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Examining the integration of ICTs in Library and Information Science (LIS) curriculum in Zimbabwe

Abstract:

Information and Communication Technologies (ICTs) have greatly influenced access, management and dissemination of information. ICTs have become central to education and training in Library and Information Science/Service (LIS) because of the great influence of these technologies on the professional world. Information professionals are increasingly required to adapt their skills and practice in order to gain an awareness of technological advances. It has changed their role in the workplace with new and diverse skills requirements. The purpose of this study was to examine how Library and Information Science (LIS) schools are integrating ICTs in their curriculum. The study was largely qualitative with content analysis being conducted on LIS modules to determine ICT coverage. A brief questionnaire was also distributed to the LIS Schools to ascertain the level of infrastructure and other resources available to support these programmes. The findings revealed that LIS schools were incorporating ICT skills in the courses taught. The study observed however that there are some courses which required ICT skills integration but were still being taught at theoretical level. Challenges faced by the LIS schools included infrastructure, hardware and internet access. The study recommends for an accelerated integration of ICTs in the courses in order to meet the requirements of industry and employers.

Keywords:

Information science education, Information technology, Information science, ICT teaching, Library and Information science education

1. Introduction and background to the study

The influence of Information and Communication Technologies (ICTs) in the library work situation has changed how Library and Information Science professionals access, manage and disseminate information. ICTs have become central to education and training in Library and Information Science/Service (LIS) because of the great influence of these technologies on the professional world (Minishi-Majanja and Ocholla 2003, Ahmad and Ahmad 2012). Information professionals are increasingly required to adapt their skills and practice in order to gain an awareness of technological advances. It has changed their role in the workplace with new and diverse skills requirements. Through the integration of new ideas and services, ICT has played an important role in this paradigm shift and brought major changes to the field of library science (Lata and Sonkar 2021).

Singh and Shahid (2010:5) aptly observed that employers are not satisfied with the skills of LIS graduates, and prefer candidates with specialized training hence graduates without ICT knowledge and skills encounter employment problems. Consequently, there is a need for LIS schools to adjust their curricula from time to time according to the needs of the market, if they intend to aim seriously at the emerging markets for LIS graduates (Ahmad and Ahmad 2012:11; Hallam 2006).

Changes have been witnessed in core subject areas from an emphasis on manual-based collection development to ICT-based information/knowledge management. In their study of students' perception in Jordanian Universities, Younis, Faten, Nashrawan and Maha (2016) established that the teaching of ICT courses in LIS programmes was very important. This observation is reiterated by Abubakar and Hassan (2013:163) who noted that ICT and related technologies have “brought about a fundamental and dramatic shift in the global educational system”. They further observe that “this fundamental shift has manifested in the form of e-learning where ICTs such as the computer, the Internet and Intranet, CD-ROMs are used as tools for teaching and learning (Abubakar and Hassan 2013:163).

1.1 Conceptual setting

According to Akanwa (2015:96) a curriculum is the total learning experience provided by a university, college or school and includes the content of courses (the syllabus), the

methods employed (strategies) and other aspects like norms and values which relate to the way the university/school is organized. It also outlines the skills, performances; attitudes and values students are expected to learn from schooling. According to Ocholla (2000) a curriculum is a fundamental part of any education or training programmes which gives information on content, purpose, methods, etc. of a programme or course of study. A curriculum for LIS education usually mirrors what is being offered to train librarians and information professionals who will not only acquire the essential knowledge and skills to become qualified personnel in the field, but also meet challenges the ever-changing information society brings (Chu 2006:328). It is critical for any programme of study to continuously evaluate its curriculum to ensure that its content remains relevant, of high quality and is in tune with the demand of the job market (Zainab, Edzan and Rahman 2004, Shongwe and Ocholla 2011). Lata and Sonkar (2021) posit that in order to keep up with new information systems experiences and the latest developments, improvements to the LIS curriculum are obligatory

Information and Communication Technology (ICT) is an umbrella term that includes any communication device or application, encompassing: radio, television, cellular phones, computer and network hardware and software, satellite system as well as the various services and applications associated with them, such as videoconferencing and distance learning (Kamila 2008:61)

1.2 Contextual setting

Okello-Obura and Kigongo-Bukenya (2011:1) note that LIS schools started in the early 1960s, developing to five main schools in Ghana, Nigeria, Senegal and Uganda in the 1980s. Ocholla and Bothma (2007:150) however note that South Africa has a LIS history dating back to 1938 with the commencement of the first education and training programme of librarians at the University of Pretoria (UP), followed by the University of Cape Town (UCT) in 1939, and the University of South Africa (Unisa) in 1955.

In Zimbabwe, library and information science education is offered at the Polytechnics and two universities. The LIS School at the Harare Polytechnic was established in 1985 offering the national Diploma and subsequently the higher national Diploma in later

years. The programme has since been devolved to other polytechnic colleges such as Bulawayo, Gweru and Gwanda. Prior to 1985, training was available on a part-time basis for the City and Guilds certificate. The National University of Science and Technology (NUST) began offering an undergraduate programme in LIS in 2001 and in 2005 it launched a master's programme in library and information science (Pasipamire 2014).

