UTILIZATION OF ARTIFICIAL INTELLIGENCE IN ACADEMIC LIBRARIES IN NIGERIA: BENEFITS AND CHALLENGES.

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Abstract

Modern technology has proved itself a major force in virtually every sector in contemporary life. This is on the assumption that almost every human activity is basically scientific, technical or technological in form. The fizzing space of changes in society and in all aspects of education as key to human development has heightened the need for more innovations and creativity in education, not least in Academic Libraries as the hub of academic service delivery. One emerging technology in response to this need that is gaining traction across the globe is Artificial Intelligence (AI), a multi-task computer system set to redefine the way libraries and other sectors function. This paper titled Utilization of Artificial Intelligence (AI) in Academic Libraries in Nigeria: Benefits and Challenges is a qualitative assessment of the use of the latest technology in Academic Libraries in Nigeria and issues around it. The paper seeks to plough related literature to arrive at the conceptual meaning and interpretation of this 21st century breakthrough and possible benefits and pit-falls in the context of Academic Libraries, it's socio-ecological variants that surround it's utilization in Nigeria was also explored. Conclusion was drawn on the basis of which way suggestions were made.

Keywords: Academic Libraries, Artificial Intelligence (AI), Computer, Library automation, Technology.

Introduction

Technology has far-reaching implications for virtually every aspect of life today, including education where it has had unqualified impact. Academic Libraries, like all other Libraries are integral part of this continuum, more so as the heart of any academic institution.

Being part of the institutional quality, the push for investment and innovations in new technologies, training and/ or retraining is becoming the trend, especially in advanced climes where strict observance of quality education is a norm. One major technical breakthrough in relatively recent time that is gaining traction is Artificial Intelligence, a multi-task computer system conceived in the mid-20th century by the British logician and computer pioneer, Alan Mathewson Turing.

This technology was developed for practical use across fields - medicine/health, business, defenses/security, oil exploration, computer control, education and many others such as expert system, natural language processing, speech recognition, machine vision, etc.

The utilization of AI in librarianship in particular is becoming a turning point in the development of library services in this age. In fact

and for many, it is a significant development that is revolutionizing library operation and services (Tella, 2020; Adebayo, Bello, kayode &Yusuf, 2022).

Studies have shown that AI is a vibrant technology whose application has over time proven to offer a viable alternative to human exertion in library service delivery. It has also been argued that AI can complement librarian's expertise rather than replace it.

This is not to gloss over several other benefits that accompany the technology. On the other hand, it has been contended that the application of this technology may have a backlash as it may lead to loss of jobs by librarians (International Labour Organization, 2018; Frey & Osborn as cited in Cox, 2022; Enakrire, n-d), thereby increasing the unemployment rate, especially in Nigeria where the incidence of unemployment is already alarming.

Whatever is the case, AI is the technology of the future, although Academic Libraries in Nigeria have not appreciably adopted the technology due to a good number of reasons. This paper explored these reasons and other critical issues that surround the utilization and application of the technology and the need for it's utilization in Academic Libraries in Nigeria, as a defining 21st century technological breakthrough.

Concept of Artificial Intelligence (AI)

Artificial intelligence is a complex, dynamic phenomenon. The technology conjures up different meanings depending on what it is used for.

This peculiarly makes the concept difficult to be defined with precision, coupled with it's somewhat evolutionary nature, which as literature showed had a long history before it was formally investigated as a scientific discipline, if you will, a field of study in computer science that develops and studies machines.

It is thus, sometimes referred to as the intelligence of machine or software as opposed to the Intelligence of living beings. Yet to some, AI is a science of making machines that can think like humans. Such machines may be called or referred to as AI.

AI could as well be said to mean the ability of a machine to display human- like capabilities such as reasoning, learning, planning and creativity. AI could also be defined as a branch of science that stimulates intelligent behavior into computers to serve complex problems better than humans.

Frankenfield (2021) defines AI as the simulations of human intelligence in computers that are trained to think and act like humans. Artificial Intelligence as described by Merriam-Webster (2019) is a branch of computer science that works with providing machines the ability to appear to natural human intelligence.

Artificial Intelligence is a replica knowledge obtained through the use of computer peripherals and programmed to become actual and valuable to mankind due to its technical application and usage (Emezaiwakpor, Idiodi & Urhiewhu, 2023)

There are indeed a litany of these definitions in the literature and possibly as many as those who attempt to define AI. However, one definition that seems to be more outstanding with promise and benefits of comprehensiveness, currency and future changes is that offered by AI.

High-level Expert Group (2019) which describes AI as system that display intelligent behaviour by analyzing the environment taking action with some degree of autonomy to achieve specific goals.

