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Artificial Intelligence, Teaching and Research Programmes in Tertiary Institutions in Nigeria

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Abstract

This paper examined the roles of artificial intelligence (AI) in the implementation of teaching and research programmes of tertiary institutions in Nigeria. The paper is a position paper that depend on secondary data. Secondary data were collected from online publications and print resources. The paper established that AI facilities are very effective in the implementation of teaching and research programmes in the tertiary institutions. The paper noted that AI facilities support the smooth execution of teaching and research programmes via (Google Scholar, Scite, Trinka. Elicit, Scholarcy, IBM, Watson, Tableau, Semantic Scholar, Consensus, Mendeley and Zotero) in the tertiary institutions in Nigeria. AI aided academic staff job performance and facilitated learning programme of students in the institutions. Based on this findings, the paper recommends that government should increase the funding of the tertiary institutions so that administrators of tertiary institutions can procure more AI facilities in their respective institutions to support implementation of teaching and research programmes.

Keywords: Artificial Intelligence, Research Programme, Teaching Programme,Tertiary Education

Introduction

Artificial intelligence (AI), according to Copeland (2023) is the ability of a digital computer or computer controlled robot to perform tasks commonly associated with intelligent beings. The term is frequently applied to the project of developing systems endowed with the intellectual processes characteristic of humans, such as the ability to reason, discover meaning, generalize,

or learn from past experience. Frankenfield (2023) defined Artificial intelligence (AI) as simulation of human intelligence by software-coded heuristics. Artificial Intelligence is a branch of science producing and studying the machines aimed at the stimulation of human intelligence processes.

AI has the ability of a computer or machine to mimic the capabilities of the human mind – learning from examples and experience, 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 (Alagbe, Awodele, & Ayorinde, 2021). Al has programs designed with human-like intelligence and structured in the forms of computers, robots, or other machines to aid in the provision of any kind of service or tasks to improve the social economic and political development of the society. Artificial Intelligence is an application or program constructed to carry out tasks with human-like intelligence (Ogunode & Ukozor 2023).

Artificial intelligence is a specific branch of computer science. Through research and development, it can simulate, extend, and expand the theory, method, technology, and application system of human intelligence. The research scope of this field is wide, including language processing, language image recognition, and intelligent robot. Since the advent of artificial intelligence technology, it has been deeply studied by scholars all over the world. The theory and technology research are becoming more and more mature, and the application field is also expanding. In the future, the scientific and technological products brought by artificial intelligence will be the aggregation of human intelligence. To some extent, artificial intelligence can carry out digital simulation of the information process of human consciousness and thinking and even surpass human in thinking ability class. At the same time, artificial intelligence is a science with great development potential (Xia, & Li, 2022).

Literature Review

Concept of teaching

Teaching is the process of facilitating learning, growth and development in others. Teaching entails instruction- sharing knowledge, skills and values; guidance- which is providing direction, support and feedback; facilitation-which is creating an environment conducive to learning; mentoring –which is offering advice, encouragement, and role-modelling and assessment- which is evaluating students' progress and understanding, Edinoh (2024). Teaching is the act of imparting knowledge to learners. Teaching is the act of transferring knowledge and skills to students. Teaching is one of the cardinal program of educational institutions. Teaching is very important in the educational setting. No meaningful educational program can take place without teaching. Teaching is one of the indicators used for measuring quality of education. There are factors that determine the quality of teaching

programme and they include: the quality of the teachers, methods of teaching, classroom management, mastery of subject matter, availability and adequacy of teaching aids, and infrastructural facilities (Edokhamhen & Ogunode 2020).

Teaching program is the first cardinal program of tertiary institutions and it is very important for the implementation of the curriculum. Teaching is a fundamental responsibility of tertiary institutions, focused on imparting knowledge, skills, and values that enable individuals to contribute positively to socio-economic and technological development (Ogunode & Ukozor, 2024; Ogunode, Somadina, Yahaya, & Olatunde-Aiyedun, 2021). It involves not only transferring academic knowledge but also instilling the right values, character, and behaviors necessary for community development (Ogunode, Ngezack & Usi, 2024).

