Data Aspects in Library and Information Science CurriculA in Selected African Universities

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ABSTRACT

Purpose - The purpose of this study was to investigate data aspects in Library and Information Science curricula at all levels in selected African Universities.
Design/methodology/approach - A review of existing literature on data aspects and LIS Curricula. Secondly, the study juxtaposed web-based courses for fourteen LIS schools to establish data aspects incorporated into their curricula.
Findings - The study's findings found that although many LIS schools have some form of data aspects in curricula, coverage is still very limited and basic.

1. Introduction

Data aspects have emerged as important areas within Library and Information Science (LIS) at all levels. However, as with any new domain, creating suitable curricula for the discipline has necessitated a lot of work (Karbasian & Johri, 2020). Arguably, many scholars assert that various African Universities are still in the early stages to introduce data studies programmes in their LIS curricula (Enakrire, 2020; Okeja, 2021). Interestingly, the present literature gives credence to some Universities and LIS academics for the exponential inclusion of data aspects. Chiware (2020b) identified various data considerations that have paved their way into LIS curricula, for instance, research data management, data science, big data, data privacy and protection, data librarianship, and curation. Consequently, the roles of LIS professionals are changing in various ways too, hence, emanating new roles such as data curators, research data managers research consultation and guidance services, and data librarians (Ashiq & Warraich, 2022; Amini, Vakilimofra, & Saberi, 2021; Okeji & Mayowa-Adebara, 2020; Ohaji, Chawner, & Yoong, 2019; Kiconco, 2018).

As the growth of data-based products and services increases, the demand for qualified professionals is ever-growing (Gurcan, 2019). Given this trend, there is an increasing demand for African Universities

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to keep up with not only data aspects but also emerging competencies and data skills. Essentially, Chiware (2020a), Enakrire (2020) and Kiconco (2018) saw the need to update the LIS curriculum in African Universities to adapt to the changing roles and requirements. LIS core competencies have thus changed and now graduates require data skills at different levels. Amini, Vakilimofra, and Saberi (2021) observed the changes in core competencies in the LIS curricula. According to Edegbo (2011), the LIS education curriculum typically reflects what is being offered to train LIS professionals to not only become qualified individuals with the right competencies but can also encounter the challenges that the constantly evolving information society brings, which have rendered LIS traditional competencies and skills obsolete. Hence, it is irrefutable that the influx of data aspects in our society has brought significant changes to LIS education in Africa. Therefore, it was imperative to investigate data aspects inclusion in the LIS curricula of selected African Universities.

2. Literature Review

The emergent debut of data aspects has been observed in recent LIS literature, predominantly in developed countries. This section describes prior studies on LIS education in selected African Universities, knowledge-based competencies to data aspects inclusion in LIS curricula, the significance of the inclusion of data aspects, and hindrances to the inclusion of data aspects in the LIS curricula.

2.1 LIS Education in Selected African Universities

LIS education in African Universities has come a long way, with improvements in competencies, skills, and curricula, that have been seen in the library and information profession in particular. Foundational to this, Otike (2017) in his examination of the origins of LIS education in African nations asserts that LIS education programmes in South Africa began as early as 1933. In 1938, the South African Library Association started a librarianship course, which resulted in the formation of the Department of Librarianship at the University of Pretoria, which was primarily offering a diploma program (Otike, 2017). The footstep was advanced by the University of Cape Town. In 1939, the University of South Africa (UNISA) commenced offering undergraduate and graduate programmes in librarianship based on the English system, which also formed part of its distance learning programmes by 1952.

With help from the British Council to develop regional programmes for Ghana, Nigeria, and Sierra Leone, librarianship training got underway at Achimota College in Ghana in 1945. The college offered an Associateship of Library Association (ALA) which lasted for two years., Some Universities at that time provided a qualification that was equivalent to a University diploma. Adegboye and Abubakar (2021) and Enakrire (2020) concur that the seminars organised by UNESCO in 1953 and funded by Carnegie corporation resulted in the creation of the Ibadan Library School in 1959. Otike (2017) adds that in 1960, the school started offering postgraduate diploma programmes to students from English-speaking states. In the same year, Ghana inaugurated its school affiliated with the University College of Ghana.

