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Optimizing the Use of Artificial Intelligence (AI) to Revamp Library and Teacher Education Services in 21st Century

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Artificial intelligence already touches many of our daily computing activities, most of the computer systems and mobile phones being developed today have artificial intelligence features, students can use it to learn, teacher can use it to teach and we have probably used them not knowing that they are intelligent machines. Examples of Artificial intelligence in computers are speech recognition, natural language processing, self-driving or autonomous cars, machine learning, deep leaning and robotics. Artificial intelligence works based on perceptual recognition unlike human beings that operate on deep cognition. The power and advantage of Artificial intelligence lies in the fact that computers can recognize patterns efficiently at a scale and speed that human beings cannot. The development of teacher societies in recent times have been facilitated by the growing demand of access to information, and libraries are the prime source in providing this access. The paradigm shift in the format and dynamics of information and knowledge as a result of the rapid advancement in computer technology and software applications especially artificial intelligence, have shifted libraries and universities to a demand of the commensurate supply of the same technologies. Unless university libraries begin to exploit the new technologies and innovate their information and services delivery, they may face obsolescence in this era. Thus, recommendations and conclusion were made.

Key Words: Artificial Intelligence, Library and Information Services, 21st Century, Academic Libraries

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INTRODUCTION

The rapid development of advanced technologies in recent decades is affecting industries in ways we are just now beginning to witness. These innovative technologies are not only changing our everyday experiences, but they are also impacting global-scale processes and trends for entire sectors around the world. Traditional roles are changing, with new skill requirements, new opportunities, and new challenges. In the world of academic and research libraries (ARL), this transformation is impacting librarians, library services, teacher education and the very role of the library as we know it. From the digitalization of information to the Internet of Things (IoT), Big Data analysis and intelligent machine learning, technological trends like these are reshaping the way we consume, access and distribute information, as well as our ability to process it, derive meaning out of it and, ultimately, make decisions based on it. In the eye of this storm of changes in habits and experiences stands the library, the traditional provider of high-quality collections of information (Mondal, 2021).

Simon, (1995) in Mondal, (2021) pointed that Artificial Intelligence (AI) is related to building software that exhibits intelligence using processes similar to those used by humans for the same activities. Artificial Intelligence mainly focuses on understanding and performing intelligent tasks such as reasoning, learning new skills and adopting to new situations and problems (Mondal, 2021). It is explained in the Merriam Webster (2019) in Mondal, (2021) that, artificial intelligence is "a part of computer science that deals with giving ability to the machines to look like they have natural human intelligence."

Artificial intelligence (AI) has made it possible to provide solutions to pressing challenges facing libraries and teacher education, such as shelving of books and other library materials, cataloguing and acquisition of library materials, among others. Consequently, library services can be done in more effective and efficient ways for improved user satisfaction (Yusuf, Adebayo, Bello and Kayode, 2022). Therefore, library users can access timely and accurate information quickly and promptly. Fernandez (2016) in Yusuf, Adebayo, Bello and Kayode, (2022) noted that using AI in academic libraries will help to analyze big data, create metadata, and improve search translation. This means that using AI in academic libraries will make library materials more accessible and available, and allow the staff to answer users' queries on AI use. Tella (2020) stressed in Yusuf, Adebayo, Bello and Kayode, (2022) that the need for academic libraries to re-position themselves to take relative advantage of artificial intelligence's potentials by refining the quality of library services in this era of the information age. Talley (2016) also emphasized in Yusuf, Adebayo, Bello and Kayode, (2022) the need for university librarians to embrace AI technologies to provide better services to researchers and other library users. Grant and Camp (2018) as cited in Yusuf, Adebayo, Bello and Kayode, (2022) observed that many academic libraries particularly in developed countries have adopted AI for various library operations, such as circulation and reference services. Sagarjit et al. (2001) in Yusuf, Adebayo, Bello and Kayode, (2022) maintained that the adoption and use of AI have improved user engagement in many developed countries in the world. Access to timely information can only occur in a situation where AI is being used to guide and support, and at the same time user friendly, particularly in information search. For instance, a friendly AI technology will help users search for information with ease, help retrieve information across various collections, and help with users' queries. There are different AI applications in library system such as: descriptive cataloguing, technical services, and collection development; subject indexing, reference services, database searching, and document delivery. Some papers deal with the underlying design issues of knowledge representation and natural language processing. Many authors have previously provided in-depth overviews of AI technologies (Yusuf, Adebayo, Bello and Kayode, 2022).

