

INFORMATION AND COMMUNICATION TECHNOLOGY IN UGANDAN HIGHER EDUCATION

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Abstract

This article focuses on the use of Information and Communications Technology (ICT) as a strategy for delivering effective management of educational services in a cross-section of institutions of higher learning. Makerere University in Uganda is taken as a case study where ICT was introduced with the main aim of improving effectiveness in the delivery of educational services. ICT has become a tool of great importance in today's business in all spheres of life globally. From commerce to aeronautics, medicine and education, the daily use of ICT is vital to the success of business. In the area of higher education management, ICT use is of central significance since universities of the contemporary world cannot afford to ignore the role that ICT plays in the running of their institutions as a business. As a matter of necessity, universities are therefore required to embrace ICT adoption in teaching/learning and administrative activities. This study discusses the concept of ICT, perceptions of stakeholders in the effectiveness of ICT adoption, educational services management and ICT, as well as strategies for effective ICT use in educational services management.

Keywords: *Information and communication technology, universities, higher education, strategies, Uganda.*

Background

As Information and Communication Technology (ICT) continues to infiltrate every aspect of human life globally, its contribution becomes a subject of concern, especially when the problem or situation it is intended to help address is not solved as expected. The concern becomes even more critical to educationists when the problem or situation is in the education sector generally (Mac Callum, 2010) and in the provision of university education in particular (Odey, 2009).

In Uganda, ICT continues to be adopted for business and various other purposes, one of which is to serve as a management enhancement tool for ensuring that the country's vision of up to the year 2025 is effectively pursued in all sectors of the economy (Ministry of Works, Housing and Communications, 2003). In this vision, education is envisaged as a sector responsible for unlocking and developing the human capacity needed to accelerate Uganda's socio-economic, cultural, moral and technological transformation (Ministry of Education and Sports, 2012). Education is particularly expected to contribute the skilled capacity needed to realize Uganda's main aspirations, which include job creation, poverty alleviation, disease prevention, and improved quality of life (Ministry of Finance, Planning and Economic Development, 2012). It is therefore one of the social services in whose management ICT is being introduced (Ministry of Education and Sports, 2012; Farrell, 2007). Makerere University, where this study was conducted, is one of the educational institutions that have introduced ICT in the management of its educational services (Baryamureeba, 2010; Matovu, 2009).

ICT became an integral part of managing educational services at Makerere University in the early 2000s (Tusubira & Mulira, 2004). This was after the university had developed the 2000 ICT Policy and Master Plan whose main purpose was to increase ICT capacity and utilization within a university-wide-system and in so doing, improve and make the management of educational services effective in all faculties (Tusubira, 2005; Tusubira & Mulira, 2004). ICT was embraced to the extent that the university established the Faculty of Computer Science not only to ensure that the system was properly working but also offer ICT education as well (Baryamureeba, 2010).

Statement of the Problem

In Uganda today, the delivery of the designed programme content is largely manual and largely dependent on the physical labour of lecturers who continue to be overloaded and are ineffective because they do not complete their assigned workloads (Kasenene, 2012; Ndagire, 2011). Students are still discontented with the teaching and learning

process; they complain about absenteeism, unreliability and unresponsiveness of lecturers to their learning and research supervision needs (Nantagya, 2010; Nabwire, 2008; Abaasa, 2005; Neema-Abooki, 2004). Students continue to learn in squeezed environments both in lecture rooms and library facilities (Kasenene, 2012). This whole scenario casts doubt on the role of ICT in enhancing the effectiveness of educational services management particularly in student learning at Makerere University.

Objectives of the Study

The objectives of this study were as follows:

1. To explore how Makerere University has provided access to ICT and facilitated the management of educational services through its adoption;
2. To propose ways in which ICT can be used to improve educational services management at Makerere University.

