THE INCORPORATION OF LIBRARY AND E-LEARNING SYSTEMS: THE CASE OF SELECTED UNIVERSITIES IN UGANDA

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Abstract

The present study examined how library and e-learning services can be integrated together for improving teaching and learning in selected higher learning institutions in Uganda. Specifically the study identified electronic technologies and applications used for providing library services; investigated how library applications and processes enhance access to contents for e-learning; determined library services incorporated in e-learning; determined how higher learning institutes in Uganda support e-learning and; recommended on how library and e-learning services can be better integrated for improving teaching and learning. The study employed qualitative research approaches in determining how to integrate library and e-learning services, it involved three Universities namely: Cavendish University Uganda, Metropolitan International University and Victoria University Uganda. Data was collected through web analysis, in-depth interviews and documentary reviews. Library officers, librarians, Information Communication Technology directors/ technicians were involved in in-depth interviews. It is recommended that libraries should subscribe more e-resources and make them accessible through the e-learning platform; universities should have strategies to improve the Information and Communication Technology (ICT) infrastructure from time to time depending on the demand and the increasing enrollment rates.

Keywords: E-learning, library services, higher learning institutes, online services, learning management systems, ICT.

Introduction

Improvement in Information and Communication Technologies (ICTS) has fetched new techniques for teaching and learning. ICTs have brought about electronic techniques. This is the electronic learning (e-learning). The definition and practices of e-learning focuses on the intersection of education, teaching, and learning with ICTs (Friesen, 2009). E-learning is all forms of electronic supported learning and teaching, which are procedural in character and aim to effect the construction of knowledge with reference to individual experience, practice and knowledge of the learner (Garrison, 2011; Tavangarian et al., 2014). E-learning employs applications and processes that rely on some type of computer technology to promote learning (Bell and Federman, 2013; Ruiz et al., 2016). Under the e-learning environment, the learning content is available online.

E-learning uses web and/or computer based learning, virtual classrooms and digital collaborations (Bencheva, 2010). The basic e-learning components include content delivery in multiple formats, management of the learning experience, a networked community of learners, and content developers and experts (Titthasiri, 2013). E-Learning uses the power of networks, not only the internet but also satellite, and digital content to enable learning (Titthasiri, 2013 Bencheva; 2010). For effective e-learning there must be a self-paced training, many virtual events, mentoring, simulation, collaboration, assessment, competency road map, authoring tools, e-store, and learning management system (Titthasiri, 2013).

There are two category of e-learning: asynchronous or self-paced, and synchronous or instructor-led, the degree of interactivity, sophistication and expense is different in each of the types (Manochehr, 2016). Asynchronous e-learning is facilitated by media such as e-mail and discussion boards, supports work relations among learners and with teachers, even when participants cannot be online at the same time (Hrastinsk, 2018). On the other hand, synchronous e-learning, commonly supported by media such as videoconferencing and chat, learners and teachers experience; synchronous e-learning is more social and avoid frustration by asking and answering questions in real time (Hrastinsk, 2018). Synchronous e-learning has a great potential of increasing

individual participation and group collaboration because it facilitates spontaneous feedback, meaningful interactions, multiple perspectives, and instructors' supports (Park and Bonk, 2017). An effective e-learning platform should enhance three types of interaction in learning: learner–instructor, learner–learner, and learner–content (Bloom 1981). Learner–instructor interaction is a major factor accounting for cognitive learning; learner–learner interaction fosters collaborative learning; while learner-content interaction is important for knowledge transfer and internalization during the learning process (Bloom 1981).