In brief, Artificial intelligence technologies have become globally recognized as indispensible tools for improving organizational efficiency and productivity. Suffice therefore to say that AI technologies have strongly influenced the world of work in the 21st century library. In the library setting, the adoption of AI can improve library services and provides access to accurate information that can drive growth and development in this information age. Artificial intelligence technologies are now being used in libraries to achieve the organic integration of readers and libraries. With this, readers interact on the same platform, track and acquire the personalized needs and information of users so that users can access accurate, all rounds, and humanized services, at a reduced cost to rationally utilize library resources (Abayomi, Adenekan, Adeleke, Ajayi & Aderonke, 2021).

Concept of Artificial Intelligence

The term artificial intelligence, according to Irizarry-Nones, Palepu & Wallace, (2017) in Omame and Alex-Nmecha, (2020) often conjures images of robots or computers that talk. Artificial intelligence is an aspect of computer science that focuses on how computers learn (Machine Learning), interpret information, vision: character recognition, picture analysis, 3D perception, and modelling of the function of the eye; furthermore, it encapsulates speech recognition, speech production, understanding and use of natural language (Natural Language Processing), and Expert System which continues to gain more attention. Furthermore, artificial intelligence is the programming and development of computers to perform human required-intelligence task, such as speech recognition, decision-making, visual perception, language translation, talking and emotional feelings.

Artificial intelligence already touches many of our daily computing activities, most of the computer systems and mobile phones being developed today have artificial intelligence features and we have probably used them not knowing that they are intelligent machines. Examples of Artificial intelligence in computers are speech recognition, natural language processing, self-driving or autonomous cars, machine learning, deep leaning and robotics. Artificial intelligence works based on perceptual recognition unlike human beings that operate on deep cognition. The power and advantage of Artificial intelligence lies in the fact that computers can recognize patterns efficiently at a scale and speed that human beings cannot. The development of societies in recent times have been facilitated by the growing demand of access to information, and libraries are the prime source in providing this access. The paradigm shift in the format and dynamics of information and knowledge as a result of the rapid advancement in computer technology and software applications

especially artificial intelligence, have shifted libraries to a demand of the commensurate supply of the same technologies. Unless libraries begin to exploit the new technologies and innovate their information and services delivery, they may face obsolescence in this era (Omame and Alex-Nmecha, 2020).

History of Artificial Intelligence in Libraries

Wang, (2018) in Yusuf, Adebayo, Bello and Kayode, (2022) declared that the origin of Artificial Intelligence (AI) can be traced to John McCarthy's research in 1955, with the assumption that every aspect of learning and other forms of intelligence can be stimulated through the use of a machine. However, the history of AI usage in academic libraries can be traced to Balleste, in law libraries in the USA in 1998. AI was introduced in libraries because of the various benefits that technology could bring to library operations, which include the opportunity to extend library opening hours, using AI to answer simple questions, providing library guide to library users on the use of the catalogue, assisting distance education, and streamlining cataloguing and circulation library operations, the essence which is to enhance library services (Abayomi, Adenekan, Adeleke, Ajayi & Aderonke, 2021). Artificial intelligence (AI) technologies have become globally recognized as indispensable tools for improving organizational efficiency and productivity. Suffice therefore to say that AI technologies have strongly influenced the world of work in the 21st century. In the library setting, the adoption of AI can improve library services and provides access to accurate information that can drive growth and development in this information age. Artificial intelligence technologies are now being used in libraries to achieve the organic integration of readers and libraries. With this, readers interact on the same platform, track and acquire the personalized needs and information of users so that users can access information accurately, and humanized services, at a reduced cost to rationally utilize library resources (Yusuf, Adebayo, Bello and Kayode, 2022). In the library also, AI can be used to develop programs for effective reference services, good scanning of textbooks, and the identification of appropriate subject categories. Furthermore, AI technologies can assist library users on how they can locate library materials through intelligent tutoring system and automated library services. Therefore, AI adoption and use in libraries will allow for better information processing, and at the same time, better information search that will excite both library personnel and users since there will be easier and faster access to information. Presently, University of Lagos is the only institution in Nigeria that has introduced the use of AI to some of the library services and operations. The level of awareness among library professional on the use of AI for library services and operations is low, therefore the study tends to look at the adoption of AI for effective library services delivery in academic libraries in Nigeria (Yusuf, Adebayo, Bello and Kayode, 2022).