Literature Review

A perusal of available literature suggests that the nature of ICT introduced and used in the management of educational services has been covered in a considerable number of studies (Baryamureeba, 2010; Mac Callum, 2010; Barreket, Scott & Payne, 2009; Aginam, 2006; Carlsson, 2006; Stead, Sharpe, Anderson, Cych & Philpott, 2006; Ashton, Beevers, Korabinsk & Youngson, 2005; Sharples, Taylor, & Vavoula, 2005; Akinsende, 2002; Eggleston, Jensen & Zeckhauser, 2002). While these studies explain the nature of ICT as used in the management of educational services and even though some of them discuss the extent of its use, they all fall short of analysing how it affects the effectiveness of this management at Makerere University. Notwithstanding this gap, which this study is actually seeking to address, some of these delineate the nature of ICT, thereby providing a number of indicators that can be used to establish the nature of ICT introduced in the management of educational services at Makerere University.

Specifically, the studies of Baryamureeba (2010), Aginam (2006), Curtain (2004) and Eggleston, Jensen and Zeckhauser (2002) indicate that the nature of this ICT refers to all forms of hardware and software tools and applications that electronically facilitate the creation, processing, storage, transmission, retrieval and utilization of information for purposes of educational services planning, delivery in terms of teaching and learning and control in terms of monitoring and evaluation. Newhouse, Trinidad and Clarkson (2000) defined ICT as all technologies used for the collection, storage, manipulation and communication of information. They also defined hardware tools as all tangible ICT components and software as electronic instruction files or applications that are used by ICT to complete tasks for a user. Barreket, Scott and Payne (2009) view this nature in terms of the capacity and cost efficiency of the ICT tools installed to manage educational services. 'Capacity' refers to how modern, relevant and adequate ICT tools available for use in educational services management are (Scott & Yates, 2007). While 'modern' refers to how up-to-date the tools are, 'relevance' refers to how appropriate the ICT tools are in facilitating the management of educational services as expected (Adepiju, 2008; Alexander, McKenzie, & Geissinger, 2008; Scott & Yates, 2007). ICT cost efficiency compares the cost incurred to install ICT tools to the budgeted cost. ICT is cost efficient when the cost incurred to install it is equal or less than the expected cost (Scott & Yates, 2008).

The studies cited so far describe the nature of ICT in terms of installed hardware and software tools, their cost efficiency, adequacy, modernity and appropriateness to management of educational services. The studies however, treat ICT in general terms, thereby falling short of specifying any installed ICT tools, particularly at Makerere University. There is therefore a gap on the nature of ICT installed at Makerere University. It is this gap which this study sought to fill. A number of studies have been conducted on the perceptions and experiences of diverse categories of ICT users which include teachers, lecturers and educational services managers on the effectiveness of ICT. A study of the available literature suggests that the perceptions and experience of ICT users concerning the implementation of ICT has been covered in a considerable number of studies (Deaney, Ruthven & Henness, 2003; Zahra, 2013; Buabeng-Andoh, 2012; Afshari, Abu Bakar, Su Luan, Afshari, Say Fooi, & Abu Samah, 2010; Nyambane & Nzuki, 2014; University of Kabianga, ICT Strategic Plan 2013-2018; E-Learning Nordic, 2006; Václav, Antonín, & Petra, 2011; Krishnaveni & Meenakumari, 2010; Mishra & Akman, 2010). While these studies explain the perceptions and experiences of effectiveness regarding ICT implementation in different educational and non-educational institutions, they all do not show how the educational services managers at Makerere University perceive and experience the effectiveness of ICT. A study by Deaney, Ruthven and Henness (2003) carried out in Britain focused on pupil perceptions on the contribution of Information and Communication

Technology to teaching and learning in the secondary school. The study showed that pupils valued ICT tools as enabling them to carry out academic tasks easily, rapidly and reliably, thus yielding results of high quality. The students however experienced situations where they were hampered in exploiting this potential because of lack of proficiency in using the tools.