This definition encompasses all applications we currently qualify as AI and at the same time provide scope for future changes to that qualification.

Alongside advanced machines, learning and deep learning technologies, this definition also allows for other technologies including the more traditional approaches (Sheikh & Schrijvers, 2023)

AI is a multi-task invention, vast and complex in application and whose adoption in Academic Libraries, especially in developed economies is setting a new level of efficiency and effectiveness. Its ultimate goal is to create computer systems that rival human Intelligence (Asemi & Asemi,2018).

This description clearly has a major implication for libraries. As Sivrajah, Kamal, Irani and Weerakkody, (2017) pointedly note, the rise of AI in Academic Libraries allows for better analysis data sets, especially large data sets used for analysis across multiple data. It also gets rid of repetitive and boring task.

It is not really out of place to say that the application of AI to library operations helps Libraries develop capabilities that can exceed human mind. This is not peculiar to libraries but to so many other fields.

So, Stern's as cited in Chemulwo and Siroorei (2010) stated that AI is the science and engineering of making intelligent smart machines and devices that are able to learn new concepts and tasks, and draw useful conclusions about the world around, understand a natural language, comprehend a visual scene and perform from other types of feats that ordinarily require human types of intelligence.

For Omame and Alex- Nmecha (2020) application of AI has become pervasive, involving expert systems for reference services, book reading and self-reading robots virtual reality for massive learning, among others.

AI makes use of concepts from various other fields including cybernetic, information theory, psychology, linguistics, logic and computer aided instructions, as well as assist machines to find solutions to complex problems in a more human-like fashion which generally involve borrowing and characteristics from human intelligence and applying them as algorithm in software programmes (Monicah & Siroorei, 2020).

On the contrary others have taken the view that the adoption and application of AI can lead to job loss in Academic Libraries. The International Labour Organization (2018) for instance has noted that with the current trend of technological change based on the adoption of AI in various organizations, including libraries, the adoption of AI has created wide spread fears of job loss and a significant rise in inequality.

In their seminar analysis, Frey and Osborn as cited in Cox (2022) stress the disappearance of more routine roles through automation. They listed library assistants clerical as 95% amenable to automation and library technicians and 99% at risk. However, the role of librarian is judged only 65% likely to be automated.

In general, it is equally easy to imagine human work being diminished or enhanced by AI. Sharing same view, Omame and Alex-Nmecha (2020) noted that the incorporation of AI in Libraries can be perceived to alienate librarians from their users.

This scenario could leave many workers as mere servants of the machine. As some have observed, this fear may contribute to none adoption or low patronage of AI in Academic Libraries in most developing countries including Nigeria.

More importantly however, studies have shown that AI can complement librarians expertise rather than replace it (Enakrire, n-d).

Automation in Academic Libraries in Nigeria

It cannot be overstressed that Academic Libraries are the central focus of their parent institutions, hence often referred to as the heart of any academic institution.

Kwampong as cited in Adubika (2007) has perhaps couched this more clearly when he remarked that the health, intellectual vitality and the effectiveness of any educational institutions depends, in the main, on the state of health and excellence of its library, which is its very lifeblood.

As the author further noted, an inert and dilapidated library will ultimately translate into an inert and dilapidated institution. These remarks are as relevant today as they were more than five decades ago when they were made.

As is already noted elsewhere, libraries, especially in developing countries may become dilapidated in the 21st Century unless they begin to harness new smart and intelligent technologies for improved operations and service delivery.

To avert this danger, Academic Libraries must be prepared to adopt, adapt and apply the wide range of innovations, skills and competence and expertise now needed for the efficient provision of information and its effective management.

This is more urgent in this information society. This is what Kumar (2008) probably meant when he writes that providing proactive library services requires careful examinations of current capabilities, users' needs and the direction for the future.

This indeed underscores the timeless saying that a library is only as good as it's resources. This explains why libraries across the world are exploring ceaselessly innovative ways to improve their services and operations.

Yet studies overtime have shown that a good number of Academic Libraries in Nigeria seem to be unable to meet their targets in most things.

Cataloguing these gaps Abayomi, Oluwafemi and Hassan (2021) noted that these libraries are not adequately funded, hence characterized by poor infrastructure, inadequate staffing, lack of facilities, among others, the effect of which translates to poor commitments towards information service delivery. Corroborating this claim, Yakubu and Sule as cited in Soyele,

Oyebola and Ajegbomogun (2021) observed that Academic Libraries find it very difficult to maintain their core collection and library activities because of finances or money and high inflation of ITC equipment that can make library activities efficient and effective. The situation becomes worse with emergence of hi-digital automation which requires huge capital outlay.

