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UTILIZATION OF ARTIFICIAL INTELLIGENCE (AI) IN THE MANAGEMENT OF TERTIARY INSTITUTIONS IN NIGERIA

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Abstract - This paper examined utilization of Artificial Intelligence (AI) in the management of tertiary institutions and challenges that might likely face the application of Al in tertiary education management in Nigeria. Secondary data collected from print and online publications was used in this paper. The paper revealed that AI if properly utilized, can aid effective tertiary institutions administration, facilitate efficient management of data and decision making, support resource optimization, aid implementation of teaching programme, improve research programme development, and improve security in tertiary institutions. The paper further identified bias and discrimination, data privacy and security breaches, lack of technical expertise and resources, power problem, job displacement amongst others as challenges that might likely affect the utilization of Artificial Intelligence in tertiary education management in Nigeria. Based on these points identified, the paper suggested that government should increase funding of tertiary institutions for the development of artificial intelligence in all public tertiary institutions across the country.

Keywords: Artificial intelligence, tertiary education, management, modern higher education

Introduction

Globally, tertiary institutions and technological landscape have continued to change and will continue to change even in the future. The institutions therefore key into the pervasive and changing technology in order to remain relevant, optimize value and increase access for effective and efficient management delivery. Modern higher education is defined as organized tertiary learning and training institutions that include conventional universities such as arts, humanities, and science faculties as well as more specialized university institutions in agriculture, engineering, science, and technology (Alemu, 2018). The concept of tertiary education also includes post-secondary institutions like polytechnics, colleges of education, and universities. Under the umbrella of tertiary education come all forms of professional institutions. Even this wide spectrum does not exhaust the possibilities of forms of higher education (Assie-Lumumba, 2005). Ogunode and Gregory (2023a) conceptualized tertiary education as a planned and organized educational system designed for the total

development of man and woman as well as the total transformation of the society through the utilization of teaching, research and provision of community service. Tertiary education is post-basic and secondary school education that embraces advanced teaching, research and community service.

Tertiary education is an advanced educational system meant for human capital development through teaching, research and provision of community service. Tertiary education is the third tier of education that is designed for the production of skilled professionals for socio-economic and technological advancement. Tertiary education or higher education is a set that constitutes the university, which is a subset of higher education. However, in some contexts, higher education and university are used interchangeably (Assie-Lumumba, 2005). The goals of tertiary education, according to the Federal Republic of Nigeria (2014) in her National Policy on Education, shall be to: contribute to national development through high-level manpower training; provide accessible and affordable quality learning opportunities in formal and informal education in response to the needs and interests of all Nigerians; provide high-quality career counseling and lifelong learning program that prepare students with the knowledge and skills for self-reliance and the world of work; reduce skill shortages through the production of skilled manpower relevant to the needs of the labour market; promote and encourage scholarship, entrepreneurship and community service; forge and cement national unity; and promote national and international understanding and interaction (pg 9). The implementation and realization of tertiary education goals depends on the availability of human resources and material resources. Artificial intelligence is one of the material resources that can be deployed for effective management of tertiary institutions.

Artificial Intelligence technologies encompass various techniques and approaches, such as machine learning, deep learning, natural language processing, computer vision and robotics. These technologies enable computers to analyze vast amounts of data, recognize patterns, make predictions and automate complex processes. In the words of Ogunode and Gregory (2023), Artificial Intelligence refers to the development of computer systems and machines capable of performing tasks that typically require human intelligence. These tasks include: learning, reasoning, problem-solving, perception and natural language understanding. Artificial Intelligence has applications across numerous fields, including health care, finance, transportation, customer service and

education. It has the potential to transform industries, improve efficiency and create new opportunities (AFSA, 2022). In the views of Alagbe, Awodele and Ayorinde (2023), AI is the ability of a computer or machine to mimic the capabilities of the human mind–learning from examples and experiences, recognizing objects, understanding and responding to language, making decisions, solving problems and combining these and other capabilities to perform functions a human might perform, such as greeting a hotel guest or driving a car. Ogunode and Ukozor (2023) defined Al as programs designed with human-like intelligence structured in the forms of computers, robots, or other machines to aid in the provision of any kind of service or tasks to improve social economic and political development of the society. In recent years, AI has emerged as a potent force in educational management, revolutionizing the learning landscape. It contributes to enhancing the learning process, elevating students' outcomes, and streamlining administrative tasks. Positioned at the forefront of the fourth educational revolution, AI represents a key driver of technological progress, reshaping societies and economies globally.

