



# Use of information communication technologies in education and training of undergraduate library and information science students in two selected Kenyan universities

Use of ICTs  
in education  
and training

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## Abstract

**Purpose** – The paper aims to establish the use of information and communications technologies (ICTs) in education and training of undergraduate library and information science (LIS) students in two selected Kenyan universities and suggest recommendations to improve ICT education and training in the country.

**Design/methodology/approach** – The study utilised a qualitative method. A survey research design was used to collect data from various categories of respondents in LIS including lecturers, undergraduate students, information professionals and employers. Interviews and document analysis were also used to collect data from the respondents.

**Findings** – Findings show that the graduates lack preferred ICTs knowledge, competencies and skills important in the modern information environment such as web technologies, information programming skills, software development, distributed systems, virtual libraries and digital information systems. Information sciences education in Kenyan universities and other institutions of higher learning need to review the curriculum and provide ICT education and training that address the needs and demands of the current job market and performance requirements.

**Research limitations/implications** – The study was effectively carried out at Kenyatta and Moi Universities being the leading universities offering LIS programmes in Kenya.

**Practical implications** – In the twenty-first century and beyond, students can no longer be confined to traditional practices of LIS education. Information sciences programmes from around the global have recognized the importance to fully integrate ICTs education and training in order to meet the needs and demands of students and employers.

**Originality/value** – Present employment and career opportunities favour information professionals with intensive technological competencies and skills.

**Keywords** LIS education, Kenya, ICT competencies and skills,  
Information communication technology education and training, Information sciences education,  
Undergraduate LIS students

**Paper type** Research paper



### **Introduction and background information**

In the knowledge-based economy of the twenty-first century, information and communications technology (ICT) is one of the emerging factors with great and growing influence in society, organisations and institutions. Developments in ICTs have affected all fields of knowledge including library and information science (LIS) (Babu *et al.*, 2007). This trend is evident in institutions of higher learning (IHL) where universities seem to be advocating, embracing and integrating ICT education and training at all levels of knowledge and learning. In the modern information environment, ICT revolution is the backbone of quality delivery of information services (Minishi-Majanja, 2007; Ocholla and Bothman, 2007; Ocholla, 2005). Training programmes at all levels are re-inventing themselves and developing new innovative curricula to educate and train information professionals with knowledge and skills to manage and handle information in various sectors, and to use modern ICTs (Kavulya, 2007; Juznic and Badovinac, 2005). The changes are evident and the effects are being felt in the information environment due to societal needs, new career opportunities and labour market.

In addition, ICTs have become central to the education and training of LIS students, due to job performance requirements and pressure to balance between the core objects of the information profession in attracting new topics (Kavulya, 2007). There are significant patterns of change because ICTs are an impetus for change in traditional concepts of teaching and learning, as well as a prime motivation behind the change in scholarly and professional activities in higher education (Minishi-Majanja, 2007). Recent studies have highlighted emerging factors that are directly linked to ICTs and are critical to the education and training of undergraduate LIS students, such as: knowledge society, technology revolution, modern information environment and megatrends (globalisation and global competition) (Abuhmaid, 2008; Amiree and Khabbazan, 2009; Hedman, 2005; Mahmood and Muhammad, 2007; Pugh, 2007).

In the recent past, the modern technological revolution has led to the development of the digital information environment, virtual libraries, library 2.0, web 2.0 technologies, new communication media, evolving technologies and social networking systems. This has led to new practices of managing, handling and supporting information and knowledge, consequently affecting the roles and responsibilities of information professionals in general, and the education and training of undergraduate students in universities in particular. There are strong indications that the changing information environment and modern technological developments have occasioned the need for LIS education that is rich in terms of ICT knowledge, competencies and skills. As the present and future generations of information professionals, traditional keepers and providers of published and digital or electronic information, it would not be reasonable to assume that undergraduate LIS students are competently educated and trained to work in intensive ICT knowledge environment. Of critical concern is the relevance of ICT education and training for undergraduate LIS programmes in relation to modern knowledge management practices. Against these developments, a study to establish ICT competencies and skills required for the education and training of undergraduate LIS students in the Kenyan context is extremely important. The current ICT education and training practices in the profession must match modern information requirements.