2. Problem statement

The use of ICT skills spills over into all aspects of library work, and the explosion of electronic information delivery has resulted in the need for electronic user support (Ashcroft and Watts 2005). These changes have led to high expectations on library and information schools to produce graduates who are competent in adapting to these changing environments. Consequently, LIS curricula need to consolidate ICT concepts, knowledge, skills and proficiency into core competencies, and LIS schools need to provide adequate content and practice that will enable LIS graduates to adapt and use ICTs effectively (Minishi-Majanja 2007:2). A study by Mugwisi and Hikwa (2015) observed that most graduate students felt that ICT skills/competencies were lacking in the masters programme at the National University of Science and Technology (NUST), Zimbabwe. Munyoro and Mutula (2016) also noted that LIS graduates were inadequately prepared for their industrial roles and this was attributed, among other concerns, ICTs skills and infrastructure in schools.

3. Aim and objectives of the study

This study examines the course content of LIS undergraduate and postgraduate programmes at NUST, and programmes at the Harare Polytechnic.

The study seeks to answer the following research objectives:

- a. to assess the number of modules bearing ICT components in the LIS schools
- b. to assess the nature of content taught
- c. to examine the level at which the modules are taught
- d. to investigate whether the facilities available adequately support such programmes

4. Related studies

The development of ICTs and in particular the internet has seen an increase in the quantity of information in various digital formats. The use of ICT skills spills over into all aspects of library work, and the explosion of electronic information delivery has resulted in the need for electronic user support (Ashcroft and Watts 2005:7). The adoption of a wide range of ICTs calls for training that enables graduates to develop information systems which will help people to meet their information needs efficiently (Abubakar and Hassan 2010).

Studies have been conducted focusing on various aspects of the LIS curriculum. Such studies have enunciated issues regarding curriculum evaluation, appropriateness of the content's relevance to the job market with tracer studies helping in providing such feedback (Aina and Moahi 1998; Stilwell 2004; Shongwe and Ocholla 2007; Noko and Ngulube 2013). Other studies were more specific, focusing on ICTs and LIS education. The effects of technological innovation and socio-cultural changes have an enormous impact on the information profession (Hallam 2006:15).

Minishi-Majanja and Ocholla (2003) looked at ICTs and LIS education in Kenya observing that all LIS schools offered a wide range of ICT related courses, the majority being core modules. The study observed however that there was a low uptake in the use of ICTs in the delivery of lectures and research. In larger study on sub-Saharan Africa, Minishi-Majanja (2007) established that LIS schools were incorporating ICT modules in their curricular through developing existing or merging content. Similarly, a regional study of Asia, Miwa (2006:25) observes that although programmes make concerted effort to balance LIS education with an IT emphasis in response to market demands, many of them are facing problems in expanding LIS education to meet the requirements for information professionals in an IT-based society.

Ocholla and Bothma (2007) looked at the status, trends and challenges of library and information education and training in Eastern and Southern Africa, establishing that LIS

schools were redesigning their curricula in line with latest developments and job requirements. In many cases departments have changed their names to reflect these new focus areas and extensions, and in many cases departments have realigned themselves within their universities (Ocholla and Bothma (2007:166). Singh and Wijetunge (2006:1) similarly observe that nomenclature of the courses offered has changed although the course contents are not consistent with the nomenclature in many cases hence the failure by LIS departments to respond adequately to ICT developments.

Ocholla and Bothma (2007:154) observed that there have been significant investments in ICT infrastructure for LIS education in Africa. Inconsistencies were however evident due to economic factors which affected the capacity to adequately acquire sufficient ICT resources, e.g. computer hardware and software, as well as limited use of available resources for teaching purposes. Ocholla and Bothma (2007:160) opine that the LIS curriculum must consist of the core LIS subjects, courses and modules, among them of ICTs.

Kamila (2006:73) and Singh and Shahid (2010:1) indicate that the LIS environment in India is still basically traditional, with courses like classification and cataloguing, reference, bibliographic searching, and professional values, the curriculum does not reflect the current needs of LIS field. They observe that most of the curriculum followed in Indian LIS schools is out-dated with little or no focus on the requirements of libraries or IT organizations. Singh and Wijetunge (2006:4) concur, adding that “whereas, the core is still stuck to classification, cataloguing, indexing, and vocabulary control, the emerging themes, such as information literacy, knowledge management, e-learning, ICT applications, use of networks in teaching, and teaching about networks have not been adequately integrated in the curricula”. Kamila (2006:73) and Singh and Shahid (2010:1) acknowledge however that LIS schools have embarked on this task by integrating ICT modules in their curricula.

Hikwa (2006) focused on how Information and Communication Technologies (ICTs) were being integrated in Library and Information Science curricula in Zimbabwe observing that both undergraduate (national certificate, national diploma, higher national diploma, degree) and postgraduate levels had embraced ICTs significantly. Hikwa (2006) notes for example that at certificate level, basic introductory Information Technology

course is taught, developing into more detail at diploma and higher diploma level. At masters' level, ICTs were covered in one compulsory module and two electives (Hikwa 2006). Pasipamire (2014:8) on the contrary concluded that ICT skills had a weak coverage in the LIS curricula in Zimbabwe as more than three quarters of the skills were not sufficiently dealt with in all LIS schools. Pasipamire (2014) acknowledges that although basic ICT skills such as; email, intranet, and database design were adequately covered, advanced skills such as distributed systems, artificial intelligence, and software engineering were not taught, attributing it to lack of competent lecturers in the area of ICT.