Teaching program required the services of an academic staff or a lecturers. Gambari, Sobowale and Shehu, (2022) maintained that **a** university lecturer is a person who lectures as an occupation in a university. Ogunode, Edinoh & Okolie (2023) conceptualized tertiary education as a planned and organized educational system designed for the total development of man/woman and for the total transformation of the society through the utilization of teaching, research and provision of community service. A University is a tertiary institution in Nigeria saddled with the responsibility of training graduates to obtain degree certificates in various disciplines. In education, the role of the university lecturer is that of a guide, mentor, facilitator, academic supervisor, and instrument to ensure comprehensive learning.

The lecturer as a facilitator, guides the learner to play an active role to get to his or her understanding of the content (Masaazi, 2015). Academic staff job performance is the total performance of teaching, researching and community services responsibilities an academic staff has carried out and still carrying in the institutions they are employed at a particular time (Aregbesola & Edinoh 2024). AI has been integrated into education, in the form of intelligent books, smart devices, web browsers, education applications, learning platforms and tutoring systems. With the utilization of Artificial Intelligence in teaching and learning, learners will have access to an unprecedented amount of authentic and relevant information. Artificial Intelligence plays a significant role in the educational success of lecturers and learners by offering them new innovative ways of teaching and learning, assessment, acquiring skills, communicating, sharing, creating, grading, analyzing and interacting with learning materials. Artificial Intelligence when effectively integrated and used optimally in the teaching and learning process will enhance the development of digital literacy and informed citizenship in the digital age (Thomas, et al 2022).

Concept of Research Programme

Research can simply be defined as the process of arriving at dependable solutions to problems through planned and systematic collection, analysis and interpretation of data.

Research is an important tool for advancing knowledge for promoting progress, and for enabling scholars to relate more effectively to the environment, to accomplish their objectives, and to resolve conflicts (National Open University 2020). The academic staffs of these institutions are compulsorily required to carry out research activities as their promotions are primarily based on their research outputs. Apart from the academic staff being promoted through research publications, research activities enhance their credibility, status, and also add value both to their immediate community and the larger global community (Ogunode, Jegede, Adah, Audu & Ajape 2020). Yusuf (2012) opined that the role of higher education research in national development cannot be overemphasized. However, research in Nigeria's institutions of higher learning like the universities, polytechnics and colleges of education is yet to make a real impact on the technological advancement of the country and the socio-economic well-being of its citizenry. The achievement of the aims of research program in the Nigerian public universities depends on effective administration of research programs.

Edinoh , Ehwe & Okolie (2023) viewed research as the second most important part of the academic programme after the theoretical background. They are carried out to advance the social, economic and technological development of their immediate community and society at large; research is conducted by both staff and students in the university system. Students do their research work as part of their academic programme while staff do research based on their individual interests and specializations.Ogunode, Offia & Walakan (2024) noted that both lecturers, researchers and students engages in research programme in the tertiary institutions. Research is conducted to solve local, national and international pressing problems. National Open University (2020) asserted that research will often argue that a certain individual is "conservative" if he or she answers a series of questions in a specific manner. The assumption is that certain answers to specific questions represent particular personality patterns, one of which is "conservatism." Research attempts to discover relationships existing among important variables. It is aimed at finding the condition under which a certain phenomenon of interest occurs and the conditions under which it does not occur in what might appear to be similar circumstances.

There are many resources that support effective conduct and implementation of research program in the tertiary institutions, some of these resources include technological resources such as information communication technology and artificial intelligence.