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### Statement of the problem

ICT education and training is critical in LIS programmes due to rapid changes in the information environment, technology revolution, media landscape, labour market requirements, Millennium Development Goals and Government Vision 2030. Modern library and information services exist in highly dynamic environments. As a result, employment opportunities favour information professionals with relevant ICT knowledge, competencies and skills. Recently, there has been a paradigm shift in LIS education, marked by technological innovations such as: library 2.0, web 2.0, social networking, virtual libraries, digital services and digital information systems, which have created a need for re-assessment of LIS education. Particularly, there is a need to provide adequate ICT knowledge and skills to enable LIS graduates to work effectively and efficiently in various LIS sectors.

The majority of the systems librarians in library and information centres in Kenya and elsewhere are graduates in either information technology or computer science. Admittedly, from these developments, it becomes crucial to examine the potential of LIS education in producing competent information professionals with knowledge and skills to use modern ICTs in information work and activities. This study sought to ascertain the extent to which the universities in Kenya are proactively involved in producing competent undergraduate LIS professionals with knowledge, competencies and skills to use ICTs. Specifically, the study analysed current trends in ICT education and training for undergraduate LIS students in two selected Kenyan universities. The study also examined the extent to which these ICT courses produce quality professionals in relation to market needs and performance requirements.

### Literature review

#### *Development and trend of ICT education and training*

Globally, there has been debate on the relevance of ICT courses in the field of LIS education. In the present competitive job market, ICT courses are critical for the education and training of information professionals. Recent studies in North America, Europe, Asia, India, Australia and Africa have been carried out and reported various trends affecting ICT education and training for LIS programmes. In the United States of America (USA), LIS programmes in universities have aligned their curricula to the current academisation environment more than to emergent web 2.0 technologies (Sultan, 2011; Hanson-Baldauf and Hassell, 2009). Hedman (2005) observed that implementation of ICT was identified as one of the central themes emerging in the study of librarianship in Scandinavia since the lack of ICTs was widely emphasised as a major factor inhibiting education and training of library and information professionals. As a result, changes in the LIS curriculum called for a deep understanding of the social dynamics of libraries and librarians. In India and many developing countries, LIS teaching schools and departments lack adequate technological infrastructure needed to support the integration of ICT into the curricula (Kamila, 2008). In Kuwait, LIS in higher education is concentrating more on traditional and outdated teaching methods, ignoring the ICT component (Buarki *et al.*, 2009). In addition, Rehman and Al-Awadhi (2011) indicated that the lack of ICT competencies for LIS students was the single biggest major concern for Kuwait employers.

There is a lot of information on the development and current state of ICT education and training for undergraduate LIS students in Africa. Recent studies on trends in LIS

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education in the Eastern, Central and Southern African regions have identified the integration of appropriate ICT programmes as important in the education and training of information professionals in general and undergraduate students in particular. In Sub-Saharan Africa, Minishi-Majanja (2007) noted that the majority of LIS teaching schools and departments are incorporating new modules to cover ICT in LIS courses. Of all the countries in Africa, South Africa is ahead of the other countries in terms of LIS education and training. Universities in South Africa are also a step ahead in integrating ICT courses into LIS education as characterised in the curriculum (UNISA, 2007).

#### *Modern information landscape*

In the digital age, rapid advances in modern technological solutions such as: web technologies, internet and the World Wide Web (WWW) have enhanced information and knowledge use, access, exchange and distribution. In the last two decades, rapid technological developments have transformed library and information services all over the world, with a recent innovation being web technologies, second generations of the WWW that have had significant impact on higher education (Arif and Mahmood, 2012). Information professionals need to keep on top of technology issues that directly affect the exchange and distribution of information and knowledge (Broady-Preston, 2009). A review of LIS curricula in response to the changing information environment in the USA indicates that LIS schools have done little to embrace education and training programmes in library 2.0 and web 2.0 technologies (Foo and Ng, 2008). Similar international studies in Australia, Ireland, Lithuania, Slovenia and the UK indicate that web 2.0 tools for LIS education is at the introduction stage (Bawden *et al.*, 2007). In Pakistan, 20 per cent of library and information professionals are generally less inclined towards the adoption and use of web 2.0 technologies, with the study advocating the need for education and training programmes in higher education (Arif and Mahmood, 2012).

