International Journal of Education, Learning and Development
Vol. 12, No.9, pp.119-133, 2024
Print ISSN: 2054-6297(Print)
Online ISSN: 2054-6300 (Online)
Website: https://www.eajournals.org/
Publication of the European Centre for Research Training and Development-UK

Effect of Fourth Industrial Revolution (4IR) on Library and Information Science Curriculum in Higher Education in Africa: A Literature Study

Peter Olubunmi Olubiyo
University Library,
Adeyemi Federal University of Education, Ondo, Nigeria.
olubiyopeter@gmail.com

doi: *https://doi.org/10.37745/ijeld.2013/vol12n9119133* Published December 15, 2024

Citation: Olubiyo P.O. (2024) Effect of Fourth Industrial Revolution (4IR) on Library and Information Science Curriculum in Higher Education in Africa: A Literature Study, *International Journal of Education, Learning and Development*, Vol. 12, No.9, pp.119-133

Abstract: *The Fourth Industrial Revolution (4IR)— characterized by the fusion of the digital, biological, and physical worlds, as well as the growing utilization of new technologies such as artificial intelligence, cloud computing, robotics, 3D printing, the Internet of Things, and advanced wireless technologies, among others—has ushered in a new era of economic disruption with uncertain socio-economic consequences for Africa. However, Africa has been left behind during the past industrial revolutions. Will this time be different? The fourth industrial revolution is associated with a lot of changes that intends to enforce digitalization, network and virtualization in every aspect of life. It has to do with library automation and data exchange in technologies which are based on digital technology. Several studies have revealed that fourth industrial revolution has started in Africa. It is an era that is using both digital and human element in the workforce. Report indicates that 4IR will create disruptions to future jobs and skills but will also simultaneously open new opportunities. There will be a demand for professionals with a blend of traditional and digital skills of subject knowledge. Thus, for LIS graduate to fit into the fourth industrial revolution, curriculum that has to do with modern practice has to be put in place. The emergence of the 4IR will have an effect on education with particular emphasis on curriculum development. The innovative technologies and socio-economic developments of the modern society was discussed and how it will affect the library education agenda, policies and the way forward. The implications of responding to 4IR with respect to curriculum development of Library and Information Science is of particular interest because it is training students for within the emergent 4IR milieu. Therefore, Fourth Industrial Revolution has both negative and positive effect on Library Science Students.*
Key words: fourth industrial revolution (4IR), library, information science curriculum

INTRODUCTION

The Fourth Industrial Revolution (4IR)— characterized by the fusion of the digital, biological, and physical worlds, as well as the growing utilization of new technologies such as artificial intelligence, cloud computing, robotics, 3D printing, the Internet of Things, and advanced

wireless technologies, among others—has ushered in a new era of economic disruption with uncertain socio-economic consequences for Africa (Ndung'u & Signé, 2019).
The roles of LIS professionals are very important in the library because they have the skills required to acquire relevant information resources for the library and are able to process them according to the library system. The LIS professionals are the bridge between information resources and the readers (Kumar, 2018). In the library, resources are acquired and processed based on rules and regulations of the profession. And these rules and regulations do not come in rosy way. They are acquired from the academic world to handle library information resources in a way that users can easily access them. The core skills traditionally associated with library/ information science include information handling skills - cataloguing, classification, indexing, enquiry work and user education training skills with facilitating skills and evaluation skills. (Hashim and Mokhtar, 2012).

Today's changing environment in library and information centres look for change in the professional skills besides the academic skill. The dramatic changes, largely the result of rapidly evolving information and communication technologies (ICTs), have impacted significantly on the knowledge and skills required for library and information science (LIS) professionals. The transformed landscape requires a new generation of LIS professionals to effectively and efficiently bridge it (Ravi, 2018). In addition, Ravi (2018) cited National Knowledge Commission (2007) while recommending the role of libraries as "gateways to knowledge" emphasized the skills required to fulfill the changing role of libraries as Library and Information handling skills, service orientation, ICT knowledge skills, communication and training skills, marketing and presentation skills, understanding of cultural diversity and knowledge mapping skills.

According to Ravi (2008), in order to cope up with the ever-changing library and information science profession, the library professionals must be a skilled professional. The skills can be categorized as domain specific skills, essential skills - reading, writing, computer application, creative thinking, analyzing skills etc. As part of the skills, the profession requires managerial skills - planning, organisation, managing negative people, assertive skills and conflict management skills. Leadership Skills are part of the key skill that a librarian needs, to be able to arrive at the target of the organization. Leadership skills include goal setting, team building, motivation, risk taking, formulating vision and others. In the library, there are lot of sectional duties with its peculiarities and uniqueness, as such, contextual skills – operational skills in different environment or culture comes in, in order to achieve the organizational goals.