In a different study conducted by Omenyi, Agu and Odimegwu (2007), it was found that on the average, teachers feel that ICT had helped them to increase their classroom efficiency. They also discovered in their study that teachers' perception of their increased job efficiency was associated with the level of ICT competence possessed by the teachers. This finding suggests that ICT is effective in providing educational delivery to students. According to BECTA (2007), leadership and management are significant factors in the extent to which policy becomes practice and developments in ICT become embedded into the life of the school and experiences of staff and students. BECTA (2007) further opines that within schools, networking has a number of potential benefits that include easier and more effective communication; central record keeping and monitoring; access to shared resources and information; and standardization across administration processes.

Hamdane, Khaldi and Bouzinab (2013) conducted research on the perception of the effectiveness of ICT implementation in the teaching of Mathematics in Morocco. The government through its Ministry of Education has invested heavily in the new technology. This shows how important it is in the management of educational services in the country. Another study conducted in South Korea by Song and Kang (2012) concentrated on evaluating the impacts of ICT use taking a multi-level analysis with hierarchical linear modelling. In this study, a number of variables were seen to affect the level and efficiency of ICT implementation in educational institutions; among them being the perceptions of the principals managing the educational institutions. In their study, Bassey, Okodoko and Akpanumoh (2009) posit that proper utilization of ICT by university management is crucial in Nigeria if they have to make a mark in their role of providing high level manpower.

Alharbi and Drew (2014) conducted a study on using the Technology Acceptance Model in understanding academics' behavioural intention to use Learning Management Systems in Saudi Arabian schools. They discuss how important the education service managers in this country consider ICT use as a vehicle for an effective and efficient teaching and learning tool, the low levels of the technology so far notwithstanding. In Saudi Arabia still, Althobeti (2013) dealt with the administration and integration of ICT in Saudi universities. His findings resonate with those of Alharbi and Drew (2014). Umeagukwu and Ngozi (2014) while discussing an analysis of ICT impact on the curricular of major Nigerian Universities in the last ten years 2003-2013, take a critical look at the emergence of ICT and its development stages in Nigerian universities. They further showcased the effect and impact of ICT on university curricular and exposed some challenges faced by educational services managers in the proper diffusion of ICT into Nigerian universities.

In Ghana, another study was conducted by Buabeng-Andoh (2012), who noted that to successfully initiate and implement educational technology in the school programme depends strongly on the teachers' support and attitudes. He pointed out that if teachers perceived technology programmes as neither fulfilling their own needs nor their students' needs, then it is likely that they will not integrate the technology into teaching and learning. Evidence suggests that teachers' attitudes and beliefs influence successful integration of ICT into teaching (Hew & Brush, 2007; Buabeng-Andoh, 2012). On the other hand, if teachers' attitudes are positive towards the use of educational technology or ICT for that matter, then they can easily provide useful insight on the adoption and integration of ICT into teaching and learning processes (Buabeng-Andoh, 2012).

A review of various studies suggests that educational services managers who take charge of the educational institutions at various levels perceive and experience the effectiveness regarding the implementation of ICT in different ways but the majority perceive and experience ICT as a tool that enhances their performance (Adeyemi, 2011; Daouk, 1995; Goyal, Purohit & Baghat, 2010; Oguta, Egessa & Mushiega, 2014; Oluoch & Osida, 2014; Sarkar, 2012; Giusy, 2007; Carnoy, 2004; Kyalo & Nzuki, 2014; Dix, 2007).

It should be noted that although these scholars identified various ways in which educational service managers perceive and experience the effectiveness regarding ICT, none of them focused on those used at Makerere University. Even scholars such as Matovu (2009) who focused on Makerere University did not make any attempt to identify the perceptions and experiences of educational managers regarding the effectiveness in ICT implementation at the university. He limited himself to ICT equipment used in the management of students' registration and examination records. The scholars, therefore, have left a gap that needs to be filled on the perceptions and experiences of educational managers regarding the effectiveness of ICT implementation specifically at Makerere University. There is therefore need to verify whether or not their discussion of the perceptions and experiences of educational services managers regarding effectiveness of ICT implementation apply to Makerere University.