Studies by Abubakar and Hassan (2011) and Akanwa (2015) looked at the integration of ICTs in the LIS curriculum in Nigeria highlighting the lack of regular reviews with most LIS schools' curricula not contain ICT components that are relevant to librarians in the work environment. Akanwa (2015) observed that courses such as: electronic resources management, management of social media tools, website design and management, networks and networking, software design and management, database design and management, innovation and creativity were necessary in bridging this gap. Abubakar and Hassan (2011) emphasise that the government and related library and information associations need to play a significant part in influencing curriculum changes. Kamba (2011:70) however notes that although most LIS schools in Nigeria have shown considerable strides in infusing ICT competencies in the curriculum through developing relevant ICT courses and also merging relevant ICT knowledge in traditional curriculum, the majority of schools teach these ICT courses theoretically due to inadequate computers and poor Internet access.

One of the issues not highlighted in the above studies is the implications of students' ICT skills in helping them navigate ICT based curriculum. Kules and McDaniel (2010:222) opine that "as programmes continue to incorporate information and communications technology (ICT) into their curricula, one of the challenges they face is the diverse technology backgrounds and competencies of incoming students". They argue that "students without adequate preparation may experience difficulty when confronted with topics such as web page creation, relational databases, and systems analysis". On the

contrary however, studies by Hikwa (2006), Singh and Wijetunge (2006), Abubakar and Hassan (2011), Kamba (2011), Pasipamire (2014) and Akanwa (2015), cited above have shown the presence, or lack of such advanced courses in the curriculum reviewed.

As observed in the studies by Ocholla 2000, Minishi-Majanja and Ocholla 2003, Raju (2005), Singh and Wijetunge (2006:1), Hikwa (2006), Ocholla and Bothma (2007), Minishi-Majanja (2007), Kamila (2008), Chisita (2009), Singh and Shahid (2010), Abubakar and Hassan (2011), Okello-Obura and Kigongo-Bukenya (2011), Kamba (2011), Ahmad and Ahmad (2012), lack of ICT policies, inadequate ICT resources and infrastructure, sustained funding and management, appropriate equipment and qualified IT personnel were factors affecting most LIS schools in Africa. According to Burnett (2013:1) it is widely known that LIS schools in many developing countries are not keeping abreast of the rapidly changing digital environment and are facing new knowledge and skills demands from employers. However, some of the challenges may not be unique to Africa and other developing countries. A study on all ALA-accredited LIS programmes in the United States, Canada, and Puerto Rico, Riley-Huff and Rholes (2011:139) concluded that although there has been a significant increase in the number of technology related courses in LIS programmes, the numbers of technology courses and content vary considerably from programme to programme. They contend that “there appears to be a clear need for additional courses at a more advanced level as evidenced by the experiences of both information technology job candidates and the administrators involved in the hiring decisions”.

5. Research methodology

The study was largely qualitative with content analysis being applied to examine various course modules from the LIS schools. A brief questionnaire was distributed to LIS schools in order to ascertain the level of ICT resources accessible/available to students and to solicit their opinion on whether schools have been responsive in this endeavour. Content analysis involves the description and analysis of text in order to represent its content and can be undertaken quantitatively, qualitatively, or using both and text can be

from books, documents and articles (Miller and Brewer 2003). Leedy and Ormrod (2010:108) define content analysis as “a detailed and systematic examination of the contents of a particular body of material in an attempt to identify patterns, themes, or biases within that material.” Devlin (2006:196-198) and Dawson (2009:122) observe that qualitative data that may require content analysis typically involves participants’ written answers to one or more questions in narrative style. Content analysis in this study was used to analyse the qualitative data from the interviews and responses to the open-ended questions in the questionnaires.

6. Findings and Discussion

The results below provide an institutional coverage of ICT courses taught at the LIS schools in Zimbabwe. These represent programmes taught at the National University of Science and Technology (NUST), and the Harare Polytechnic (being representative of all polytechnics in the country). The results also indicate the level at which the courses are taught.

Table 1 shows results for courses taught at Polytechnics in Zimbabwe. At certificate level, the results shows that students are taught an Introduction to computers course focusing on hardware and software and Microsoft packages. The students had access to a computer laboratory in the school and assessment was through field and competency tests and a written exam. There were no other observed ICT related programmes at this level of study.

Table 1: ICT courses offered at undergraduate Certificate; Diploma and Higher National Diploma (HND) levels

Course	School A	Level of study	Remarks
Introduction to computers: (338/S07)	X	Certificate	Module covers: hardware, software; file management, word processing, spreadsheets packages, databases, PowerPoint presentation Assessment includes field based assignments, Skills competency test 3-hour written exam paper Students have to a computer laboratory with internet connectivity
Data Communication and Networks in Libraries (530/S06) Topics include:	X	Diploma	Module presents an overview of Data Communication and Networks, representation and Transmission of Data, Integrated Services Digital Network (ISDN) Mobile User Technologies Assessment includes Field Work based assignments, and Skills Competency Testing 3-hour written examination
Cataloguing I (530/S01)	X	Diploma	Module covers Introduction to cataloguing: Manual and Digital cataloguing (Integrated Library Management System, covered in theory)) 3-hour written examination
Collection Development and Reference Services Management 1 (530/S04)			Module includes: Information Retrieval definition and concepts (Theoretical aspects) 3-hour written examination
Production and Publishing (530/S11)	X	Diploma	Topics include: Electronic publishing Desktop publishing Electronic publishing and Desktop publishing are some of the topics covered in theory. 3-hour written examination
Database Concepts and Design (701/04/S02)	X	HND	Topics covered include: Database environment Database system components, Database models, Database systems architecture, Database Life cycle Database security and integrity, Database implementation and administration Database management and Recommended software (e.g. Oracle, INNOPAC) Assessment includes: assignments and practicals Students have access to a computer lab with internet connectivity 3-hour written examination

Key: A= Harare Polytechnic

Three ICT related courses were observed at the national diploma level. Data communication and networks in libraries, sought to empower students with networking skills including basic network troubleshooting. A written exam contributed 40% of the overall assessment.