According to DIK (2011) in Widén and Kronqvist-Berg (2014), seven key areas were identified for professional efficiency in LIS. They are digitalization, reading skill, scholarly 5 communication, participatory culture, pedagogical skills, marketing, and academic skills. The key areas focused on communicative skills, in various ways as well as juridical competence within the different areas. Digitalization skill entails technical competency and ability to communicate with IT personnel and systems, juridical competence, license agreements, and procurement. In addition, reading skill involves information and media literacy skills

competency, to meet all kinds of user groups (children, multicultural and people with disabilities). Consequently, the library of this century must give ICT a top priority. These skills will assist Library and Information Science professionals to effectively apply ICT-based technologies to the provision of library and information services (Nkanu, Iyishu and Ogar, 2013).

History of 4th Industrial Revolution

Philbeck & Nicholas, (2019) in David-West (2021) expressed that Industrial Revolutionism are simply eras that introduced and developed technologies, that has to do with changes in technologies that are connected to digital transformation. The first industrial revolution, started in United Kingdom in the 18th century. The steam pressure and mechanical manufacturing was introduced. This however brought a change in the output.

Macpherson, (1962) as cited in David-West (2021) opined that this brought about greater productivity that led to urbanization and relevance of democratic government using middle class to western hemisphere. In the educational sector the IIR brought a vision for a new kind of curriculum that has to do with diverse degree options and new general education programs that gave in-depth knowledge about upcoming discipline. The second industrial revolution dated in the period between 1867 and 1914 is a subsequent wave of systems change that brought about the believe that science and technology are the way forward to a better life. The revolution brought a step change in standardization, technical complexity and precision in manufacturing as well as large-scale technological infrastructure, such as electricity and new forms of public transportation based on internal combustion. Also, innovations such as steamship, telephone, gas turbines, artificial intelligence and mass production. In the education sector, it brought about new powerful technologies that produce a large crop of new innovative educational institutions. This era was intended to enable industrial classes and open up opportunities for education to be accessible to all. The third industrial revolution began in 1950s leading to the invention of computers and internet. It is characterized as computerization and web-based interconnectivity, the expansion and access to education rose to a greater prominence with globalization of academic research accelerated by online technology. The duplication of new education institutions and new curriculum alter the first two industrial revolution enable the workforce capacity upgrade and to implement the massive expansion of the economy and manufacturing that arose in the twentieth century.

Mazur, (2019) in David-West (2021) asserted that the third industrial revolution brought education to an environment where access to information is immediate and free, shifting focus towards active learning pedagogies that place premium in collaboration within diverse teams and peer learning environments. The 4IR is the prevalent and developing environment in which disruptive technologies and trends are changing the way we live and work. The impact of the 4IR technologies is still unknown. It is certain that it will bring a profound change in every aspect of human endeavor. The need for Library and Information Schools to respond to it is very necessary. It will afford students the opportunity to develop capacity in the fast-emerging area.

International Journal of Education, Learning and Development
Vol. 12, No.9, pp.119-133, 2024
Print ISSN: 2054-6297(Print)
Online ISSN: 2054-6300 (Online)
Website: https://www.eajournals.org/
Publication of the European Centre for Research Training and Development-UK

History of Curriculum Development

The word "curriculum" according to Wikipedia (2021) began as a Latin word which means "a race" or "the course of a race" (which in turn derives from the verb currere meaning "to run/to proceed"). The word is "from a Modern Latin transferred use of classical Latin curriculum "a running, course, career" (also "a fast chariot, racing car"), from currere "to run". The first known use in an educational context is in the Professio Regia, a work by University of Paris professor Petrus Ramus published posthumously in 1576. The term subsequently appears in University of Leiden records in 1582. The word's origins appear closely linked to the Calvinist desire to bring greater order to education. By the seventeenth century, the University of Glasgow also referred to its "course" of study as a "curriculum", producing the first known use of the term in English in 1633. By the nineteenth century, European universities routinely referred to their curriculum to describe both the complete course of study (as for a degree in surgery) and particular courses and their content. By 1824, the word was defined as "a course, especially a fixed course of study at a college, university, or school." There is no generally agreed upon definition of curriculum. Some influential definitions combine various elements to describe curriculum as follows:

Types of Curricula

Through the readings, four types of curricula could be defined as affirmed by Kelly (2009) in Wikipedia (2021). They are as following:

Explicit curriculum: subjects that will be taught, the identified "mission" of the school, and the knowledge and skills that the school expects successful students to acquire.

o Implicit curriculum: lessons that arise from the culture of the school and the behaviors, attitudes, and expectations that characterize that culture, the unintended curriculum.