Learning management system is the traditional approach to e-learning, learning in learning management systems is organized as courses (Du et al., 2012). With technological advancements current e-learning systems are more interactive. An e-learning system consists of tools used for teaching and learning which integrate a variety of functions (Pituch and Lee, 2004). Both instructional materials, e-mail, live chat sessions, online discussions, forums, quizzes and assignments, and the World Wide Web (Pituch and Lee, 2004). This makes the systems suitable for both synchronous and asynchronous learning thus accommodating both in-campus and off-campus learners. These systems use multimedia technologies and the internet to improve the quality of learning by facilitating access to resources and services as well as remote exchange and collaborations (Alkhattabi et al., 2010). Multimedia technologies are important for distributing audio, video, graphics and text contents needed by learners.

To facilitate both synchronous and asynchronous learning, e-learning systems must be developed as distributed applications with software and hardware components (Pocatilu et al., 2019). The systems must have well developed infrastructure, platforms and software. The infrastructure is made up the hardware while the platform and software are sets of instructions developed to enhance teaching and learning. An effective e-learning system must use appropriate technologies in distributing learning materials, have good quality of contents to meet the needs of learners; and facilitates interactions among learners (Alkhattabi et al., 2010). E-learning systems should facilitate collaborations and create environment of social presence of instructors and co-learners.

E-learning have several benefits over traditional learning approaches. E-Learning liberates interactions between learners and instructors, or learners and learners, from limitations of time and space (Sun et al., 2017). It increases independency among learners and reduces operation cost of both learners and learning institutions. E-learning accommodates learners who due to time and geographical limitations cannot attend traditional classes. Kruse (2002) describes that with e-learning the learning times are reduced; completion and certification easily documented; the level of interactivity is increased and; confidence among learners increases too.

Applying e-learning in developing countries face several challenges. According to Sife et al. (2007), installing e-learning systems is very expensive and requires dedications in terms of funds, time and skill development. Andersson and Grönlund (2009) categorize challenges facing e-learning into four groups: course challenges, challenges related to characteristics of the individual, technological challenges, and contextual challenges. Course challenges are related to the content of the course, the activities taking place during the course, the support functions provided, and the course delivery mode. Individual characteristics relate to skills, level of independency, and related traits influencing learning. Technological challenges in e-learning are related to technological requirements (Andersson and Grönlund, 2009). Technological requirements are related to both hardware and software; technological requirements may be related to costs for their acquisition and maintenance (Marengo and Marengo, 2005). Technological requirements may also be related to issues of security, technological interoperability, scalability, flexibility, supportability, manageability, performance and usability (Palanivel and Kuppuswami, 2014).

Libraries play a vital role in teaching and learning through acting as access points for contents needed for teaching and learning processes. This has been possible through integrating library resources and services, learning, teaching and research (Sen, 2019). Many libraries are hybrids, providing virtual access to electronic resources and services, while maintaining and supporting use of a physical collection housed in a library building (Anderson, 2018). This is due to the fact that learners come in contact with the different learning opportunities that can be supported by the

different types of libraries (Gunn, 2012). Furthermore, physical libraries are sometimes closed that users can not have access reading materials. Virtual libraries are accessed twenty-four hour and seven days a week, learners can have access to online libraries and information resources including library catalogues and full-text electronic journals and books. In addition, online libraries can be accessed from a distance. This makes online libraries more convenient for e-learning. Thus, libraries are important in making e-learning efficient because they are sources of contents needed for learning. Learner–content interaction involves any interactive activities between the learner and instructional content or libraries in an online learning environment (Bloom 1981). For this to happen, there must be a strong link between libraries (e-libraries in particular) and e-learning systems. The current study was set to investigate how library and e-learning services are be integrated together thus improving teaching and learning in higher learning institutes in Uganda. Specifically the study identified electronic technologies and applications used for providing library services; determined library services incorporated in e-learning; investigated how library applications and processes enhance access to contents for e-learning; determined how higher learning institutes in Uganda support e-learning and; recommended on how library and e-learning services can increase the efficiency of e-learning systems.

Libraries host collections of knowledge base learners, researchers and instructions need for their academic purposes. This knowledge base builds on a variety of resources such as documents, websites, experts, communities, tools and events (Chandra and Patkar, 2017). Learners usually interact with libraries for accessing knowledge. Thus, libraries are enablers of the learning process.