Concept of Artificial Intelligence

Artificial Intelligence (AI) is gaining significant attention due to its potentials to revolutionize almost all facets of human endeavor, including the tertiary education environment. It is seen as a new technology and a key factor which has the potential to introduce new sources of growth and change the way work is done across institutions, organizations, and work-places inclusive (Duggal, 2023). Artificial intelligence (AI) stands as an advanced technological frontier, simulating human intelligence through machine learning algorithms and neural networks. Artificial intelligence (AI) is a concept that has been in use since the 1950s, when it was defined as a machine's ability to perform a task that would have previously required human intelligence such as self-driving cars, robots, ChatGPT or other AI chatbots, and artificially created images, (Diaz, 2023).

AI robots are controlled electronically with the aid of the computer by mimicking the competences of the human mind. Artificial Intelligence refers to the development of computer systems capable of performing tasks that typically require human intelligence (AFSA, 2022). Artificial Intelligence is a method of making a computer, a computer-controlled robot, or a software think intelligently like the human mind (Duggal, 2023). It leverages on computers and machines to mimic the problem-solving and decision-making capabilities of the human mind.

Artificial Intelligence (AI), according to Nwakunor (2021), is the computer-controlled robots that think intelligently like human beings. Liu (2016) viewed AI as intelligent machines or intelligent systems that simulate human intelligence activities and extend the science of human intelligence.

Artificial intelligence is therefore an emerging technology and the simulation of human intelligence by machine capable of understanding, reasoning, learning, and applying knowledge to function, act and mimic the problem-solving and decision-making capabilities of the human mind to solve problem. The study of intelligent machines and software capable of reasoning, learning, knowledge acquisition, communication, manipulation, and perception define the realm of Artificial Intelligence (Verma, 2018).

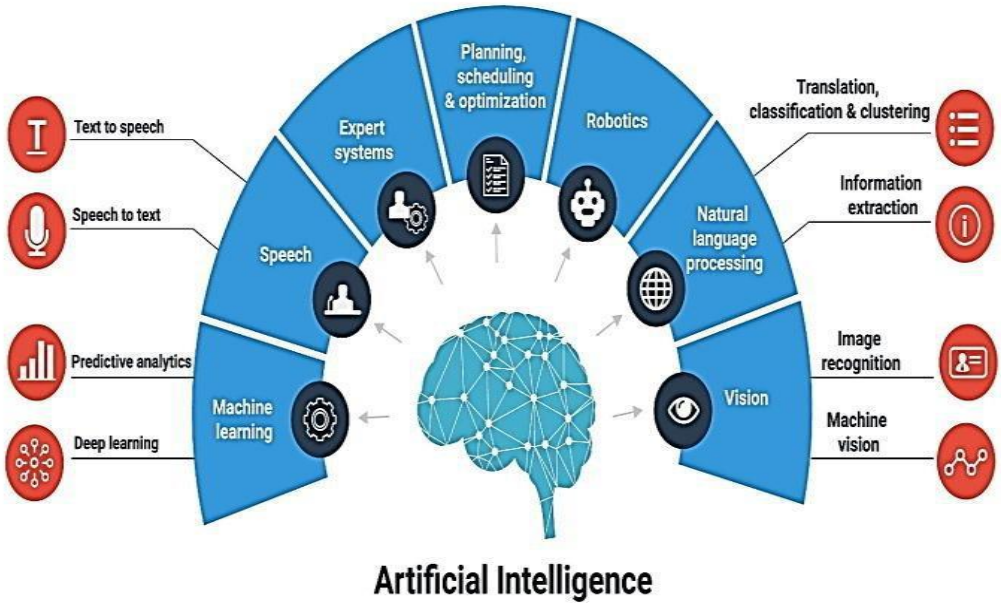

Fig 1: *Pictorial Diagram of AI Components* (**Source:** Vijayakumar & Sheshadri, 2019).