o Hidden curriculum: Jackson, (1986) in Wikipedia, (2021) explained that they are things which students learn, 'because of the way in which the work of the school is planned and organized but which are not in themselves overtly included in the planning or even in the consciousness of those responsible for the school arrangements. The term itself is attributed to Philip W. Jackson and is not always meant to be a negative. Hidden curriculum, if its potential is realized, could benefit students and learners in all educational systems. Also, it does not just include the physical environment of the school, but the relationships formed or not formed between students and other students or even students and teachers.

o Excluded curriculum: Hancock, Dyke, and Jones, (2012) in Wikipedia (2021) asserted that excluded curriculum topics or perspectives that are specifically excluded from the curriculum. It may also come in the form of extracurricular activities. This may include school-sponsored programs, which are intended to supplement the academic aspect of the school experience or community-based programs and activities. Examples of school sponsored extracurricular programs include sports, academic clubs, and performing arts. Community-based programs and activities may take place at a school after hours but are not linked directly to the school. Community-based programs frequently expand on the curriculum that was introduced in the classroom. For instance, students may be introduced to environmental conservation in the classroom. This knowledge is further developed through a community-based program.

Participants then act on what they know with a conservation project. Community-based extracurricular activities may include “environmental clubs, boy/girl scouts, and religious groups.”

According to Smith (1996,2000) in Wikipedia (2021), a curriculum can be ordered into a procedure: Step 1: Diagnosis of needs. Step 2: Formulation of objectives. Step 3: Selection of content. Step 4: Organization of content. Step 5: Selection of learning experiences. Step 6: Organization of learning experiences. Step 7: Determination of what to evaluate and of the ways and means of doing it. Under some definitions, curriculum is prescriptive, and is based on a more general syllabus which merely specifies what topics must be understood and to what level to achieve a particular grade or standard. A curriculum may also refer to a defined and prescribed course of studies, which students must fulfil in order to pass a certain level of education. For example, an elementary school might discuss how its curricula is designed to improve national testing scores or help students learn fundamental skills. An individual teacher might also refer to his or her curriculum, meaning all the subjects that will be taught during a school year. The courses are arranged in a sequence to make learning a subject easier. In schools, a curriculum spans several grades.

On the other hand, a high school might refer to their curricula as the courses required in order to receive one’s diploma. They might also refer to it in exactly the same way as an elementary school and use it to mean both individual courses needed to pass as well as the overall offering of courses, which help prepare a student for life after high school.

A curriculum can be seen from different perspectives. What societies envisage as important teaching and learning constitutes the "intended" curriculum. Since it is usually presented in official documents, it may be also called the "written" or "official" curriculum. However, at a classroom level this intended curriculum may be altered through a range of complex classroom interactions, and what is actually delivered can be considered the "implemented" curriculum. What learners really learn (i.e. what can be assessed and can be demonstrated as learning outcomes or competencies) constitutes the "achieved" or "learned" curriculum. In addition, curriculum theory points to a "hidden" curriculum (i.e. the unintended development of personal values and beliefs of learners, teachers, and communities; the unexpected impact of a curriculum; or the unforeseen aspects of a learning process). Those who develop the intended curriculum should have all these different dimensions of the curriculum in view. While the "written" curriculum does not exhaust the meaning of curriculum, it is important because it represents the vision of the society. The "written" curriculum is usually expressed in comprehensive and user-friendly documents, such as curriculum frameworks or subject curricula/syllabi, and in relevant and helpful learning materials, such as textbooks, teacher guides, and assessment guides. In some cases, people see the curriculum entirely in terms of the subjects that are taught, and as set out within the set of textbooks, and forget the wider goals of competencies and personal development. This is why a curriculum framework is important. It sets the subjects within this wider context, and shows how learning experiences within the subjects need to contribute to the attainment of the wider goals. Curriculum is almost always

defined with relation to schooling. According to some, it is the major division between formal and informal education. However, under some circumstances it may also be applied to informal education or free-choice learning settings. For instance, a science museum may have a "curriculum" of what topics or exhibits it wishes to cover.