#### *Web technologies*

The paradigm shift or transition from the industrial age to the knowledge age has brought new technological innovations – library 2.0 and web 2.0. Munatsi (2010) observes that it is regrettable that library 2.0 and web 2.0 systems have not been overly embraced in a good number of African academic and research university libraries. The development of library 2.0 and web 2.0 technologies have placed library and information agencies at the modern level or platform of socialisation that is critical in the emerging knowledge society. Information professionals in the country face many challenges in regard to these technological solutions, with the biggest hindrance being inadequate knowledge and skills. In the modern learning environment, it is important that LIS education in universities integrates library 2.0 and web 2.0 systems into the mainstream curriculum, since knowledge services are managed and handled in terms of changes, developments and issues brought about by these innovations.

#### *Integration of ICT courses in the LIS curriculum*

LIS education and training has been undergoing tremendous transformations across the world. In Kenya, the debate continues on the current state of LIS education and training. There is great concern for what should constitute appropriate ICT education

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and training of undergraduate LIS students. LIS graduates lack ICT competencies and skills that have a bearing on the practice of information work, and which are extremely important to the education and training of LIS professionals (Kavulya, 2007). An ICT component has become critical in the LIS education programmes in Kenyan universities. There is increased integration of ICT courses in the LIS curriculum, as exemplified by universities of Kenyatta University (2010) and Moi University (2010).

## **Research methodology**

### *Research method and design*

This study utilised the qualitative research approach with a survey research design used to collect data from lecturers, students, information professionals and employers. The respondents were drawn from various universities and other special organisational libraries as well as from LIS teaching departments in Kenyan universities.

### *Population and study sample*

The sample was drawn from the two public universities leading in the offering of LIS education (Kenyatta and Moi Universities), public and private university libraries as well as special organisational libraries. The respondents included: lecturers, LIS undergraduate students, and library and information professionals. Three categories of interview guides were used to collect and gather data from the respondents. In total, the sample size for the study was 120 respondents, distributed as follows: 20 lecturers, 90 final year undergraduate LIS students, and ten library and information professionals.

Lecturers are proactively involved in the education and training of undergraduate LIS students and, therefore, were better placed to offer valid information regarding all aspects of ICT education and training. Undergraduate LIS students as the incoming professionals were instrumental in providing first-hand information with regard to the issues of ICT education and training in the universities. The students acquire ICT knowledge, competencies and skills that have a direct bearing to the information profession and can assess the value of the education and training received in the courses. The study involved finalist undergraduate LIS students in order to get a complete picture of the current ICT education and training in the universities.

Library and information professionals consisted of information managers or leaders occupying senior positions like heads of libraries and sections, with doctorates and masters in LIS, and those who advise relevant organisations in terms of recruitment process. They manage information services and know quite clearly the possible challenges facing information professionals, and provide a direct link between the information industry and training institutions or organisations. Professional working experiences, ideas and opinions directly reflect the demands and desires of employers. As practitioners, information professionals provided vital knowledge and shared personal experiences and opinions regarding ICT education and training in the modern information environment. Universities are the leading educational and training organisations or institutions and employers of information professionals in the country. Special information service organisations also employ a sizable number of information professionals.

### *Sampling strategy and techniques*

Kenyatta and Moi Universities, being the leading universities offering LIS programmes in Kenya, were purposively selected for the study. The university libraries selected are

within Nairobi city where the use of ICT in handling and supporting information services is in practice. Special libraries in international organisations reflect the modern trends of managing information services in the current knowledge-based society. A total of 120 respondents were selected for inclusion in the study. Specifically, ten library and information professionals from public and private university libraries and special organisations were selected using simple random sampling, as well as ten lecturers from each university; 90 undergraduate LIS students from Kenyatta and Moi Universities were selected by stratified random sampling.

