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## FOURTH INDUSTRIAL REVOLUTION AND LIBRARY AND INFORMATION SCIENCE CURRICULUM DEVELOPMENT IN NIGERIA.

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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 automation and data exchange in manufacturing technologies which are based on digital technology. (Spotti & Windelband 2020). Several studies have revealed that fourth industrial revolution has started. It is an era that is using both digital and human element in the workforce. The technology and socio-economic developments of the modern society is widely discussed and how it will affect the education agenda, policies and the way forward.. The World economic forum (2017) 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.

However, not much has been done to prepare students through school curriculum tailored to the skills and knowledge required of workers in the 4IR. As observed by researchers such as (Yaya & Adeeko, 2015). Library and Information science graduates do not have the necessary skills that is prevalent in the 21<sup>st</sup> century workforce.. This is mostly as a result of the poor curriculum that was used to train this groups of young Librarians. The inadequacies in curriculum and pedagogy is such that most schools are still using the out model curriculum to train students, while computer application and online information services has taken the place of traditional method of Librarianship that. most Library schools do not have computer laboratory where student will be exposed to electronic formats of processing and disseminating information.

However, 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 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.

More so, the 4IR will bring about a change that will enhance new competences and also result in adjusting and updating of Library and Information Science curriculum that will correspond with the current trends/ Implication of the 4IR challenges traditional boundaries of disciplines. It requires interdisciplinary and collective competencies that integrate knowledge and skills from the fields of machinery production, electronics and information technologies (Grim, 2020).

Cross curricular learning and transferable skills should be part of the curriculum, training students for jobs that are novel or even yet to be created. Online and technology enhanced teaching within the Universities should be encouraged especially for training LIS professionals. This will enable educators to teach students efficiently from diverse background and also open up the Library schools to a more global community.

This paper posits that there is need to work how development of skills relevant for 4IR employment and jobs can be achieved through curriculum design. The new curriculum should describe and characterize the conditions based on the 4IR. Learning should be done in a way that it can be appropriated for the future. Furthermore, there is an urgent need for library schools to see the need of adopting these new 4IR sets of curricula to assume the sustainability and relevance of library and information science education as a vital tool of society's response to 4IR. This curriculum should also place much value for training in the use of computer as a way of 4IR literacy. Implementing the aforementioned modalities prepare students for future workforce. operating in the 4IR.

## **HISTORICAL CONTEXT OF THE 4IR**

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 18<sup>th</sup> century. The steam pressure and mechanical manufacturing was introduced. (Philbeck & Nicholas, 2019). This however brought a change in the output. This brought about greater productivity that led to urbanization and relevance of democratic government using middle class to western hemisphere (Macpherson, 1962). 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. 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. (Mazur, 2019).

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.

#### **The 4IR and Education 4.0**

The educational system is being transformed by computer-based learning methods. The fourth industrial revolution has advanced developments like the Artificial Intelligence (AI), extensive information and research, online networks and the internet of things. This is an era of virtual reality and virtual augmented computer entertainments. Library schools needs application of information and communication technologies using online and conventional methods to improve the learning skills of students. It is an era that requires human development that will fulfil knowledge and expertise. This will bring about a change in the reading and learning habits, moving away from the traditional form to a new smart teaching and learning skills (Sharma, 2019).

Education 4.0 of the 4IR ensures that educational experience should be stimulant to work experience. It is a more pragmatic technique to learning and teaching that will produce excellent

results for students in the work place There is need to make use of digital technology for what it has to offer, for efficiency, effectiveness, engagement and communication but most of all for authentic and valued educational experiences (Admiraal, et al 2019). Education 4.0 requires that Library schools should identify brand new programs that would be inculcated into the curriculum. This is likely to prepare students for industry 4.0, to have worthwhile sustainable, multiple careers and to become contributing citizens of globalization (Salmon, 2019). Also, it gave the different ways and approaches that higher education institution can align their services and curriculum to prepare future graduates for work (Hussin, 2018). It will help to transform the approach and design of delivering lectures and providing a digital learning environment, learning tools and services.

### **EMERGING TECHNOLOGIES FOR 4IR**

In the new technologies' robots, artificial intelligence and biotechnologies are bound to replacing human factor in work. The 4IR has already begun in Europe and in the United States. There is the fact that it will bring about unemployment. Frey & Osborne(2013) in their study support that 47% of jobs in US maybe at risk of automation in the near future. This will bring about a future where many of the elements of what we consider as industry labour force within large companies will no longer exist.