Many after-school programs in the US have tried to apply the concept; this typically has more success when not rigidly clinging to the definition of curriculum as a product or as a body of knowledge to be transferred. Rather, informal education and free-choice learning settings are more suited to the model of curriculum as practice or praxis. In recent years the field of education and curriculum has expanded outside the walls of the classroom and into other settings, such as museums and library and information science education. Within these settings curriculum is an even broader topic, including various teachers, librarians, inanimate objects such as audio tour devices, and even the learners themselves. As with the traditional idea of curriculum, curriculum in a free choice learning environment can consist of the explicit stated curriculum and the hidden curriculum; both of which contribute to the learner's experience and lessons from the experience. These elements are further compounded by the setting, cultural influences, and the state of mind of the learner. Libraries and other similar settings are most commonly leveraged within traditional classroom settings as enhancements to the curriculum when educators develop curricula that encompass visits to museums, zoos, and aquariums. Many educational institutions are currently trying to balance two opposing forces. On the one hand, some believe students should have a common knowledge foundation, often in the form of a core curriculum whereas others want students to be able to pursue their own educational interests, often through early specialty in a major or through the free choice of courses. This tension has received a large amount of coverage due to Harvard University's reorganization of its core requirements. An essential feature of curriculum design, seen in every college catalog and at every other level of schooling, is the identification of prerequisites for each course. These prerequisites can be satisfied by taking particular courses, and in some cases by examination, or by other means, such as work experience. In general, more advanced courses in any subject require some foundation in basic courses, but some coursework requires study in other departments, as in the sequence of math classes required for a physics major, or the language requirements for students preparing in literature, music, or scientific research. A more detailed curriculum design must deal with prerequisites within a course for each topic taken up. This in turn leads to the problems of course organization and scheduling once the dependencies between topics are known.

Curriculum Development: An Insight

Stutt (2021) described curriculum development as the step-by-step process used to create positive improvements in courses offered by a school, college or university. As the world continues to evolve, new discoveries have to be roped into the education curricula. Innovative teaching techniques and strategies (such as active learning or blended learning) are also constantly being devised in order to improve the student learning experience. As a result, an institution must have a plan in place for acknowledging these shifts—and then be able to implement them in the college curriculum. Curriculum development is synonymous with

course planning or course development. It's important to recognize that differences in course design exist: a math course taken at one university may cover the same material, but the educator may teach it in a different way. However, the core fundamentals of curriculum development remain the same.

What are the different categories of curriculum development? Current curriculum development can be broken down into two broad categories: the product category and the process category. The product category is results-oriented. Grades are the prime objective, with the focus lying more on the finished product rather than on the learning process. The process category, however, is more open-ended, and focuses on how learning develops over a period of time. These two categories need to be taken into account when developing curriculum (Wikipedia 2021).

Wikipedia (2021) explained that Curriculum development is a process of improving the curriculum. Various approaches have been used in developing curricula. Commonly used approaches consist of analysis (i.e. need analysis, task analysis), design (i.e. objective design), selecting (i.e. choosing appropriate learning/teaching methods and appropriate assessment methods) formation (i.e. formation of the curriculum implementation committee / curriculum evaluation committee) and review (i.e. curriculum review committee). 1. Analysis 2. Design 3. Selecting 4. Formation 5. Review.

Furthermore, SkyePack (2020) expressed that Curriculum development is the organized preparation of whatever is going to be taught in schools at a given. Whether you're a first-year teacher at a high school or a veteran university professor, you know that developing an effective curriculum is a core component of providing a successful education. As any educator knows, the literature and philosophy surrounding the concept of curriculum have evolved over the years. Today the term can be broadly used to encompass the entire plan for a course, including the learning objectives, teaching strategies, materials, and assessments. Generally, curriculum development is the process by which an instructor or institution creates or adopts that plan for a course. Because this subject is so broad, it can be difficult to wade through the noise to find up-to-date best practices.

According to SkyePack (2020), there are also many schools of thought for how best to approach the curriculum development process. With an overwhelming amount of advice available, how do you know who to listen to so that you can develop a curriculum that makes sense for you and your course? Curriculum development help professors and teachers provide the best learning experience possible for their students. It equips instructors with customized course materials built to align with curricula, so it helps to understand the importance of a thoughtful development process. What is curriculum development? Curriculum development is the multi-step process of creating and improving a course taught at a school or university. While the exact process will vary from institution to institution, the broad framework includes stages of analysis, building, implementation, and evaluation. In college, curricula are often developed at a local or state level to result in standardized learning outcomes across different

schools. At the college level, instructors may get more individual flexibility to develop their own curricula. Either way, the individual or group is responsible for planning a course (and choosing strong corresponding course materials) that effectively accomplishes educational goals and meets student needs. Ideally, the curriculum development process should be one of continuous improvement rather than a linear or stagnant approach.

Plans for instruction should be frequently reviewed, revised, and updated as new and different needs arise. Change may be required due to subjectarea discoveries, innovations in instructional best practices, or shifts in course delivery such as the pivot to remote teaching. Why is curriculum development useful for educators? In many ways, the need for curriculum development is self-evident. Just imagine trying to teach each day in a lecture hall or K-12 classroom without a plan in place! A thoughtfully developed curriculum provides educators with a useful framework to build upon during day-to-day instruction. Curriculum development takes care of the big-picture strategy required to successfully teach a course. Because decisions like course objectives, content sequencing, and delivery methods are made upfront, instructors can focus on smaller details like planning for a specific lecture or writing effective assessments (SkyePack, 2020).