Introduction to Cataloguing (manual and digital cataloguing) (530/S01) incorporated Integrated Library management systems, focused on theoretical applications with no computer practicals.

Collection Development and Reference services management module (530/S04) included information retrieval definition and concepts and was taught from a theoretical perspective.

Production and Publishing module (530/S11) incorporated electronic and desktop publishing and these topics were covered in theory.

At Higher national diploma level, Database Concepts and Design module (701/04/S02) incorporated database management systems architecture, database security and integrity and a recommended software, among other topics. Students had access to a computer lab with internet connectivity and assessment included both theory and practicals.

Indications from an interview with teaching staff at the Polytechnic showed that the curriculum was being constantly reviewed in order to match the job market requirements and an ICT bias in the courses was thus paramount. Challenges were faced particularly with infrastructure and facilities to support teaching of such courses. The computer lab needed to be upgraded by bringing in modern computers and also increasing space in order to accommodate more students and courses.

The results above show that more needs to be done to integrate ICTs in some of the courses which currently have a theoretical approach, in order prepare the graduates for the job market. Chanetsa and Ngulube (2016) established that new skills which includes web design, online cataloguing, classification, knowledge of HTML, virtual reference were important requirements. Raju (2017) also observed that job adverts for academic librarians emphasised skills which included advanced IT skills, for example, Integrated

library system, advanced computer skills, digitization process, web design and development, IR, and technical skills which are repositories, digitization, and curation of research data and other digital.

The second analysis looked at the LIS programmes offered at NUST in the BSc (Hons) undergraduate degree. Table 2 shows that ICT related courses were taught in the first and second years, with none in the third and fourth years of the degree programme. Unless where stated, these courses are taught and examined over one semester

Introduction to Information Technology (ILI 1103) is a course that is taught to all LIS first years. This module introduces information technology, including hardware, software and Microsoft packages among others. It incorporates practical applications and assessment through written exams. The course enables students to master minimum IT skills and knowledge sets which would enable them to carry out assignments requiring IT skills.

Theory and practice of classification (ILI 1107) module looks at theories and practices which underpin classification of resources in a library or information centre. Distinction between classificatory structures such as the deductive and the inductive approaches will be analysed. The module introduces students to online classification using Library management systems like KOHA.

Application of Information Technology Tools in Information centres (ILI 1208) typically includes topics on networking, internet applications, web coding such as HTML, XML web design among others. It requires students to cover at least 2 hours lab practicals per week and a written final assessment.

Theory and practice of cataloguing (ILI 1209) module deals with cataloguing in library or information centres. It enables the student to understand the concept of cataloguing and

its application to libraries and information centres as a basis for information retrieval. The module introduces students to online cataloguing using Library management systems like KOHA

Database Design and Management in Information Centres (ILI 2109) places special emphasis on data integrity, models and data manipulation, covering practical topics which include data warehousing and mining. Students do a minimum of 2 hours per week lab use and also get to develop small databases and a final written assessment.

Information Storage and Retrieval (ILI 2110) covers components of information retrieval systems, models and techniques and evaluation of information retrieval systems. Students do a minimum of 2 hours per week in the lab plus a written final exam.

Web Design and Content Management (ILI 2207) equips students with skills to develop simple and complex websites. The course also builds on ILI 1208 and a continuation of web design including HTMLs, CSS, Java scripting, web content, among others.

Digital libraries (ILI 2210) blends old and new information management techniques, addressing theoretical, technological, practical and social issues regarding establishing of such libraries. Students do a minimum of 2 hours per week in the lab plus a written final exam.

Library Management Systems (ILI 2211) introduces students to a variety of software for managing routine library operations such as circulation. Students do a minimum of 2 hours per week in the lab plus a written final exam.

Table 2: ICT courses offered at university undergraduate level

Course	School B	Level of study	Remarks
Introduction to Information Technology (ILI 1103)	X	BSc (LIS)	This module introduces information technology, including hardware, software and Microsoft packages among others. The course enables students to master minimum IT skills and knowledge sets which would enable them to carry out assignments requiring IT skills. 3 hour per week practicals + 3 hour exam (theory)
Theory and practice of classification (ILI 1107)	X	BSc (LIS)	The module looks at theories and practices which underpin classification of resources and introduces students to online classification using Library management systems like KOHA. Practical exposure to classification using popular established classification schemes is given. 4 hours per week practicals + 3 hour exam (theory)
Applications of Information Technology tools in Information centres (ILI 1208)	X	BSc (LIS)	The module focuses on a networked computer application such as Internet tools as useful IT for various information centre types. Topics include networking and Internet application, web coding (HTML and XML), designing websites and working with CGL. 2 hours per week practicals + 3 hour exam (theory)
Theory and practice of cataloguing (ILI 1209)	X	BSc (LIS)	This module covers concepts and application of cataloguing as a basis for information retrieval. Principles and standards like International Standard Bibliographic Description (ISBD), Anglo-American Cataloguing Rules II and Subject cataloguing are dealt with using standard Lists of Subject Headings. 4 hours per week practicals + 3 hour exam (theory)
Database Design and Management in Information Centres (ILI 2109)	X	BSc (LIS)	The module provides an introduction to the concepts and practice of information storage and retrieval systems design. Special emphasis is placed on data integrity, models and data manipulation, covering practical topics which include data warehousing and mining. 2 hour per week practicals + 3 hour exam (theory)