Advancements of ICTs have brought about another opportunity for libraries to provide services and reach more potential users. The use of ICTs in libraries has not only provided more services to traditional students, it has also enabled remote learners to benefit from services previously offered through traditional libraries. Moreover, ICTs have revolutionized not only the way information is packaged, processed, stored, and disseminated, but also how users seek and access information (Anunobi and Okoye, 2008).

There are various ICT applications delivered in libraries. Scholars (Ghuloum and Ahmed, 2011; Afolabi, and Abidoye, 2011) mention the wide-area network applications, local area networks, online information services (the Internet), online databases, library databases, CD-ROMs, online access catalogues, retrieval networks, digital online archives, mainframe computers, microcomputer labs, and other digital content services to be the major applications delivered in libraries. Some others include video conferencing, electronic mails, networks and expert systems and DVD-ROMs (Mishra and Mishra, 2014). When users consult these applications they may have access to a range of resources and services including: bibliographic databases, e-books, e-journals and the Online Public Access Catalogue (OPAC). Some libraries have managed to have thesis and dissertation electronic databases. In most cases these are locally generated resources which are important for research and learning purposes.

For enhancing usage of e-resources, most academic libraries have set up information literacy programmes. Information literacy (IL) is the set of abilities requiring individuals to recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information (Association of College and Research Libraries, 2010). To be information literate you must know "when and why you need information, where to find it, and how to evaluate, use and communicate it in an ethical manner (ALIA, 2016). Libraries have information literacy experts who know how information from different sources can be accessed. Through information literacy, library users may use limited efforts to access the needed information resources.

Off campus library users access e-resources remotely through the internet (Association of College and Research Libraries, 2000). Remote access to resources has become increasingly important in academic libraries, spurred largely by the growth of online education (Tobin, 2004). Like traditional library users, off campus users need information literacy skills that they may be able to access e-resources from libraries. Off campus or remote users are either distant or local, but not in-person use of library services, they may have access to library services through mediating technologies (Middleton, 2016). Most libraries have information literacy

instruction and reference assistance to remote users. (Middleton, 2016). In most cases, information literacy instructions are found in the library webpages, users may simply go through the instructions before accessing information. Tobin (2006) mentions that remote users need to be information literate that they may access information efficiently and effectively; they may evaluate information critically and competently; and they may use information more accurately and creatively. Moreover, information literate users are independent learners and contribute greatly to knowledge generation and learning community.

Generally, for effective usage of e-resources library users need to be ICT and information literate. Under e-learning environment, literacy makes learners more proficient ad independent. Through ICT and information literacy learners may be able to access and use relevant information and accomplish tasks on time.

Tertiary institutions in Uganda have coped to install the basic ICT infrastructure for delivery of information resources for supporting teaching and learning. According to Kyewaryanga Wahabu (2019), most Universities in Uganda have dedicated computer centres, e-library, education and research networking and e-learning as a strategy to increase access. Like in other countries, ICTs play an enabling role of enhancing achieving the core functions of Universities in Uganda which are teaching, learning, research and consultancy. Students from higher learning in Uganda are motivated to acquire their own laptop computers they may use while in and out of University campuses. A study conducted by NITA Uganda (2018) showed that the level of ownership of laptop computers is increasing in the country particularly among bachelor students who are partaking ICT Courses. With the fast growing internet infrastructure in most urban areas where higher learning institutes are, it is possible for students to access to online contents from various sources. Tertiary institution libraries in Uganda manage both print and electronic resources. With basic ICT facilities most libraries in Uganda have, it has been possible to automate most of the library services in most academic libraries (Emmanuel and Sife, 2018). Automation has enabled library users to have access to Online Public Access Catalogues (OPAC) which increase the visibility of print resources (Sife, 2013). With OPAC users

may know what is in libraries before they pay a physical visit. Moreover, most academic libraries subscribe electronic resources (e-resources) through the Consortium of Uganda University Libraries (CUUL, EIFL) and Research Libraries (Mtega et al. 2013). According to Angello and Wema (2010), e-journals, CR-ROMs, digital libraries, gateways and e-books are among the electronic services provided by libraries. However, despite employing all these strategies the demand for ICT related services among learners and instructors in Uganda has been growing at a fast rate (Chatama, 2014).