Additionally, an iterative curriculum development process gives educators a structure to make improvements to the course after evaluating student performance and receiving end-of-semester feedback. Why is a concrete curriculum development strategy valuable for learners? In addition to providing benefits for teachers, curriculum development is a useful structure for learners. Curriculum development allows teachers to take a thoughtful and methodical approach to determine what students will be required to learn. The early phases of the process involve deep research and analysis to ensure that students get the best education possible. Additionally, one of the most effective approaches for course development specifically addresses the needs of learners. We'll cover learner-centered design later in this article.

Are there different curriculum development processes or models? First, there are generally two types of curriculum models: the product model and the process model. The model you choose to follow will influence the steps you'll take to develop the course. Entire textbooks have been written on these long-standing models, but here's a brief explanation of each to make sure everyone is on the same page: • Product model. Also known as the objectives model, this model focuses on evaluations, outcomes, and results. It determines what learning has occurred. If you need to develop a curriculum that prioritizes standardized test scores, you'll need to adhere to the product model. Generally, this model is thought to be more rigid and more difficult to adapt to your students' unique needs, but it does provide quantitative learning assessments. • Process model. This model focuses on how learning develops over time. There's an emphasis on how the students are learning, and what thoughts they have throughout the process. This approach is more open-ended and considers the overall growth and development of a student rather than their performance on an exam. Consider the characteristics of each model as well as any institutional requirements you need to adhere to. You may already have a strong preference for

one of the two! It is also possible to develop a curriculum that values both product and process.

Library And Information Science Curriculum Development and Fourth Industrial Revolution

Peters, (2017) as cited in David-West (2021) observed that choosing a curriculum that will fit into the 4IR should be a key concern of every library school. It has been characterized by an increased emphasis on technology with the advent of a robot which could result in period of unemployment. Preferences should be given to learning programs that focus directly on the development of skills that is needed in the future labour market. Library school curriculum needs to respond to the political, social and fast pace of technological change. More so, the new curriculum development will need fundamental technological tool available.

Becker, Horning & Wessmann (2011) in David-West (2021) expressed that these tools should be added to the out model educational curriculum to meet the growing demand of the labour market. The drastic change on the labour market will also bring a change from the routine task a traditional academic curriculum to more creative activities. The course should move away from the traditional content that are mostly theoretical or abstract in nature and focus on career base application. It should include academic materials that are more engaging and hands on training. Also, courses that have practical relevance should be introduced. That is courses that have the potential to transform student's knowledge and skills should be implemented. The curriculum design for LIS within the 4IR should include; critical thinking, ethical thinking, digital literacy, which will encourage impactfull and informal application of the developing technologies.

Bayne & Jandric, (2017) as stated in David-West (2021) observed that the new curriculum can also help students grapple with the complex issues of relationships of artificial intelligence that may approach or even surpass human intelligence. The curriculum should also train students to recognize and help manage the perforating numbers of exponentially repository system.

Effect of Fourth Industrial Revolution (4IR) on Library and Information Science Curriculum Development

Oparah (2006) in Edegbo (2011) observed that until 1999; there was no uniform or harmonized curriculum for Nigerian University Library and information science schools. According to him, the newer LIS schools appear to operate modified curricula of the older schools. A review of the curricula of these schools shows that while some emphasize more library science courses, other strife to strike a balance between library science and information science. In the later case, ICT application to library and information services appears to be accorded appreciable emphasis. The library and information science schools of Abia and Delta States in Nigeria are good examples. Learning experience at any level of formal education is primarily determined by the contents of relevant curriculum. At the Abia State University Library and Information Science School, the following ICT courses are offered at the 100 level: LIS 104 - Basic Computer Operations I LIS 106 - Basic Computer Operations II. These two courses are designed to acquaint the students with the parts, functions and operation of the computer and

introduction to computer software. At the 200 level, the following courses are available; LIS 270 - Information Structure and System I LIS 271 - Information Structure and System II. These two cover electronic networks databases internet access, information systems, programming language, etc. At the 300 level, the following ICT based courses were available: LIS 381 - Information System and Networks LIS 351 - Database Management. At the 400 level, the following was available: LIS 411 - Automation of Library and Information Centres. However, he noted that the content of the two general reference service courses LIS 231 and 232 do not include the application of ICT. Same for the following subject reference sources and services: LIS 331 - Literature and Reference Sources for social sciences LIS 332 - Literature and Reference Sources in the Humanities.

