the researcher to the respondents. The letter was containing the topic of the study and the objectives of the study. The researcher addressed the respondents briefing them of their role in the study; to fill the questionnaires after which instruments were distributed and collected after some time collected. For the case of interview, an appointment was sought from the respondents after which interviews were conducted in the session; data were recorded as the interview session was being carried out.

3.8 Ethical Considerations

The researcher sought respondents' consent before involving them in the research. This included briefing the respondents about the research objectives and roles of the respondents and how they were going to benefit from the research. Researcher also assured the respondents about the degree of confidentiality in the information that was gathered from them.

3.9 Data analysis

Qualitative data from interviews were analyzed as the study progressed following a logical analysis, a method highly recommended for qualitative research (Brown and Lloyd, 2001). While quantitative data were analyzed using the Statistical Package for Social Sciences (SPSS). Quantitative data were coded and entered into the SPSS computer package for analysis. The analysis of quantitative data included; running descriptive statistics, cross tabulation and the analysis of the statistical relationships

between dependent and independent variables in the study using Pearson product moment correlation.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.0 Introduction

This chapter presents findings from the study about ICT and management of students' academic affairs. The study intended to establish the effect of ICT on management of students' academic affairs in Makerere University. A series of self-administered questionnaires and interviews were used to gather data from the teaching staff and academic registrars in charge of examination in different faculties/institutes/schools of Makerere University. The chapter begins with presenting background information of the respondents and then their experiences with ICT in management.

4.1 Background information

A questionnaire was administered to a selected sampled teaching staff and administrators of Makerere University. The study took into account all the academic levels of the teaching staff ranging from teaching assistant to professor, both females and males were considered in the study and the following information was obtained.

Table 2: Number of faculties/institutes/schools that responded to the study

	No. of respondents	Responses in percentages
Faculty of Agriculture	23	11.3
Faculty of Arts	15	7.4
Faculty of Computing and Information Technology	65	32.0
Faculty of Technology	30	14.8
Institute of Adult and Continuing Education	10	4.9
Statistics and Applied Economics	25	12.3
School of Education	25	12.3
Faculty of Science	10	4.9
Total	203	100

According to Table 1, majority (32.0%) respondents were from faculty of computing and information technology and the least respondents were from Adult and Continuing Education (4.9%) and faculty of science (4.9%). The findings revealed 32% of respondents were from Computing and Information Technology, 14.8% from faculty of technology, 12.3% from Statistics and Applied Economics, 12.3% School of Education, 11.3% from Faculty of Agriculture, 7.4% from Faculty of Arts, 4.9% from Institute of Adult and Continuing Education and lastly 4.9% Faculty of Science

Sex of the respondents

Table 3 presents respondents according to their sex.

Table 3: Gender response distribution

Gender	Number of respondents	Responses in percentages
Male	147	72.4%
Female	56	27.6%
Total	203	100

Table 2 show that most of the respondents 147 (72.4%) were male while the number of females were 56 representing a percentage of 27.6%. This attributed to the dominance of male lecturers in most of the faculties/schools/institutions where females tend to constitute a low percentage.

4.1.4 Current rank / position/ Designation

Respondents according to their current rank/position are presented in Table 3

Table 4: Positions of respondents

Rank	Number of respondents	Responses in percentages
Assoc. Professor	2	1
Senior Lecturer	30	14.7
Lecturer	80	39.5
Assistant Lecturer	51	25.1
Teaching Assistant	35	17.2
Part time	5	2.5
Total	203	100

Table 4 shows that least responses (1.0%) were from associate professors and the highest responses (37.9%) were from lecturers. Data from the Table above show that 1% of respondents were associate professors, 2.5% part timers, 15.2% senior lectures, 17.7% teaching assistant, 25.8% assistant lecturer and the highest number of respondents were lecturers rated at 37.9%.

4.2 Research question one: What are the levels of availability of ICT for exam management in Makerere University?

To establish the level of availability of ICT for examination management, ICT facilities such as internet, computers, emails, electronic databases and management information systems were considered. A number of questions were presented to the respondents for answering to verify the availability of ICT features. Presented in Table 5 on the next page are the results from the study about the availability of ICT.

Table 5: Levels of Availability of ICT

Response items		Number of respondents	Responses in percentages
Do you have a computer in your office	No	3	1.5
	Yes	200	98.5
Where do you mainly access a computer from?	Office	200	100
Do you have computer skills?	Yes	200	100
Is your faculty connected to the internet?	Yes	195	97.5
	No	5	2.5
Do you use internet for your work?	Yes	200	100
Do you have an email address?	No	5	2.5
	Yes	195	97.5
Do you know how to use it?	Yes	200	100
Does the faculty/school/institute have any electronic examination management system/database?	No	5	2.8
	Don't know	65	36.1
	Yes	110	61.1
Do you have formal logging in/monitoring requirements for that system?	No	25	15.6
	Don't know	60	37.5
	Yes	75	46.9
Do you have an ant-virus management program to protect system from destroying the content?	No	25	13.9
	Don't know	45	25
	Yes	110	61.1
Do you have proper procedures for communication to students on line?	No	55	32.4
	Don't know	35	20.6
	Yes	80	47.1

Table 5 shows that 98% respondents had computers in their offices and only 1.5% did not have and question two confirmed that they all access computer from their offices and all respondents had computer skills. These results are implication of the availability of ICT

structures like computers in the University. Majority respondents (97.5%) also revealed that their faculties were connected to the internet and 100% confirmed that they used internet to do their work.

It was found out that 97.5% respondents had emails and all knew how to use them. When asked whether the faculty had an electronic examination management system/database, majority respondents revealed that their faculties had them. However, 36.1% did not know whether their faculties had electronic examination system/database. That means that there is a need for massive ICT sensitization and training different faculties, for all would be users of such ICT facilities to get to know of their availability and use. Through interview, it was established that some members of the faculty could not access some ICT facilities like computers (computer lab) especially part timers, others could not access internet and so could have been the results management system. Those who had access to the results examination management system disclosed that there were policies governing the use of the system and that there was a formal logging in procedure to access data or to use the system. So security was provided to protect information from unauthorized users. The above results show that there is availability of ICT facilities in Makerere University.

At what levels is ICTs available for examination management in Makerere University?

To determine how examination management by lecturers is affected by availability of ICT, certain activities of examination management that included setting examinations, with the use of ICT examination questions can be set in a way that time is very limited to the extent that a student cannot get time to copy another and students' progress can be

tracked automatically online. Other activities include; assessing/analyzing students' performance, grading of students, record keeping and reporting students' marks to the head of department were considered and data has been presented according to these. Responses were based on true-false form of response where 'true' implied 'yes' and 'False' implied 'No'. So a number of questions were asked and are the findings

Record keeping

Examination process involves record keeping that is, keeping examination questions and marks/results. It was discovered that lecturers' perception towards ICT in keeping records was positive, and they disclosed that keeping records electronically reduced loss of students' marks. Respondents revealed that ICT facilities enhance proper recording and keeping of students' assessed work. They added that making electronic assessment played an important role in minimizing loss of students' results. This implies that availability of ICT enhances proper record keeping.

Examination process requires effective communication between parties such as to fellow lecturers, administrators and students. Upon this note, teachers were asked whether they used ICT facilities like emails, websites, SMS and others to communicate to the above mentioned parties and the findings are presented in Table 5.

Table 6: ICT for communication

Question item	False		True	
	F	%	T	%
ICT facilities like emails and SMS enhance effective communication between me and other examination officials during exam	100	58.8	70	41.2
Course work results are returned to students online using emails	135	81.8	30	18.2
I electronically transfer assessed results to departmental head using emails	60	36.4	105	63.6
With electronic assessment instant feedback is ensured to students.	40	24.2	125	75.8

Communication is vital for effective management, so it was discovered that ICT tools like e-mails and SMS were important in effecting communication between lecturers and other officials in charge of exams. However, statistics show that ICT did not significantly enhance communication; this was represented by 58.8% of respondent responding “false” to the question item and only 41.2% respondents confirmed that ICT enhanced communication. However, inability to enhance effective communication according to the respondents was due to irregularities of internet connections and power cuts i.e. by the time one would be communicating online, there is no power or there is no internet connection. Otherwise, emails and SMS would have played an important role in ensuring effective communication.

As discovered through interviews, inadequate ICT skills limited lecturers to effectively communicate to their students using a few facilities available on issues of exams. Figures in Table 5 show that majority respondents (81.8%) disclosed that results were not returned to students online and just 18.2% did return marks to students online especially for course works. It was observed that students have to congest lecturers' offices for their results especially those with examination problems like missing marks. Yet lecturers would communicate such cases on announcement, chats rooms and discussion forums on the website. This means that faculty authorities should train their personnel how to use such tools for effective communication to students.