For efficient learning there should be a burly link between learning platform and library services. Masoumi (2006) mentions availability of technological infrastructure, library resources, and literacy (technology and information literacy) among learners to influence learning through e-learning systems. Technological infrastructure is also known as the ICT infrastructure which is made up of software and hardware. Andersson (2012) describes about the access issues which include access to ICT infrastructure and the quality of connectivity needed for supporting e-learning.

This study was directed by the model shown in Figure 1 which indicates the role played by electronic library (e-library) in facilitating effective e-learning in an academic institution setting. ICT infrastructure is important for linking library and e-learning systems, the infrastructure links learners and instructors together. Institutional support is important for making the whole system work (for library to provide it information services and for the e-learning system to facilitate the learning goal). The model guided in identifying e-library services in terms of types, relevancy and accessibility through e-learning platforms. model also guided the study in determining applications/tools used to provide e-library services. The model also guided the study in determining the type of support higher learning institutions provide to support both e-library and e-learning system.
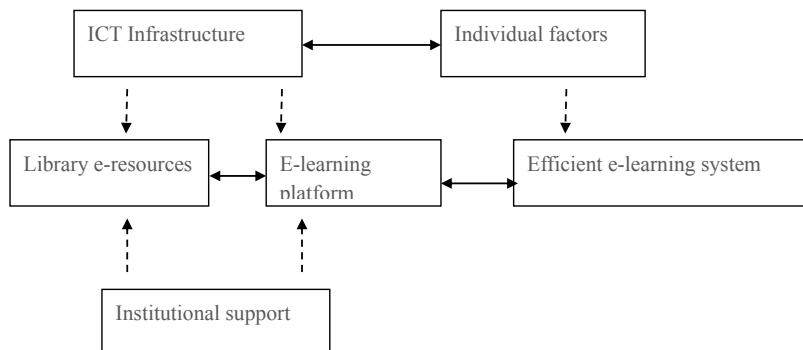
Figure 1: Positioning electronic library services in e-learning systems

For efficient e-learning, it is vital to have an e-learning system that meets all system requirements. The system should have appropriate course contents and be supported by a library from which learners can access reading materials. Users should be imparted with necessary skills for using the system, these skills include computer and information literacy. Literate learners are independent and confidently use e-learning platforms.

Methodology

The study employed qualitative research approaches in studying how to incorporate library and e-learning services. The study was conducted in three Private Universities which were randomly selected. The Private Universities selected for the study were: Cavendish University Uganda, Metropolitan International University and Victoria University Uganda. Data were collected through web analysis, documentary reviews and in-depth interviews through key informants. Library Officer, librarians, ICT personnel involved in managing e-learning systems were purposely selected for in-depth interviews. Collected data was analyzed through content analysis. Tables, figures and descriptions were used for presenting findings of the study.

Results and Discussions
ICT infrastructure in selected higher learning institutions
Findings point out that all of Private Universities had basic ICT

infrastructure need for e-learning and provision of e-library services. It was found that all Private Universities provided internet services to students and staff especially during Covid – 19 Pandemic. It was found that each of the three Universities had both wired and wireless connections for provision of internet services. Wireless Internet connectivity was accessible around lecture rooms, auditorium and offices within each of the three Universities, while Victoria University Uganda had provided internet access to all staffs and students using their Airtel line too. This helped staff and students access internet services within and outside computer laboratories. Moreover, it was found that all these three private Universities had internet speed exceeding 15 MBS. Users could access internet services through wireless connection where APs were used as access points or through wired connection from computer laboratories.