Applications of Artificial Intelligence in Academic Libraries

ALA, (2019) in Omame and Alex-Nmecha, (2020)Artificial Intelligence matters to libraries because it be used for organizing and making available large collections of information. According to Sridevi and Shanmugam (2017) in Omame and Alex-Nmecha, (2020) artificial intelligence is the modern technology which is used to manage the digital library. The ultimate promise of artificial intelligence is to develop computer systems or machines that think, behave and in fact rival human intelligence, and this clearly has major implications on librarianship. Artificial intelligence is not just an intelligent system or software program, it is a biologically motivated technology used to replicate human ways of perceiving and processing information. Intelligent library automation systems rely on artificial intelligence technologies to provide knowledge-based services to library clientele and staff. Artificial intelligence in libraries should not be misconstrued with library automation. While the later implies the degree of mechanisation to routine library operations, the former goes beyond just automating library activities, and create intelligent rational systems that behave and act like librarians and requires little or no human intervention. Artificial intelligent systems can replicate and thus replace a human being in the library, although Li, Huang, Kurniawan and Ho (2015) in Omame and Alex-Nmecha, (2020) believed that this invention will never replace librarians, but will center on menial and time-consuming library operations such as shelf reading and leave the librarians to engage with the patrons. University of Lagos, (2020) in Oyetola, Oladokun, Maxwell and Akor (n.d) asserted that Platform Capital's funding in June 2020 allowed the University of Lagos to become the first organisation in Nigeria to employ artificial intelligence. The robots, which are "cloud-based intelligent humanoid robots," have the following features, according to the information provided by Roboscholar: face recognition, surveillance technology, Open API, data management, advert & promotion, book shelf management, research, customizable, and entry validation. Integrating cutting-edge novel technology into standard library operations is the most practical approach to accomplish new aims and objectives in today's wireless and connected environment. To stay up with the trend in the digital age, libraries and librarians are making every effort. It's interesting to note that the bulk of AI features are already widely utilised in word processing or web and mobile application search (such as auto-suggest, relevance ranking, auto-recommendation, bookmarking, and personalization) (autocomplete, spell-checking, translation, voice recognition). Many characteristics can be added to library services to make them more interactive and user-friendly. The application of AI in libraries guarantees

that information is available quickly and in inventive ways. Using voice commands to perform informational searches is one illustration of this (Oyetola, Oladokun, Maxwell and Akor n.d).

Sridevi and Shanmugam, (2017) in Omame and Alex-Nmecha, (2020) expressed that some fields of artificial intelligence that are used in library management system include: Natural Language Processing (NLP), Expert Systems (ES), Pattern Recognition, Robotics etc. Succinctly, Natural Language Processing (NLP) is the analysis and generation of natural language text by computers. The goal is to enable natural languages such as French, English, or Chinese, to serve either as the medium through which users interact with computer systems or as the object that a system processes. In libraries, NLP can be used to design intelligent expert reference system or information retrieval system, where users can interact directly with the system using natural languages. McGraw-Hill Encyclopedia of Science and Technology, (2007) in Omame and Alex-Nmecha, (2020) the computer takes in the natural language as input, analyses and processes it, then respond accordingly with the needed information. NLP has been used as medium of interaction in database management systems and as object/input for processing in automatic text translation or text summarization.

Liqin and Feng, (2015) in Yu, Gong, Sun and Jiang (2019), asserted that Artificial intelligence covers almost all of the business activities of the Smart Library. Through the case analysis and systematic review of a large number of domestic and foreign literature and practical applications, the three application areas are summarized as: Intelligent resource system, intelligent management (smart warehouse management and intelligent security management), intelligent services (smart application services, intelligent consulting services, intelligent knowledge services).