Table 6 again shows that majority respondents (63.6%) confirmed that assessed work can easily be transferred electronically to departmental head, 36.4% did not accept it. Since the highest percentage 63.6% conformed to the statement, it implies that ICT plays an important role in the way records are kept and are transferred from one office to another i.e. from lecturers to departmental heads. Hitherto the introduction of ICT in examination management, results used to be kept and reported using folder files but now even when some one is abroad, he/she can mark exams and send results online.

For effectiveness and efficiency, participants disclosed that utilization of ICT in examination management ensured efficiency and effectiveness in the examination exercises were carried out. This was disclosed by 75.8% of respondents who revealed that electronic assessment ensures instant feedback to students, 24.2% of respondents rejected it. Depending on the results, this implies that utilization of ICT in examination

management makes it easier for students to get feed back from their lecturers about their performance.

ICT for setting and marking of exams

Computers were considered important in the process of setting examinations by teachers. So teachers were examined on whether they used computers in setting exams and their responses are as in Table 7.

Table 7: Respondents’ use of computers

Do you use a computer	Response	Number of respondents	Responses in percentages
	No	80	44.4
	Yes	100	55.6
	Total	180	100.0

Respondents who were using computers for examination exercises were 55.6% of all respondents and 44.4% were not using them. This implies that computers were available and utilized. In the interview with respondents, it was discovered that computers were used for typing, storing and keeping examinations questions, safely kept with a password to avoid unauthorized users and viewers. Respondents had a general perception that ICT facilities ensure proper grading of students. For example, with the use of Electronic Examination Management System/Results Management System there is automatic grading of students. The researcher went a head to establish how ICT tools can facilitate in enhancing examination process.

Table 8 shows how examination process is conducted and the type of questions that can be supported by using ICT tools. The process involves setting, invigilation and marking of examinations.

Table 8: ICT for management of examination process

	False		True	
	F	%	T	%
I administer multiple questions online	160	91.4	15	8.6
I administer essay questions online	150	85.7	25	14.3
I easily track students progress during examination on line	85	51.5	80	48.5
I have overall control over students participation in examination online	145	87.9	20	12.1
I easily assess students performance online	120	72.7	45	27.3

Proper grading of students is enhanced by automation system of the examination platforms; KEWL and Blackboard. For example, objective questions are set with their answers already set, when a student attempts such a number, a computer program marks him/her automatically and he/she is given feedback on whether he/she has got the answer correctly or not. Unfortunately, it was discovered that lecturers found it hard to set and mark essay questions automatically using examination ICT platforms like KEWL and Blackboard, this was disclosed by 85.7% of respondents. So there is need for more training to acquaint lecturers with more skills in setting and marking online exams. However, the results implied that unlike the traditional method of examining students i.e.

giving them a paper test, online exam is very easy to mark and grading students is done automatically by the computer. Other respondents 36.4% rejected it.

Researcher further investigated on the type of exam that can be set online by lecturers. It was founded out that majority participants could not set multiple questions online. This was disclosed by 91.4% of respondents and 8.6% revealed to be setting multiple questions online. The above results indicate an inability for the teaching staff to manage online exam setting, invigilation and marking.

Lecturers confirmed that they could easily track students' progress during examination. For example when questions are set on say KEWL or Blackboard, there are tools that support tracking students, whereby a student once he/she answers a question, he/she cannot change that answer and it provides time when you must be through with each question. Results indicate that 48.5% of respondents confirmed that they could track students' progress during exam period and 51.5% could not afford it. This implies that if ICT is effectively used, it has the potential to minimize copying of answers in the examination process.

Table 8 indicates that lecturers did not have the ability to control students' participation in the exam online, i.e. allowing or prohibiting students from sitting for the exam. Of the total participants, 87.9% disclosed that they did not have overall control over students' participation and it was only 12.1% of respondents that confirmed over all control over students' participation. This could have been due to much expertise that this group of people had in setting and controlling online exam. The highest number of respondents did

not have enough expertise to enable them control students because ICT teaching platforms have got tools that can be set where a student must log in first to gain access to the exam. This then calls for more training and exposures to such teaching and learning platforms. The study looked into the idea of ease of using ICT facilities in examination management and mostly time saving was considered.

Table 9: Time saving and ease of using ICT for examination management

Response	Number of respondents	Responses in percentages
With electronic assessment I save time while dealing with examination management exercise		
False	37	36.4
True	128	63.6
Total	165	100.0
It is hard for me to set online exams		
False	105	63.6
True	60	36.4
Total	165	100.0

Results in Table 9 indicate that 63.6% agreed that electronic assessment was less time consuming, 36.4% did not conform to the item. The findings imply that availability of ICT ensures efficiency; less time is spent in making assessment.

The findings in Table 9 show that 63.6% of the respondents did not agree to the view that it is hard to set online exam, only 36.4% agreed to that view that it is hard. The results imply that the availability of ICT ensures easy setting of exam.

4.3 Research question two: At what levels is the accessibility of ICT for exam management in Makerere University?

To establish the effect of accessibility to ICT on examination management, utilization of structures like emails, MISs and computers in examination management were considered. Activities in examination management in which ICT could be applied included record keeping, grading students, communication to students, tracking students' data, time management and others were investigated. Responses were based on true-false form of response where 'true' implied 'yes' and 'False' implied 'No'. Having realized the use of computers by lecturers, the researcher also investigated the use of computers and MIS by administrators. The resulting statistics of each item are presented in Tables 10.

Table 10: ICT accessibility for examination management

Response	Number of respondents	Responses in percentages
I access a computer for examination management		
False	00	00
True	22	100.0
I have access to electronic examination Management Information System (MIS) for computing students' results		
False	00	00
True	22	100.0
With access to ICT structures like intranet, results are returned to students online		
False	4	18.2
True	18	81.8
Accessibility to electronic assessment system ensures reduced loss of students' results		
False	4	18.2
True	18	81.8

Results in Table 10 above indicate that all respondents (100%) were using computers for purposes of examination management. This implies that they had access to computers and they have computer knowledge. This was so because the University gave computers to all administrators in charge of examination and observation showed that computer were available in their offices.

Table 10 above shows that all respondents (administrators) (100%) use electronic examination management system to analyze students' results. This reveals that all respondents had access to MIS, this was so because the University had made it mandatory for all faculties/institutes/schools to use electronic means in analyzing data. To implement this, the University established ARIS to manage exam related data but

however, different faculties/institutes/schools use different electronic examination systems which were developed locally. Locally developed systems were used because some faculties/institutes/schools could not get access to ARIS and some complained that ARIS tools were difficult to use. For example in faculty of technology and Arts they use Excel in making assessment (evaluation/computing students' results). It was also discovered that some faculties were hesitant to change to ARIS because they were used to their old excel system.

With regard to communication to students, the results are returned to students online. This was indicated by the findings in the Table above from the study that showed that 81.8% respondents said truly results were electronically returned to students and 18.2% did not agree with it. This implies that accessibility to ICT has an effect on management of students' results. In an interview, one respondent said "these days I no longer hassle with students for exam marks, when they come to my office I instead send them to the internet because everything is uploaded after making computation.....". For safety, the findings showed that electronic assessment/computation ensures proper keeping of students' results. Results indicated that 81.8% conformed to the item that electronic assessment/computation reduces loss of students' results as always been the case with the manual system. This implies that accessibility to ICT enhances safety in record keeping. Only 18.2% did not conform to the item; this could have been due to the effect of inadequate ICT skills to use electronic system in managing results.

The researcher also investigated the accessibility and Utilization of ICT in examination management by administrators.

Table 11 shows results from the study about accessibility and use of ICT for examination management.

Table 11: Accessibility to ICT for examination management (cont'n.)

Response	Number of respondents	Responses in percentages
Accessibility to electronic examination system enhances efficiency in tracking students' academic progress.		
False	00	00%
True	22	100%
Accessibility to ICT facilities like email, enhance effective communication between me and other administrators		
False	8	36.4
True	14	63.6
Total	22	100.0
With access to MIS I safely keep and control all students' results		
False	2	9.1
True	20	90.9
Total	22	100.0
There is proper grading of students' performance with access to electronic systems of assessment/computation		
False	4	28.2
True	18	71.8
Total	22	100.0

Responses in the Table 11 above indicate that it is easy to track students' general academic data. 100% 'true' response implies that electronic examination management systems are efficient for monitoring academic performance of students. Administrators in interviews said that is very easy to track students' academic record and verification of students' transcripts through the use of results management system though it was server

based. Once an error occurs, it can easily be verified and all other faculties/schools/institutes will be updated.

Findings in Table 11 show that ICT facilities enhance effective communication. Results indicate that 63.6% of the respondents agreeing to the item in question. It was only 36.4% of the respondents that disputed ICTs' enhancement to effective communication. Through observation, the researcher realized that 95% of respondents had access to emails though it was not established whether they were being used for managing students' academic affairs. Administrator revealed that in case of any need for communication between them, they use Short Messaging Service (SMS) to communicate. This was possible because all offices had internet connections though they complained of the unreliability of internet.