Findings show that each University had an ICT/computer Manager with a key responsibility of providing ICT services and managing the ICT infrastructure. The ICT managers were responsible with managing computer laboratories, it was found that each university had several computer laboratories. Cavendish University Uganda had 250 computers in its computer laboratories while the other two Polytechnics had less than 150 computers. The ICT managers were also responsible with managing the University websites and e-learning systems. However, none of the three universities had e-learning infrastructure which could support synchronous learning.

E-library services provided by the selected higher learning institutions

Findings indicate that each of the three Universities had a hybrid library. The Universities libraries involved were Cavendish University Uganda, Metropolitan International University and Victoria University Uganda. Findings indicate that all three libraries had basic ICT infrastructure needed for provision of library services (Table 1).

Table 1 Online and offline resources in some tertiary institutions

University Library	Online Resources	Offline Resources
Cavendish University Uganda	e-journals, e-books, databases.	databases, CD/DVD ROMs
Metropolitan International University	e-journals, e-books.	CD/DVD ROMs
Victoria University Uganda	e-journals, e-books, databases.	CD/DVD ROMs, databases.

Findings indicate that most subscriptions of e-resources were made through the Consortium of Uganda University Libraries (CUUL) Mostly, the subscriptions made included e-journals and e-books. However, libraries databases and CD/DVD ROMs were subscribed too by using MYLOFT. Subscriptions made related much to core disciplines of Universities

It was found that each library had a website that incorporated Web 2.0 tools, most of them had Facebook, Twitter which were used for alerting users and developing user community. Moreover, Web 2.0 tools were used for communicating between students and library staff. They also provided a forum for discussion and for publicizing library events through MyLoFT. Library websites were used for enhancing access to library resources. Online Public Access Catalogues (OPACs) were accessed through library websites. Moreover, for Victoria University Library has login interface was also linked to the Victoria University websites. Library had links e-books and e-journal subscribed. Furthermore, for increasing the usage of e- resources, libraries were providing information literacy training. Information literacy trainings were either provided through face to face, online tutorials, or through information literacy guides posted on library websites.

Delivery of e-resources in the selected university libraries

Selected libraries served students, lecturers, and researchers who were broadly categorized into in-campus and remote users. It was mentioned that most in-campus users paid physical visits to libraries for accessing

e-resources. However, they could access some of the e-resources through visiting library websites. Remote users (researchers and students who for one reason or the other were not on the campus) had to access e-library services remotely.

Table 2: Number of computers installed in library computer laboratories

University library	Number of Computers
Cavendish University Uganda	38
Metropolitan International University	28
Victoria University	30

Findings indicate that in-campus users accessed e-resources through wired and wireless internet connections within university campuses (Table 2). In-campus library users could access e-resources from library computer laboratories. Each library installed several computers in computer laboratories for its in-campus users (Table 2). In-campus users could easily access e-resources repackaged in CD/DVD-ROMs while in library computer laboratories.

Libraries provided access to subscribed e-resources to users. Libraries authenticated access to e-resources among users through Internet Protocol (IP) address and through username and passwords. However, most publishers have been provided access to e-resources through IP authentication (Punchihewa et al, 2013). This kind of access has created many problems to the users especially for users who do not visit the Polytechnic regularly as many users need to access e-resources from anywhere, anytime (Punchihewa et al, 2013).

Librarians involved in the study mentioned that it has been difficulty for them to enhance access to subscribed e-resources to remote users. It was found that Cavendish and Victoria University library had managed to install proxy servers for remote users. This helped remote users access subscribed e-resources which were authenticated. However, remote users could only access online resources, they could not have access to CD/DVD ROMs and resources accessed through local area networks.

It was found that libraries subscribed e-resources from many publishers at a time. To simplify accessing resources from all those publishers several

strategies have been adopted aiming at enhancing a single sign-on to access web resources. It was found that Victoria University library used blade server central database to access web resources.