In East Africa, LIS education programmes started in the 1960s. In 1963, the East African School of Librarianship (EASL) started to serve Uganda, Kenya, Tanganyika, Mauritius, and Zanzibar offering a certificate program in librarianship for six months and in 1965, holders with a certificate in librarianship or an advanced level school certificate were enrolled for a diploma program lasting for two academic years (Otike, 2017). EASL latterly transformed into the East African School of Library and Information Science (EASLIS) (Okello-Obura & Kigongo-Bukenya, 2011). In its initial inauguration, "the school was manned by the heads of national public library networks and University libraries in East Africa under the Council for Library Training in East Africa (CLTEA) and Makerere University", which acted as a think tank for the school. The need for LIS education in East Africa stemmed from schools, colleges, and Universities (Otike, 2017). Subsequently, Okello-Obura, and Kigongo-Bukenya (2011) opine that in 1989, Makerere University started awarding bachelor's degrees in LIS education. It is also worth noting that there are now numerous Universities offering similar programmes, for instance in Uganda; Uganda Christian University, Kabale University, and Ndejje University, in Kenya; Moi University, Nairobi University, and Kenyatta University, in Tanzania; University of Dar-Es-Salaam, Tumaini University, and Library School at Bagamoyo (Okello-Obura & Kigongo-Bukenya, 2011; Otike, 2017).

Currently, LIS education in Universities' curricula has changed. These changes have sprung due to the need for updating the curriculum to stay abreast with the novel roles and expectations. Okello-Obura and Kigongo-Bukenya (2011) observed changes in LIS departments through a combination of other disciplines, for instance, the information and communication studies department at the University of Namibia and the University of Johannesburg changed to information and knowledge management, and the EASL to EASLIS at Makerere University. For a long time, all these African Universities have been providing programmes for all LIS professionals i.e., PhD in Information Science, Master of Science in information science, Postgraduate Diploma in Librarianship, Bachelor of Library and Information Science, undergraduate Diploma in Library and Information Studies with undergraduate certificate programmes being phased out.

2.2 Knowledge-Based Competencies Encapsulated in LIS Curricula

Competence refers to the well-articulated, persistent incorporation of one's skills and innate knowledge necessary to assure efficient, safe, and ethical work practices (Essien, Lu, & Zu, 2020). Competencies are of significant value to LIS professions and this is the reason why its studies are manifested multifarious times in LIS literature. According to Okeji and Mayowa-Adebara (2020), an examination of the digital literacy skills and knowledge-based competencies among librarians found two groups of competencies. The competencies include; professional competencies and core competencies. The scholars described core competencies as *"anchoring the professional and personal competencies essential for every information professional"*. While Lester (2017) described professional competencies as the practitioner's ability to use knowledge and skills as a foundation for rendering effective services at a fully-qualified level in the occupation, the ever-changing nature of jobs and technology inclines LIS professionals to deal with knowledge and skills about work (Farooq et al., 2016).

Obura-Okello and Kigongo (2011) argue that LIS practitioners imbue more time and attention to the theoretical knowledge in the curricula than developing a practical knowledge base of the field. Nevertheless, for LIS professionals to effectively render services at any point of request requires adequate knowledge and skills for effective service delivery (Adegboye & Abubakar, 2021). Yadav (2021) elucidates on the notion of LIS professionals. He draws that they possess specialised education, and their knowledge and skills are used in the service of others and to improve the literacy of people. He further noted that possessing technological expertise is not adequate; professionals require interpersonal skills, managerial, emotional intelligence, and research skills through a well-developed curriculum and training. The curriculum comprehends academic prerequisite competencies required by students during training at the University. Essien, Lu, and Zu (2020) and Pedzisai (2014) concur that the curriculum should be a well-developed integration of competencies required for effective service delivery by all practitioners in the LIS profession. For LIS graduates and professionals to effectively render their professional services, they must possess an array of LIS core competencies (Essien, Lu, & Zu, 2020). Multifarious studies have been conducted in various Universities to investigate the prerequisite competencies for LIS graduates (Yadav, 2021).