- Intelligent resource system with the development of big data and Artificial Intelligence technology, the intelligent resource procurement system can automatically collect and integrate all users' personalized demand information and various types of document resource information through deep learning mechanism. Therefore, it is possible to construct an intelligent document resource procurement decision system. Intelligent procurement system construction needs to pay attention to two key points: (1) It is necessary to scientifically and reasonably determine the influencing factors. The library can establish a scientific and objective decision-making model by combining the comprehensive factors such as user group characteristics (such as gender, age, educational background, occupation, etc.), user personalized information (such as in colleges and universities, the number of teachers and students of various majors, subject setting, subject status ranking, school key construction disciplines, teachers and students hobbies, school opening Course name), recommendation and purchase of books (related to professional degree, popularity or utilization of books, book prices, etc.), expert advice (discipline construction, book utilization rate, book reproduction rate, etc.) and annual budget, so as to complete the book ordering plan and optimize the allocation of book purchasing funds. (2) To comprehensively collect and analyze open resources. Through intelligent collection and analysis of open resources, the intelligent procurement system can provide reference for procurement librarians to make decision.

- Intelligent management: Intelligent warehousing management has several distinct characteristics: (1) realize the self-service management of the book library with the goal of automatic book circulation and paper document management; (2) the books can be stored randomly on the bookshelf, no need for the book number, reducing the multifarious bookshelf arrangement; (3) Introduce a robot system to realize the management of automatic and unmanned counting, checking and sorting of book storage. There are many successful cases in the library intelligent warehouse management system. The ultrahigh-frequency RFID technology intelligent book inventory robot of Nanjing University Library in China mainly uses the automatic identification technology and RF phase technology in RFID technology, as well as machine automation technology to realize the automatic library book counting function.

And the library book inventory can be realized accurately and quickly, so that the library administrator can find and manage the book conveniently and quickly, which greatly reduces the reader's time to find books. Kuilin, Bo, Lijun et.al. (2016) and Jie, (2017) as cited in Yu, Gong, Sun and Jiang (2019) expressed that BookBot, the Hunter Library of North Carolina State University, is a robotic book delivery system that uses high-density automated shelf technology to store up to 2 million items and deliver any item within five minutes of clicking on the online catalog. Kushins (2018) in Yu, Gong, Sun and Jiang (2019) BookBot only accounts for one-ninth of the space of traditional traditional bookshelves, transforming the library from a storage facility into a rich learning and collaborative space environment. Books and other items are bar coded, sorted by size, and stored in more than 18,000 boxes, and each book and item is scanned as it is borrowed or returned from the system, allowing the library's online catalog to track all data at any time.

Choudhury, Lorie , Fitzpatrick et.al (2019) in Yu, Gong Sun and Jiang (2019) observed that the unique Work Robotics Project (CAPM) at the Johns Hopkins University Library in the United States automatically retrieves books on the shelves and carries them to a scanning station outside the bookshelf. CAPM has real-time enhanced browsing and search capabilities, using a combination of robotics, automated systems, and software technologies to find books on shelves through the web. The user enters the requirements into the CAPM system, which starts a robot to find the appropriate book. The user can view or print the required page and choose to return or borrow the book. Once the text is scanned, the user can also use CAPM to perform automatic text analysis options. In addition, LIB-100B, the book loss prevention

intelligent terminal of the Library of Southwest University of China, the Automatic Access Center (ARC) of the Villard Merlot Library, and the AVG of the Humboldt University Library in Germany, are bold innovations of intelligent warehouse management of libraries, and also the future development direction of intelligent warehouse management of libraries. 2) Intelligent Security Management. Ping, (2018) in Yu, Gong, Sun and Jiang (2019) added that The library's daily services include seat management, lending management and identity management and other security management, while face recognition, fingerprint recognition and other artificial intelligence technology can further solve the library's security management. For example, face recognition technology specially designed by artificial intelligence technology is used to collect students' face information and bind it with students' information. After binding, students no longer need to carry student identification information, but can directly enter and exit the library through face brushing.
Peirong, Jie, Xu and Shanshan (2018) inYu, Gong, Sun and Jiang (2019) expressed that the identity authentication module uses face recognition technology as a technical support. Previous face recognition technologies are mostly traditional statistical methods such as Adaboost and PCA (Principal Component Analysis). After the deep development of artificial intelligence, deep learning algorithms such as CNN (Convolutional Neural Networks) and RCNN (Region CNN) have emerged. Such algorithms have been qualitatively improved in recognition accuracy and speed. With the improvement of these core algorithms, the application of face recognition technology has algorithm support in the construction of smart libraries. Face recognition technology is mainly composed of four parts: face image acquisition and detection, face image preprocessing, face image feature extraction, matching and recognition.