Services accessed through e-learning platforms

It was found that various learning materials were found in the e-learning platforms. At Victoria University the e-learning platform had learning materials, most of which were those uploaded by lecturers. There were some lecture notes and search interface. The Victoria University e-learning system was part of the integrated Students' Information System. The system incorporated the registration, payment of school fees, accommodation, billing, e-learning and the timetable sub systems. It was a newly introduced system called Vclass and for this reason some of the VCLASS' sub-systems including the e-learning were still at initial stages of being adopted.

At Victoria University, the e-learning platform had a lot of services and contents. The platform has some lecture notes for every course, PowerPoint presentations for most courses, assignments, and online tests. The platform here had important links including site blogs, MyLoft Login for library, Library catalogue, E-resources, and reading materials for Health students. The platform had several interactive features which were used for enhancing interactions among the learners and between the instructor and the learner.

The Metropolitan International University e-Learning Platform had several services accessed on the e-learning platform. The platform had study materials developed by instructors. It had links to courseware and university website. Metropolitan International University e-learning system was also part of the Students' information System, the e-learning system had links to other systems including the Students' Academic Register Information System.

For accessing the e-learning system users had to log in using a username and password. This applied when learners where in campus or off campus. Each of the university's e-learning system required users' authentications.

University e-learning system allowed users to login as guests with which learners could only have access to few features.

Challenges in implementing e-learning systems

It was found that the implementation of e-learning strategies faced several challenges. There were some challenges which were common to all institutions. These challenges included unreliable power supply and low bandwidth. Power supply was not reliable; this resulted into irregular accessibility of internet services. Low bandwidth limited the accessibility of some internet based services. It was found that some lecturers did not have all required skills of developing online content. It was also found that the ICT infrastructure of most of these institutions was not adequate; wired and wireless connections were only in some parts of the university campuses. In addition, the number of computers and projectors in the computer lecture rooms and laboratories did not match with the specifications of handling the learning online. Furthermore, the number of e-journals and databases subscribed by selected Universities was still low. On the other hand librarians involved in the study mentioned that the level of usage of e-resources was still low. Libraries have to set up strategies for increasing usage of e-resources in their institutions.

Victoria University had adequate teaching staff for basic ICT courses; however, the Computer and Information Technology curriculum did not have e-learning related topics in it. It was in this case the number of e-learning platform visitors was very low which indicated that the level of usage of the system was low too. At Metropolitan International University, the e-resources are not linked to the e-learning system. This made it difficult for users to use e-resources. Moreover, due to the nature of institution, it was difficult to conduct e-literacy training at the University; this was because learners and instructors rarely met for face to face. This had a negative impact on the effectiveness of e-learning systems.

Generally, the efficiency of e-learning systems to teaching and learning was influenced by both individual and institutional factors. Universities have to set up strategies for limiting the influence of these challenges. Universities should set up enough funds for developing the ICT infrastructure needed for e-learning; libraries on the other hand should

make sure that e-resources are easily accessible through the e-learning platform.

Conclusion and recommendations

The current study investigated how library and e-learning services can be integrated together thus improving teaching and learning. Each University involved in the study had the basic ICT infrastructure for e-library services and e-learning. Despite this infrastructure, the level of integration of the two systems was still at initial stages. The developed ICT infrastructure supported only asynchronous e-learning. Victoria University was a better position followed by Cavendish University. There were several library applications and services found in the library websites but very few of them were incorporated in the e-learning platform or were not oriented well in the universities websites. Cavendish and Victoria University which provide distance programmes must set strategies of meeting most learners through e-learning; their university library can include e-literacy guidelines which may help learners easily access e-resources motely. Libraries should subscribe to more e-resources and make them accessible through the e-learning platform; Universities should have strategies to improve the ICT infrastructure from time to time depending on the demand and the increasing enrolment rates.

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