Web Design and Content management (ILI 2207)	X	BSc (LIS)	This module provides the methods and techniques of developing simple to complex websites. It covers web page layout techniques, simple, html, cascading style sheets, java scripting and emerging web technologies like blogs, listserv and events. Module is a continuation of HTMLs CSS, Java scripting, Active Server Pages (ASP), from ILI 1208. 2 hour per week practicals + 3 hour exam (theory).
Digital libraries (ILI 2210)	X	BSc (LIS)	This course provides an overview of principles and practices in digital libraries. Topics covered include theoretical, practical and technological development and assessment, formatting standards and practices, metadata and mark-up standards, technical infrastructure and end user experience of digital libraries. 2 hours per week practicals + 3 hour exam (theory)
Library Management Systems ILI 2211)	X	BSc (LIS)	This module introduces a variety of software such as, but not limited to KOHA, for managing routine library operations such as circulation, cataloguing, serials control and acquisitions. It aims to provide skills on end-user support and end- user responsibilities. 2 hours per week practicals + 3 hour exam (theory)

Key: B - NUST

Source: NUST Faculty of Communication and Information Science prospectus (2019)

At postgraduate level 6 courses with ICT content were identified. These were at postgraduate diploma (PGD), and the MSc level as shown in Table 3.

Application of Information Technology and Tools for libraries (PDL 5307) covers aspects of word processing and document design and spreadsheets, internet access and database design. Assessment is through a 3 hour written examination

Web Applications and Design (PDL 5309) covers Web 2.0 and Internet based application including website designing. The course has a practical focus and a 3 hour written exam.

Reference Services and Retrieval Systems (PDL 5308) has a theoretical focus of major online information retrieval systems and a 3 hour written examination.

At MSc (LIS), Advanced Information Technology Application (ILI 5101) is basically theory focusing on various ICT applications like e-commerce. Assessment is through a 3 hour written examination.

Management Information Systems (ILI 5202) has a theoretical approach focusing on concepts and techniques for applying computer technology to functional areas of various work environments. Assessment is through a 3 hour written examination.

Data Management and Data Curatorship (ILI 5308) Has both theory and practical applications and aims to impart students with skills and competencies through hands on experiences with technologies and applications in a virtual lab setting

Results in Table 3 indicate consciousness to include ICT application in the postgraduate modules. The application is mostly theoretical albeit these courses requiring computer laboratory access and teaching. All the modules have theory examinations of 3 hours each.

Table 3: ICT courses offered at postgraduate level

Course	School B	Level of study	Remarks
Application of Information Technology Tools for libraries (PDL 5307)	X	Post Graduate Diploma (PGD)	Topics cover: Accessing internet information, electronic communication, word processing and document design, data modeling with spreadsheets, database design and maintenance for storage, retrieval and presentation Emphasis on educational and administrative value of ICTs 3-hour written examination
Web applications and design (PDL 5309)	X	PGD	Covers: Web 2.0, Internet based applications including designing websites. Course has a practical focus 3-hour written examination
Reference Services and Retrieval Systems (PDL 5308)	X	PGD	An advanced study of major online information retrieval systems is included 3-hour written examination (Theory)
Advanced Information Technology Applications (ILI 5101)	X	MSc (LIS)	3-hour written examination (Theory) Focuses on various ICT applications including e-commerce as a factor in business applications
ILI 5307 Instructional Methods for Information Literacy		MSc (LIS)	3-hour written examination (Study of concepts and techniques for applying computer technology to functional areas of Libraries (Libguides and websites).
Management Information Systems (ILI 5202)	X	MSc (LIS)	Advantages, limitations, characteristics and potential contribution of MIS in business Study of concepts and techniques for applying computer technology to functional areas of business and government 3-hour written examination (Theory)
Data Management and Data Curatorship (ILI 5308)	X	MSc (LIS)	Hands on experiences with technologies and applications in a virtual lab setting 3-hour written examination (Theory and practical orientation)

Key: B= National University of Science and Technology (NUST)

The fourth analysis looked at undergraduate LIS courses at School B which had ICT components but were being taught in theory only. The modules and content description is shown in Table 4.

Indexing and Abstracting (ILI 2106)

The purpose of this course is to introduce the student to theories and applications of document indexing and abstracting, as a type of information organisation and a tool of document retrieval.

Information Storage and Retrieval (ILI 2110)

The course examines principles of information storage and retrieval and how the principles apply to information systems and services.

Metadata Description and Access (ILI 2111)

The module covers issues on the application of standards and rules to the construction of tools for information retrieval, primary web resources and catalogues in library and information environments

Informatics (ILI 2212) The module introduces students to fundamental topics in Informatics while developing a basic understanding of Information Theory

Interview results

The study also sought the opinion of chairperson/HOD at institution B regarding the curriculum in general and challenges being faced in integrating ICTs. The HOD indicated that there was continuous review of the course content in order to align the teaching with employment requirements. The chairperson observed that there was an overlap in some of the modules and these required streamlining. For example Theory and practice of cataloguing (ILI 1209), which teaches aspects like AACR2, RDA, Metadata, with the similar , if not the same content being taught in module Metadata Description and Access (ILI 2111).