Results in Table 11 above indicate that MIS ensures safe record keeping. This is revealed with findings that showed that 90.9% agreed with the item that MIS ensures safety and control in keeping students' results and 9.1% disagreed with the idea. This implies that majority respondents had access to MIS and that MIS affects management of students' examination results. The results from interviews showed that most administrators (83.6%) could comfortably use management information system and every office had an electronic examination system that was use being used to manage students' examinations.

It was revealed that an electronic assessment/computation system ensures proper grading of students' performance. Results show that 71.8% realize the importance of electronic system in making assessment/computation; it was only 28.2% that disputed that idea.

This implies that accessibility to ICT facilities like management information system would redeem the administrators from the problem of making errant mistakes of assigning grades wrongly to non owners and underrate students' performance. For example giving a student a lower CGPA yet marks are high that would push that student to a higher CGPA. This is so because an electronic system automatically assigns values to corresponding owner if properly commanded by the user and automatically calculates students' results. The researcher investigated users' opinion on the use of ICT facilities in examination management. Considered aspects included urgency and motivation and the following were the results in the Table 12.

Table 12: Users' opinion on access to ICT facilities in examination management

Question item	Number of respondents	Responses in percentages
Electronic assessment/computation is less time consuming		
False	6	27.3
True	16	72.7
Total	22	100.0
Accessibility to ICT facilities like electronic assessment systems motivates me to work		
False	6	30.0
True	14	70.0
Total	20	100.0
I highly recommend electronic examination management		
False	00	00
True	22	100.0

Table 12 reveals that electronic assessment/computation is less time consuming according to the findings. Results show that 72.7% respondents who were using

electronic system found cost effective in terms of time. They revealed that it was cost effective because all students' results could be entered once and calculating the Cumulative Grade Point Average (CGPA) becomes easier, there is no much time needed for making calculations because the system can automatically calculate it. Respondents revealed that the user should instead be accurate when entering in marks in the system. They explained that system as '*garbage in garbage out*'. In other words what is entered is what is calculated and produced by the system. This means that accessibility to electronic examination system is much better to use provided the user is well equipped with skills to operate it to avoid mistakes.

Results in Table 12 indicate that accessibility to ICT facilities like assessment systems motivate users to work. Findings in Table 12 show that 70.0% were motivated to use electronic assessment/computation systems in examination management. This implies that use of ICT facilities motivates user to work. One respondent from Senate building when asked whether results management system motivated him to work, he replied that he get forced to work overtime because most of the things like producing transcripts are done automatically once all results are entered correctly. He added, once a student enters here, within a few minutes, I have produced his/her transcript unlike before when we had to look for the folder files in our stores.

After using electronic systems and realizing its importance in managing exams, respondents wholesomely commended for the use of management information system. This was indicated by 100% response from the respondents. This implies that

accessibility to ICT is very beneficial to management of students results so should highly be implemented according to the respondents.

4.4 Research question three: What are the levels of use of ICT for registration management in Makerere University?

This section reports evidence on the levels of use of ICT for exam management in Makerere University. E-registration as sub element of ARIS in Makerere University has not been fully implemented due to technical problems according to the administrators. From the study, it was realized that there is electronic registration of students in Makerere University; instead, after registering students manually, the information is then uploaded in the registration databases. This was due to a number of reasons as advanced by the respondents, such as unreliability of internet, inadequate ICT facilitates to be accessed by all students and uncertainties in the ICT security systems.

The research established the functionality of ICT for registration management and the results are presented below

Table 13: Operation of the system – technological aspects

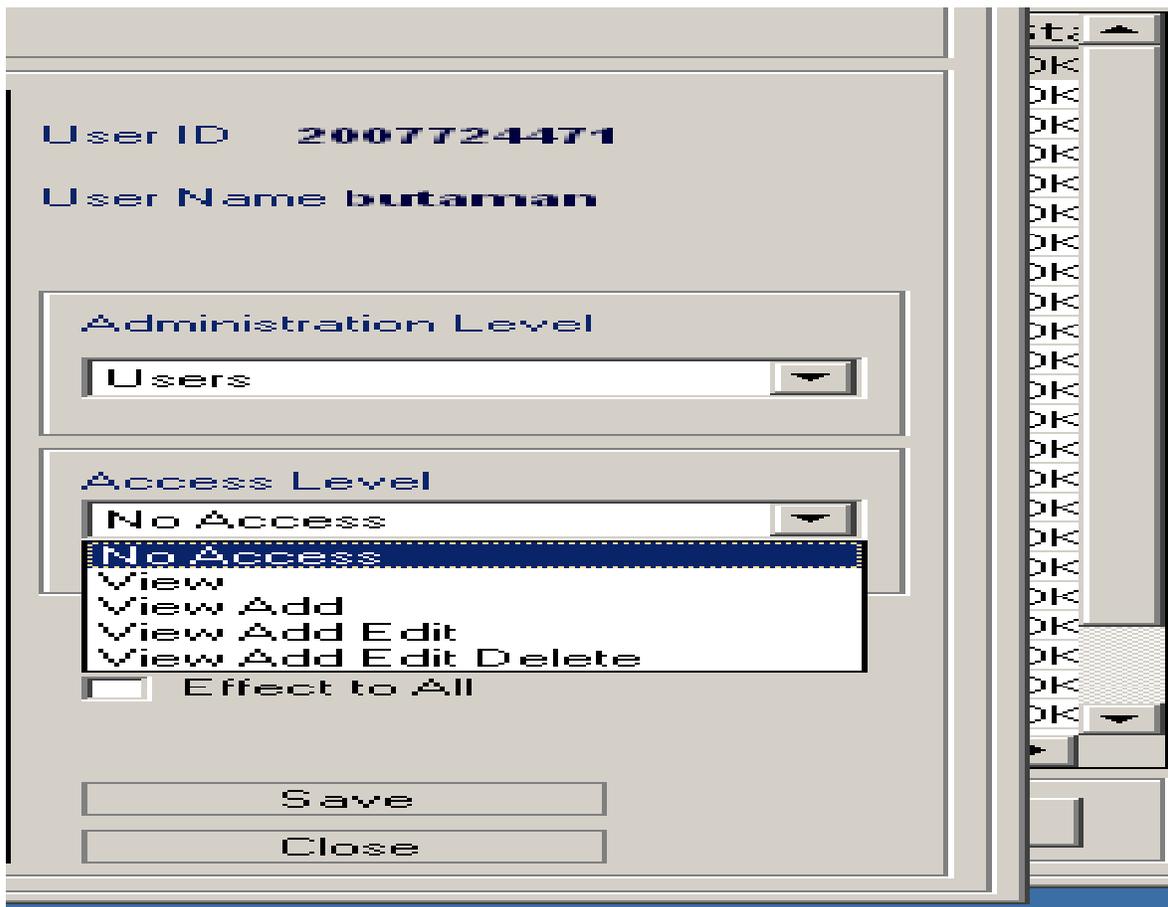
Responses	Number of respondents	Responses in percentages
The Electronic Registration System is reliable		
False	7	35.0
True	13	65.0
The system is easy to use		
False	6	31.6
True	13	68.4

System reliability is fundamental and while about 65% of the respondents were positive about 35% were dissatisfied with the reliability of the system. The reasons for unsatisfactory reliability were many and varied. Some were specific to the system e.g. there is low band width which slows down work during day and the system cannot detect errors when data are being entered, so if any mistake is done it can only be identified by the users, the system cannot identify it. One respondent characterized it as ‘garbage in garbage out’. So the user must be careful when entered in data in the system otherwise there will be effectiveness and credibility in the information produced.

Reliability was credited on the basis that when data are properly entered into the system, there is restrictions i.e. access levels to the use of the system. No unauthorized person can just tamper and change students’ data without authorization of the administrator.

Figure 2 : Access levels of Results Examination Management System considered for successful registration of students for graduation.

The system helps in tracking students' academic progress that in turn helps the registration administrators to identify what the student registered for how his/her progress has been. University students to successfully progress and register for graduation must have passed all examination papers.



The system has access levels according to users' level. On the right, the dialogue box shows the different levels of accessing the system. It shows that some users cannot access it, others can only view it, view and add, view and add information and edit, and others can view information, add information, edit it and have rights to delete information. So the system is limited to forgeries by 'loose' administrators and students. It was also

discovered that when there are any changes made, the system tracks the person who has made such a change and it record the time the change has been made. So once data are entered, any alteration can only be done by the top administrators of the University (systems administrators).