In summary, according to Mondal (2021), application of AI in Library are extended to:

Reference service is the foremost activity of any library and the expert system will serve as a substitute for reference librarians. REFSEARCH, POINTER, Online Reference Assistance (ORA), AMSWERMAN, PLEXUS all of these systems are advisory systems for locating reference resources and factual data.

Cataloguing: Cataloguing is one of the oldest library techniques. Recent attempts to automate cataloguing through expert systems have focused on descriptive cataloguing because it is rule-based (AACR2). There are two ways to apply artificial intelligence techniques in cataloguing: (a) Human-machine interfaces, where intellectual work is divides between the intermediary and the support system. (b) An expert system with full cataloguing capabilities associated with electronic publishing systems. Since the cataloguing text is generates online, it can be passed through a knowledge-based system, and the intermediary does the cataloguing process without any intellectual input.

Classification: Classification is the basic activity of a knowledge organization. Therefore, it is prominent in all systems that organize knowledge in libraries and information centres. The application of expert systems in the field of library classification includes Coal SORT, EP-X, and BIOSIS.

Acquisition: The users of the library have a significant role to play in building library collection and online resources in particular. Several systems have been incorporates for the acquisition of these resources. Monograph Selection Advisor, a pioneering effort in applying this emerging technology is another area of building library collection. Specifically, the task modelled is the item-by-item decision that a subject bibliographer makes in selecting monographic. The prerequisite is that the knowledge base has to be broad enough and the interfacing aspect must be easy enough for the library to get the desired information from the machine.

Natural Language Processing in Library Services: When we think of the term NLP, the first thing that comes to mind is the ability to speak or write a complete sentence and have a machine process of requesting and speaking. NLP can applied to many disciplines, including libraries. When apply to the field of library and information science, more specifically, to search databases such as the Online Public Access Catalogue (OPAC), indexing is the basis of document retrieval. The purpose of the index is to improve the precision of retrieving parts of the relevant documents; and to reduce the proportion of recalls and related files retrieved.

Machine learning in Library Services: One specific challenge that is ripe is the improvement of library metadata generation. Libraries, through various vendors as part of the purchasing and acquisitions process, acquire thousands of pieces of metadata for print and digital resources made available to their library users. In cases where an e-book platform does not include metadata, libraries they generate their own. For the increasing majority of borndigital resources, machine learning provides an array of possible tools to help libraries generate metadata for digital resources, allowing cataloguing to not only increase the speed of metadata generation but also vastly improve the depth and breadth of subject terms.

Robotics in the Library Services: The robot is "A reprogrammable, multipurpose manipulator, automatically controlled, programmable in three or more axes, which can be fixed on the location or portable for use in automation applications". Libraries providing an increased variety of services and resources for digital libraries, they are still acquiring a great number of printed documents. This combined pressure to provide electronic and printed resources and services has caused serious space constraints for many libraries, especially academic libraries and research. The objective of CAPM (comprehensive approach to printed material) is to build a personalized robotic scanning system based on a series, which allows the browsing of imprints in real time via the web interface. The user includes a CAPM system that, in turn, starts a

robot that recovers the item requested. This item is delivered to another robotic system, which opens the item and rotates pages automatically.

Knowledge Acquisition, Representation, and Maintenance: Ideally, there would be two primary ways of creating and updating knowledge bases in intelligent systems: (1) intelligent Library systems would distill new knowledge from full-text and other electronic information sources; and (2) human experts would add their unique insights to this knowledge base by unrestricted natural language dialogues with intelligent systems.

Benefits of Artificial Intelligence in Academic Libraries

Omame and Alex-Nmecha, (2020) expressed that artificial intelligence is the current technology that has evolved with huge prospects and promising applications in libraries. Hence, the need to also explore this tech, its pros and cons, in order to adequately maximize its rich benefits for innovative and optimal services delivery in libraries, as Corke (2013) in Omame and Alex-Nmecha, (2020) asserted that artificial intelligent systems (robots) will be an important technology in this century. In a nutshell, the crux for applying artificial intelligent systems in libraries is the fact that they are less prone to errors unlike human beings; they can work for 24 hours/7 days without getting tired thereby freeing the librarians to do other jobs. Ultimately, since computers can operate efficiently at a scale and speed beyond human abilities, it will maximize speed, efficiency and effectiveness in processing library materials and enhance library services delivery at all levels. Artificial intelligence covers almost all of the business activities of the Smart Library. Through the case analysis and systematic review of a large number of domestic and foreign literature and practical applications, the three application areas are summarized: Intelligent resource system, intelligent management (smart warehouse management and intelligent security management), intelligent services (smart application services, intelligent consulting services, intelligent knowledge services) (Yu, Gong Sun and Jiang, 2019)