The strong emphasis on ICT courses at the undergraduate level is absent at the (MLS) level. Perhaps, the designers of the master's programme forgot that some of the entrants who are not graduates of the library schools may not have acquired ICT knowledge and skills. The implication is that such students may graduate without the requisite of ICT knowledge and skill for the job performance. At the Delta State University LIS School, the following ICT courses are offered at the 100, 200 and 400 levels of the undergraduate programme. LIS 105 - Introduction to Computer I LIS 115 - Introduction to Computer II LIS 202 - Computer Application to Library Process I LIS 205 - Introduction to Computer Programming I LIS 212 - Computer Application to Library Processes II LIS 218 - Introduction to Database Management System LIS 401 - Information Science and Modern Technology I LIS 411 - Information Science and Modern Technology II. At the premier library school in Nigeria - the University of Ibadan – the following ICT courses are in its curriculum. LSE 122 - Information and Development with (Introduction to information technology) LSE 227 - Information Technology LSE 415 - Computer in Libraries.

Again, Oparah (2006) noted that a course likes LSE 113 - Reference Sources and Services do not provide for the application of ICT to reference services, except at the masters level. Also at master's level, there is LSE 707 - Automation in Libraries, Archives and Information centres. The National University Commission (NUC) issued in 1999 the Approved Minimum Standard in Library and Information Science Education. The curriculum according to Oparah (2006) in Edegbo (2011) is for the undergraduate programme. It provides for the following ICT courses: LIS 210 - Computer and Data Processing. This course among other objective is designed to enable students conduct searches and databases- LIS 305 - Introduction to Information Science. The contents of this course include the role of the computer in information storage and retrieval. LIS 301 - Information Technologies. This course covers contemporary information technologies in library and information centres, multimedia information system, non-book communication technology, network and networking, internet etc. The National Universities Commission curriculum though provide general library courses and subjects, again the contents of these courses do not include the application of ICT to them e.g. Reference Services. It is thus left for wisdom of the individual of course lecturers to include ICT or not. In the university system, Master degree program is specifically designed to qualify a library and information

practitioner a professional. Any qualification below that level makes a practitioner a para-professional staff in any university library in Nigeria

Library and Information professionals apart from their educational practices required different kinds of skills and competency to give right information at the right time for right users. The role of libraries and librarians are changing rapidly due to growth in science and technology. Prior to this, library professionals' jobs were limited to library boundaries but now, it has spread 7 across the globe known as digital library. In this age, it is difficult to manage and preserve all changing forms and formats of the documents for all types of patrons using all key Skills. Today, librarians need to play different roles which demand various skills ranging from an old culture to new fashion (Muddapur and Agadi, n.d). Until recently, information professionals did not see the need to deal with informal knowledge and intellectual capital. Their role was restricted to managing formal knowledge. As more and more organisations realise the value of informal knowledge in an increasingly competitive knowledge economy, there is a growing need for information professionals to sharpen their skills and assume the role of knowledge managers (Al-Hawamdeh and Foo, 2001). Mohammed (2003) in Nkanu, Iyishu and Ogar, (2013) asserted that the need for the provision of library and information science education and the acquisition of relevant knowledge, techniques and skills for effective and efficient library and information work is needed now more than before due to differences in library and information systems, services and infrastructure to cope with the changing needs and expectations of the 21st century people, societies, communities and institutions.

Aina (2007) as cited by Nkanu, Iyishu and Ogar, (2013) is of the view that, the Nigerian LIS professional is expected to possess skills in repacking of information, management and operation of audio-visual equipment, documentation of indigenous knowledge, preservation and conservation of records, provision of query and answers service in the communities. Hashim and Mokhtar, (2012) explained that the foundations of librarianship, which include skills such as cataloguing and user education, are as relevant in an electronic age as they are in a print based one and will continue to provide a solid base of skills. It is hoped that in this fast changing environment, librarians and information professionals must be someone with 8 multi-skills, multi-tasking abilities, and competent in areas of work such as management, communication, language, public relations and others. We live in an information society where the development of information technology and telecommunication networks is accompanied by a corresponding increase in knowledge, with a rapidly growing flow of information. This new information environment requires new skills in seeking, processing and using information. The base for individual ability to understand and use information is a qualitative, ongoing learning process (Hashim and Mokhtar, 2012).

In a study carried out by Al-Hawamdeh and Foo (2001), it can be seen that the 75 participants agreed that information-seeking skills are a must for information specialists. This includes the ability to capture, index, retrieve and disseminate information. The second most important skill as highlighted by the study is the social and communications skills. Seventy-two participants or 96% of the participants emphasized the importance of social and communications skills.