Fraser-Arnott (2017) enumerated five categories under his research on competencies for information specialists in emerging roles: records, information and knowledge management; program and service delivery; organisational understanding and strategic alignment; collaboration, client service, and communication. In a study that assessed LIS education and training in Zimbabwe under the context of paradigm change, Pedzisai (2014) revealed eighteen major competencies, including foundational or core competencies; technological skills; managerial skills; communication and community service skills; workplace competencies and interpersonal skills; legal framework for practice and research, among others. In some studies, the generic key competencies for LIS students in the twenty-first century were recognised as English language proficiency, computer literacy, and computer programming (Chaka, 2020; Geraei & Heidari, 2015). The proliferation of ICTs and the repetitive needs of the job market have found their way into the LIS curriculum and new topics have been included in core competencies. However, the results revealed that contrary to what was advised in the competency framework published by IFLA, data aspects were not included as components of LIS education and training programmes in African Universities (Fernández-Molina et al., 2022; Sonzini, 2022).

2.3 Data aspects inclusion in the LIS Curriculum

Present literature demonstrates an exponential rise in LIS programmes in different Universities, and voluminous survey studies have been carried out to identify data aspects inclusions in LIS curricula. However, researchers opine that there is inadequate awareness of data aspects or studies in African Universities with no proper repository for research data management, low competencies in academics and inadequate technological tools for data (Chiware, 2020a; Enakrire, 2020). Nevertheless, Okeji, and Mayowa-Adebara (2020) recommend the integration of data aspects into LIS curricula. Deja et al. (2021) argued that LIS academics should leverage data literacy skills to develop learning programmes that can be integrated with the curricula.

The analysis of Chiware (2020b) revealed that there were three South African Universities offering

programmes that relate to data aspects. One institution offered data curation in a Post-Graduate Diploma (PGD) in LIS. Research data management was included in a Master of philosophy in digital curation. The second institution offered courses in data structures and algorithms and database systems and programming languages in a bachelor of information science specialising in multimedia and information science. The third institution offered data curatorship as a research area. A recent study by Yadav (2021) identified data visualisation and data mining as areas considered important by LIS alumni.

Khan and Parveen (2020) revealed that data analysis, text mining and visualisation skills were offered to LIS scholars in Pakistan Universities. The University of London offers a master's program in LIS teaching courses in data librarianship. Essien, Lu, and Zu (2020) and Sonzini (2022) singled out digital data management as a data aspect in LIS curricula in the twenty-first century. Other studies reported programming languages i.e., R, python, structured query language and NoSQL as technologies that have maintained their dominance in data management in information science (Chiware, 2020a; Okeji & Mayowa-Adebara, 2020). Other Universities i.e., the University of Sheffield and the University of Toronto also offer PGD courses in data librarianship. Different studies explored the field of data revealing that data science was an interdisciplinary field (Chang et al., 2019; Wang, 2018; (Chiware, 2020a; Virkus & Garoufallou, 2019).). The authors posit that the field encompasses knowledge and skills from mathematics, computer and information science.

With the belief that LIS may have a substantial impact on the field of data science, Wang (2018) advocated for the integration of data science with information science to develop field ambidexterity. Due to the rapid developments in technology in libraries and information centres, it is now more important than ever to pay attention to the data and information available in libraries and information centres and to provide it to visitors (Amini, Vakilimofra, & Saberi, 2021). Da Sylva (2017) investigated how LIS specialists gear themselves to handle various types of data. She proposed three components which include, types of data, an introduction to tools required to process the types and an understanding of the impact that each type will have on information science as a discipline and the practice of information professionals. Chiware (2020a) opines that LIS schools are reskilling librarians to manage data and the talent acquisition of newly trained graduates with data handling skills is emerging as some of the recommendations for the adoption of data aspects. An experimental course at Harvard Library aimed at getting librarians ready for the growing data needs of their communities. The course covered the research data lifecycle and provided hands-on experience using cutting-edge data management systems and tools (Virkus & Garoufallou, 2020). The role of the LIS profession in the discipline of data aspects movement was examined in several papers.