#### *Data collection methods and approaches*

Three interview guides were used for gathering and collecting data from the respondents: one interview guide for lecturers, another for undergraduate LIS students, and a third for library and information professionals. Within these categories, questions requiring ideas and opinions from the respondents were identified and used in open-ended interviews. The study also used document analysis to collect data and information. Documents examined or analysed included the LIS education curriculum which indicated, among others, the available ICT education and training programmes in the universities. In addition, other related information sources consulted included the current leading texts for LIS education, and ICT education and training, as well as conferences and workshop proceedings.

#### *Data analysis procedures*

The study utilised various primary and secondary data collection approaches. Primary data collection used interview guides. Interview guides in relation to the research questions were carefully studied to identify and generate the themes and categories of the study. The responses from the respondents were compared in order to ensure that similar answers or replies were grouped in the right theme or category. Secondary data collection involved document analysis or review of relevant information sources.

### **Research questions**

The following research questions guided this study:

- RQ1.* What is the current status of ICT education and training for undergraduate LIS students in the two selected Kenyan universities?
- RQ2.* What are the perceptions of the stakeholders towards the current ICT education and training of undergraduate LIS students in the selected universities?
- RQ3.* Which ICT competencies and skills are critical for the education and training of undergraduate LIS students in relation to the current job market and career development?
- RQ4.* What are the challenges facing ICT education and training for undergraduate LIS students in the modern information environment?
- RQ5.* How can ICT education and training within the undergraduate LIS curriculum be improved?

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## Research context

In the last two decades, Kenya has experienced tremendous growth in university education leading to an increased number of public and private universities. Kenya has adopted a new body to manage education and training in universities and colleges – the Commission for University Education – established through the Act of Parliament Commission for University Act 2012. The number of chartered universities in Kenya is almost 50, including both public and private universities. Public universities are: University of Nairobi, Moi University, Kenyatta University, Egerton University, Jomo Kenyatta University of Agriculture and Technology, Maseno University, Masinde Muliro University of Science and Technology, Technical University of Kenya, Technical University of Mombasa, Kisii University, Multimedia University, University of Kabianga and University of Eldoret, among others. Private universities include: University of Eastern Africa – Baraton, Catholic University of Eastern Africa, Daystar University, United States International University, Africa Nazarene University, Kenya Methodist University, Adventist University of Africa and Aga Khan University, among others. These universities also have affiliate campuses or colleges in major towns in the country (Commission for University Education, 2013).

Kenyatta University is one of the oldest universities offering LIS education in Kenya. The Department of Library and Information Science falls within the School of Education and offers undergraduate and postgraduate degree programmes. The undergraduate programmes are: Bachelor of Education in Library Science and Bachelor of Library and Information Science. The postgraduate studies are: Master of Education in Library and Information Science, Master of Library and Information Science, Master of Information Science in Records and Archives Management, and a doctorate programme in Library and Information Science (Kenyatta University, 2010).

Moi University is the other leading university offering information science education and training in Kenya, through the School of Information Sciences. The school consists of three departments: library, records management and information studies, publishing and media studies, and information technology. The Moi University School of Information Sciences is one of the leading schools in Eastern, Central and Southern Africa. It offers various academic programmes at bachelor's, master's, and doctoral levels. The bachelor's level has five programmes: LIS, information technology, publishing and media studies, informatics, and records and archives management. The Master of Philosophy programmes are: library and information studies, publishing studies, information technology, and records and archives management. The school also offers a Doctor of Philosophy programme in Library and Information Studies (Moi University, 2010).

## Findings

### *Response rate to interview guides*

Using 120 interview guides, data was collected from respondents in the library and information profession, that is: lecturers, undergraduate LIS students, and library and information professionals. Respondents were drawn from six university libraries (University of Nairobi, Kenyatta University, Jomo Kenyatta University of Agriculture and Technology, Moi University, Catholic University of Eastern Africa and Strathmore University) and four special organisational libraries (International Livestock Research Institute, Capital Markets Authority, AMREF International and Kenya Energy

Generation Company) as well as LIS teaching departments of Kenyatta and Moi Universities. Three types of interview guides were used for the three categories of respondents. The study sought to examine the situation that is facing the ICT education and training of undergraduate LIS students in Kenya. Each of the three categories of respondents yielded a 100 per cent response rate. This can be attributed to the fact that the researcher personally distributed the interview guides and made follow-up visits with the respondents.