Utilization of Artificial Intelligence in Tertiary Education Management

AI can play a critical role in tertiary education by aiding effective tertiary institution administration, efficient management of data and decision making, resource optimization, effective implementation of teaching programme, improve research programme development, amongst others discussed below in detail:

Aids Effective Tertiary Institutions Administration: Tertiary institutions administration refers to the use of tertiary institutions resources to execute tertiary institutions programmes for the attainment of tertiary institutions objectives. Tertiary institutions administration covers all activities and programmes of tertiary institutions. Tertiary institutions administration also focuses on teaching, research and community service programmes of tertiary institutions. According to Ogunode (2020), the objectives of university administration or tertiary institution administration include: implementing the programme of the universities as defined; allocating resources for the implementation of the university programme; ensuring implementation of the teaching programme, ensuring implementation of the research programme; to ensure delivery of quality community services programme, to ensure effective staff development, to ensure effective students' administration, to ensure smooth implementation of academic calendar and to ensure quality education. Bordia (2023) contended that AI tools can automate repetitive tasks essential for the smooth functioning of an institute. AI can be used to aid effective tertiary institution administration by automating activities like fee collection, admission enquiries management, tracking the circulation of books in the library, helping staff plan the entire academic year and most importantly, AI can improve the efficiency and effectiveness of tertiary institutions' administration. AI can facilitate the automation of administrative tasks (Chan & Tsi, 2023).

Efficient Management of Data and Decision Making: AI can be employed in tertiary institutions to improve data management and decision making in the system. In education, the concept of Big Data refers to large volumes of structured and unstructured data generated within the educational ecosystem, including students' information, academic records, assessments, social interactions, and more. Decision-making involves the process of choosing from alternative course of actions. Many issues arising in the educational institutions demand decision-making because there is more than a single option of action. Many alternatives are generated out of which one is taken for implementation. The manager must have an adequate knowledge of alternative actions available on an issue, who should be involved in decision-making and mode of implementation of the decision (Fasasi, 2011). Big Data in education is characterized by its immense volume, variety, velocity, and veracity. The velocity of data generation requires real-time processing for timely interventions

and personalized support. With the increasing digitization of educational processes, enormous amounts of data are generated, including students' performance metrics, learning activities, assessments, and more (Anisova, 2023).

Resource Optimization: Resources allocation is another fundamental function of management. Educational resources are divided into two, human and material resources. It is the responsibilities of institution's management to ensure these resources are effectively allocated to realize the efficiency of goals and programme. AFSA (2022) asserted that AI can help tertiary institutions' management optimize the allocation of resources, such as staff, lecture rooms and materials. By analyzing data on students' enrollment, class sizes and scheduling, AI systems can suggest efficient resource allocation strategies to optimize learning environments and support students' needs.

Implementation of Teaching Programme: Artificial intelligence can be deployed to solve various problems hindering effective implementation of teaching programmes in tertiary institutions across the country. The teaching programme is a core programme of tertiary institutions and is very critical to the attainment of tertiary institutions objectives. The teaching programme covers the preparation of lecture notes, presentation of lectures, assessment of students' academic programmes via tests and examinations, marking of students' scripts, preparation of students' results, integration of resources into lecture presentations and classroom management. These entire things that constitute teaching programmes can be easily done by deployment of Artificial intelligence. On the issue of learning development in tertiary institutions, Bordia (2023) concluded that educational institutions can use AI-powered chatbots to provide uninterrupted learning to students. As chatbots are available, students can use them to resolve doubts in real time. Moreover, chatbots can also be used by school authorities to provide information to parents and students. Tasks such as grading assignments, generating reports, and managing administrative paperwork can be automated, leading to increased efficiency and improved teacher-student interactions (Borbajo, Malbas, & Dacanay, 2023)).

Improve Research Programme Development: Paul (2015) and Fawole et al. (2006) also viewed research as a systematic investigation including development, testing and evaluation, designed to contribute to knowledge. Research is a curiosity-driven activity that has the purpose of discovery and advancement of knowledge. Research is conducted mostly in the higher institutions environment

to solve problems affecting society. The academic staff is saddled with the responsibility of carrying out research in the universities. Conducting research is one criterion for measuring their performance (Yusuf, 2012; Ogunode & Ade 2023). The conduct of research is one of the basic functions of tertiary institutions, which comprise Universities, Polytechnics, Monotechnics and Colleges of Education. The academic staff is compulsorily required to carry out research activities as their promotions are primarily based on their research outputs which enhance their credibility, status, and also add value both to their immediate community and the larger global community. Khedkar (2023) observed that researchers can use AI tools for writing a research grant, a book, or even academic journal articles. Some AI-powered tools can help researchers to edit their articles and use grammatically correct English. Analyzing data from the experiments conducted is an important aspect of research. AI-powered data analysis tools can help researchers analyze data more efficiently and make the process free of any bias. Researchers can save hundreds of hours by using AI tools that can read complex papers and summarize them. Researchers can also make use of AI tools for citing literature and keeping their sources organized. AI-powered research tools for reading, annotating, and note-taking can make the process of acquiring knowledge considerably more efficient. Such tools can provide the user excerpts from the literature source, with the most relevant information highlighted, and help one decide whether an article is worth reading.

