

APPLICATION OF ARTIFICIAL INTELLIGENCE IN TERTIARY EDUCATION AND NATIONAL DEVELOPMENT OF NIGERIA

Etuki, G. E

godwinecheng@gmail.com

Department of Educational Foundation,
School of General Education Federal College of Education Obudu

Abstract

Artificial Intelligence (AI) is bringing a transformative innovation in all aspect of human endeavors but adaptation to this new innovation has been a serious challenge especially for developing countries like Nigeria. AI is playing essential role in workplaces, Education especially as it concerns teaching and learning, businesses and in the entertainment industry. In the modern world many are conceiving AI as a technological tool that enhances changes, and lead to efficiency in handling certain tasks while other perceived Artificial Intelligence (AI) as a discouragement to a genuine human Intelligence in exchanging information, teaching methods learning approaches, scientific research and evaluation of information among other things. The paper discusses the roles of AI, the prospects, limitation and potential challenges of incorporating the use of AI into Tertiary Education System. The paper concludes that regardless of all the limitation characterizing AI, it benefits Tertiary Education and lead to national development in Nigeria.

Keyword: Artificial Intelligence, Tertiary Education, National Development.

Introduction

There is a fast-growing concern about a technological innovation called Artificial Intelligence (AI). This technology has brought about potential changes in our country Nigeria and the world at large. AI's impacts are being felt in all aspects of human endeavors. Its presences are mostly felt in our tertiary educational institution of learning where more serious teachers, students and learners are making consistent effort to adapt properly into the new global trend of applying AI tools. Businesses and entertainment industry are not left out. This is because AI provides teachers, learners and other users grounds of approaching learning and teaching in a manner that suites personal need, and AI also aid automated evaluation and instant feedback anywhere, any day and any time. Nevertheless, their efforts are met by major shortcomings like lack of infrastructural availability, qualified personnel and policy formulation to back up the use of Artificial Intelligence in our tertiary education. Moreover, while many are conceiving AI as catalyst for change and speed in handling certain tasks, other perceived Artificial Intelligence (AI) as a discouragement to a genuine human Intelligence in exchanging information, teaching methods learning approaches, scientific research and evaluation of information among other things therefore, there is a need for educational institutions in collaboration with government to swiftly respond to AI's technical innovation and policy formulations that guide the application of Artificial Intelligence.

Artificial Intelligence (AI), refers to a computer or other technological tools or machines that has the capability to execute certain tasks which require an individual or human intelligence and reasoning to function maximally. The use of this AI tools is appreciated across all working space, especially in tertiary institution and education in general where AI has been adopted for teaching and learning activities. According to Chu et al (2022), "the adoption of AI in higher education has surged in the past five years, with a corresponding increase in new AI

tools" .Dever, et al (2020). Stated that AI has been adopted to customize instruction for various needs in a peculiar approach to learner's types of needs. Cagatayli and Celeb (2022). Pointed out that AI provide immediate feedback in real time and develop complex assessments, and predict academic success. Notwithstanding, many institutions have not yet adequately adjusted to the use of these technological innovations.

A study was carried out by Microsoft and Times Higher Education (2019). Their finding indicated that university leaders acknowledge the significant role AI will play in higher education thereby predicting a glorious future for higher education, which can by extension lead to national development. According to the finding, only 41% have formulated an AI strategy for their institutions. Other researches by Microsoft Asia and IDC Asia reveals that AI fosters innovation in higher education institutions, enhancing student engagement, enrolment, and funding. Zhang and Aslan, (2021). An article reviewing extensive empirical research on AI in education published from 1993 to 2020 notes that no African countries participated in AI research Although Africa is progressing in AI implementation, researchers believe that increased initiatives and support are necessary to promote the research and development of AI tools. Given that many African nations are developing, or underdeveloped, additional assistance is crucial for these countries to keep pace with the global AI surge.

Tertiary education comprises all higher education such as Universities, Polytechnics and Colleges of Education. According to University of Canada West (2025), shared that "Artificial Intelligence (AI) in education refers to the use of computer systems that can perform tasks typically requiring human intelligence to enhance learning experiences, this streamline administrative processes and support tertiary educators." They went further to clarify that AI technologies include machine learning, natural language processing and robotics, which can personalize learning by adapting content and pace to individual students need. The individual approach addresses complex learning styles and space safeguarding students and users' feedback for successes. The role of AI in tertiary education is rapidly enhancing changes on how students learn and how teaches teach. AI powered tools allows personalized learning experiences, adapting content and pace to meet learners' need. Intelligence Tutoring systems, automated grading and virtual assistants lead to both teaching efficiency and student's participation. Through AI evaluation method it can easily identify those students who are lacking behind which enable timely intervention. Another key role of AI as pointed out by University of Canada West (2025) is that AI in Education has the ability to improve accessibility and inclusivity, also that AI-driven platform can provide real-time translation, speech to text capabilities and adaptive learning material for students living with disabilities, as AI continue to advance, it holds the potentials to create more equitable and effective educational environment across the global village.