Academic library automation includes the use of computer to carry out routine or traditional housekeeping tasks including reference, acquisition, circulation, cataloguing, stock verification and several controls.

It could as well be referred to as the conversion of Academic Library procedures from manual to computerized, such as from a card catalogue to an OPAC or from manual circulation cards to an integrated library system (Librarianship Studies and Information Technology, 2020).

Incidentally, with the introduction of AI in library Automation has undergone a resolution which has taken a diverse approach to converting static libraries into technologically advance information center. Today AI algorithms automate the process of cataloguing and classifying library materials based on metadata extraction from text and so on.

In spite of these soaring advantages and potential impact of AI in transforming Academic Library services, Academic Libraries in Nigeria

still find it difficult to invest meaningfully in this state- of - the –art technology.

This does not only account for low level of awareness of these automations and their uses among library professionals but also their low patronage in Academic Libraries in Nigeria.

Perhaps the most unexpected outcome of this is that only a few universities in Nigeria as is the case in many other developing economies have introduced AI in their libraries.

Although, appreciable number of universities in Nigeria now offers degrees in AI, perhaps as a policy response preparatory to the application and use of the technology, but enough ground has not been prepared as so much uncertainty seem to becloud its application in the country.

Potential Benefits of Artificial Intelligence

As earlier implicated, obsolescence and inadequacies of traditional library service in information society, such as ours, has underscored the importance, if not the inevitability of modern technologies today.

It should be obvious by now that there is no aspect of the library that is not affected by computer technology-information acquisition, storage, handling and dissemination, not least routine activities such as collection development, circulation and reference services, serial management and technical services, name it, have been improved tremendously with the use of technology.

Ankrah and Atuase (2018) have indeed made a point when they noted that the era of ICTs which is the advent of internet where academic library services has been transformed to electronic services which include social mediation application, digital cu-ration, mobile technologies, preservation and online scholarly communication has in one way or the other enhanced the mission of Academic libraries in this dispensation.

AI is no exception. Apart from improving all science and human interactions the technology is reconfiguring many library tasks such as classification, indexing, cataloguing, information retrieval, reference, information literacy and even learning. It has indeed been acclaimed to be the greatest usable intelligence that has the capacity of assisting librarians in decision making and administration.

As earlier noted, Artificial Intelligence is a multi-task technology with promise of incredible benefits which include:

i. **Automation of Library Operations:** Artificial Intelligence can easily automate such traditional library tasks as cataloguing, circulation, acquisition, reference, stock verification, free up librarians time to focus on more complex tasks, etc.

ii. **Allows for Better Data Analysis:** Artificial Intelligence allows for better analysis of big data sets, especially data sets used for analysis across multiple data sets (Sivarajah, Kamal,Irani & Weerakkbody, 2017).

iii. **Reduces Human Error in Library Operations:** Library operations with Artificial Intelligence is less prone to errors and defects than when carried out by humans.

iv. **Saves Labour, Increases Production and Efficiency:** Artificial Intelligence has the capacity to operate at scales and faster in processing library items than any human being. It can work continuously as much as seven days without experiencing fatigue.

v. **It Enables Data-Driven Decision Making:** Artificial Intelligence powers data analytic tool, enables libraries extract valuable insights from their collections, usage data and user interaction.

vi. **Enhances Library Users' Experience:** Artificial Intelligence technologies offer opportunities to enhance efficiency, personalizes user experience and revolutionizes knowledge dissemination in libraries.

vii. **Improves Information Retrieval:** AI helps to search information easily, retrieve information across different combination and assist with users' questions.

viii. **It Provides Visual Assistance and Chatbots:** The virtual assistants can provide instant assistance to users, answer their questions and direct them to relevant resources. Chatbots can help to reduce the workload of library staff and improve their experience (Kaushal & Yadav, 2022).

ix. **Enhances Information Organization:** By leveraging AI tools and technologies, libraries can enhance information organization, streamline operations and provide personalized services to their users.

x. Assists machines to find solutions to complex problems in a more human-like fashion which generally involves characteristics from human intelligence and applying them as algorism in software programmes (Chemulwo & chapkiru, 2020).

xi. **Provides Collaborative Research Platforms:** AI can easily connect users with similar research interest and facilitate knowledge sharing and collaboration. These platforms promote interdisciplinary collaboration and foster innovation, research and scholarship (Xu, Yang & Liu, 2021).

With these highlights one can see that the benefits of AI are incredibly infinite. AI ensures that libraries continue to play a vital role, not only in transforming library services but also in supporting academic research, teaching and learning in this digital age.

Challenges of the Application of Artificial Intelligence in Academic Libraries in Nigeria

Artificial Intelligence evidently has become one of the defining characteristics in Academic Libraries, especially as researchers are increasingly relying on a wide range of information resources that can be critical to support teaching, research and learning.