The major challenge faced as highlighted in the interview was the availability of resources, particularly modern computers which can handle advanced software programmes as well as a dedicated computer laboratory for exclusive use by the department's students. The department shared a computer laboratory with three other departments of the same faculty (CIS), whose teaching also requires them to use the same facilities. The small computer lab allocated to the department did not have working computers.

Such congestion was therefore very inhibiting. The lack of resources also affected the lecturers' ability to use technology for teaching purposes.

Table 4: Courses with ICT elements but currently teaching theory only

Course	School B	Level	Course description
Indexing and Abstracting (ILI 2106)	X	BSc (LIS)	The purpose of this course is to introduce the student to theories and applications of document indexing and abstracting, as a type of information organisation and a tool of document retrieval. The course reviews pre-coordinate and post-coordinate systems, automatic and manual indexing and abstracting, discussing the advantages and disadvantages of different systems. Additional topics covered include various types of printed and computerized indexes, standards for thesaurus construction and the indexing process. 3-hour written examination
Information Storage and Retrieval (ILI 2110)	X	BSc (LIS)	The module examines principles of information storage and retrieval and how the principles apply to information systems and services. It covers components of information storage and retrieval systems, information representation, storage and retrieval models and techniques (including human information processing), retrieval evaluation and evaluation of information retrieval systems. 3-hour written examination
Metadata Description and Access (ILI 2111)	X	BSc (LIS)	The module covers issues on the application of standards and rules to the construction of tools for information retrieval, primary web resources and catalogues in library and information environments; an overview of concepts of knowledge organisation and metadata applications (Dublin Core, Encoded Archival Description [EAD], Anglo-American Cataloguing Rules and Machine readable Cataloguing [AACR2 and MARC21]; functional requirements for Bibliographic Records [FRBR], RDF and XML)) as well as special problems in the organisation of resources: archival and library materials, in various forms including Internet resources. It also includes metadata formats, descriptive detail for different forms of material, choice and form of entry for names and uniform titles, provision of authority control for names and titles. 3-hour written examination
Informatics (ILI 2212)	X	BSc (LIS)	The module introduces students to fundamental topics in Informatics while developing a basic understanding of Information Theory. It covers foundational Informatics concepts such as Information, Knowledge, Modeling and Uncertainty. The module introduces all the conceptual building blocks necessary to understand the basics of Information Theory. Those building blocks are introduced hand in hand with the practical dimension of Informatics, which focuses on solving real problems with information technology. There is presentation of informatics tools in the field of information sciences and discussion of their implications for the practice in the field of information sciences. 3-hour written examination

Key: B = NUST

Source: NUST Faculty of Communication and Information Science prospectus (2019)

ICTs have had a huge impact on the services of libraries and their use has greatly revolutionised the ways in which information can be accessed and used for a variety of purposes. Adoption of ICT based LIS curriculum has thus become important as the world is adopting modern technology and digital content (Mahilang and Singh 2019). This is also important in aligning graduates' skills and competencies with the job market requirements. Modules like Cataloguing (ILI1209) and Classification (ILI 1107) previously taught predominantly in theory have now embraced open source Library Management system like KOHA. According to Sibiya (2017), Yadav 2022, essential skills and competencies sought by prospective employers for library and information science (LIS) positions include cataloguing and classification, and ICT related management systems.

The results from institutions A & B shows an awareness of the importance of ICTs inclusion in LIS programmes. This concurs with studies by Hikwa (2006) and Minishi-Majanja (2007) who earlier observed that LIS schools had shown great effort in fusing ICTs in their teaching and learning. As observed by Kamba (2011) and Minishi-Majanja (2007) most of the courses were however being taught theoretically due to inadequate resources like computers and laboratories. Some advanced ICT courses were not taught due to lack of competent lecturers, thus creating a weak ICT coverage in the courses (Pasipamire 2014). The study observed that there was an overlap in some modules like ILI 1107; ILI 1209 & ILI 2112 as they focus on similar aspects of information retrieval. Modules like ILI 2109 & ILI 2207 also exhibited similar extensions of each other.

7. Conclusions

Because of the rapid shift toward an information- and knowledge-oriented society, librarians and information professionals need to develop the required knowledge and skills to take advantage of ICT. These needs have driven the shift of LIS education from traditional librarianship toward ICT-oriented informatics (Miwa 2006: 24). ICT integration in LIS programmes shows a positive uptake by the institutions investigated although being mostly theoretical. Because of rapid technological changes in the information environment, resource support has become fundamental in the growth and

sustainability of LIS schools (Okello-Obura and Kigongo-Bukenya 2011:5). Not only should LIS curriculum infuse ICT content, and as Kules and McDaniel (2010:222) point out, “programmes should inform incoming students of expectations and help students address weaknesses early so they are technically prepared as they begin an LIS programmes”.

Resources and other infrastructure were cited as major hindrances. The challenges established in the study seem to create a peculiar scenario in studies conducted in Africa and developing countries as alluded in the literature above (Abubakar and Hassan 2011, Akanwa 2015, Chisita 2009, Burnett 2013). However, to some extent, Huff and Rholes (2011) observed that ICT related content varied among ALA-accredited LIS programmes in North America.