National Development, a nation can be said to have developed when it has high economic prosperity (GDP, per capital income), advanced technological infrastructure, high living standards with strong social indicators like good healthcare system and Universal Basic Education. The development of any country is not based on iron and steel but depend on proper education and training of her human resources, these individuals who are well trained through tertiary education lied the development of its nation, therefore, if Nigerian students are properly equipped with the knowledge of AI in tertiary education it will in turn lead to national development. Federal Republic of Nigeria, in Ezeaku and Agu (2025), stated in her National Policy on Education that the goals of tertiary education are to contribute to national development through high level manpower training, provide accessible quality learning opportunities in formal and informal education in response to the needs and interests of all Nigerians; provide high-quality career counselling and lifelong learning programs that prepare students with the knowledge and skills for self-reliance in the world of work; reduce skill shortages through the production of skilled manpower relevant to the needs of the labour market; and promote and encourage scholarship, entrepreneurship, and community service, among others.

The achievement of these goals of tertiary education depends on the availability and effective utilization of both human and material resources, among which Artificial Intelligence is increasingly gaining relevance. Hence, the application of AI in schools and tertiary institutions in Nigeria can help improve the quality of education and produce better-quality graduates. Jacob (2024) asserts that AI has significant potential to revolutionize Nigeria's education system by personalizing learning experiences, improving student engagement, and streamlining administrative processes. This is particularly important in Nigeria, where classrooms are often overcrowded, and teachers may struggle to cater to each student's unique needs (Aliyu & Yusuf, 2024). The intersection of Artificial Intelligence (AI) and education represents swiftly advancing domain with great potential to transform the educational experience of both the lecturers and students in tertiary institutions. AI presents a valuable opportunity to improve teaching and learning approaches, rendering them more efficient, engaging, and accessible. Similarly, AI applies Intelligent Tutoring Systems (ITS) defined as computer-based educational systems that have independent databases, or knowledge bases for educational content in addition to teaching strategies and try to use conclusions about the learner's ability to understand topics and identify his weaknesses and strengths so that they can adapt the learning process dynamically (Alrakhawi, Jamiat, & Abu-Naser, 2023). The ITS use Artificial Intelligence techniques to mimic the guidance a human tutor offers, tailoring educational content, problem-solving support, and feedback according to the student's individual learning needs, style and pace.

Therefore, the purpose of this paper is to discuss the benefit of AI usage in tertiary education in the enhancement of national development and the experiences of some countries as to encourage policy makers, administrators, teachers and students to pay necessary attention to integrate AI tools into tertiary educational system. It equally highlights the benefit of AI in tertiary education, existing promises, limitation and the challenges of incorporating AI into Tertiary education system. The paper also discusses the purpose and cause of National development

The Benefits of AI in Tertiary Education

The general benefits of Artificial Intelligence in education comprise performance efficiency and customization, meaning AI can be modify to suite individual need or task. It also applies to the following area:

1, AI in education can facilitate learning with greater flexibility and convenience as learners can learn in their own time and space using AI-related tools and infrastructure (Kabudi et al, 2022). Along with flexibility, AI can also enhance accessibility to education as more and more learners can access quality educational resources regardless of their economic background or geographic location. This advantage makes providing universal access to education much easier (Baidoo-Anu & Ansah, 2023). Adaptive platforms analyze how you solve problems and feed you harder and easier examples right when you need them.

2, AI can also enable tutors to empower their students' AI competencies, attitudes, and readiness to communicate with other learners, solve authentic problems, and develop ideas, theories, and solutions innovatively and collaboratively (ISTE, 2022). Thus, the use of AI in education is resulting in overall improvement of the students' performance. Chat-base tutor can walk you through proofs, debug code or explain concepts.

3, AI makes greater support available to students (Baidoo-Anu & Ansah, 2023). They gave an example that, AI-based assistance to students uses Chatbot and virtual assistants which are based on intelligent systems and can offer round-the-clock availability, address queries, and offer valuable feedback. AI also enables enhanced engagement and motivation of students by providing tools such as gamification of learning or interactive content.

4, Application of AI tools enables students to be more engaged and motivated (Zhang & Aslan, 2021). AI systems also enable automated grading thus enabling more time available to tutors for lesson planning and

preparation (Adlawan, 2024; Baidoo-Anu & Ansah, 2023). The automation of assessment is shifting the role of the teacher to a facilitator (Holmes & Tuomi, 2022). Teachers can integrate AI lessons as supplementary materials to assist weak students and provide hands-on experiences in the form of human interaction for students.