Beneath the benefits of AI, there lurks myriad of challenges in its usage in Academic Libraries especially in developing countries where the technology is yet to find sound footing.

In fact Tella (2020) has noted that libraries in the developed countries have accepted and use AI technologies virtually in all spheres of life whereas those in developing countries are still struggling to find their feet.

Academic libraries in Nigeria are no exception to these challenges. These challenges may include but are not limited to:

1. **Culture of Resistance to Change.** There has been this stereotype that Africans have a tendency to resist change, the fear of trying new things and indeed averse to accept new values created by the impact of innovations. This attitude constitutes a drag on progress and can easily hinder the adoption and use of AI in

academic libraries as well as other sectors in Nigeria.

2. **Fear of loss of jobs.** Closely tied to the above is deep seated fear that the introduction of AI in Academic libraries may lead to loss of jobs by librarians and allied workers, especially when human labour is displaced enmasse, which ordinarily will increase the already swollen unemployment rate in the country.

3. **Underfunding.** Utilization of AI and its maintenance, like every other hi-tech is capital intensive. Incidentally poor funding of tertiary education in Nigeria has been consistently low. The effect this trend has already had on the development of academic libraries and education in general in Nigeria has been catastrophic. If this status quo does not change it may lead to a little or no acquisition of AI in academic libraries in Nigeria, and of course, it is one thing to acquire the technology and quite another to put them into use by experts, maintain them and all that. All this has cost implications which government or parent institutions must be prepared to bear.

4. **Power Outage.** AI is power -driven and continued erratic power supply in the country and/or in universities and other institutions of higher learning as is often the case today may pose a hindrance to the operations of the technology.

5. **Dearth of Manpower.** AI is a complex and sophisticated technology that require specialized knowledge to manage. Besides, it is novel, especially to developing countries like ours where such critical skills and knowledge to operate and maintain the technology is in short supply, especially in the short run, whether indigenous or imported. This technological backwardness can constitute a problem in the management of AI in the libraries.

6. **Organizational Restructuring.** The introduction of any hi-tech such as AI usually leads to structural re-organization and system change, including work relations which may create some ecological uncertainties in any organization. With the adoption of such automations as AI this situation is bound to arise and may require new commitment and understanding to adjust. This does not come cheap. New orientation of staff, training and retraining, and user education and learning support are required with far-reaching implications in terms cost and logistics. Consider that every change comes with its intended and unintended consequences.

7. **Lack of Human Touch.** Many have argued that with the advent of automation we have become over dependent on smart devices and this reliance is having a negative impact on our cognitive abilities. This becomes worse with the introduction of AI. No matter the luxury of smart devices or any other automation, its efficiency and effectiveness, the machine cannot be a substitute for human touch, warmth and cordiality. Humans being what they are will always prefer to interact with fellow humans directly to whom they

express their feelings rather than with a machine.

8. **Fear of Over Dependence.** Excessive dependence on machines or automations can easily lead to loss of skill and ability to initiate solutions to problems. If massively dependent on, AI can hamper our skills sharpening abilities, impair our ability to think about anything else or perform task.

Way forward

In view of the issues raised above the following suggestions are made:

1. There is urgent need for formulation of AI policy by the government and allied bodies to address broader and structural concerns about the adoption and use of AI in Academic Libraries in Nigeria.

2. Efforts should be made by parent institutions and other relevant authorities to address the problem of energy system to power the high performance computers required for AI.

3. Efforts should be made by Academic Libraries to provide programmes to re-skill or up-skill existing workforce as anti-dote to the potential threat of job loss that may arise from AI automation.

4. There is need for creation of awareness and staff orientation and/or re-orientation against stereotypes that may affect the adoption and use of AI in Academic Libraries in Nigeria.

5. Considering that the adoption and use of AI requires huge capital outlay both the government and parent institutions of Academic Libraries should see the issue of funding as a priority.

Conclusion

Libraries by nature are ever evolving as organic entities, and since the *raison d'etre* of any university or college is the education of its students, no programme, however well intended can succeed without the active participation of the library, a role that makes the academic library the fulcrum around which every academic activity revolves.

This role has become more critical with the new knowledge economy. If the Academic libraries in Nigeria are to thrive they must open for innovations and changes in their services and adapt to the changing demands of the time.

One emerging technology that will have an increasingly revolutionary impact, and indeed offer incredible promise in this direction today is AI. The technology has already set to change the complexion of Academic Libraries across the globe.

So, if Academic Libraries in Nigeria must come to terms with the rapid changes and expectations for the library of the future they must avail themselves of the soaring benefits of this 21st century breakthrough.

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