Methodology

The researcher employed both quantitative and qualitative approaches and also adopted an exploratory research design. This type of research methodology permits methodological choices, rather than narrow and dogmatic preconceived approaches; and in so doing, enables researchers to overcome challenges of having to choose between quantitative and qualitative, as well as deductive and inductive techniques of research.

The study targeted a total of 57 respondents which included Heads of Department, Deans of Schools, Principals of Colleges and 8 officers of the University. However, only 42 respondents among the Heads of Department, Deans and Principals and 7 officers of the University could be reached.

The sample size was determined using Krejcie and Morgan's statistical table which is recommended by Amin (2005, p.454) and Sarantakos (2005). Amin (2005) indicates both the population size and the corresponding minimum sample size needed to achieve statistical representativeness and generalizability of findings. He further recommends at least 30 respondents to be a minimum for a sample of up to 1000 respondents. For survey research, at least 100 subjects should be selected in each major sub-group, 30-50 for correlational research, 10-30 for ex-post-facto or causal comparative and experimental research in each group to be compared (Amin, 2005). This means the sample size for this study was adequate.

For this inquiry, the researcher used open ended interviews to collect qualitative data. The data was collected in the form of first-hand views and perceptions that were told by ICT administrators about the nature of ICT hardware and software installed and its effect on the university. The participant responses to the interview questions were either written or digitally recorded. ICT administrators were at liberty to write or answer orally because by virtue of their jobs, they were literate enough to use any of the styles available. In case a selected ICT administrator, educational services manager or university manager preferred to answer orally, the responses were recorded by the researcher using the very copy of the interview schedule that the respondent would have filled in had they opted for writing.

Three interview schedules were used since they could accommodate both open and closed-ended questions, thereby enabling ICT administrators, the educational services managers and university managers to answer some of the questions freely. Documentary information was also used for gathering of data. The data was collected for purposes of corroborating primary data collected from respondents.

Discussion of Findings

Summary of Results (Quantitative Data)

The study aimed at establishing the following: the nature of ICT installed and accessed at Makerere University; the perceptions and experiences of educational services managers on the effectiveness regarding ICT implementation; the effect of ICT on management and student learning at Makerere University; and suggestions by stakeholders on how to make ICT as effective as expected by them at Makerere University.

Data collection was done by using questionnaires among 374 students and 323 lecturers, while 57 Key Informant Interviews were conducted among ICT administrators, education service managers and university managers. Students and lecturers were selected from six colleges of the university namely: College of Business and Management Sciences (CoBAMs), College of Engineering, Design, Art and Technology (CEDAT), College of Agricultural and Environmental Sciences (CoAES), Computing and Information Sciences (CoCIS), College of Education and External Studies (CEES), and College of Humanities and Social Sciences (CHUSS).

Data analysis was done using the Statistical Package for Social Sciences (SPSS) programme to produce descriptive statistics and factor analysis. Inferential statistics using Pearson Correlation Coefficient(r) and Multiple Linear regression model was used to establish the effects of ICT hardware and software on the effectiveness of managing educational services at Makerere University. Table 4.1 shows the effect of the hardware and software on managing educational services at the University. Results from descriptive statistics indicated that the white board (19.6%) was the most accessed and installed hardware across Makerere University campus in almost all lecture rooms.

Table 4.1: Hardware used in Managing Educational Services at Makerere University

Hardware used in managing educational services at Makerere University	Frequency	Percentage (%)
Desktop computer	53	16.5
Servers	30	9.30
Laptops	35	10.9
Projectors	32	10.0
Loudspeakers	45	14.0
Screens	25	7.80
Photocopiers	22	6.90
Printers	16	5.00
Whiteboards	63	19.6
Total	321	100.0

Source: Primary Data

Table 4.2 shows that most lecturers at Makerere University used Microsoft Access (19.0%) and Result Management System applications to manage educational services (15.3%).