5, AI systems also provide students with a judgment-free environment of learning and can suggest solutions to improve students' performance. AI can also reduce the cost borne by educational institutes as it removes unnecessary work and automates processes which reduce the resource requirements (Adlawan, 2024). The reduced cost thus can be transferred to other stakeholders such as students. Overall, we can argue with confidence that AI application in the education field has benefits for learners, tutors, and educational institutes in terms of flexibility, increased learning, a focus on more important tasks, and increased efficiency rather than focusing on its limitation and challenges. With these few points we can now agree that AI is not just a boost word but is actually a backbone of improvement in our educational system,

Implication of AI-Enhanced Tertiary Education for Policy and Planning

Many hold the believe that AI has played a very significant role in affecting changes in diverse ways which include teaching practice, personalize learning approaches, technological innovation and general ways of doing things. Therefore, government and policy makers should come out with policies that can create an enabling ground to ensure the right impact of AI in tertiary education and streamlining AI technological tools with national programs and policies in line with the changes in Pedagogy, curriculum, assessment and teachers training is more likely to lead to greater learning on the part of students and other outcome, Kozma in (Ehinola & Olaleye, 2014). According to Chiu et al, (2023). Implementing AI requires training for large population of tutors and educational managers to use the system which may not be an easier task. The educational system of many countries are not up to date to accommodate the needed changes, it therefore remains a challenge. So there is a need for government policies intervention.

CHALLENGES

The new trend of using AI tools as a technology that simplifies and facilitate human activities through the use of computer which needed human intelligent a reasoning is not only beneficial in many aspects but also has it own challenges or limitations. Many within and outside the educational circle, considered AI as the best technology that offers efficient solution to schools and outside schools' problems through new innovations. however, many conditions can be considered as challenges of AI in tertiary education and educational system in general.

Literatures have suggested that one of the key challenges for AI in education is related to ethics. The ethical issues that can arise while using AI in education are the issues of transparency, fairness, privacy, morality, and removal of bias (Garrett, Beard, & Fiesler, 2020; Holmes & Tuomi, 2022)

A serious challenge of AI in education is students' privacy. Because students must interact with the AI-based system which can limit their privacy through aspects such as facial recognition and recommender system (Akgun & Greenhow, 2022). Student privacy can also be compromised if data captured by AI-based education systems lands in the wrong hands such as hackers. (Dignum, 2021; Kuleto, Ilic, Dumangiu, Rankovic, Martins, Paun, & Mihoreanu, 2021). Therefore, the privacy of users of AI-based education systems remains a challenge.

Another challenge of AI is inclusion and ease of accessibility (Awofiranye, 2024). This is because many individuals do not have equal access to technology which can create a disadvantageous position for such individuals. For example, many students in developing countries do not have access to a smartphone or internet

connection which can put them in a disadvantageous position compared to those who have such facilities. Besides the socioeconomic status of students, geographical location can also be a factor in access to AI-based education. The researcher narrated the difficulties faced sometimes when he was carrying out his national service in a certain remote area in Yobe state to be precise, the issues of accessing network was a serious challenge, there are cases one must climb a tree to enable you have access to network. this constitute a serious challenge and is still a problem to the adoption AI in our educational system.

A big challenge that is also related to the use of AI in education is dehumanize the learning experience (Adlawan, 2024). A decreased dependence on teachers is a challenge since AI despite its capacity cannot replace the need for human teachers. This argument was brought forth since the teacher's role is important not only for education but also for shaping the students' careers. Therefore, AI brings a challenge as a decreased dependence on teachers means a decreased focus on students' moral and personality development (Chiu, Xia, Zhou, Chai, and Cheng, 2023). Take for instance a counselor guiding a student in certain issues that need the expression of empathy in expressing what the student may be feeling in a given circumstances is not there because AI is a machine and dose not actually feel your pain, joy or fear because it responses are base on patterns in language not lived emotion. AI cannot diagnose mental health conditions or create treatment plans.

Another relevant challenge of AI is the inadequate preparedness of tutors and educational institutes in general (Awofiranye, 2024; Chiu et al., 2023; Pedro et al., 2019). Implementing AI requires training a large number of tutors and educational managers to use the system which may not be an easier task. The educational system of many countries is not up to date to accommodate such change and thus it remains a challenge.

Another challenge is the inability of students to explore their full potential (Awofiranye, 2024). This is because if students start depending too much on AI-based education, it will limit their critical abilities including thinking, logic, and memory which is a big drawback. In other words, students will be depending too much on machines which can hinder their learning and making full use of their potential.