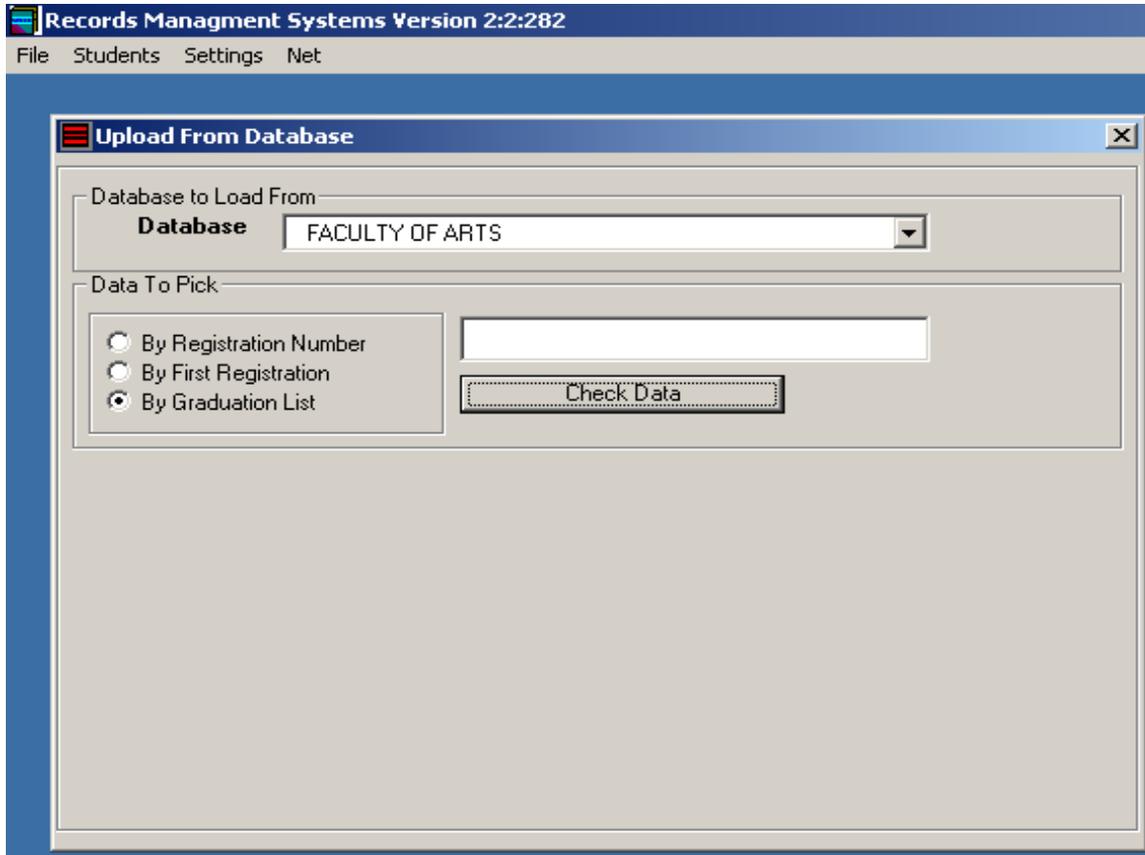
Respondents' views on operating of e-registration were generally positive: For example 68.4% of respondents confirmed that the system was easy and 31.6% of responses indicated that the system was not easy. As seen above, this could have been due to the fact that the training to them was inadequate, so they don't have enough skills to use that system. Since the system is easy to use, it implies that all administrators could use it, so the University should provide enough training to ease application of ICT in management. Administrators revealed that it is very easy to check students' registration status. Important information like payments, current registration, bio data, education background and courses can easily be viewed.

User friendliness is very important in usage and applicability of ICT in management. Respondents were asked to tell whether the system they were using to manage registration of students was easy to use and majority respondents 68.4% confirmed that it was easy to use. This was due to the fact that the system was designed in a way that it does not require much experience and skills.

Records Management System has a few features which can be used by any person with little experience to check students' data.

Figure 3 shows some of the features on the system.

Figure 3: Records Management System



Above is an image that shows a few features of the system used (Records Management System) used by administrators in Senate (Makerere University). The system shows that there are three ways by which one can check data i.e. by registration number, first name or graduation list. This confirms what respondents said that it only requires time to learn the system.

It was however discovered that the biggest challenge normally faced was the information wrongly entered into the system especially concerning finances. It is normally

challenging with international students, once information is wrongly entered, it takes time to verify payments. Such rectifications can only be rectified from Senate administrators. Another challenge with the use of the system was that students could not check whether what has been entered is correct particularly on their registration, it is until when they get their print outs that they can discover their registration status.

The researcher investigated on the way the system works in terms of providing information easily to the users. Table 14 indicates the operation of the system as far as providing information is concerned.

Table 14: Usability of the system in provision of information

The system provides useful information to be produced easily on registration of students		
False	8	40.0
True	12	60.0
The system provides easy comparison with other data (E.g. academic progress of a student)		
False	5	27.8
True	13	72.2
The system makes it easier to verify students' registration related data e.g. verification of payments receipts		
False	8	42.1
True	11	57.9

Registration monitoring was particularly beneficial, providing information on continuous registration of students throughout the year. The researcher learnt from administrators that, it was very easy to track students' progress in terms of registration. Students could not easily get their transcripts without having confirmed their registration of all the years of studying in the University, so students' data can easily be tracked i.e. bio data, education background, courses and their programs. One administrator from Senate building of Makerere University remarked "it is very easy to verify students' transcripts when am in office. When a student enters my office, within a minute, I have seen and printed his/her transcript". In case of any error made in registration with faculties, there is normally easy communication between faculties and once the information is corrected by systems administrators from Senate, that information will be displayed and read in all faculties.

It was discovered that records management system allowed for easy comparison of registration status with other data for example, students' academic progress i.e. whether a student was on normal progress or had retakes or he/she had asked for a dead year. Registration system in Makerere University is that every year a student must register, so when one misses a year without registering, administrators can easily trap him/her. Once a student registers, or pays tuition fees, data bases automatically get updated.

The study founded out that records management system used for registration and examination management provides useful information, for example if a student paid school fees, and he/she wanted to check his/her registration status, information can easily be produced. The way the system was designed, it comprises of all the information that

would enable the administrators to produce any kind of information as would be required by the student. This was supported by 57.9% responses confirming ‘true’ meaning it easily provided useful information and 42.1% did not find the item valid, so they responded ‘false’ to mean the system do not provide useful information.

Having realized the way the system operates in providing information, the study further investigated specifically on the effect of ICT on administrators and students. Table 15 presents results from the study about the effect of ICT on administrators and students.

The researcher sought to know the effectiveness of the installation of the system; in this it was intended to indicate whether the training given to the users was adequate to favor effective implementation of e-registration. The findings are presented in the Table 14.

Table 15: Set-up of the system

Responses	Number of respondents	Responses in percentages
Training provided in the system operation was.....		
Very poor	1	5.0
Poor	5	25.0
Good	9	45.0
Very good	2	10.0
Don't know	3	15.0

Findings in Table 15 above show that the training provided to the staff to acquaint them with skills of using the system were good. However for some faculties, administrator exposed that the training was not adequate. Faculties included social sciences, technology, agriculture, adult and continuing education, forestry and nature conservation Arts and school of education administrators complained of inadequate training.

It was again discovered that the system was comprehensive but could easily be understood; one administrator from Senate building (Makerere University) said “the system is very comprehensive, but it requires time to learn its operations”. This implies that however inadequate the training was, this would not fully bar users from using the system because it is not very complicated. But this again calls for more training because users’ skills and attitude toward application of technology vary. It was again discovered that some faculties still manually process students’ data, thus stagnating registration system.

Data collected from interviews with administrators indicated that faculties’ difficulties with operating e-registration were varied. Some related to perceived inadequacies of the system in that when a mistake is made in entering students’ data it takes much time to correct such a mistake due to rigidity of the system and many restrictions. Respondents revealed that students have to be sent to Senate building (administrators) for corrections in case of any error like name errors, making a mistake in hall of residence, subjects and other related mistakes.

Top University administrators in charge of registration revealed that the failure to full implementation of ARIS was due to technical, hardware and software problems. Computers in different faculties/schools/institutes are not enough to support e-registration. Effective implementation of the system generally needed users to develop skills in producing reports, integrating databases in order to explore trends and relationships with other data like academic progress of the student, and to add generally to the intelligence available (monitory program of the system) to support determining policy and further actions for example on retakers, dead year students and other problematic students.

This does not necessarily imply a deficiency in the e-registration system itself, however; in some cases it reflects a lack of training to enable staff to undertake data analysis requiring the interface of different systems. Having realized the installation of the system, it was important to investigate on the way the system works that is, the reliability and ease to use the system.

Table 16: Effect of ICT on administrators and students

The system releases administrators' time for other work		
Response	Number of respondents	Responses in percentages
False	8	40.0
True	12	60.0
The system improves collaboration with other agencies (e.g. administrators, students and parents)		
False	12	70.6
True	5	29.4
Unauthorized sitting of exams without having registered decreased as a result of using the system		
False	3	15.8
True	16	84.2
The system motivates me to work		
False	4	21.1
True	15	78.9

Administrators revealed that e-registration saved time for looking for students' files but however there was no clear time-saving for administrative work (the amount of time saved was not specified). Time saving was due to the fact that the system provided speedy and accurate solutions to problems of looking for data than used to be with the traditional use of folder files. The results indicated that 60% of respondents accepting that there was time saving, so they could get time for other things (not specified) yet to others ICT did not favor them getting enough time for other work, this was represented by 40% responses.