Table 4.2: Applications to Manage Educational Services at Makerere University

Applications to manage educational services at Makerere University	Frequency	Percentage (%)
Academic Records Information System (ARIS)	16	5.00
Microsoft Access	61	19.0
Microsoft Excel	26	8.10
Microsoft Word	46	14.3
Internet	37	11.5
Result Management System	49	15.3
Online Registration System	19	5.90
Makerere University E-Learning Environment (MUELE)	39	12.1
Statistical Package for Social Sciences (SPSS)	19	5.90
EpiData	9	2.80
Total	321	100.0

Source: Primary Data

Field findings on the adequacy of ICT services indicated that respondents noted that library services were computerized and also that lecturers use e-mail to supervise students. The results on modernity of ICT tools indicated that most respondents agreed that students with PCs were enabled to access lecture notes. Some other findings indicated that lecturers were using e-mails to send lecture notes to students. Findings further indicated that students with PCs were enabled to access library services. Findings also supported the fact that students with mobile phones were enabled to use library services.

On the perceptions of Makerere University lecturers towards ICT access and utilization at Makerere University, results revealed that most of them (78.0%) agreed that ICT-based sources of information were in place and this enabled lecturers to access the content needed to be included in the curricula of the academic courses offered by Makerere University. Also, most lecturers (80.7%) believed that Makerere University had online facilities by which they could access the necessary curriculum updates. There was also a strong perception (71.5% of the lecturers) that Makerere University had internet facilities that support searching of relevant curriculum materials via the World Wide Web. Most lecturers (67.8%) also believed that Makerere University had online facilities to enable them network with other universities for purposes of internationalizing the curriculum content delivered to students. On the effects of ICT on Makerere University management, respondents indicated that ICT adoption contributed a lot to university management. For instance, it eased supervision of staff and students in the university. ICT reduced the cost of sending mails and also expanded quick linkages in coordinating university activities. Concerning the effect of ICT on student learning at Makerere University, it was found that students could use ICT to assist them in conducting research as well as accessing class notes. Students accessed coursework lecture notes from the lecturers through use of personal emails. Students also accessed internet using their smart phones. The university also used projectors and microphones to enhance student learning at the university.

Summary of Findings (Qualitative Data)

According to the study findings, the ICT tools provided by Makerere University were used for both teaching and management functions. It was found that a number of ICT tools have been adopted in different academic units of the university as follows: Sun Systems which are used in accounting; International Business Management (IBM) servers which are gadgets used in managing and computing intensive workloads and business applications; Hewlett Packard (HP) servers; Unix/Linux operating systems; Microsoft Windows Operating Systems; Makerere University E-Learning Environment (MUELE); Human Resource Information System (HURIS); Academic Records Information System (ARIS); Financial Information System (FIS); and Library Information System (LIBIS). In the College of Engineering, Design, Art and Technology (CEDAT), ICT tools were reported to have been incorporated in the teaching of courses. These included computers, projectors, switches, I-max printers, publisher, metrics, textonics, fibre optics, visual studio, python, MySQL, workbench, PHP and Adobe. On the ICT access to students for learning, it was found that Makerere University had stocked computer laboratories with modern computers and accessories to

assist the students in learning. The Makerere University bursar confirmed that the university had procured a number of computers for academic purposes and were to be distributed to the colleges. The university had also provided free wireless internet to all students with personal laptops. This enabled the students to access online educational materials. However, even students without laptops could use university installed computers to access academic materials.