The study recommends a revisit and merging of courses which showed some serious overlaps when reviews are undertaken. LIS schools in Zimbabwe should also review, broaden and redesign their curricula in line with market requirements. Emphasis is to be given to IT, management and information service that would give graduates a competitive edge on the labour market, at the same time making them competent in the work place Pasipamire (2014:13).

References:

Abubakar, B.M and Hassan, B.B. (2010). Incorporating information technology in library and information science curriculum in Nigeria: a strategy for survival in the 21st century. *Library Philosophy and Practice*. Available: <http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1465&context=libphilprac> Accessed: 20/06 2023

Ahmad, S and Ahmad, S. (2012). Use of Information and Communication Technology by LIS students: asurvey of University of Peshawar. *Pakistan Library & Information Science Journal*, 43:2:11-21. Available: <http://eds.b.ebscohost.com/eds/pdfviewer/pdfviewer?sid=d43ea468-ffba-4ce7-80de-80dfee5cd956%40sessionmgr198&vid=1&hid=122> Accessed: 28/05/2023.

Akanwa, C.P. (2015). Towards restructuring library and information science curricula for the challenges of Information and Communication Technology (ICT) environment in Nigeria. *International Journal of Science and Technology (STECH)*, 4:1:94-103. DOI: <http://dx.doi.org/10.4314/stech.v4i1.8> Accessed: 14/07/2022.

Ashcroft, L. and Watts, C. (2005). ICT skills for information professionals in developing countries: perspectives from a study of the electronic information environment in Nigeria. *IFLA Journal*, 31(1): 6–12.

Burnett, P. (2013). Challenges and problems of library and information science education in selected African countries, paper presented at IFLA WLIC Singapore, 2013. <http://library.ifla.org/175/1/199-burnett-en.pdf> Accessed: 19/11/2022.

Chanetsa, B. and Ngulube, P. (2016). The changing roles, responsibilities and skills of subject and learning support librarians in the Southern African Customs Union region. *Journal of Librarianship and Information Science*, 48 (2): 151-176.

Chisita, C. (2009). Future librarians in Southern Africa: case of Zimbabwe. 75th *IFLA General Conference and Assembly August 23 -27*, Milan: Italy. Available at: <http://www.ifla.org/annual-conference/ifla75/index.htm> Accessed 26/05/2022.

Chu, H. (2006). Curricula of LIS programs in the USA: a content analysis. In: Khoo, C., D Singh, D. and Chaudhry, A.S. eds. *Proceedings of the Asia-Pacific Conference on Library and Information Education and Practice 2006 (A-LIEP 2006)*, Singapore, 3-6 April 2006 Singapore: School of Communication and Information, Nanyang Technological University, pp. 328-337. <http://myweb.cwpost.liu.edu/hchu/NJUST2014/MethodExamples/ContentAnalysis-Chu2006CurriculaOfLISPrograms.pdf> Accessed: 21/11/ 2022.

Dawson, C. (2009). *Introduction to research methods: a practical guide for everyone undertaking a research project*. 4th ed. Oxford: How to Books.

Devlin, A.S. (2006). *Research methods: planning, conducting and presenting research*. Belmont (Calif.): Thomson/Wadsworth.

Hallam, G.C. (2006). Trends in LIS education in Australia. In Khoo,C. and Singh, D. and Chaudhry, A.S., Eds. *Proceedings Asia-PacificConference on Library and Information Education and Practice 2006*. Preparing information professionals for leadership in the new age.pp. 41-51, Singapore, Nanyang Technological University. Available: http://eprints.qut.edu.au/4354/1/4354_1.pdf Accessed: 21/11/2022.

Harding, J. (2013). *Qualitative data analysis from start to finish*. Los Angeles: Sage Publications.

Hikwa, L. (2006). Integrating Information and Communication Technologies (ICTs) in Library and Information Science Curricula in Zimbabwe: country report presented at a Regional Workshop on “Integrating ICTs in Library and Information Science Curriculum in Africa” 20 to 23 November, 2006, Windhoek, Namibia. Available: <http://ir.nust.ac.zw/xmlui/handle/123456789/171> Accessed: 19/06/2023.

Kamba, M.A. (2011). ICT competency framework for library and information science schools in Nigeria: the need for model curriculum. *International Journal of Library and Information Science*, 3:4:68-80 Available: <http://www.academicjournals.org/ijlis>. Accessed: 12/07.2023

Kamila, K. (2008). Impact of ICT towards change of Library and Information Science (LIS) curricula and information services pattern. Paper presented at the 6th International

CALIBER-2008, University of Allahabad, Allahabad, 28 February – 1 March1, 2008. Available: <https://ir.inflibnet.ac.in:8443/ir/bitstream/1944/1241/1/7.pdf> Accessed 17/07/2023

Kules, B. and McDaniel, J. (2010). LIS program expectations of incoming students' technology knowledge and skills. *Journal of Education for Library and Information Science*, 51 4—(Fall) October 2010. Available: <https://www.jstor.org/stable/25764639> Accessed: 17/07/2023

Lata, N. and Sonkar, S.K. (2021). Massive Transformation through ICT in Library and Information Science Education and Career: Changing the Boundaries of Library Professionals. *Library Philosophy and Practice* (e-journal). 5986 Available: <https://digitalcommons.unl.edu/libphilprac/5986> Accessed 17/07/2023

Leedy, P.D. and Ormrod, J.E. (2010). *Practical research: planning and design*. 9th ed. Boston (Mass.): Pearson Education.