Use of ICT improves collaboration with other stake holders of the institution. This is done through effective communication enhanced by use of emails. It was unfortunately discovered that it was not the case with Makerere University. Results indicated that only 29.4 % of respondents revealed that use of ICT improved collaboration with other agencies and the highest percentage confirmed that use of ICT did not improve collaboration with other agencies. This implies that the use of ICT in Makerere University for administration is not yet effective. It was discovered by the researcher that users of ICT in administration still lacked skills to fully utilize all the tools that would support collaboration. Such tools include emails, SMS, Yahoo groups, announcements on websites.

As was observed in chapter one, after registering a student, information is uploaded into the records management information system. This system however, according to the administrators has made it easy for administrators to properly monitor students. Percentage response of participants who confirmed that e-registration decreased the sitting of exams by unauthorized was 84.2%. One administrator commented that “it is easy to check students’ registration status and print out his/her profile”. However it was observed that monitoring was not done electronic; it was manual in a way that examination permission notes are issued to students.

Results in the Table 15 indicate that despite uploading students’ data after manually registering students, the system motivated administrators to work. However, with thorough investigations, it was discovered that motivation was due to the effect of speed that the system provided in reporting information. The system’s automation ability in

handling students' registration related data. Of all respondents, 78.9% confirmed that the system motivated them to work and only 21.1% were not motivated by the system's operations.

CHAPTER FIVE

DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

This chapter presents the discussion of results, draws conclusions according to the findings on each of the study objective and gives recommendations as per research objective.

5.1 Discussion

5.1.1 Levels of availability of ICT for exam management in Makerere University

Any modern institution of higher learning is critically dependent on the smooth operation of the new innovations of Information and Communication Technology, (Tusubira, 2005). Makerere University recognizing this critical need, therefore, agreed to establish its ICT Policy and information system called Academic Records Information System (ARIS) to support student and education related administrative and managerial processes

Sibangani, (2006)observed that, if ICT facilities like word processors and e-mail are put in place, they can result in more efficient communications and reduction of fraud in exams. In this study it was observed that ICT facilities like e-mails and use of SMS enhanced effective communication between lecturers during examination period and among administrators. It was discovered that for administrators to communicate with fellow administrators in different faculties it does not necessitate one to move, instead they use emails and internet SMS. This has resulted into saving of time for other

administrative work. More to that, it was realized that communication to students for their results and registration status is done through online, students do not flock lecturers' office to know their performance.

This can be solved by the use of ICT infrastructures. Students find it, at times easier to use any technological tools.

Kirsti (2005) observed that students today find it easy to pick up any available new electronic device and learn how to communicate with it easily. However, it was observed that, ICT tools in the University of Makerere are inadequate, so cannot support effective communication between students and their lecturers. Results indicated that one of the biggest challenges with the use of ICT in examination management by lecturers was lack of ICT facilities like computers and unreliable internet.

Devon, (2004), noted that recording data electronically, storing it centrally, and sharing it with colleagues are vital to reducing workloads through available ICT structures. In congruent to Devon's finding, this study revealed that the available ICT facilities like computers and word processors, excel enhance recording and keeping of students' assessed/evaluated work. This was pointed out a key factor reducing the bureaucratic process of manually recording and keeping a pile of files. Teachers revealed that manual system was so tedious compared to the computerized system of analyzing, recording and keeping students' data. It was again confirmed that assessed work can easily be transferred electronically to departmental head through use of e-mails and SMS.

The above results confirmed what JISC (2001) observed that marks for assessed work can be recorded within the virtual learning environment (VLE) and that assessment marks recorded at the module level may be automatically transferred to departmental or institutional level without rekeying. JISC more noted that institutions that provide well integrated facilities for providing online information about programs, modules and assessed results in which VLEs for individual modules are embedded can be said to provide a Managed Learning Environment (MLE). So this implies that Makerere University can be said to having managed virtual learning environment. Unfortunately however, it was a handful of lecturers that were managing VLE, thus a call for more training and provision of ICT facilities to enhance fully managed learning environment (MLE).

Devon further observed that ICT has had an effect on the management of education institutions; it increases efficiency and accountability to institutional resources. It also came to the researchers' attention that electronic assessment ensures instant feedback to students; a symbol to institutional efficiency enhanced by use of ICT.

It was again founded out that electronic assessment reduces loss of students' marks. It has always been difficult to lecturers to give a proper accountability or justification for loss of marks and it had always bee eminent for students to be under marked. However with the use of ICT assessment tools, transparency has been evident that, once the exam is set, it is marked automatically, and students graded automatically according to pre-set conditions that apply to all students. Automation of assessment enhances prep grading of students,

so question of malice is then deleted, so there is much transparency and accountability as previous research has indicated.

Auma, (2006), considered the transcript section, which determines the ability of students to get job opportunities, as a disaster due to bureaucracy in the offices. However, with the effective introduction and use of records management information, it was discovered that getting a transcript takes no time once the student is fully registered and all results are readily available. Registration monitoring through using records management information system, was particularly beneficial; providing information on continuous registration of students throughout the year. The researcher learnt from administrators that, it was very easy to track students' registration progress. Students could not easily get their transcripts without having confirmed their registration of all the years of studying in the University, so students' data can easily be tracked i.e. bio data, education background, courses and their programs.

Results further indicated as one administrator from Senate building remarked "it is very easy to verify students' transcripts when am in office. When a student enters my office, within a minute, I have seen and printed his/her transcript". In case of any error made in registration with faculties, there is normally easy communication between faculties and once the information is corrected by systems administrators from Senate , that information will be displayed and read in all faculties, the applies to results.

5.1.2 Levels of Accessibility of ICT for examination management

Accessibility to ICT facilities ensures accuracy, timeliness and effectiveness of managing the whole process of examination i.e. it allows easy flow of information and risk monitoring systems that are appropriate (BECTA, 2000). In agreement to that idea, was the finding that ICT tools enhance easy tracking of students' academic record and verification of students' transcripts through the use of results management system. It was discovered that there is much time saving compared to the previous traditional method of processing data. Once an error occurs, it can easily be verified and all other faculties/schools/institutes will be updated.

However, in discussing the assessment of learning, it is valuable to consider the types of learning which can be measured, and particularly, which types currently lend them to computer assisted assessment. It is widely accepted that Bloom provides a sensible taxonomy of educational objectives that apply to most academic subjects (Bloom, Englehart, Fwest, Hill, Krathmohl, 1956). In current practice, e-assessment can be applied to test the so-called lower order skills (knowledge, comprehension, and application) (Helen, 2005).

Research indicated that e-assessment in Makerere University had not taken off well. It was observed that only a few lecturers in the University can test students online. And a few who can do it only test lower order skills, that is, knowledge which can only be tested using objective questions or multiple questions.

While attempts are already appearing to provide automatic testing for the higher order skills or extended competencies of analysis, synthesis and evaluation have not gained much attention, (Beevers & Paterson, 2003). Beevers and Paterson's argument was confirmed with the findings of this study, ICT tools already in existence have not been fully utilized. For example KEWL and blackboard have such tools that can support testing higher order skills like evaluation and syntheses but they are not utilized.

Sangwin, (2002), observation was also confirmed that computer aided assessment only takes certain form of questions. According to Sangwin, the vast majority of current computer aided assessment systems provide only the following question types: multiple choices, multiple response, numeric answer, text string, "hot spot" (or other graphic/mouse responses).

Such question types have been criticized on many fronts. Only certain questions are suitable for these formats, other questions need to be rewritten to fit into the format, or worse distorted using ICT tools. In addition, there is consensus that such "objective tests" promote surface and strategic, rather than deep, learning. But this is limited by inadequate skills. With the technical use of education platforms like blackboard, KEWL all types of question can be administered. But even such objective and structured questions can be used to test higher level understanding. Questions can be designed in a way that prompts a student to think. For example Sangwin, (2002) suggests that students can be requested to generate examples of objects that are required to satisfy certain pre-specified properties - which are beneficial activities and which promote the use of higher level skills.

Plummer and Cletus, (2003), maintained that many instructional applications provide an objective means of assessment. They can also maintain records of individual progress of each student and can assist teachers in identifying students' weaknesses and in determining measures that can be taken to address such weaknesses. However, the survey indicated no such platforms in Makerere University. This implies that the University is still lagging behind in terms of instructional technology.

Educational institutions are under increased pressure to do more with less and optimize management through the use of innovative technologies. Harding and Raikes, (2002) Observed that in the world of ICT-led innovation, assessment usually fails to raise much enthusiasm. This was tested true with Makerere University, despite the current technological utilization and application in management of students' academic affairs like registration and banking, little attention has been dedicated to online assessment.