Virkus and Garoufallou (2020) posit that data management work in research libraries is still in its infancy. The significance of academic librarians in data management was subsequently established. In a study conducted at the University of Florida, Maxwell, Norton and Wu (2018) reported results of a survey which indicated an increasing need for education in analytical tools and technology. The authors postulate that one of the pivotal opportunities for academic LIS practitioners may be data-driven research and discovery. Koltay (2017) articulated the roles that academic LIS practitioners have to comprehend in response to the demands of data-intensive research. He recognises the theoretical considerations as well as practical knowledge-based research data management that should be offered

to scholars. He also observes that data-intensive researchers require support in the planning, organisation, documentation, and dissemination of data sets for deposit, preservation, copyright, licensing, and intellectual property issues. Koltay (2017) asserts that libraries need to work closely with researchers and other support service providers to address all of these challenges. There are similarities between the responsibilities and competencies of data-related professions i.e., data librarians, data scientists, and records professionals. However, data librarians are not data scientists; their work environments, culture and scope of duties differ. Other responsibilities mentioned included: providing scientific data navigation services; developing integrated retrieval systems; conducting research on data curation-related issues such as data mining, digital publishing, and visual data analysis; and promoting open access and sharing of scientific data to facilitate scholarly communication.

2.4 Significance of inclusion of data studies in the LIS Curriculum

Considering the relevance of data literacy, data-driven decision-making and big data, LIS professionals must comprehend these concepts and know how to apply them to their daily work (Kiconco, 2018). The integration of data literacy studies in LIS education will give LIS students a competitive edge in the labour market as well as fuel their competency in the job market. In Yadav's (2021) study investigating the competencies of LIS professionals in the digital age, it was revealed that data management skills enable data librarians to analyse, explore, model and draw conclusions and provide inputs for the decision-making process. Supporting the development of critical data literacies in higher education, a study by Raffaghelli et al. (2020) urges Universities to establish hubs' stakeholders to engage in substantial actions and research in areas of data usage, transforming data into information. The researchers evaluate results that of how tutors determine future pedagogical practices, understand students' needs and make adjustments; supporting students' data literacy and pedagogical data literacy.

2.5 Hindrances to the Inclusion of Data Studies

Latterly, a study by Ashiq and Warraich (2022) in Pakistan investigated the perceptions of LIS professionals on data librarianship. The emerging challenges were limited training opportunities for data librarianship roles, and limitations to acquiring advanced technical data-driven skills. These later impeded the inclusion of data aspects in the LIS curricula. Inadequate academic staff was another challenge fronted by Essien, Lu, and Zu (2020) who reveales that LIS schools in Ghana battled with this challenge due to continuing education and retirement. The authors add that competent staff in LIS quit for better salaries in the information technology (IT) field. Okello-Obura and Kigongo-Bukenya (2011) assert that this technological challenge has continued to pose a challenge to the LIS field.

The study of Essien, Lu, and Zu (2020) showed that LIS schools in Ghana are still threatened with challenges, particularly budgetary limitations and inadequacy of modern equipment. A recent study by Chiware (2020b) identified challenges of unstable internet platforms, absence of data centres, unreliable electric power supply, and low-performance centres. Kiconco (2018) studied the implications

of big data on the role of libraries in the realisation of Sustainable Development Goals (SDGs). She revealed the absence of motivation and drive in LIS practitioners, issues with open data, science policies, and guidelines. Given the emergent research data management, Abankwa and Yuan (2019) and Chigwada, Chiparausha, and Kasiroori, (2017) report the absence of institutional support and leadership in African Universities and the paucity of synergy between librarians and researchers in Ghana and Zimbabwe respectively. McBurney and Kubas (2022) identified hindrances to library data support in South Africa and the United States of America. The challenges relate to limited documentation, data privacy and protection, inadequate data curation, and technology resources limitation like security and access. Recently, Huang, Cox, and Sbaffi (2021) conducted a study on research data management policy and practices in Chinese academic libraries. They identified data sharing reluctance, data scalability and the LIS practitioner's reluctance to accept the research data management role.

