Akinwande, E. R. (2025)

GENERATIVE AI AND TEACHER EDUCATION PROGRAMME IN NIGERIAN UNIVERSITIES: OPPORTUNITIES, CHALLENGES, AND PATHWAYS TO SUSTAINABLE DEVELOPMENT

Akinwande, Eric Rotimi
Department of Foundation of Education
Federal University Kashere, Gombe State
akinwandeeric@gmail.com 08138234355
Federal University Kashere, Gombe
Faulty of Education

Abstract
The paper examines the opportunities and challenges of integrating generative AI into teacher preparation, highlight its potential to enhance research, personalize learning, and improve pedagogical efficiency. At the same time, it underscores critical concerns such as bias in data, privacy risks, over - dependence on Technology, and the displacement of traditional cognitive skills. Drawing on global perspectives and local realities, the study situates AI within the broader content of the fourth industrial revolution and sustainable national development. It argues that while AI offers transformative possibilities for curriculum design instructional delivery, and academic research, its ethical use and responsible management are essential to safeguard educational integrity. The paper recommends continuous training of faculty, the establishment of clear institutional guidelines, and the incorporation of AI literacy into curricula to ensure that Nigerian Universities harness AI as a tool for innovation rather than a threat to human agency. Ultimately, the work calls for a balanced approach that embraces AI's benefits while mitigating its risks, positioning teacher education as a driven of sustainable development in the digital age.

Keywords: Generative AI, Teacher Education, Universities, Opportunities, and Sustainable Development

Introduction
As early mention the relationship between AI and education is inevitable and one may rightly say that AI could determine even the future of our education in addition, we may recall what did Martin Luther king Jr (1946) said he argued that the function of education is to make you to think intensively and to think critically. The main purpose of Education is not employment after graduation but rather in whatever we do as long as we are educated, we suppose to think extensively and also think critically and take decision evaluate each and every situation that come up and take decision based on that critical thinking, so education supposed to make you to be a better person. So, this is very relevant so whatever time, we seek for education we are not seeking education for our meal ticket but education makes you a better person in whatever you do either you work for Government or Private sector, or you go back to your Farm or you become an Entrepreneur, Education will make you to be a better person.

Think extensively and intensively also critically to the future of AI or which bring us to the era of AI. Meanwhile the Nigeria Universities continue to struggle with overpopulated classrooms, outdated curricula, and insufficient digital infrastructures, while simultaneously facing pressures to bring into line with worldwide educational standards (Okonkwo, & Ade-Ibijola, 2021).

Generative AI provides a chance to rethink teaching management within these contexts, supplying resources for curriculum development, feedback in large classrooms, and promoting inclusive teaching. Nonetheless, the process of adoption is accompanied by apprehensions regarding academic integrity, the preparedness of staff, ethical dilemmas, and the necessity for regulatory supervision (NITDA, 2024).

AI is a Machine that emulate you cognitive functional as human being, this cognitive function, are like hearing, reading, listening, thinking, making decision and also evaluating a complex situation and make a decision in a situation where the Machine is deployed in other to perform this access. In otherwise where this machine is deployed in other to perform this action that machine can be categorize as AI machine. There is word that are synonymous to AI machine intelligent is another name for AI another name for AI cognitive intelligent, it is also called Algorithms computing or intelligent machine perform cognitive function of human being

AI was phrase in 1965 by the leading scholar by computer science John Meta B and he announce AI in 1965 a year after in a conference he was a lecturer. AI was discovered 70 years ago and it was announced in a conference 59 years ago, however, the foundation of AI was established more than one thousand years ago why because the invention and the discover of the algorithms. Algorithms is the foundation of AI one may academically say there is no AI without algorithms there is no education. algorithm can never function other than or can never function without algorithms so algorithms is the foundation of AI and with algorithms AI cannot function and computer science and computing cannot exist. Algorithms was developed by renounce scholar by name

Mohammed Musa Alphawari from a modern day Kadishtan he proposes algorithms and algebra he was born 78CD and he pass away 80CBD he leaves in this world for just 7 years Algorithm is the father of AI that we deployed today because without him AI cannot exist.

The first industrial revolution in the 18th century significantly in the United Kingdom most in importantly in Liverpool and Manchester through the invention of skill farmer or skill energy. The second industrial revolution took place in the 19th century in the United Kingdom, Belgium, Germany, France and later on US with the invention of electricity combusting Engine, Mass production among many others. Third revolution in descent century in the 19th with the invention of ICT, IT world wide web, globalization, HTT dish, with the invention of protocol use internet connectivity. Industrial revolution is more of an extension, the invention of image Technology or distortive Technology, cyber security, AI, Nano Technology today the most effective and efficient is the AI. The fourth industrial revolution is bringing even greater efficiencies to how the world's machines run. Joshi, (2022). They have become smarter, require less human supervision, communicate with one another, leading to less defects in products, and a chain of effects that could create $3.7 trillion in value by 2025, according to the world Economic forum.