5.1.3 Levels of use ICT for Registration Management

Mark, (2003) argued that due to diffusion of ICTs in education institutions, work radically changed; ICTs offered tremendous possibilities in improving and developing administrators' professional capability. This strengthens institutional capacity to handle administrative work since tasks can be accomplished effectively and efficiently. Results showed that administrators with the use of the electronic system can accomplish their tasks faster and get time for other duties.

Administrators revealed that e-registration saved much of their time i.e. less time is spent looking for students' files. Time saving was due to the fact that the system provided speedy and accurate solutions to problems of looking for data than used to be with the traditional use of folder files.

Development of professional capability was evident in a way the system provided effective and easier way of monitoring students' progress as far as registration is concerned. This was due to the fact that the system provided information on continuous registration of students throughout the year. Once student registers, data is entered and kept till when students finish their studies. The researcher learnt from administrators that, it was very easy to track students' progress in terms of registration. Students could not easily get their transcripts without having confirmed their registration of all the years of studying in the University, so students' data can easily be tracked i.e. bio data, education background, courses and their programs.

BECTA, (2000) stressed that ICT is helpful in supporting management functions, for example E-registration enables management of attendance via analysis of data and can be supported by automatic communication to parents via SMS messaging and email. Use of ICT improves collaboration with other stake holders of the institution. This is done through effective communication enhanced by use of emails, SMS and some announcements on the institutional website. It was unfortunately discovered that this was not the case with Makerere University. Such tools have not been explored and put to use by many lecturers and administrators. Results indicated that only 29.4 % of respondents

revealed that use of ICT improved collaboration with other agencies and the highest percentage confirmed that use of ICT did not improve collaboration with other agencies.

It was discovered by the researcher that users of ICT in administration still lacked skills to fully utilize all the tools that would support collaboration.

Findings revealed that Makerere University had not started registering students automatically online yet it could be possible provided users are acquainted with enough skills. For example Utrecht University developed a system called OSIRIS; it is a student registration web based system offering students' information and allowing them to register for courses (Student Support and Student Affairs 2006-2007). One can arguably say that Utrecht University is a developed one, but technology does not discriminate so long as users are well equipped with enough skills and provided with enough facilities.

With OSIRIS, student can access and change their personal information, check for their course schedule and register for courses and exams and it can be accessed from any computer with an internet connection. Unfortunately however, it was found that in Makerere University students did not have enough computer skill to utilize such tool. Secondly, ICT facilities were not adequate to support online transactions. For example participants disclosed that internet was not reliable, computers were not enough and on top of it users' capacity to use ICT tools was daunting.

So Walsh's, (2002) observation that effective management information systems (MIS) provide a tool for leaders to achieve their institutional vision, as per the moment cannot

be achieved in Makerere University. It can only be realized if strength and support is given to users in terms of capacity building and provision of ICT facilities.

In their research (Geoff, Daniel, Dimitra, and Sue,2006), observed that electronic registration could play an important role in helping schools with high rates of absence to improve attendance, it saved time, lesson monitoring was particularly beneficial however initially a significant minority of schools experienced substantial difficulties. To my observation e-registration might be beneficial especially to ICT developed institutions with enough facilities, but to developing ICT institutions like Makerere University, it might not be beneficial because a few people can have access to ICT structures like internet and computer. However, once ICT structures are well established and users are fully developed in terms of knowledge and skills a lot of benefits can be yielded.

5.2 Conclusions

About the levels of availability of ICT for examination management in Makerere University, it was concluded that, ICT facilities such as computers Management Information System and internet were the most common used for examination management. Such facilities for examination management were mainly applied in processing examination results, tracking students' academic progress, grading of students according to their performance, communication between lecturers and heads of department, communication to students via emails. Results in chapter 4 indicated that electronic assessment ensured instant feedback to students and reduced loss of students' marks. However a few a few respondents applied ICT in management of exams and this

was attributed to low level of experience and inadequate ICT skills for both lecturers and students.

For the levels of accessibility of ICT for examination management in Makerere University by administrators it was concluded that ICT was accessed for communication between administrators and other teaching staff members in the University through use of emails and this was enhanced by internet connectivity in offices. ICT was also accessible for returning results to students online, for calculating students' GPA and CGPA and processing transcripts.

Investigation about the level of use of ICT for registration management in Makerere University concluded that Electronic Registration System was more reliable compared to the previous manual system; enforced restrictions to an unauthorized users and limited duplication of registration documents. ICT facilities such as MIS provided useful information easily on registration of students and allow easy monitoring of students' registration progress. It was also noted that records management system allowed for easy comparison of registration status with other data such as students' academic progress and enhanced time management. However ICT had not effectively improved collaboration between University administrators, students and the university outside community.

5.3 Recommendations

ARIS as an ICT innovation initiated to handle students' academic related issues had not been fully implemented. Yet it had been observed that availability of ICT facilities offer a range of functions, so as a foundation for the successful implementation of ICT for

examination management, the University authorities should adequately train and acquaint users with ICT skills such as database management, typing and printing, online examination management, skills in management information systems and internet and facilitate them with ICT facilities. Again University authorities should make it a policy for lecturers to use ICT facilities for examination management.

After realizing the levels ICT for examination management, it is therefore imperative for the University authorities to train administrators and provide more ICT facilities with the required ICT facilities like computers, computer software, internet facilities and reliable databases to effectively use ICT at all levels of examination management. University authorities should put in place formal procedure to be followed to enforce strict use of ICT structures like MISs, internet based communication and other tools to manage examination system in all faculties/schools/institutes of Makerere University.

After realizing that some ARIS tools that would support e-registration were not activated and were not in use partly due to lack of skills and that some faculties had inadequate ICT facilities to support full implementation of ARIS. It was recommended, It was also recommended that a framework of guideline be provided for prior to purchasing an e-registration system, that is, a list of the required specifications be made after consultation with users (administrators) to enable purchase of a reliable ICT structure and initial ICT training for administrators must be undertaken to engender commitment to e-registration initiative and support for new ICT skills acquisition for effective implementation of online registration.

5.3 Areas for further Research

1. The impact of computers on teacher trainees' ability of teaching using new technologies since the establishment of a well facilitated computer lab in 2006 in School of Education, Makerere University.
2. Availability, accessibility and use of ICT facilities for teaching and learning process in rural schools in Uganda.
3. The effect of school administrators' attitude on the use of computers for management of schools in Masaka District.

REFERENCES

Abaasa, F (2005) Makerere University is a Mess, an article published in the New vision, October 3, <http://www.ugpulse.com/articles/daily/homepage.asp?ID=166>

Ajayi, O. (2000) Summary of Online Discussion. Prepared for the AAU Technical Experts, Meeting in Dar es Salaam.

Albanese, M.A, Kent, T.A, Whitney, D.R. (1977) A comparison of the difficulty reliability and validity of complex multiple choice response and multiple true-false items
Paper presented at the Annual Conference on Research In Medical Education

Amin M. E (2005) Social Science Research: Conception, methodology and analysis, Makerere University printery

Ashton, Helen S., Cliff E. Beevers, Athol A. Korabinski, Martin A. Youngson (2005), Investigating the medium effect in computer-aided assessment of school Chemistry and college Computing national examinations British Journal of Educational Technology 36 (5), 771–787.

Auma J. (2006) African Executive Staff Writer, in an article State Should Relinquish Varsity Control,
<http://africanexecutive.com/modules/magazine/sections.php?magazine=102§ions=12>

Becta (2000) A Preliminary Report for the DfEE on the Relationship Between ICT and Primary School Standards.

<http://www.becta.org.uk/research/reports/ictresources.html>

Beevers, C. E. & Paterson, J. S. (2003) Automatic assessment of problem solving skills in mathematics. Active Learning in Higher Education, 42, 127–145.

Beevers, McGuire, Stirling & Wild, (1995). Mathematical ability assessed by computer. Computers & Education, 123–132, British Journal of Educational Technology

Bertin C. K, (2006), The Impact of Information Technology on the School System, National Principals Association Annual Conference, Castries, Saint Lucia

Bisaso, R. (2006). The gaps in training Makerere University staff in information technology in educational management, paper presented in a workshop of National education graduate students fellowship. Held 26th -29th September, 2006, at Regency hotel, Kampala-Uganda. Daly, J. (2000), Discussion Paper for a Meeting on the Higher Education Information Infrastructure in Africa.

Available: <http://www.bsos.umd.edu/cidcm/papers/jdaly/dalypaper1.html>

Bloom, B. S., Englehart, M. D., Fwest, E. J., Hill, W. H. & Krathmohl, D. R. (1956, 1964). Taxonomy of Educational Objectives: The Classification of Educational Goals. London: Longman.

Bouffard S. and Little, P. (2004). Detangling Data Collection: Methods for Gathering Data, Harvard Family Research Project, www.gse.harvard.edu/hfrp/projects/afterschool/evaldatabase.html

Brancheau, J.C. & Wetherbe, J.C. 1990. The adoption of spreadsheet software: testing Innovation Diffusion Theory in the context of end-user computing. *Information Systems Research*, vol.1, no.2, pp.115-143.