#### *Views on ICT education and training needs and requirements*

This study sought the respondents' views regarding the needs and requirements of ICT education and training of undergraduate LIS students. The respondents indicated that:

[...] the ICT education and training needs and requirements for undergraduate LIS students is characterised by, among others: the need for practical courses in ICT and computer based subjects, computer hardware equipment, computer software packages, qualified teaching staff, market oriented ICT courses, computer fundamentals literacy, and modern information education programmes in web 2.0, library 2.0, information 2.0 and social media.

The respondents noted these as critical requirements for the teaching of ICT education and training in the modern information environment.

Library and information professionals noted that:

ICT courses in LIS programmes need to be in line with modern information management practices. The graduates are not familiar with web technologies and social media applications as these relate to the modern information environment. The lack of appropriate ICT courses in LIS programmes affect undergraduate students in career opportunities, job market and performance requirements.

The lecturers observed that:

[...] in the modern knowledge environment, rapid technological developments and solutions have changed the information landscape in information centres to the extent that education and training programmes in universities have to provide the necessary facilities and requirements in relation to ICT courses.

The needs and requirements for ICT education and training include: practical courses in ICT and computer based subjects, computer hardware equipment or facilities, computer software packages, qualified teaching staff, curricula to provide ICT courses that are market oriented, and computer fundamentals literacy.

Over half of the students in one of the universities under study stated that:

[...] there is a need for LIS education to provide adequate training in modern ICT courses in web technologies, social media and networking systems, to enable the graduates to stay on top of technology in relation to the information environment.

Updating of the ICT curriculum is extremely important in bachelor's degrees of LIS and related programmes in the universities.

#### *Adequacy of teaching and learning of ICT courses*

The study established that the availability of resources normally influence the nature of the teaching and learning of ICT courses. The respondents interviewed mentioned various issues central to the teaching and learning of ICT courses. In particular, views



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from two-thirds of the respondents indicated that “teaching and learning of ICT courses is purely theoretical. This shows that the theoretical approach seems to be the most preferable method of teaching and learning of ICT courses”. More than half of the Bachelor of LIS students pointed out that “the practical approach is the other method of teaching and learning of ICT, but given less attention”. Over half of the respondents interviewed also gave various reasons affecting the adequacy of teaching and learning of ICT courses, such as: “inadequate computer hardware facilities, inadequate information software programmes, and inadequate ICT courses not relevant to the modern information environment requirements are taught”. When prompted further the respondents affirmed that:

[...] teaching and learning of ICT courses depends upon various factors including relevance to the job market requirements, relevant ICT courses in relation to modern information environment, depth of the courses, and teaching and learning resources.

#### *Perceptions on current ICT education and training in relation to information work*

With respect to the importance of ICT education and training in relation to competence in information work, the study established various views presented as follows. From the responses obtained, more than half of the respondents noted that “ICT is essential in the management of information activities and services”. The respondents also noted strongly that “ICT education and training empowers the student with relevant competencies and skills”. Some of the LIS students in one of the university under study stated that “ICT education and training provides essential skills in the modern information environment”. Two-thirds of library and information professionals noted the following: “ICT enhances effectiveness and efficiency in the provision and delivery of information services, and ICT makes information professionals competent in handling information services and activities”.

In regard to the above, more than half of the library and information professionals interviewed noted that “undergraduate LIS students do not perform well in information work and related services, due to inadequate ICT knowledge, competencies and skills”. Similarly, two-thirds of the library and information professional respondents noted that “undergraduate students lack the essential ICT competencies and skills needed to function efficiently in work places and career development”. From the opinions presented, competence in ICT programmes is central in defining employment opportunities and career development for undergraduate LIS students and information professionals in general.