Emerging technologies has transformed the way library and information services are been delivered to users. (David-West, 2021). There is an urgent need for NUC to respond in implementing a new curriculum. Substantial changes to the Library and Information Science curriculum would be reasonable strategy, to allow for students to develop capacity in the rapidly emerging data science, artificial intelligence and Robots etc. Similarly, emphasis should be placed on computer application, computer programming, software development, JavaScript and network system etc. as a way of 4IR literacy. The new emerging technologies will also bring about a paradigm shift on how educators teach, with the evolution of online, artificial intelligence, new guidelines are needed to provide a theoretical basis for digital pedagogy. This emphasize that digital education is more than a purely technical concern, as it changes the dynamics of space and create new types of learning cultures that challenges our motions of what it means to be human (Bayne & Jandric, 2017).

The use of robots in industries may have both positive and negative consequences for human lives (Zeruodi, 2020). On the negative sides robots maybe considered as a threat for human labour in

the sense that, the use of robots significantly reduces labour cost and the like hood of human error can be reduced.

Studies support that robots may lift productivity wages and total labour demand, but mostly for the benefit of higher skilled workers. However individuals have to exploit their comparative advantages such as their cognitive skills and their capability to think out of the box, in order to manage complex situations, capabilities that maybe significantly strengthened by curriculum in countries where people are working with robots, their adaptation to automation is easier and higher in comparison with other countries, where adaptation to automation is slower.

### **LIBRARY AND INFORMATION SCIENCE CURRICULUM DEVELOPMENT FOR 4IR**

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 (Peters, 2017).

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). 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. 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

(Bayne & Jandric, 2017). The curriculum should also train students to recognize and help manage the perforating numbers of exponentially repository system.

### **DEVELOPING NEW SKILLS FOR THE 4IR**

A lot of studies have shown that the 4IR and its impact on workforce is enormous. Many findings revealed that employment opportunities for low skilled employees will decrease in the implementation of 4IR. World Economic Forum Report (2018) estimates that at least 133million new roles may emerge globally by 2022, as a result of the new division of labour between human, machine algorithms. This will require that employees require significant reskilling and upskilling (Baldwin, 2019). Students should be taught on how to use these new technologies ethically and morally.

The 4IR is expected to challenge the stability of the structure and content of competence will cease to be just defined by more or less stable capabilities within a profession or domain of expertise, but rather by the continuous evolvement of dynamically, changing capabilities through acquiring skills and approaches to acting in the changing variety.

There should be competence that enables students to deal with the perspective of an unknown future. The competence model should contain capabilities required for dealing with global openness with abilities to analyze and evaluate future oriented development to promote interdisciplinary knowledge.

The 4IR revolution came with a rapid pace of change which will require robust expansion of existing initiatives for updating skills, after graduating students need to be educated in a way that will help them develop and shape, the use of today's most rapidly emerging technologies. Developing skills enable creative solutions to the unknown problems. Since artificial intelligence is developing fast, students need to acquire skill that robots do not have. That is to say they need to think out of the box at all times to outsmart robots in terms of solving problems. Also, students with the right educators and training are qualified to be part of the 4IR workforce.

### **CHALLENGES OF EMPLOYING 4IR IN CURRICULUM DEVELOPMENT**

The development and innovation in ICT have facilitated changes in the development of curriculum in the library and information studies. Despite the efforts its professional bodies have done in

developing modular curriculum, and demands for teaching departments to revise their syllabus introducing more IT components. Mahaputa (2006) asserts that LIS schools experience challenges due to many factors like lack of sufficient equipment for teaching, ICT oriented practical work, lack of ICT manpower, lack of uniformity in course contents, proliferation of courses, shortage of budgetary provision etc. The educational standard and training in technology is generally low due to lack of investment by government (Atiku & Boateng, 2019). This has led to producing students with inadequate skills for the new labour market. The key for the successful adoption of the new technological conditions is the ability of government to implement the new technology as it will make their economy to be backward and not meeting up with the 21<sup>st</sup> century standards, if it is not implemented. Library schools despite all odds needs to review their curricula in line with new skills that are essential in the fourth industrial revolution. This however will enhance Library and Information Science graduate's employability.

## **CONCLUSION AND RECOMMENDATION**

The implementation of 4IR in curriculum development in library schools will impact the mode of providing services in libraries. The library work at this stage will be describe with new requirements for the task. Curriculum modifications will help LIS schools to describe and characterize and inculcate the new working conditions and skills based on 4IR. There is an urgent need for Library schools to recognize the necessity of implementing these new 4IR forms of curriculum to assure the sustainability and relevance of Library and Information Science education as a responsive and vital component of society's response to 4IR. All these will prepare students for future workforce. Also, government as relevant stakeholders should invest in education and training of students to be able to adapt to new technologies and digitalization. The bottom line is however, that students should be trained to have the necessary skills for the 21<sup>st</sup> century labour market. There should be a direct connection between education and labour market. The right infrastructures should be put in place to make learning and teaching easy. Educators should update their skills and ensure that higher premium is placed on computer application as a form of 4IR .

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