Brown C. and Lloyd K. (2001). Advances in Psychiatric Treatment Qualitative methods in psychiatric research, <http://apt.rcpsych.org/cgi/content/full/7/5/350>

Byaruhanga M. (2002). The Paradox of Curriculum Innovation and Implementation in a Liberalized Higher Education System in Uganda: A Challenge to Makerere University. Paper presented at the 10th general assembly of CODESRIA, international conference, centre, Kampala, Uganda, 8TH - 12th December, 2002.

- Cantillon, P. Bill, I. David, S., Using computers for assessment in medicine
<http://www.bmj.com/cgi/content/full/329/7466/606?etoc>
- Cuban, L. (1986), Teachers and Machines: The Classroom Use of Technology Since, <http://www.apdip.net>
- Desanctis, G. & Poole, M. S. (1994). Capturing the Complexity in Advanced Technology Use: Adaptive Structuration Theory. *Organization Science*.
- Dave H, (2007) A Lean look at Practical Innovation across the enterprise Giving Process Innovation the respect it deserves, an article for Jeff Brownlee
- Devon County Council LEA ICT Strategy for schools 2003-2006 (2004)
http://www.devon.gov.uk/ict_strategy_for_schools.pdf
- Earnest M, Bertin C, Plummer M, (2003), Information & Communication Technology Policy for the Education System: Draft Policy for the Integration of Information & Communication Technology in the Education System,
<http://unpan1.un.org/intradoc/groups/public/documents/tasf/unpan024792.pdf>.
- Faulkner, A. (1998). The year 2000: Problems and its implications for the information profession. *Journal of Information Science* 24 (4): 4.
- Felman, M.S and J.G March, (1981), Information in Organizations as signal and symbol: *Administrative Science*, 26, 2, 171-186
- Geoff, L, Daniel. M, Dimitra, H and Sue B, (2006). Evaluation of Capital Modernization Funding for Electronic Registration in Selected Secondary Schools, Centre for Educational Development, Appraisal and Research (CEDAR), University of Warwick, University of Manchester, Institute of Education, Research Report,

<<http://www.dfes.gov.uk/schoolattendance/uploads/E-registration-Evaluation%20Research%20Brief%2006%2004%2026.doc>>

Giddens, Anthony (1984) *The Constitution of Society. Outline of the Theory of Structuration*. Cambridge: Polity (publisher).

Harding, R. & Raikes, N. (2002). ICT in assessment and learning: The evolving role of an external examinations board. *LTSN Maths, Stats & OR Network Series on CAA in, Mathematics*, <http://ltsn.mathstore.ac.uk/articles/maths-caa-series/feb2002/>.

Huseman, R.C and E.W. Miles, (1988), Organizational Communication in the Information Age: Implication of computer-based Systems, *Journal of management*, 14,2,181-204

ICT4DGUYANA, (2006). National Strategy final draft, http://www.ict4d.gov.gy/ictstrategy/ICT4D_Strategy_FinalDraft.pdf

Igor Felipe, R.G. (2005).The emancipatory potential of a new information system and its effect on technology acceptance, Thesis Submitted in partial fulfillment of the requirements for the degree of *M.Com (Informatics), Faculty of Economic and Management Sciences, University of Pretoria*

Itohowo, H. (2005). Effective Communication and Smooth Administration of Academic Libraries in the 21st Century: a New Paradigm in Nigeria University of Oyo, Nigeria, Alphonsus. *Libraries at University of Nebraska-Lincoln, Library Philosophy and Practice* (e-journal).

Jack L. W, (1969). The Diffusion of Innovations among the American States
The American Political Science Review, <http://links.jstor.org/sici?sici=0003-0554%28196909%2963%3A3%3C880%3ATDOIAT%3E2.0.CO%3B2-G&size=SMALL&origin=JSTOR-reducePage>

Jenny P, (1999): Evidence-Based Nursing, Identifying the best research design to fit the question. Part 2: qualitative designs, <http://ebn.bmj.com/cgi/content/full/2/2/36>

JISC (2001) JISC (Joint Information Systems Committee) JISC MLE and VLE, Briefing Papers. <http://www.jisc.ac.uk/mle/reps/briefings/>

John D (2003) Correlation research methods The model underlying correlational research methods, <http://clem.msced.edu/~davisj/prm2/correl1.html>

Karen T. (2006) (an editor/writer in the Carnegie Corporation's Public Affairs department). Makerere at the Crossroads. Problems and Pitfalls, <http://www.carnegie.org/reporter/13/crossroads/index5.html>

Key J. P. (1997), Research Design in Occupational Education. Oklahoma State University, (ex. IRB, Thesis Handbook).

<http://www.okstate.edu/ag/agedcm4h/academic/aged5980a/5980/newpage21.htm>

Kigongo-Bukenya (2006), Curriculum Content, Makerere University, Uganda, World Library and Information Congress, Seoul, Korea, <http://www.ifla.org>

Kirsti Aho (2005). Teaching Digital Communication to All Students, journal, http://www.adobe.com/resources/education/whitepapers/dc_for_all_students.pdf

Krejcie R.V and Morgan D.W (1970), Determining sample size for research activities, Educational and psychological measurement, 30,608, sage Publications.

Leeds Metropolitan University (2005) Assessment, Learning and Teaching.: an Education Strategy,

<http://www.leedsmet.ac.uk/about/keydocuments/Version32AssesmentTeachingLearningStrategy1.pdf>

Manielli M.C, Ferris S. P (2005), Electronic courseware in higher education, <http://firstmonday.org>

Miles, M. B., & Huberman, A. M. (1994). Logical Analysis/Matrix Analysis: Qualitative data analysis, 2nd ed. Newbury Park, Cal.: Sage. Compiled by Donald R, 15 Methods of Data Analysis in Qualitative Research, <http://don.ratcliffs.net/qual/15methods.pdf>

Moore, G.C. & Benbasat, I. (1991). Development of an instrument to measure the perceptions of adopting an information technology innovation. *Information Systems Research*, vol.6, no.2, pp.144-176.

Morten F. P, An Analysis of Online Education and Learning Management Systems in the Nordic Countries. <http://www.westga.edu>

Nakanyike, B.M. and Nansozi, K.M. (2003) Makerere University in Transition, 1993-2000: Realizing the importance of ICT, Fountain publishers Kampala

Owens L.K. (2002) Introduction to survey research design, paper presented to SRL Fall Seminar Series

Peter, D. F. (1985). Innovation and Entrepreneurship: Practice and Principles, Harper & Row, New York.

Rice .R. and Associates (Ed) (1984), The new media, Communication, Research and Technology, Berverly Hills, CA, Sage publication

Rogers E.M (1962), Theories of Innovation Diffusion: Diffusion of Innovations, The Free Press, New York, <http://www.ciadvertising.org>.

Sangwin, C. J. (2002). Assessing higher skills with computer algebra marking University of Birmingham, http://www.jisc.ac.uk/whatwedo/services/services_techwatch/techwatch/techwatch_0204_supp.aspx

Sibangani G (2006) ICT and Administrative Efficiency.... A Case for NSSA Zimbabwe Presented in Seychelles

Siegel, J.V, Dubrovsky, S. Kiesler and T.W. McGuire, (1986) Group processes in Computer-mediated communication: Organizational behavior and human decisions processes, 37, 157-187

Stuion Support and Student Affairs: ICT facilities Student Manual 2006 – 2007
<http://www.uu.nl/osirisstudent>

Surry D. W. (1997) Diffusion Theory and Instructional Technology
University of Southern Mississippi

Paper presented at the Annual Conference of the Association for Educational Communications and Technology (AECT), Albuquerque, New Mexico February 12 - 15,

Perrow , C (1986), Complex organizations: A critical essay, 3rd edition, New York: Random House

Taylor FW, (1911) The Principles of Scientific Management, Harper & Bros publisher

Tanestik (2007), ICT for Africa, Country report, <http://www.wikieducator.org>
Association of African Universities Guidelines for Institutional Self assessment Of ICT Maturity In African Universities

Taylor, S. & Todd, P. (1995). Understanding information technology usage: a test of competing models. *Information Systems Research*, June 1995, vol.6, no.2, pp.144-176

Tinio V.L. (2003) ICT in Education,
<http://www.apdip.net/publications/iespprimers/eprimer-edu.pdf>

Tornatzky, L.G. & Klein, K.J. (1982). Innovation characteristics and innovation adoption-implementation: a meta-analysis of findings. *IEEE Transactions on Engineering Management*, vol.29, no.1, pp.28-45.

Tusubira F Frederick (2005), Supporting University ICT Developments: The Makerere University Experience, <http://www.codesria.org>

Tusubira F Frederick (2005) Makerere University Information and Communication Technology Policy, <http://www.makerere.ac.ug/makict/documents/policydoc/copy.htm>

UNESCO Harnessing Information Technology for Development in Africa (Online) Available: <http://www.unesco.org/education/educprog/lwf/doc/IA1.html#Rationale>

UNESCO (2000). International education. Parks: UNESCO House, p.12.