The cost factor related to AI is another challenge that cannot be be put aside (Adlawani, 2024; Chiu et al., 2023). The prevision of the initial outlays for software and cloud support is very costly for educational systems. Not only the costs for continuous employee training are expensive but also ongoing training of the AI system would be costly if organizational processes change. Since there are several technology options, hence it is a difficult decision to restrict the potential options to a few (Chiu et al., 2023; Pedro et al., 2019). Therefore, it is arguable that there are some subtle challenges related to the use of AI in the tertiary education.

Purpose and goals of Tertiary Education for National Development

The concern is what can be done to solve the problem of national development in Nigeria using AI in tertiary education as a tool that can be relied on. This can be looked at using sets of question:

(A.) How can AI in tertiary education be used as a tool for national development in Nigeria?

Education is perceived in Nigeria as a vital investment for human capital, social economic, political and national development. Again for the expanded role, education is serving as

An aggregate tool of empowerment for the poor, and socially marginalized groups

The mean of development of competent work force through the acquisition of practical life skills relevant to the work force FRN in (Antiabong, 2019). See figure 1:

Empowerment Capacity Development

Acquisition of Practical skills

For development competent work force

Figure 1: Expanded Role of Education in Nigeria.

The goals of AI in tertiary education as a tool for national development should be directed toward:

The achievement of national unity

The production of quality manpower for all development sectors

Democratization in the provision of education as the right of all citizens

Inculcation of positive values in the citizens

Achievement of national integration and harmony

in the formal school system, education is provided through structured and interwoven curriculum for impastation of the knowledge content to the clientele at every stage of as preparation for useful living in the future (Antiabong, 2019)

(A.) Antiabong, also Advocates for national collective will and decision to consciously declare education as a reliable tool for development, thereby setting in motion mechanism to rebrand, recognize and sector specific implementation toward a redefined national development goal, there is a nexus between education, curriculum and national development. See figure 2:

An investment in

Human capacity

Subjects' matters content and activities

Selection, Organization and presentation

NexusFor learning in formal school

All sectors social, Political,

Industrial, infrastructure,

National integration

National Development

Enhance National Development

Development of a nation can be improved upon when policies makers in the field of education introduces and implement innovative ideas such as AI tools into educational curriculums thereby streamlining polices that ensures usability and sustainability. The adoption of these modern tools has been generally considered to bring about efficiency in the accomplishment of certain task, and as pointed above "An aggregate tool of empowerment for the poor, and socially marginalized groups, the use of AI is a mean of developing competent work force through the acquisition of practical life skills relevant to the work force, the right application of this computer tools has been recorded for speed and efficiency. This Nexus reflect standard delivery in the field of work all things being equal, Education of citizens will in turn leads to national development, what is necessary is for nations to embrace AI innovation and create a friendly environment that encourages utilization irrespective of class or status and among teachers and leaners in the field of education

Summary, Conclusion and Recommendation

This paper is attempted to give an answer to questions on the role of AI in tertiary education for national development, existing promises limitation and the challenges of it introduction to tertiary educational system. AI computer tool holds a potential influence in all aspect of life including tertiary education. This modern innovation called AI is enhancing changes in working condition, with peculiar approaches to teaching and learning among others. The paper also explains some relevance goals of tertiary education which is for national development. One of the areas where the impact of AI is felt is the educational system. The adoption of AI tools in education is positively influencing approaches to teaching and learning. Where space and location are no longer a barrier to teaching, learning and feedback are attainable in real time. AI facilitate active, collaborative and creativity, instant evolution and posting result in real time to enable a learner access their weakness and strength. At the same time, AI reduces burden on the teacher from the traditional ways of evaluation and computing of scores which usually takes a long time compare to AI tools which offers instant result on submission.

In addition, this article discusses the major challenges of the use of AI in tertiary education as teachers related, students related and technology related challenges. There is a general consensus that the development of any country depends upon the quality of education offered to it citizens. Despite the challenges of AI tools application, known limitation in education, the beneficial aspects are believed to be overweight the limitations. The computer and the internet are useful to enhance student's engagement in learning and positively impact students' achievements and in turn lead to national development all things being equal. Therefore, in making sure that application of AI in tertiary education brings about national development the following suggestions are made:

There is a need for educational institutions in collaboration with government to swiftly respond to AI's technical innovation thereby formulate policies that would guide and strengthens the application of Artificial Intelligence (AI) in tertiary institutions.

Government to partner with private bodies to established necessary infrastructural facilities that enhances the utilization of AI and ensure maintenance approaches for sustainability.

Also, government is advice to partnership with stake holders in education to roll out programs to train it citizens including both teachers and students on the knowledge of artificial intelligence and it application for national development.

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