Improve Security in Tertiary Institutions: AI can be used in tertiary institutions across Nigeria to improve the security of lives and properties. Tertiary institutions in Nigeria are presently faced with various insecurity problems. Source Security (2023) noted that security is a 24-hour challenge. Protecting schools involves the deployment of a range of security and physical handling tools. Reducing risk requires that access to school buildings be controlled, while also preserving an "open" campus atmosphere that promotes a learning environment. Schools should be an inviting place for students and families, so technological solutions aimed at restricting access should be low-profile and unobtrusive. School Security must also be designed in layers, or concentric circles of protection, starting at the school's perimeter and working inward to secure individual classrooms and other internal areas. Source Security (2023) listed the following Al devices to solve security problems in tertiary institutions to include:

i. **Enhancing Video Security at Schools:** Video surveillance is a technology that is unobtrusive and can promote security beginning at the outermost boundaries of the school environment – at the perimeter and as automobiles drive onto school grounds. Surveillance can keep a silent and constant watch as people come and go. Furthermore, incorporating new artificial intelligence (AI) and deep learning technologies is increasing the real-time capabilities of video surveillance to provide early warning of a possible security threat as it enters a campus. AI and deep learning analyses the content of video feeds and provide usable information to security personnel, including analysis of trends and real-time alarms when an event takes place (ibid).

ii. **Automated Number Plate Recognition (ANPR) Systems:** Automated number plate recognition (ANPR) systems identify the license numbers of cars that enter an institution's parking entrance or gate and can match the numbers to a watch list and provide an alarm. The technology could also be used to monitor compliance with restricted areas; for example, to only allow vehicles that are registered for a parking pass to park in a certain lot. A more advanced approach could involve dual identification technologies – vehicle plate and facial recognition of a driver to add another layer of security. Video systems with illegal parking detection can define a zone for no parking at a school. If any vehicle enters the area, the camera will be triggered to collect evidence. Images are captured of illegally parked vehicles, and the system provides data about when and where it occurred, the vehicle plate number and the parking violation (ibid).

iii. **Facial Recognition Systems:** Facial recognition can be used at school entrances and gates to promote the security of students and staff and to identify known suspects who attempt to enter the building. "Blacklist alarm" technology generates a notification if a known suspect enters. Clarity is paramount when identifying faces and cameras that provide wide dynamic range (WDR) can offset challenges such as backlighting on a bright day when the light behind a person coming in is brighter than the ambient light inside (ibid).

iv. **People Counting Cameras:** Facial recognition systems can also be used inside school buildings. A facial recognition terminal installed at the

entrance of a campus building or library can be configured to ensure that only registered students and staff have access to the buildings. People counting cameras can be used in cafeterias and libraries to provide daily or monthly traffic reports and to better understand peak times and arrange workflow accordingly (ibid).

v. **Improvement on Attendance of Staff in Tertiary Institutions:** Tertiary institutions in Nigeria seem to be facing the problem of poor attendance of staff to offices. It has been observed that most tertiary institutions across the country are facing poor turn in of staff to work. Pocket (2022) submitted that the attitude of most staff in tertiary institutions to work is poor. He further stated that some of the staff does not go to work as scheduled for them. In addition, he emphasized that an AI-based attendance management system is a technological solution that streamlines attendance-related practices like facial recognition, biometric identification, working hours' auto tracking, and more. The recent cut-age machine learning technique helps employers in employee data analysis to automate and enhance the process of tracking employee attendance. By utilizing AI algorithms, the system accurately identifies employees, records their attendance in real-time, analyses attendance patterns, and provides valuable insights for workforce management. With an AI attendance system, HR can perform administrative tasks without any errors, enhance the HR operation more efficiently, and improve the decision-making processes.

vi. **Maximizing School Surveillance Capabilities:** Systems to maximize school surveillance and security include dedicated, high-performance cameras for event capture, an embedded network video recorder for event recording and storage, and a centralized video management platform to unify the system. AI and deep learning technologies automate security processes and provide useful real-time information that extends beyond video images. Deploying these technologies at the perimeter can promote better security campus-wide by preventing danger from entering the learning environment (ibid.).