With all these imminent challenges, LIS schools, especially in African Universities are not able to fulfil the mandate of producing graduates equipped with technical data-driven competencies to manage the emerging new roles (Chiware, 2020a).

3. Methodology

The research methodology adopted for the study juxtaposed LIS curricula from selected African Universities with those with and without data aspects in their curricula and an investigative study in which LIS programmes at all levels in Universities have been explored by navigating websites of various LIS departments to find out data studies inclusion in their curricula. Most of the data was gathered from LIS schools' websites and web pages. For every program, the study analysed the required information that was available in the course contents and course description. In every program, the researchers searched for content related to data studies or any data-related courses. However, different methodological impediments were incurred. Some African Universities' websites were not fully updated and were not navigable to curate the required data.

4. Results

The study analysed fourteen Universities as a sample. The study found five LIS schools that had no course, or subject with data-related content or studies: University of Nairobi in Kenya, University of Johannesburg in South Africa, Obafemi Awolowo University in Nigeria, and University of Dar-es-Salaam in Tanzania. These Universities offer LIS programmes at all levels with courses related to information and digital literacy, but their course content does not show any term "data". It could be that these subject contents are not yet included in the curricula or the websites are not updated. The table shows all Universities analysed that offer courses related data totalled nine, dedicated specifically to data studies inclusion in their curricula. The four Universities show no data-related subjects in their programmes and course contents. However, they offer other courses

in research methods, digital literacy and information literacy.

4.1 Institutions offering data-related courses in their LIS Curricula

The table shows African Universities and different LIS departments that incorporated data studies into their curricula. The examined offer courses such as database management systems, health data and welfare information services, and data and research management. The study also revealed that Universities offer these courses for both undergraduates and graduates.

Table 1. Courses dedicated to data studies

University	Course title
Makerere University	Database management and information retrieval, introduction to data management, Data storage and security, Advanced data information management.
Uganda Christian University	Database management systems
Kabale University	Database management systems
Moi University	Data structures and Algorithms, Database Construction & management
Kenyatta University	Database management systems, Health Data and Welfare information Services
University of Pretoria	Data management, Research data management
University of South Africa	Database systems
University of Nigeria	Computers and Data Processing
University of Botswana	Computer and Data studies, Database systems

4.2 Courses partially related to data studies

With the recent literature on challenges that impede the inclusion of data courses in the existing LIS curriculum, it's evident that Nairobi University, Kabale University and Uganda Christian University LIS are not prepared yet to take the lead in incorporating data studies in the school curriculum. Results from Table I show that only a few LIS in Africa such as Makerere University, South Africa and Kenya have taken a step by integrating data aspects as standalone courses in their curricula.

Table 2. Overview of African Universities' Data Courses

S/n	Country	University	Department	Programmes	Courses	Website
1	Uganda	Makerere University	Department of LIS	Bachelor of Library & information science	Database management and information retrieval, introduction to data management, Data storage and security, Advanced data information management.	https://courses.mak.ac.ug/

S/n	Country	University	Department	Programmes	Courses	Website
				Master of information Science	X	
				PhD in information Science	X	
		Uganda Christian University	Department of LIS	Bachelor of Library & information science	Database management systems	https://ucu.ac.ug/bachelor-of-library-and-information-science/
		Kabale University	Department of LIS	Diploma in Library and Information Science	X	https://www.kab.ac.ug/University_unit/faculty-of-computing-library-and-information-science/
				Bachelor of Library & information Science	Database management systems	
				Master of information Science	X	
2	Kenya	Moi University	Department of LIS	BSc information Sciences	Data structures and Algorithms	https://is.mu.ac.ke/index.php/undergraduate/bsc-in-information-sciences
					Database Construction & management	
				Master of Library &information Studies	X	
				PhD in Library &information Studies	X	
		Nairobi University	Department of LIS	Bachelor of information science	X	
				Master of information Science	X	
				PhD in information Science	X	
		Kenyatta University	Department of LIS	Bachelor of Library &information science	Database Management Systems	
					Health Data and Welfare information Services	
				Master of information Science	X	
				PhD in information Science	X	
3	South Africa	University of Pretoria	Department of information Science	BIS (HON) information Science	Data management	https://www.up.ac.za/information-science
				Masters of ICT in information Science	Research data management	
					Data, information and knowledge management	
				Master in Library Science	Research data management	
					Data, information and knowledge management	
				PhD in Information Science	X	
				PhD in Library Science	X	
		UNISA	Department of LIS	Advanced Diploma in information resource management	Database systems IV	https://www.unisa.ac.za/sites/corporate/default/Register-to-study-through-UNISA/Undergraduate-&-honours-qualifications/
				X		
				X		
		University of Johannesburg	Department of LIS	X		
				X		
				X		