- Intelligent services 1) Intelligent application service at present, the technology of library self-service application service is relatively mature, and the forms and contents of services are also rich and diverse. The main representatives are: Self-service seat management system, self-service library ATM, self-service print copy management, lecture training appointment management system, etc. Self-service applications have the following advantages over traditional application services: (1) Break through the space-time boundary with artificial intelligence to realize instant service in no-show; (2) Extend the service form of library services and expand the scope of service targets, thereby reducing the logistics and labor costs of library services; (3) Enhance the user's willingness to participate and protect the service application privacy of reader users; (4) Promote the rational allocation of service resources and reduce the probability of service errors caused by manual services. The above intelligent application services are visible in the general smart library.

- Intelligent consulting service Consulting services are an important part of library services. Traditional consulting services are inevitably insufficient, such as the limited number of consulting librarians, the low efficiency of manual consultation, and the time limit for consulting work, etc. The emergence of intelligent consulting services can effectively meet the needs of users' consulting services, make up for the above shortcomings, and realize the library's independent, instant, convenient and all weather intelligent consulting services.

Qingpu and Mang (2016) in Yu, Gong Sun and Jiang (2019)Intelligent knowledge service or simply put, Knowledge service is the core of library service, and intelligent knowledge service is the new positioning of library service innovation, with strong vitality and broad prospects. The rapid development of artificial intelligence technologies such as cross-media awareness, big data management, deep autonomous learning, virtual bionic functions and simulation language interaction provides convenient conditions for the intelligentization and specialization of knowledge services. The patterns and deep knowledge mining processes of intelligent knowledge service are mainly embodied in intelligent analysis of user behavior, intelligent management of information data and intelligent operation of service business, etc., which are realized through knowledge analysis tools, knowledge presentation methods, research conceptual models and analytical research methods Specific as follows: a) Intelligent analysis of user behavior. From the perspective of the user, Lixin, Yang &Chenglong (2015) in Yu, Gong Sun and Jiang (2019) the user's application behavior is analyzed through artificial intelligence, and the required knowledge is actively recommended to meet the individualized needs of the user and improve the utilization of knowledge resources ; b) Intelligent management of information data. Use literature, patents, science, and personal data to conduct intelligent analysis and forecasting, establish knowledge-related networks, and provide reference for knowledge services ; c) The intelligent operation of the service business. From the service business and management process, to enhance the core competitiveness of knowledge services, On the one hand, optimizing knowledge service process can improve service efficiency. On the other hand, it can also provide decision-making and strategic planning for knowledge service. The SoLoMo-based smart service of Huazhong Normal University and the knowledge search engine of Wuhan University have begun to boldly try different forms of intelligent knowledge services

Challenges and Way Forward to Use of Artificial Intelligence in Academic Libraries and Teacher Education

Despite all AI potentials in libraries, academic libraries and most teacher education activities in Nigeria are yet to adopt and implement AI. Perhaps, this might be due to low level of awareness and adoption of AI's relevance in libraries and Higher Institution on Learning, as research connecting artificial intelligence (AI) to librarianship remains relatively low. While the use of AI has been increasing exponentially in other fields, this has not been the case in library and information science. The challenges, faced by libraries today, pose a tangible risk to the traditional role of libraries. Libraries are now struggling with operational inefficiency, technological disadvantage, difficulty in maintaining current audiences and engaging new ones, and an inability to demonstrate value and benefits to all stakeholders. Korinek and Stiglitz (2017) as cited in Yusuf, Adebayo, Bello and Kayode, (2022) maintained that advances in AI technologies could bring about job losses or job polarization. AI adoption has the potential for a high rise in inequality due to automation. World Bank (2016) in Yusuf, Adebayo, Bello and Kayode, (2022) maintained that developing countries may be more hinted at the adoption of AI because it will lead to a high job loss rate. The report further states that 69% of job loss will be experienced in India through AI adoption; 72% in Thailand; 77% in China and 85% in Ethiopia. All these studies indicate that AI can lead to job losses and the potential for gross job destruction. International Labor Organization (2018) as stated in Yusuf, Adebayo, Bello and Kayode, (2022) also stressed that with the current trend in technological change based on the adoption of artificial intelligence in different organizations that include libraries, AI adoption has created widespread fear of job losses and a high rise in inequality. Other challenges posed by the adoption of AI in academic libraries include:

1. Financial uncertainty: Tella, (2020) in Yusuf, Adebayo, Bello and Kayode, (2022) When government funds are shrinking and political or economic changes are underway, cultural institutions are often the first to suffer cuts. In many ways, the struggle for institutional or government funding is much like the chicken and egg problem. Libraries are expected to show value for money and demonstrate cost effective practices, but they can't do that without integrating new technologies to upgrade their physical spaces, offer new services, and improve the user experience for today's patrons – all of which requires additional funding. Thus, today's libraries often find themselves in a financial limbo - unable to show value without additional funding.
2. Emerging skill gaps: The digitalization of information has impacted both library operations and systems. Today, the digital realm is just as important as the physical one, making it essential for libraries to develop new skills not only to stay competent, but to better serve patrons in the digital age. These services require new competencies, such as: higher levels of digital fluency, the ability to provide the most relevant resources at a much faster pace, and supporting hands-on creative activities to maximize a patron's learning experiences.
3. Competing with today's alternative sources of information: According to a 2017 Horizon report in Yusuf, Adebayo, Bello and Kayode, (2022) a survey found that 68% of college students start their research with Google and Wikipedia. These free providers of information, along with the emerging open access trend in scholarly publication methods, are daring libraries to rethink their distribution of high-quality information in to the context of maintaining a vital presence in the new information landscape.
4. Attracting new and more diverse audiences: For libraries to appeal to their existing audiences and engage new ones, they need to offer services that meet the expectations of the new generation of hyper-connected patrons. This includes rethinking the library's traditional physical space, moving from a quiet place filled with bookshelves for reflective reading and writing to something entirely different. For the library to remain relevant, it needs to become a vibrant space for collaboration and innovative activities, alongside a quiet space for reflective studying. Several of the challenges associated with adopting AI in libraries have been highlighted by CILIP (2021) in Oyetola, Oladokun, Maxwell and Akor (n.d) and other organisations. These include, but are not limited to, copyright and intellectual property rights (IPR), the General Data Protection Regulation (GDPR), the cost of working at scale, the reintegration of project data into systems, a lack of management / executive support, insufficient budget and funding, an inability to keep up with the increasing trend in new technologies, and the challenge of implementing new technologies

Conclusion and Recommendations

Oyetola, Oladokun, Maxwell and Akor (n.d) asserted that advances in digital technology have fundamentally altered how traditional library work is done throughout time. Academic and research libraries all around the world are wired for technology and have incorporated it into all of their internal operations and activities; developing countries like Nigeria are not lagging behind in this race. In Nigeria, the incorporation of technology into library services is not new. Throughout the past twenty years or so, Nigerian libraries have not fallen behind in the adoption and implementation of technological developments to enhance library operations and services. Examples of these technologies include computers, scanning and printing devices, electronic resources, CCTV cameras, social media, and most recently, RFID technology. Innovative technology, like artificial intelligence, is still not widely used.

Some of the recommendations suggested by Yusuf, Adebayo, Bello and Kayode, (2022) include:

1. Government and library management must come together to proffer the way forward for academic libraries in terms of meeting up with the latest standard of the use of AI in libraries
2. Library staff should be exposed to training and retraining in the use of artificial intelligence in delivering of libraries' services in order to achieve improved operational efficiency in libraries where the technology is to be adopted or already adopted.
3. There must be proper policy formulation and implementation prior to, during and after the adoption of AI in African academic libraries and Higher Institution in general.
4. Higher institutions libraries should intensify efforts in adopting artificial intelligence in the delivery of libraries' services for libraries users to gain very high level satisfaction.
5. Government and concerned agencies should provide adequate artificial intelligent hardware and software to aid in the delivery of libraries' services to users.

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