Challenges of Artificial Intelligence in Tertiary Education Management

Some of the challenges facing the utilization of Artificial Intelligence are; Bias and discrimination, data privacy and security breaches, lack of technical expertise and resources, power problem, job displacement and others:

Bias and Discrimination: One of the significant limitations of AI in educational management is the potential for bias and discrimination. Igbokwe (2023) asserted that AI algorithms may replicate and amplify existing biases and discrimination in educational systems, leading to further inequality and injustice. For example, AI may perpetuate gender or racial biases in student evaluations or admissions decisions. Educational managers need to be aware of these limitations and work to ensure that AI is used in a fair and equitable manner.

Data Privacy and Security Breaches: Another significant limitation of AI in educational management is the potential for data privacy and security breaches. As argued by Igbokwe (2023), the use of AI in educational management requires access to large amounts of data, including personal information about students, faculty, and staff. This data is vulnerable to cyber-attacks and other security breaches, potentially exposing sensitive information and undermining the trust and confidence of stakeholders.

Lack of Technical Expertise and Resources: A third significant limitation of Artificial Intelligence in educational management is the shortage of Al teachers and experts for educational administration in Nigeria. Attah (2021) lamented that about "90 percent of our primary schools do not have computer teachers. Therefore, the government needs to redefine our educational system. We cannot depend on an analogue age. As the world is changing, we need to change too," the scholar stated. Igbokwe (2023) noted that another challenge is lack of technical expertise and resources. AI requires specialized skills and knowledge, and educational institutions may lack the necessary resources to implement AI effectively. Training and professional development opportunities must be provided to ensure that educators and administrators have the skills to use AI effectively.

Power Problem: Many cities and communities today in Nigeria do not have access to a stable power supply. This problem also affects Al deployment for educational management especially public educational institutions across the country. The problem of unstable power supply is hindering the students and teachers from integrating digital technologies into their teaching and learning

program. Recently, Thisday (2022) cited Energy Progress Report by Tracking SDG 7 (sustainable development goal number 7) and stated that Nigeria has the lowest access to electricity globally, with about 92 million persons lacking access to power which is stifling the country's industrial growth and causing other problems. The report also noted that West Africa has one of the lowest rates of electricity access in the world with only about 42% of the total population and 8% of rural residents, having access to electricity. The educational system is faced with the problem of unstable power (Ogunode, Okwelogu. &Yahaya, 2021)

Job Displacement: Artificial Intelligence (AI) in educational management also raises concerns about job displacement. AI can automate administrative tasks, and there is a fear that this will lead to job losses for educators and administrators. It is essential to ensure that the use of AI does not lead to job displacement but rather supports educators in their work (Igbokwe, 2023).

High Cost of Maintenance: The high cost of Maintaining Al facilities in educational institutions has limited many school managers and administrators to adopt the platform for school administration only. Al facilities are very expensive and capital intensive in terms of maintenance. Due to poor funding of educational institutions by government, heads of institutions cannot procure or guarantee effective maintenance of these Al facilities in institutions.

Conclusion

In conclusion, modern tertiary education changes are prompted by evolving societal needs and technological advancements, such as the utilization of artificial intelligence (AI) in the management of tertiary institutions in Nigeria. This paper has explored the multifaceted ways AI can genuinely contribute in Nigerian tertiary institutions management, assessing its impact on effective tertiary institutions administration, efficient management of data and decision making, resource optimization, research programme development, and improving security in tertiary institutions. The paper also identified some challenges that might likely affect the utilization of AI in tertiary education management.

Suggestions

1. The government should increase the funding of the tertiary educational institutions. This will make funds available for school administrators to procure and to maintain Al facilities for effective school management

2. The government should ensure adequate training and retraining programmes for administrative staff for effective usage of the Al facilities.
3. The government should ensure that the power supply is stable and available to all educational institutions.
4. The government should subsidize the high cost of Al facilities for educational institutions and students likewise. This will make many tertiary institutions and students afford the Al facilities for personal use.
5. The government should employ more Al teachers and professionals and deploy them to schools.

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