According to the study findings, it was clear that ICT had improved management of educational services at the university in a number of ways. ICT had enabled teaching by helping students with no computer knowledge to understand the hardware and software. There were online open source integrated library services that enabled students to access notes. Students could also do their research, conduct online education, submit coursework and access information on various subjects because of ICT adoption. Technology advancement was reported in the School of Women and Gender Studies where the staff had gone to the extent of doing a You-Tube class. Despite all these gains, some respondents indicated that ICT had not improved teaching due to inadequate ICT infrastructure; for instance, in the School of Liberal and Performing Arts, the ICT Administrator reported a class of 120 students sharing only 20 computers in the laboratory.

On the perceptions of educational service managers on the effectiveness of ICT at Makerere University, it was found that there was effective ICT implementation at Makerere University because the university had embraced ICT policy due to its importance. There are many ways that ICT has been used effectively at Makerere University; for instance, Statistical Package for Social Sciences (SPSS); Epidata; Epi Info; and Stata programmes are used to analyse socio-economic data and write reports. According to the Head of Department in the School of Distance and Lifelong Learning, there was a positive perception that ICT had played a big role in the effectiveness of learning at Makerere University. It was however noted that there is still much more to be done to make it effective. The Dean, School of Education shared her perceptions on the ICT progress and indicated that the implementation of ICT has been successful in different colleges since the ICT facilities function independently. It was also noted that the staff had access to both wireless and Local Area Network in doing administrative and teaching work. The Dean, Margaret Trowel School of Industrial and Fine Arts noted how ICT had helped them to develop graphics to ease the art and design work instead of doing it manually. The Dean, School of Food Technology, Nutrition and Bio-Engineering observed that Makerere University had gone into ICT training in order to improve ICT implementation. For instance, it was made compulsory to teach computer techniques to all first year students. Besides, the Dean School of Computing and Information Sciences believed a milestone has been achieved, and courses had been developed to suit the current ICT needs. There was however no policy on online courses by Makerere University although it had been promoted.

The study findings revealed numerous experiences of respondents about the effectiveness of ICT implementation. For instance, the Principal of the College of Computing and Information Science (CoCIS) observed how ICT had helped in settling complaints among students as soon as possible in areas such as financial management aspects, updating of students results, tracking academic progress of students as well as printing of testimonials among others. There were also reports of class group e-mails being mandatory for all students to enable them have updates. The feedback provided to students online in some cases is timely because students and lecturers access free internet. Research supervision is done online to a large extent, meeting students under supervision done only when there is great need to do so, hence helping lecturers to cope with large numbers of students to supervise. In the College of Humanities and Social Sciences (CHUSS), a good number of lecturers had picked up the use of ICT in teaching and research. For instance, about 80 percent of the lecturers effectively used ICT for teaching by using PowerPoint which improved on teaching and research techniques. It was also reported that ICT had attracted sponsorship of projects to enhance its implementation; for instance, there is the Swedish Programme for ICT in Developing Regions (SPIDER) project. The Norwegian Agency for Development Cooperation (NORAD) also gave aid in terms of powered whiteboards stationed in different colleges of Makerere University.

However, it was found that some of the students could not cope with the latest technological innovations since most of them had not been exposed to ICT before. The Head of Department, Economic Theory and Analysis expressed his experience that some lecturers were still using old pedagogy; for instance, giving handouts to students. Additionally, only a small proportion of the university staff had attained training in modern ICT pedagogy locally, particularly in the use of PowerPoint and demonstrations while teaching.

Findings from the university managers revealed that ICT was very important in planning for the university. It particularly helps the university to keep up with other universities of the world through adoption of best practices. The Deputy Vice Chancellor in charge of Finance and Administration noted that ICT gadgets like telephones are used in communication with staff to plan for activities such as meetings with within the colleges, bursar's office or even the university secretary. It was also noted that university staff benefit from tools used for planning financial

and administrative affairs. The university librarian underscored the role of ICT in accessing library records in all college libraries as well as in the main library. ICT gave information on books that were in short supply and even assisted in following trends in libraries of other universities in the world.