Walsh K. (2002), ICT's About Learning: School leadership and the effective integration of information and communications technology, <http://becta.org.uk>,

West, R., & Turner, L. H. (2000). *Introducing communication theory: Analysis and application.* Mountain View, CA: Mayfield, p. 209-223.

APENDICES

APENDIX A

RESEARCH INSTRUMENT FOR THE TEACHING STAFF

As part of the requirements for the fulfillment of the requirements for degree of master of education in information and communication, I there for conduct research about ‘the effect of Information and Communication Technology (ICT) on management of students’ academic affairs of Makerere University’. There for, I am requesting for your participation by filling this questionnaire. All answers provided will be strictly confidential. Your information will be beneficial for proper improvement of the ICT policy and operation in academic management of students’ affairs.

Instructions

Please fill in as appropriate

A. BACKGROUND INFORMATION

Sex.....

Faculty/School/ Institute.....

Department

Program: day afternoon evening

Please tick (✓) your current rank/position

i. Professor	iii. Senior lecturer	v. Assistant lecturer
ii. Associate professor	iv. Lecturer	vi. Teaching assistant

B. INDEPENDENT VARIABLE: ICT

B1. Accessibility to ICT facilities (Please tick as appropriate)

1. Do you have access to a computer?
 - a. Yes
 - b. No
2. Where do you mainly access computer from?
 - a. In my office
 - b. In school/faculty/institute’s computer laboratory
 - c. Home
 - d. Café
 - e. Other
3. Do you have computer skills?
 - a. Yes
 - b. No
4. Do you have access to internet?
 - a. Yes
 - b. No
5. Where do you access the internet from?
 - a. In my office
 - b. In a friend's computer
 - c. In computer laboratory
 - d. In café
 - e. Home

6. Do you use internet for your work?
 - a. Yes
 - b. No
7. If you have access to the internet, do you have speedy internet access? (Please tick all that apply)
 - a. Yes
 - b. No
 - c. Don't know
8. Do you have an email address?
 - a. Yes
 - b. No
9. Do you know how to use it?
 - a. Yes
 - b. No
10. Does the faculty/institute/school allow you time to do your work online?
 - a. Yes
 - b. No
11. How much time does the University allow you to work online?
 - a. Unlimited
 - b. 1 hour + per day
 - c. Less than 1 hour per day
 - d. N/A
 - e. I'm not interested in accessing online work related activities or resources
12. Do you have any experience in managing exam online?
 - a. Yes
 - b. No

B2. Availability of ICT facilities (Please tick as appropriate)

13. Do you have a computer in your office?
 - a. Yes
 - b. No
14. Where do you mainly access a computer from?
 - a. My office
 - b. Computer lab
15. Do you have computer skills?
 - a. Yes
 - b. No
16. Is your faculty connected to the internet?
 - a. Yes
 - b. No
17. Do you use internet for your work?
 - a. Yes
 - b. No
18. Do you have an email address?
 - a. Yes
 - b. No
19. Do you know how to use it?
 - a. Yes
 - b. No
20. Does the faculty/school/institute have any electronic examination management system/database?
 - a. Yes
 - b. No
21. Do you have an ant-virus management program to protect system from destroying the content?
 - a. Yes
 - b. No
22. Do you have proper procedures for communication to students online?
 - a. Yes
 - b. No

C: DEPENDENT VARIABLE

A Management of examination by teachers

Please tick as appropriate, rating the following as True or False

ICT adoption, application and compatibility

	False	True
23. I use a computer for examination exercise		
24. I use intranet/ internet for examination purposes		
25. I use intranet facilities like KEWL and Blackboard to set and mark examination		
26. I administer objective questions online		
27. I administer multiple questions online		
28. I administer essay questions online		
29. I rate the performance of online examination management highly		
30. ICT facilities like emails and SMS enhance effective communication between me and other examination officials during exam		
31. I easily track students' progress during examination		
32. I easily assess/evaluate students' performance online		
33. I have over all control over students' participation in the examination online		
34. Course work results are returned to students online using emails		
35. With availability of ICT, marks for assessed/evaluated work are recorded and kept electronically		
36. I electronically transfer assessed recorded results to departmental head via email		
37. When I administer electronic assessment instant feedback to students is ensured.		
38. Assessing/computing students' results electronically reduces loss of students' marks		
39. Electronic assessment/computation ensures proper grading of students' performance		
40. Electronic assessment is less time consuming and motivates		
41. It is hard to set online exams		
42. I test all the Bloom's taxonomy competences i.e. knowledge and application online		
43. I can only test knowledge online		
44. I only test application of knowledge online		
45. I test both knowledge and application online		

46. Are the problems that affect ICT application in examination management

.....

47. The following should be done to effectively implement the application of ICT in examination management

APPENDIX B

RESEARCH INSTRUMENT FOR ADMINISTRATORS

As part of the requirements for the fulfillment of the requirements for degree of master of education in information and communication, I there for conduct research about ‘the effect of Information and Communication Technology (ICT) on management of students’ academic affairs of Makerere University’. There for, I am requesting for your participation by filling this questionnaire. All answers provided will be strictly confidential. Your information will be beneficial for proper improvement of the ICT policy and operation in academic management of students’ affairs.

Instructions

Please fill in as appropriate

A. BACKGROUND INFORMATION

Sex.....

Faculty/School/ Institute.....

Department

INDEPENDENT VARIABLE: ICT

A1. Accessibility to ICT facilities (Please tick as appropriate)

1. Do you have access to a computer?
a. Yes b. No
2. Where do you mainly access computer from?
d. In my office
e. In school/faculty/institute’s computer laboratory
f. Home d. Café e. Other
3. Do you have computer skills?
a. Yes b. No
4. Do you have access to internet?
a. Yes b. No
5. Where do u access the internet from?
f. In my office
g. In a friend's computer
h. In computer laboratory
i. In café
j. Home
6. Do you use internet for your work?
a. Yes b. No
7. If you have access to the internet, do you have speedy internet access? (Please tick all that apply)
a. Yes b. No c. Don't know
8. Do you have an email address?
b. Yes b. No
9. Do you know how to use it?
a. Yes b. No

27. With access to MIS I safely keep and control all students' results		
28. I return results to students online		
29. Access to electronic assessment system ensures reduced loss of students' results		
30. There is proper grading of students' performance with access to electronic systems of assessment		
31. Electronic assessment/computation is less time consuming		
32. Accessibility to ICT facilities like assessment systems motivates me to work		
33. I am competent at using Examination MIS		
34. Examination MIS reduces examination workload		
35. I have adequate skills to use MIS		
36. I highly recommend electronic examination management		

37. Which of the following affect your use of ICT facilities in examination management?

Inadequate skills	Inaccessibility to information systems (MIS)	Inaccessibility intranet/ internet	Lack of motivation	Inaccessibility to computer
Other (specify)				

ICT and registration management by administrators

Please choose one appropriate answer

A. Set-up of the system

	Very poor	Poor	Good	Very good	Don't know
1. Installation of the system was					
2. Training provided in system operation was					

B. Operation of the system – technological aspects

	False	True
3. The Electronic Registration System is reliable		
4. The system is adequate for the school's needs		
5. The system is easy to use		

C. Operation of the system – information

	False	True
6. The system provides useful information on unauthorized registration of students		
7. The system provides easy comparison with other data (e.g. academic progress of a student)		
8. The system makes it easier to verify students' registration related data e.g. verification of payments receipts		
9. The system allows accuracy in recording information i.e. error free		

D. Effect on administrators

	False	True
10. The system releases administrators time for other work		
11. The system improves collaboration with other agencies (e.g. administrators, students and parents)		

E. Effect on students

	False	True
12. Unauthorized sitting of exams without having registered decreased as a result of using the system	13.	14.
15. Students' behavior towards registration in the University has improved as a result of using the system	16.	17.

F. General views on the system

	False	True
18. So far the system has met our expectations		
19. We expect the system to become even more useful over the next years when fully implemented		
20. I would recommend this system to other universities		

APPENDIX C

INTERVIEW QUESTIONS FOR THE ADMINISTRATORS

SECTION A

Registration of Students

1. How advantageous is the implementation of ARIS to;
 - i. Supporting admission of students?
 - ii. Registration of students?
 - iii. Verification of students' payments?
 - iv. Management of student personal records?
2. What challenges do you normally face when you are registering students online
3. If any, what changes would you propose if ICT is to be fully implemented in registration of students?

SECTION B

Analysis of ICT influence on administrators' examination management

1. How efficient is on-line database query and reporting facilities of ARIS in terms of managing academic records? Consider the following aspects
 - i. Time/speed
 - ii. Effectiveness/ competence
 - iii. Ability to use
 - iv. Motivation