Materials and Methods

This study adopts a qualitative research design utilizing secondary data to analyze the role of artificial intelligence (AI) in teaching and research programs in tertiary institutions in Nigeria. The data were sourced from online publications, journal articles, books, and reports

on AI applications in education and research. By synthesizing relevant literature, the study investigates how AI technologies like Google Scholar, Scite, Trinka, Elicit, Grammarly, and others are being integrated into academic programs to enhance teaching efficiency and research productivity. The methodological approach focuses on analyzing and interpreting data to identify trends, challenges, and opportunities associated with AI adoption. The data were systematically reviewed to assess the impact of AI on academic staff performance, learning experiences, and institutional research outputs. The analysis involved evaluating the tools' capacity for automating tasks such as personalized learning, assessment, plagiarism detection, and organizing references. This approach allowed for a comprehensive understanding of how AI supports academic functions and overcomes traditional barriers in education and research. The study's focus on secondary data ensures a broad perspective on AI applications across multiple contexts within tertiary education in Nigeria. Findings were interpreted through a critical lens to provide actionable insights and recommendations for policymakers and educators. This methodology is suitable for exploring the potential of AI-driven solutions in addressing challenges in Nigeria's higher education system, ultimately providing a foundation for future empirical studies and policy formulation.

Results and Discussion

Impact of AI on teaching programme

Intelligent Tutoring Systems according to Karsenti, (2019) provide personalized learning to learners, automatic correction of certain kinds of schoolwork, which enables lecturers to have time for other tasks, help lecturers adjust their courses to some extent, provide ongoing feedback on students' assessment. For example, Coursera and MOOC platforms are using AI technology to inform teachers when many students answer a question incorrectly. Ogunode et al (2023) asserted Al can be applied to aid delivery of lecture or implementation of teaching programme in educational institutions. Westagilelabs (2022) observed that tutoring programs or intelligent tutoring systems (ITS) based on artificial intelligence are equipped to handle personalized feedback and instructions for one-on-one teaching. They can help in scenarios where human tutors are not available for small lessons that can be taught and evaluated online. It can be an effective tool in e-learning platforms to teach languages, geography, circuits, medical diagnosis, computer programming, mathematics, physics, genetics, chemistry, etc. They are designed to factor in engagement, metrics for grading and comprehension. Borbajo, et al (2023) observed that the integration of AI technologies in the classroom was found to enhance student engagement and motivation. AI-based educational tools, such as adaptive learning platforms and intelligent tutoring systems provide personalized and interactive learning experiences. These technologies adapt to individual student needs, pacing, and

learning styles, fostering greater student engagement and intrinsic motivation. Students showed increased interest and active participation in their learning process, leading to improved learning outcomes.

On enhanced personalized learning, Borbajo, et al (2023) noted that AI integration facilitated personalized learning experiences by tailoring instruction to individual student abilities and preferences. Intelligent algorithms analyzed student data and provided adaptive feedback, suggesting targeted learning materials and activities. This personalized approach allowed students to learn at their own pace and focus on areas where they needed additional support. Ogunode (2021) noted that teaching that is learner centered produces positive result. It has been advocated that school should ensure teachers make their teaching and instructional resources learner centered. Making teaching learned centered have been one of the challenges teachers are facing. Deployment of AI into classroom can make teaching learner centered and improved students engagement.

Deployment of AI for school management can assist both the teachers and school managers in the marking of student's exams and preparation of student's report cards. Ogunode et al (2023) remarked that AI can assistant teachers and lecturers especially exam officers prepare students result very fast and reliable. Westagilelabs (2022) observed that AI-powered grading software combines Machines Learning to create calculating systems after it collects important data on metrics for grading assignments from papers that have been graded by teachers/professors. The tools are designed to understand and replicate the teachers' human grading process earlier. Teachers' inputs + AI combination can grade essays, papers and tests in seconds, even in different languages. They can easily integrate them into an existing virtual environment or cloud-based platform. They are handy when the number of papers is significant so that the teachers can be occupied by more value-based work instead of wasting hours in grading. AI can aid effective marking of students online based examinations and also help to prepare the result on time.