Most participants see the role of information professional as a mediator who must possess the skills of active listening and have the ability to clearly convey ideas and information to others. Managerial and leadership skills are also essential for information specialists to handle projects that involve multiple departments within the organisation. And it was stated in the study that managerial skills are essential for knowledge worker in the organisation. Sixty-five participants or 86% of the participants enveloped in the study agreed that an information specialist should be friendly, open minded and able to adapt to changes and relates to new ideas. The research revealed that an information specialist should be able to work with people in the organisation regardless of their diverse subject background. Also he must be able to motivate and convince people to share information and knowledge. Information professionals need to be proactive, responsive and have diverse subject background. An information professional can possess a variety of different skills, depending on the sector in which the person is employed. Some essential cross-sector skills are:

• IT skills, such as word-processing and spreadsheets, digitization skills, and conducting internet searches, together with skills in digitization, loan systems, databases, content management systems, and specially designed programmes and packages.
• Customer service: An information professional should have the ability to address the information needs of customers.
• Language proficiency: This is essential in order to manage the information at hand and deal with customer needs.
• Soft skills: These include skills such as negotiating, conflict resolution, and time management, which are useful for all interactions at a workplace (Wikipedia, 2019).

In the innovative age of information science and technology, it is crucial for librarians to possess the necessary competencies for working in a specialized workplace, where the equipment and the clients' needs are being changing rapidly. Such changes are happening at a fast speed that every day the new skills and styles are needed to handle the information and the related ideas (Abotalebi and Biglu 2017). This is in line with Danchak's (2012) as cited by Chikonzo, Bothma, Kusekwa and Mushowani (2014) who advised that libraries and librarians need to be where the users spend most of their time. Such a shift in the characteristic and type of library clientele calls for the need to identify new professional skills and competences which librarians need in order to effectively function in this digital age. Orme (2008) in Chikonzo, Bothma, Kusekwa and Mushowani (2014) conducted a content analysis of 180 job advertisements collected between June 2006 and May 2007 from the library 10 sectors in the United Kingdom. She categorized skills into generic, personal and professional. The findings indicated that generic skills are the most normally required. Professional skills and personal skills are the second and the third place respectively. The following categorization of skills is provided: Generic: 'interpersonal/communication, general computing, team work'. Professional: 'professional related experience, customer service, chartered librarian, cataloguing, classification and Metadata'. Personal: 'enthusiasm, flexibility and self-motivation'.

Anyaoku (2012) in Kumar (2018) indicated in his paper that a large majority of 173 (98.8%) rated themselves as having some skills in basic computing, which is the use of word processing software. In addition, the large majority 165 (95.2 %) had some internet information retrieval skills. A high percentage of 79.9 % (138) rated themselves as having some skills in the use of presentation software. More than half of the respondents 118 (68.1 %) had Web 2.0/Lib 2.0 skills, 113 (64.3%) had statistics package usage skills, 106 (60.8 %) had graphic skills and 89 (51.2 %) had software installation skills. It was also indicated that respondents rated their skill low in some area of ICT use. A majority of 122 (69.9 %) had no technical skills in repair and maintenance of equipment. More than half of 101 (59.4 %) also had no digitization skills and slightly above half the respondents 91 (51.8 %) had no web page development skills.

According to Rao (2014), Richard Harrington while addressing the 25th Online Information Meeting in London in December 2001, the Chief Executive Officer of the Thomson Corporation noted that no profession had changed as much as that of an information profession in the last five years with the development of the range of Internet-based technologies. There is a need to acquire professional skills that helps the librarians to deal effectively with their clientele. Paramanik (2015) observed the rapid change in modern technology and communication which has raised the need to acquire new skill and knowledge in the present day working environment. Present LIS Professionals have computer and communication skill and get-in-depth training in software package designs, use of software package, as part of their professional education. The existing skills of classification, cataloguing, indexing etc. are to be remodeled for data analysis, data structuring, data organization, packaging and repackaging of information. The researcher explained the skills needed by Library and Information Professional in the 21st century as follows: • Communication skills: Communication skills have vital role in the life. It is also important to the library and information science professionals. Communication media may be written, oral, interpersonal, human or public relation and user orientation etc. • Management skills: Management is the core aspect of library and information centre. These skills required to manage the library financially by applying techniques and skills i.e. supervisory, counseling, auditing, planning, decision making motivating etc. • Technological skills: The present age is considered as an “Age of Technology”. Skills are required to handle technology in general with reference to information technology like computer operation, telecommunication media, library network, micrographics, online database, website design, internet searching, handling audio visual material and digital collection. • Traditional skills: Traditional skills include acquisition, organization, collection, classification, cataloguing, indexing, abstracting, preservation, conservation and dissemination of information. • Research and statistical skills: Research & statistical skills are basically required for faculty members, researchers in library school which range from analysis to synthesis, 12 manipulate, consolidate, evaluate, and interpretation of result of the research in a scientific manner. • Other skills: There is large number of skills like navigation, advocacy, innovation etc. These skills help professionals to take proper decision in the changing environment. Among the specific skills needed for working as digital information professional were knowledge of Web publishing, imaging technologies, optical character recognition and markup languages (Nonthacumjane, 2011).