#### *Role of ICT competencies and skills in the job market*

The study established the extent to which ICT courses offered new career opportunities for LIS undergraduate students in the job market. The general view was that ICT courses are instrumental and essential in offering new and increased career opportunities in the job market. Two-thirds of the library respondents were of the view that “ICT provides better management of information skills”, while more than half felt that “ICT provides competitive advantage in the job market”. At the same time, half indicated that “ICT leads to increased job opportunities”, while some were of the opinion that “ICT contributes to societal and economic development”. In addition, some also thought that “ICT facilitates better communication and dissemination of information services”.

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*Critical ICT competencies and skills essential in the labour market*

The study established critical ICT competencies and skills that are essential in the education and training of undergraduate LIS students in the country. ICT courses which are essential for the education and training of undergraduate LIS students, identified by over half of the respondents include:

[...] computer hardware and software systems, information programming skills, server management systems, practical aspects of ICT, software engineering, digital libraries, web management, distributed systems, networking administration and management, artificial intelligence, computer security and content management.

The magnitude of the internet in the information profession is well documented, although the course was noted by less than half of the respondents.

In describing the critical ICT competencies and skills essential for the education and training of undergraduate LIS students, the respondents from the three categories provided additional comments. Half of the lecturers pointed out:

[...] a number of ICT courses that are not offered in the LIS programmes although the courses are essential in the information profession. In addition, Kenyatta University and Moi University need to expand the ICT curriculum in order to include emerging and new areas in the information profession.

Regarding the same issue, the students in one of the universities under study went on to argue that:

[...] the current ICT courses in the LIS programmes need to be updated. Unless something is done, as a matter of fact, the training expectations are far below the requirements of modern information professionals.

Library and information professionals noted that:

LIS programmes concentrate mainly on information related courses as opposed to ICT courses. As a result, undergraduate students end up being disadvantaged in the current job market.

The invasion of ICT into the modern information environment has shaken the information profession and consequently transformed education and training programmes. LIS programmes need to provide education and training that caters for the needs and requirements of the modern knowledge society. If information professionals are to be effective and efficient in information services then the incoming information professionals must be adequately educated and trained in ICT to meet the requirements of the labour and job market. The strongest deduction to be made is that the current crop of undergraduate LIS students should have the necessary ICT knowledge, competencies and skills needed in the modern information environment.

*Challenges or issues facing or affecting ICT education and training*

This research established numerous constraints that affect the education and training of ICT in LIS programmes in the country. These include the following:

[...] inadequate computer laboratories, inadequate computer hardware and equipment, inadequate software packages, lack of relevant ICT courses, inadequate qualified teaching staff, inadequate teaching of ICT courses, ICT courses that are not in line with market needs, and inadequate infrastructure.

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Inadequate computer laboratories, inadequate computer hardware and equipment, and inadequate software packages were, therefore, emerging as the biggest contributing factors and key issues obstructing ICT education and training for undergraduate LIS students in the universities, according to the respondents.

Regarding the same issue two-thirds of the students in one of the universities under study highlighted:

[...] the need for LIS teaching departments in Kenyan universities to provide quality education and training in ICT courses. Inadequate ICT education has forced some of the students to train again in information technology or computer science courses.

The library and information professionals further stated that:

[...] among the modern issues facing LIS professionals in the job market is inadequate education and training in ICT courses. A comprehensive review of ICT courses is particularly important in addressing modern information requirements.

#### *Measures to improve ICT education and training in the universities*

The respondents suggested various measures for improving the state of ICT education and training for undergraduate LIS students and related programmes in Kenyan universities. These include: “updating of ICT education and training curriculum; acquisition of hardware and software systems; provision of ICT facilities such as computer laboratories, emphasis on practical aspects of ICT subjects, employing qualified lecturers, providing reading materials”, and finally “undertaking regular needs assessments to determine the market trends”. Other possible measures suggested include:

ICT courses be made core in LIS programmes, internship programmes for LIS students be undertaken rigorously, linkages and collaboration between the university and the industry be established, adequate time be allocated for teaching and learning of ICT, professional courses in ICT-related areas like Microsoft Certified Systems Engineer (MCSE) and Oracle be introduced, and lecturers to participate in continuing academic and professional activities such as further studies in ICT and attending conferences and seminars.