Mahilang, D.K and Singh, S. (2019). Important Role of ICT in Library and Information Science Education with special reference to Dr. C.V. Raman University Kota Bilaspur. *International Journal of Intelligence in Science and Engineering*, Available: https://issuu.com/thilagavathyranjan/docs/important_role_of_ict_in_library_an Accessed: 11/07/2023.

Minishi-Majanja, M.K. (2007). Integration of ICTs in Library and Information Science Education in sub-Saharan Africa. Paper presented at the World Library and Information Congress: 73rd Ifla General Conference and Council 19-23 August 2007, Durban, South Africa. Available: <http://www.ifla.org/IV/ifla73/index.htm> Accessed: 15/07/2022.

Minishi-Majanja, M.K. and Ocholla, D.N. (2003) Information and communication technologies in Library and Information Science education in Kenya. *Education for Information*, 21:243–262

Miller, R.L. and Brewer, J.D. (2003). *The A-Z of Social Research: a dictionary of key social research concepts*. London: Sage.

Miwa, M. (2006). Trends and Issues in LIS Education in Asia. *Journal of Education for Library and Information Science*, 47(3), 167–180. <https://doi.org/10.2307/40323828> Accessed 16/07/2023

Mugwisi, T. and Hikwa, L. (2015). A Tracer Study of Master of Science in Library and Information Science Graduates from the National University of Science and Technology, Bulawayo, Zimbabwe. *African Journal of Library, Archives and Information Science*, 25(2): 173-183.

Munyoro, P. and Mutula, S. (2016). Library and Information Science Education and training and employability skills in Zimbabwe. *African Journal of Archives and Information Science*, 26(2): 133-146

Ocholla, D. (2000). Review and Revision of Library and Information Science Curriculum in a South African University and the Usage of Follow-Up Study and Advertisement and Scanning Methods. Available at: <https://journals.library.ualberta.ca/ojs.caais-asci.ca/index.php/cais-asci/article/view/22/18> Accessed 16/07/2023

Ocholla, D. and Bothma, T. (2007). Trends, challenges and opportunities for LIS education and training in Eastern and Southern Africa. Available: <http://hdl.handle.net/2263/2674> Accessed: 16/07/2023

Ocholla, D.N. and Bothma, T. (2007). Library and information education and training in South Africa. Libraries for the future: progress and development of South African libraries. Pretoria: Library and Information Association of South Africa (LIASA), pp.149-168.

Okello-Obura, C. and Kigongo-Bukenya, I.M.N. (2011). Library and Information Science Education and Training in Uganda: Trends, Challenges, and the Way Forward. *Education Research International*, 2011:1-9. <https://doi:10.1155/2011/705372> Accessed 22/07/2022

Pasipamire, N. (2014). Examining the Gap between Employers' Skills Needs and Library and Information Science Education in Zimbabwe. Paper presented at the IFLA WLIC Conference in Lyon, France. Available: <http://library.ifla.org/1002/1/150-pasipamire-en.pdf> Accessed: 22/07/2022

Raju, J. (2017). Information professional or IT professional?: the knowledge and skills required by academic librarians in the digital library environment. *Libraries and the Academy*, 17(4): 739-757

Riley-Huff, D. A., & Rholes, J. M. (2011). Librarians and technology skill acquisition: Issues and perspectives. *Information Technology and Libraries*, 30(3): 129 - 140

Shongwe, M. and Ocholla, D. (2011). A tracer study of LIS graduates at the University of Zululand, 2000–2009. *Mousaion*, 29 (2):227—245

Sibiya, P.T., (2017). *The link between cataloguing and classification curricula and job requirements in South Africa* (MA dissertation, University of Zululand).

Singh, J. and Shahid, S.M. (2010). Changing needs of Library and Information Science curricula in India. *Library Philosophy and Practice* Paper 357. Available: <http://digitalcommons.unl.edu/libphilprac/357> Accessed: 19/07/2022.

Singh, J., and Wijetunge, P. (2006). Library and information science education in South Asia: Challenges and opportunities. Presented at the Asia-Pacific Conference on Library & Information Education & Practice 2006 (A-LIEP 2006), Singapore, 3-6 April 2006. Available: <http://arizona.openrepository.com/arizona/bitstream/10150/106432/1/jagtar.A-LIEP2006.pdf>. Accessed : 28/07/2022

Yadav, A.K.S. (2022), Key skills and competencies of LIS professionals in the digital library environment: a content analysis of job advertisements", *Library Management*, 43(1/2): 50-65. Available: <https://doi.org/10.1108/LM-03-2021-0030> Accessed 13/07/2023

Younis A., Faten H., Nashrawan T. and Maha A. (2016) .The integration of ICT in library and information science curriculum analytical study of students' perception in Jordanian Universities. *Library Review*, 65(6/7): 461-478. Available: <https://doi.org/10.1108/LR-12-2015-0115> Accessed 24/05/2022.

Zainab, A.N., Edzan, N.N. and Rahman, S.S.A. (2004). Tracing graduates to ascertain curriculum relevance. *Malaysian Journal of Library & Information Science*, 9(1): 27-37. Available: <http://ejum.fsktm.um.edu.my/article/277.pdf> Accessed: 04/08/2021.