S/n	Country	University	Department	Programmes	Courses	Website
4	Nigeria	University of Nigeria	Department of LIS	Bachelor of Library &information science	Computers and Data Processing	https://www.unn.edu.ng/department-of-library-information-science/
		Obafemi Awolowo University Nigeria	Department of LIS	X		
				X		
				X		
5	Ghana	University College of Ghana	Department of Information & Communication studies	Bachelor Information Studies	Data & information management	https://www.admission,ug.edu.gh/
6	Botswana	University of Botswana	Information	Bachelor of Information & Knowledge Management (LIS)	Computer and Data studies, Database systems	Information
				Master in Library and Information Studies	Computer and Information, Database systems	
				PhD in Information Studies	X	
7	Tanzania	University of Dar-Es-Salaam	Department of LIS	Bachelor of Library and Information Studies	X	https://www.udsm.ac.tz/web/index.php/institutes/libraInformationrmation-studies
				Masters of Library and Information Studies	X	
				No Available	X	

5. Discussion

From the fourteen African Universities offering LIS education reviewed, the study established that five LIS schools lacked data-related content in their LIS curricula despite offering LIS programmes at all levels with courses related to information and digital literacy. The other nine had data-related content in their LIS curricula with topics such as database management, database systems and data structures.

To a large extent, there was a limited inclusion of data aspects in the LIS curricula with the results showing that data-related content was only offered at the Bachelor level. These findings are consistent with what previous scholars have established. Enakrire (2020) and Okeja (2021) reported that the inclusion of data-related courses in most LIS schools in Africa was still at its early stage. This stage seems to be taking longer than LIS Schools in other continents. This is still persistent despite the changing role of the LIS profession emanating new roles that require data competencies. The studies of Amini, Vakilimofra, and Saberi (2021), Okeji and Mayowa-Adebara (2020), Ohaji, Chawner, and Yoong (2019) and Kiconco (2018) assert that some of the new roles in the LIS profession include data curation, data librarianship and research data management. This assertion shows how indispensable data aspects are to the LIS profession today and necessitate the need to include them in the LIS curricula. They also elucidate on the changing field of the

LIS profession requiring new sets of skills to offer efficient and effective services. Kiconco (2018) notes that LIS professionals need to have a general understanding data concepts and their application in work. With limited exposure to data aspects, LIS professions are at risk of failing to meet job demands and expectations. Therefore, LIS professionals ought to increase their competency in data aspects. LIS schools in African Universities should also incorporate data-related courses in their LIS curricula.

6. Conclusion

In conclusion, this study provides insights about data aspects inclusion in the selected African Universities. This study shows that very few Universities offer data-inclusive courses at undergraduate and graduate levels.

The study also revealed a gap in LIS schools which have failed to incorporate data studies in their curriculum and skill LIS scholars. However, it is expected that all LIS schools, especially in East Africa and West Africa review their curricula to include data courses to produce highly competent. The study explores the significance of data inclusion in the LIS curricula emergent roles i.e., data librarianship, curatorship and research data management. Data studies are the routes to participating and competing in this data-driven society. It contributes to student's skills and knowledge base which indoctrinates continuous learning which is a prerequisite for innovation and problem-solving. Overall, LIS professionals with data skills can play a vital role in helping libraries and information centres navigate the data-rich environment, and provide valuable services to patrons, researchers and organisations.

Conflict of Interest

All authors declare that they have no conflict of interest to declare

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