The university secretary reported that ICT was used to photocopy, print and scan important documents; for instance, the strategic plan of the university. ICT is useful in making estimates, calculations, and tabulating information in programming activities for the department like information on employees' leave. The Dean of Students uses ICT to draw programmes for student activities in a semester in view of the amount of money on the student guild account. Similarly, ICT helps to determine the number of students to be accommodated in the male and female halls of residence. This is very useful when planning for bed spaces, beds, meals, and sanitary facilities. ICT has assisted the university management in organizing functions of the university in a number of ways. This has ensured speedy management of information and its reliable storage; for instance, through Financial Information System (FINIS) and Human Resource Information System (HURIS). It was indicated by the university bursar that the university had procured a module from South Africa that is being used for management of financial records and in managing student financial information, asset management and payroll management and it uses packages like PEOPLE MANAGER. ICT was therefore found to be very useful in processing, storing and disseminating information at the university.

On ICT contribution to university supervision function, the study findings indicated that using the staff database, ICT was very instrumental in establishing who was doing what, at what time and where. This enabled communication. It assisted the university secretary to get information regarding human resource matters at the colleges and staff issues at the different colleges thus ensuring accountability. The package called SAGE PASTEL makes supervision in Finance very easy because one can use it to detect who is responsible for a mistake in any transaction. SAGE PASTEL also assists in telling the number of transactions executed in a day. The university librarian observed that ICT enabled easy access to information on library affairs from different university college libraries. It also facilitated library staff to network and share their experiences with each other.

From the findings, it was established that ICT was very key in giving direction to Makerere University; for instance, 42 policies were made and passed by the university through the help of ICT. Besides students getting information on their academic status and other relevant information coming from university management, it was noted that policies also provide direction to the university. This was revealed by the Deputy Vice Chancellor in charge of Finance and Administration. The university bursar noted the fact that ICT enables division of labour in activities like posting receipts, posting expenditure, and reconciliation through Financial Information System (FINIS). Findings from the university bursar further indicated that ICT had helped in coordinating all the staff in the bursar's office through use of internet as well as linking up with other university units like the Dean of student's office and the university secretary office. The university secretary being at the centre of coordinating university activities was benefiting much more than anyone else from ICT in terms of coordinating his daily work. This was made possible through usage of intranet among the staff.

ICT contribution to university budgeting function was very significant. For instance, findings indicated that a university manager like the university librarian was aware of the importance of ICT in budgeting. For instance, she indicated that computer aided budgets are used to develop spreadsheets for budgeting purposes. It was found that the university uses bottom-up system of budgeting where departments or colleges are asked to put together their budgets and send to the bursar's office using ICT. Besides, ICT helps in using the budget frame to fit into the Uganda government financial limits.

Conclusions and Recommendations

The major conclusions drawn from the study were based on the two study objectives as follows: Makerere University has installed and provided access to ICT tools that are important in the management of educational services; ICT has improved the University Management and Student Learning at Makerere University to a large extent. It was concluded that the stakeholders do not feel that the implementation of ICT at Makerere University is as effective as it should be. This means that there is a lot of room for improvement in the implementation of ICT at the university.

From the study results, the researchers recommend the following in the order of research objectives: There is need for investment in more ICT infrastructure at Makerere University; The university should have an annual budget to purchase more ICT tools, for instance, projectors, computers and other accessories; There is need to get new computers after every 4 years and also increase the security in the computer laboratories to prevent computer parts from being stolen; There is also need to carry out more training on how to use ICT tools at all levels, that is for

staff, students and ICT technical staff. This will equip them on how to use the ICT tools in delivery of their lectures thus contributing to effective learning. There is also need for training students on how to use computers and other ICT technologies better. Makerere university management should lobby for donations, more funding and encourage proposal writing so that money can be secured for development of ICT. Makerere University still has a long way to go to improve the implementation of ICT through many avenues such as buying a standby generator since the university frequently experiences load shedding, increasing on the bandwidth, building more computer laboratories and expanding existing ones, and also providing laptops to both lecturers and administrators.

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