Studies by Khare, Stewart and Khare, (2018); Singh, and Singh, (2021); Ogunode, Edinoh, and Chinedu, (2023); Igbokwe, (2023); Ogunode and Olowonefa (2023) established that AI aided implementation of curriculum in tertiary institutions; students assessment, script making, students supervision, personized learning;

Impact of AI on research programme

AI software and web browsers can be used to predict citation impact, automate the extraction of references from PDF articles, organise and share research questions in research. Thus, AI frees the researcher time that would have been used for sorting and arranging of reference materials, examples of such software and web browser are Mendeley, Scopus, and

EndNote. AI integrated Grammarly Premium to automate proofreading identify and correct errors in research writing while also preventing plagiarism; this will enable the researcher to focus on the content being written rather than the grammatical or spelling errors. Education develops mind and expands knowledge bases and learning process involves a person carrying out a particular action within a specific situation, and then recognizing the effect of that action (Turesky & Gallagher, 2011).

Most Nigerian universities also make use of Artificial Intelligence based applications to detect plagiarism in students' work according to (Thomas, Gambari, Sobowale,& Shehu, 2022; Karsenti, 2019). For example, Turn-it-in can recognize degrees of plagiarism in students' works when they "turn it in'' (Karsenti, 2019; Thomas,et al 2022). It shows the parts that are likely to have been plagiarised, the potential sources, and the percentages of the potential sources that have been plagiarised. Lecturers that are able to embrace and utilise Artificial Intelligence technologies to augment their teaching reap the benefits of their learners' engagement and active participation and as such delivery of higher standards of teaching which will assist weak students and provide practical experiences (Thomas, et al 2022). Kundariya (2023) listed the following Al tools that can aid research in higher institutions;

1. Google Scholar

To get better information on academic research, students and scholars can consider Google Scholar in their topmost favourite list. Through this tool, you can easily stay up-to-date on the latest research papers, scholarly literature, articles, conference papers, and theses. It also allows scholars to find relevant publications and citations easily. Most importantly, its simple user-friendly interface makes it a valuable resource and a great tool to use.

2. Scite

Scite is one of the most popular AI-powered academic research tools that improve any academic research in one go. Its own natural language processing and machine learning help users do better research on scholarly articles and analyze citations. Moreover, Scite allows researchers like you to assess the dependability in any particular context of references. It helps in evaluating the quality and impact of the research. It also provides better visualizations and metrics to understand the citation landscape of a particular paper or a topic. If you have missed out on using this tool, try it out today.

4. Trinka

It is one of the most commonly used AI tools for scholars and students, as it helps with grammar and language correction for academic and technical writing. It has 3000+ grammar checks, and tone, and style enhancements, which help scholars write better theses and projects without any errors. Trinka helps you document scientific findings and allows you to have a more technical tone and style without any difficulty. Therefore, for academic research purposes, Trinka is the most promising tool, as it helps document research papers and white

papers in a better way.

5. Elicit

Lecturers can consider Elicit as one of the easiest go-to AI tools in the market to process your knowledge. With the help of this tool, you can design and conduct qualitative research. From analyzing the textual data to specifying the key themes, sentiments, and patterns, a researcher can use this tool to automate. Also, Elicit can be used to deduce summaries and visualizations for effective data interpretation. For any researcher, Elicit is a gold mine as it helps them gain deeper insights and make informed decisions.

6. Scholarly AI

Scholarly is an Al tool that improves academic research by automating the process of reading, summarizing, and extracting information. It can help you recognize figures, tables, and references from the articles and help grasp the main concepts. Additionally, this tool has citation extraction features that allow the users to organize and cite the sources used in the research. It also provides the literature review process which enables you to save valuable time and effort. Using artificial intelligence and machine learning algorithms.