According to Australian Library and Information Association (2014) Library and information specialists must be able to understand, analyse and interpret the contexts in which information is originated, described, stored, organized, retrieved, disseminated, modified and used. In addition, a specialist must understand the ethical, legal and policy issues that are relevant to the sector. Also, an LIS professional must be able to discuss future directions and negotiate alliances for library and information sector development aligned with corporate, social and cultural goals and values. And lastly, the specialist must respectfully acknowledge, learn about and understand the important contribution of our first peoples, especially in their role as the inheritors and the custodians of the longest living human culture on earth.

CONCLUSION

Curriculum development is core issue in the feasibility and growth of any discipline, library and information science education inclusive. Modern day librarianship, that is 21st century library and information science education (LISE) should integrate full information and communication technology programmes and not just computer application for professional efficiency and global acceptability. Therefore, curriculum of LIS in Nigerian Universities should be integrated with 4IR both at undergraduate and postgraduate level.

REFERENCES

Abotalebi, P. and Biglu (2017). Identification of Competencies for Professional Staff of Academic Medical Libraries in Iran. Open Access Library Journal, 4: e3657. https://doi.org/10.4236/oalib.1103657

Al-Hawamdeh, S. and Foo, S. (2001). Information Professionals in the Information Age: Vital Skills and Competencies. Proc. International Conference for Library and Information Science Educators in the Asia Pacific Region, Kuala Lumpur, Malaysia, June 11-12.

Australian Library and Information Association (2014). The Library and Information Sector: Core Knowledge, Skills and Attributes. Available at: https://read.alia.org.au

Chikonzo, A., Bothma, T., Kusekwa, L. and Mushowani, A. (2014). An Assessment of the Changing Needs of Information Professionals in Zimbabwe. Afr. J. Lib. Arch. & Inf. Sc. 24 (1) 107-118

David-West, B. T.(2021). Fourth industrial revolution and library and information science curriculum development in Nigeria. Library Philosophy and Practice (e-journal). https://digitalcommons.unl.edu/libphilprac/6702

Edegbo,W.I. (2011).Curriculum Development in Library and Information Science Education in Nigerian Universities: Issues and Prospects. Library Philosophy and Practice (e-journal). Retrieved from: https://digitalcommons.unl.edu/libphilprac/560

Hashim, L.B. and Mokhar, W.N.H.W. (2012). Preparing New Era Librarians and Information Professionals: Trends and Issues. International Journal of Humanities and Social Science 2 (7)

Kumar, A. (2018). Evaluation of Library and Information Science (LIS) Professional Skills: A Case Study of Dr. B R. Ambedkar Central Library, JNU, New Delhi, India. Available at: Library Philosophy and Practice (e-journal). https://digitalcommons.unl.edu/libphilprac/1816

Muddapur, S. and Agadi, K.B. (n.d). Library Professionals: Skills for Providing Information Services. Available at: http://www.iiserpune.ac.in/library/life2017/program/16/10-sumanmuddapur

Ndung'u, N. and Signé, L . (2019). The Fourth Industrial Revolution and digitization will transform Africa into a global powerhouse. GSM Association, The Mobile Economy: Sub-Saharan Africa (London: GSM Association)

Nkanu, W.O., Iyishu, V.A. and Ogar, F.O. (2013). Education and training for library and information science professionals in Nigeria: their role, opportunities and challenges in the information age. Knowledge Review 28 (2)

Nonthacumjane, P. (2011). Key skills and competencies of a new generation of LIS professionals. Available at: http://conference.ifla.org/ifla77

Paramanik, A. (2015). The Prospects of Library and Information Science Professionals in PostIndustrial Era. International Journal of Interdisciplinary and Multidisciplinary Studies (IJIMS), 2, (9), 48-52.

Rao, P.V. (2014). 21st century libraries and librarianship with reference to their professional skills. Journal of Business and Economics, 5, (12), pp. 2421-2428

Ravi, S. (2018). Challenges in skill development Among library and information Science professional. International Journal of Research in Library Science. 4(2) pp 27-39

SkyePack(2020). Curriculum Development: Complete Overview & 6 Steps. Retrieved from: http://www.skyepack.com/post/curriculum-development

Stutt,A. (2021). Curriculum Development and the 3 Models [+ Free Course Plan Template]. Retrieved from: http://tophat.com/blog/curriculum-developement-model-design

Widen, G. and Kronqvist-Berg, M. (2014). The Future Librarian: A Diverse and Complex Professional. Proceedings of the 14th IATUL Conferences. Purdue University Purdue e-Pubs

Wikipedia (2021). Curriculum. Retrieved from: http:// en.wikipedia.org.wiki/Curriculum\

Wikipedia (2021). Curriculum Development. Retrieved from:http://en.wikipedia.org.wiki/Curriculumdevelopment