Half of the lecturers noted that “there is a need to update the LIS education and training curriculum, especially in ICT courses because of the modern information environment that keeps on changing”. Two-thirds of the students in one of the universities under study commented that:

[...] although it is good to train as librarians, the ICT courses do not adequately offer the necessary education to the students. The role of effective information professionals depends on adequate education and training in ICT courses that are not integrated in the curriculum.

Needs assessment in the field of LIS is important in identifying gaps in the profession in order to provide adequate education and training programmes that address market requirements. Inadequate resources and conditions in the universities hinder ICT education and training for undergraduate LIS students and therefore there is a need to improve the facilities. LIS programmes offer limited ICT courses, since the technological infrastructure and access needed to help achieve quality education and training is poor.

## **Conclusion and recommendations**

### *Conclusion*

There is a need to change the focus on ICT courses in LIS education and other related programmes in universities. LIS teaching departments should extensively monitor developments in the modern information environment, and play significant roles in implementing positive change to ensure that the educational needs at each level of training are inclusive and comprehensive. In the current digital environment, ICT education and training has to reflect the requirements of the labour market. LIS programmes should offer quality ICT education and training opportunities befitting the academic and professional status of twenty-first century graduates. In addition, the teaching and learning of ICT should emphasise better instruction methods. Most importantly, the teaching and learning methods should always strive to achieve quality in imparting ICT knowledge, competencies and skills to the students. The modern information environment has rapidly changed, to the extent that traditional librarianship courses cannot produce competent information professionals. The respondents noted various factors hindering the ICT education and training of undergraduate students in the country, such as inadequate computer laboratories, inadequate computer hardware and inadequate software packages. In particular, it is important to look at these challenges or issues to ensure that undergraduate students are adequately educated and trained in ICT courses.

The Kenyan curriculum should provide education and training that meets employment opportunities and labour market requirements for the students. LIS education programmes should ensure a suitable curriculum for ICT programmes is used and applied to give the students the opportunity to train in market oriented courses. The ICT curriculum should address the needs and demands of the students, in addition to being comprehensive and exhaustive in content and application. The students should learn and acquire ICT knowledge, competencies and skills through an updated curriculum to reflect the diversity of the modern information and knowledge environment. In this knowledge-based society, where the information environment is rapidly changing and expanding, it is essential for LIS students to keep up with the needs and requirements of the job market. In Africa, and Kenya in particular, it is time to bridge the ICT gap in the education and training of information professionals. Kenyan universities, information services organisations, library and information professionals, and friends of the profession should join hands and ensure comprehensive updating of the ICT curriculum. ICT education and training is the first step in making incoming information professionals effective and efficient information leaders.

### *Recommendations*

First, there is a need to review the current status and nature of ICT courses for LIS programmes, so as to provide and implement better platforms for the education and training of information professionals. ICT related courses seem to be affected at all levels of LIS education and training. It is imperative for LIS teaching departments in universities to put in place the necessary arrangements to produce quality graduates.

Second, the development of ICT has changed and created a modern information and knowledge environment that depends upon highly technological systems. This development has also changed and affected the roles of library and information professionals, including education and training programmes. This implies that LIS

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programmes should lay emphasis on proper education and training in ICT related courses. LIS programmes should address the issue of new emerging areas in the knowledge industry.

Third, there is a need for LIS teaching schools and departments in Kenyan universities to redefine and design adequate ICT curricula in relation to career opportunities, job market and performance requirements. LIS programmes should look at the content and modern information requirements for appropriate curriculum design. The curriculum should address imbalances that have always affected the field of LIS in the past. In order to bridge the knowledge gap, the issue of alignment of the curriculum may require concerted efforts of the teaching departments, lecturers, information professionals and employers. This is to facilitate the development of a curriculum which includes a wide range of ICT issues relevant in the information environment. Employers strongly require information graduates with adequate ICT competencies and skills.