7. Knewton

Knewton allows users to deliver personalized educational content. You can tailor the tool for the educational content as per individual needs and learning styles. This is a one-stop and easy pickup tool in the academic learning phase. Knewton also allows users to analyze student performance data, strengths, weaknesses, and progress. By leveraging the benefits of AI, Knewton seeks to improve engagement making it one of the best online learning platforms.

8. IBM Watson

IBM Watson has various AI-powered tools for academic research. This tool has its own Watson Discovery and Watson Natural Language Understanding features. Features like data extraction, sentiment analysis, and language processing are built into this tool that smoothens the research process. In this way, this tool can help you discover insights from unstructured data.

9. Tableau

Tableau is a powerful tool that helps users to analyze data. With its drag-and-drop interface, Tableau helps users easily explore, understand, and identify data, trends, patterns, and outliers. It supports everything from basic charts and graphs to advanced maps, treemaps, and heat maps. It is a popular choice for data analysts, businesses, and researchers across industries for its user-friendly interface and robust data visualization capabilities.

10. Semantic Scholar

Semantic Scholar is an AI academic search engine that focuses only on relevant research papers. It is used in computer science, neuroscience, and the biomedical sciences. Also, its natural language processing and machine learning techniques help to analyze the content. This

tool can help researchers find and navigate relevant literature, visualize citations, and track scholarly articles. Its advanced search capabilities and citation analysis are some of the most recommended features to use. With its AI-driven approach, you can efficiently create and deliver high-quality scientific literature.

11 Consensus

Consensus is one of the best AI tools if you are looking for genuine scientific findings. Using this Al tool, lecturers and students can't go wrong with any research information, as they source the information for you only from published sources. That makes the process very reliable and uncomplicated to understand the subject and document it effectively. Also, this AI tool scans each topic thoroughly (through peer-reviewed research) so that it can provide you with a genuine and well-researched article that will reduce your stress.

12. Mendeley

Mendeley is a user-friendly AI tool to organize, share, and cite your research papers properly in one place. It helps you organize your PDFs, create better bibliographies, and annotate documents easily. Moreover, this tool enables researchers to collaborate on projects and discover relevant articles based on their interests. Mendeley's powerful features and integration into academic workflows make it a practical tool. It helps you to streamline your management and enhance collaboration within the scholarly community.

13. Zotero

Zotero is an AI-powered management tool and your research assistant. It is specially designed to help researchers and scholars collect, organize, annotate, cite, and share research documents. This tool can help you customize all your collections and automatically extract metadata from sources. Zotero has 10,000 citation styles for you to format your work and match your style to a publication. Moreover, it takes help from references and bibliographies to edit text and give you genuine information in your Google Doc or Word document. Ogunode, & Gregory (2023); Ogunode, & Ukozor, (2023); Ogunode, Agbade, & Bassey (2023b) and Chen, Chen, & Lin (2020) concluded that AI facilitate implementation of research programme among researchers, lecturers and students of higher institutions.

Findings

The paper concluded that AI facilities are very effective in the implementation of teaching and research programme in the tertiary institutions. The paper stated that AI facilities supported smooth execution of teaching programme and research programme in the tertiary institutions in Nigeria.

Conclusion

This paper examined the roles of AI in the implementation of teaching programme and research programme of tertiary institutions in Nigeria. The paper established that AI facilities

are very effective in the implementation of teaching and research programme in the tertiary institutions. The paper noted that AI facilities supported smooth execution of teaching programme and research programme via (Google Scholar, Scite, Trinka. Elicit, Scholarcy, Knewton,IBM, Watson, Tableau, Semantic Scholar, Consensus, Mendeley and Zotero) in the tertiary institutions in Nigeria. AI aided academic staff job performance and facilitated learning programme of students in the institutions. Based on this findings, the paper recommends that government should increase the funding of tertiary institutions so that administrators of tertiary institutions can procure more AI facilities in their respective institutions to support implementation of teaching and research programme.

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