Fourth, library and information teaching departments ought to address issues of resources that hinder quality education and training of ICT courses. Due to financial constraints, Kenyan universities have poor information infrastructure, thus affecting the ICT education and training of undergraduate LIS students.

Fifth, information professionals must champion best leadership practices in order to implement ICT education and training programmes that suit the present and future information environments.

Sixth, LIS teaching departments should regularly carry out needs assessments in order to review the curriculum demands and desires. Needs assessment provides the opportunity to align modern information working conditions with the required ICT knowledge and skills.

Seventh, continuous professional development programmes also provide excellent education and training opportunities to be highly knowledgeable in ICT courses.

Finally, there are potential solutions for improving the state of ICT education and training of undergraduate LIS students that must be undertaken such as: acquisition of hardware and software systems, provision of ICT facilities like computer laboratories, updating of ICT curricula, and establishment of linkages and collaboration between the university and the industry.

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### Appendix

#### *Interview guide for lecturers*

ICT education and training needs and requirements for undergraduate students:

- (1) Highlight the key ICT education and training needs and requirements for undergraduate LIS students.
- (2) Describe the adequacy of teaching and learning ICT courses for undergraduate LIS students.

ICT education and training in the modern information environment:

- (3) How useful are the current ICT courses for undergraduate LIS students in relation to competence in information work?
- (4) How is ICT education and training offering new opportunities to undergraduate LIS students in the job market?

Critical ICT competencies and skills essential for career opportunities, job market and performance requirements:

- (5) Which ICT courses do you think are essential for undergraduate LIS education?
- (6) What critical ICT competencies and skills are essential for undergraduate LIS students in the labour market and performance requirements in the current digital information environment?

Challenges and measures to improve ICT education and training:

- (7) Explain the key issues or factors obstructing or affecting ICT education and training for undergraduate LIS students in the universities.
- (8) What are some of the measures that need to be undertaken to improve ICT education and training for undergraduate LIS students?
- (9) What other comments can you give that you find relevant in improving ICT education and training for undergraduate LIS students in Kenyan universities?

*Interview guide for undergraduate LIS students*

ICT education and training needs and requirements for undergraduate students:

- (1) Describe the key ICT education and training needs and requirements for undergraduate LIS students.
- (2) Highlight the adequacy of teaching and learning ICT courses for undergraduate LIS students.

ICT education and training in the modern information environment:

- (3) How useful are the current ICT courses for undergraduate LIS students in relation to competence in information work?
- (4) Highlight the role of ICT education and training in career opportunities, job market and performance requirements for undergraduate LIS students.

Critical ICT competencies and skills essential for career opportunities, job market and performance requirements:

- (5) Which ICT courses do you think are essential for undergraduate LIS education?
- (6) What critical ICT competencies and skills are essential for undergraduate LIS students in the labour market and performance requirements in the current digital information environment?

Challenges and measures to improve ICT education and training:

- (7) Explain the key issues or factors obstructing or affecting ICT education and training for undergraduate LIS students in the universities.
- (8) What are some of the measures that need to be undertaken to improve ICT education and training for undergraduate LIS students?
- (9) What other comments can you give that you find relevant in improving ICT education and training for undergraduate LIS students in Kenyan universities?

*Interview guide for library and information professionals*

ICT education and training needs and requirements for undergraduate students:

- (1) Highlight the key ICT education and training needs and requirements for undergraduate LIS students.

ICT education and training in the modern information environment:

- (2) How useful are the current ICT courses for undergraduate LIS students in relation to competence in information work?
- (3) Describe the role of ICT in career opportunities, job market and performance requirements for undergraduate LIS students.



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Critical ICT competencies and skills essential for career opportunities, job market and performance requirements:

- (4) Which ICT courses do you think are essential for undergraduate LIS education?
- (5) What critical ICT competencies and skills are essential for undergraduate LIS students in the labour market and performance requirements in the current digital information environment?

Challenges and measures to improve ICT education and training:

- (6) What are some of the measures that need to be undertaken to improve ICT education and training for undergraduate LIS students?
- (7) What other comments that you find relevant in improving ICT education and training for undergraduate information science students in Kenyan universities?

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