Diffusion of Innovation Theory (Rogers 2023): This theory explains the process by which novel concepts and technologies disseminate throughout a social system. As per Rogers, for an innovation such as GenAI to gain acceptance, it must navigate five distinct stages: knowledge, persuasion, decision, implementation, and confirmation. Educational leaders are instrumental at each stage by promoting awareness, mitigating resistance, and

aiding in the implementation. It also, elucidates the mechanisms by which new technologies disseminate within a system, emphasizing the contributions of innovators, early adopters, and laggards in the adoption of AI technologies in higher education.

Artificial intelligent AI it is rapidly growing technologically innovation, it is defined as the ability of a digital computer or a computer control robot to perform task commonly associated with intelligent beings according to this source AI is endow with some intellectual characteristics of human such as the ability to reason, to discovered meaning, generalize or learn from pass experience have been apply for medical diagnosis, computer search engines, voice or hand writing recognition. The advantages of AI are increasingly manifesting in different sectors. The prominent advantages includes A reduction in human errors interrupting availability from AI devices shifting of risk from human to machines similar benefit are also notable in medical applications indeed the advantages of AI in activities that is involve risk human, can be over emphasize it has been noted that AI application can be used in areas that are harder to human, AI system minimize the risk involve in perilous task for instance Robot can take harder task such as co-mining, C-exploration rescue creation during natural disaster and warfare, on the fift side at the high cost of creation the possibility of making human race and unemployment one aspect of AI that is gaining popularity today is generative AI a concept that has been describe as next step artificial intelligent it is a time of AI that can create new content and ideas including conversations, stories, images, videos and music it describe machine learning system capable of generating text, code and other types of content often in respond to or promote by users.

For consumer safety and digital fairness, misinformation previously violation and discriminative practices furthermore, there are consumer specific concern these include the feature of original and independent research in the face of increasing result to generative AI for researchers absent of effective channel for readers for consumers who will suffer any danger o lost as a result of generating a the liability of the originators of AI devices such as copy right issues and lack of concerting effort to create consumer awareness of this new technology particularly in Africa. Like many countries gripping with imagined technology Nigeria has known dedicated law regulated AI by necessary extension generative AI this exposes consumer to risk on verify or in accurate information from generative AI chat bot this is inimical not just the users of such devices but to the overall economy, necessitating the landscape of AI in Nigeria one must acknowledge the various measure institute by the government such as establishment of Federal Ministry of Communication, innovation and digital economy, the National centre for artificial intelligent and robotics and other dedicated agencies to optimize the artificial intelligent includes generative.AI Nigeria should institute sector specific policies that aim innovation and development while protecting the overall interest of consumers.

Digital Technology

The advent of digital Technology make communication effective and dynamic. Digital Technology according to Google are electronic tools devices and resources can store and process data. They include social media, online Games, smart phones and web site. In January 2023, Nigeria interest users rose to one hundred and two point five Million is an estimated population of two point five million people Nigeria internet penetration rate stood at

fifty-five forty-seven million at start of 2023 as review by statistical data.

Digital Technology usage have become more prominent every day and these has becoming easier to pass information at a short time than was traditionally possible today the advancement of Technology plays a crucial role in enhancing learning in the classroom and make academicals instructions more meaningful. Digital media among the young ones' increases awareness among them, it foster literacy skills and improve medical care, on the average according to findings the youth spend more than four hours each day on the social media. They are known longer interesting in studying and learning rather they focus on electronic gadget and entertainment increase technology usage means less time spend on homework causing the child to struggle with falling grade young one who spend more times on phones struggle with face to face interaction causing many of them to spend some online activities gaming for example attempt to be highly addicted.

Digital technology among the young ones increases the risk of depression there by increasing suicide rate. Young children spend time using the media usually struggle with lengthen emotional health issues also digital technology reduces the quality on average human required 6 to 8 hours of sleep however, when people do not get the amount of sleep each night, there state of health suffer, technology poses a great risk for young ones as the internet is an evil for cyber bullust this is because when online young ones become more aggressive and in sensitive to others feelings.

Some misuse of social media can be related to a person in not to a desired to be followed and light on social media. Unlimited smart phone access can expose children to form language and explicitly images, parent should realise well teachers can help but they are not full proved know matter how it is view the most responsibility fall on the parents, parent most guide and instill values on their children this virtual qualities such as self-control, honesty and sense of responsibility for he or her actions instill in them because the young ones who have moral values is more likely to the smart phone more wisely and independently. Children need parental guidance when it comes to the responsible users of smart phone. Parent and teachers should teach young ones' time management and priorities skills as well parent most be familiar with a features of a child phones, settlement and block in appropriate content, teachers and parent most make rules, most be ready to enforce them when broken in all. Youth can choose to make technology their master of servant.

The implication of AI
AI has so many implications in each and every sector of our life in security, health, tourism, commerce, finance, Agriculture and also in Education each sector there is an application of AI. Recently, Elon Musks make a statement AI is likely to be either good or bad, there is every probability AI could be the best invention by human being and there is a very high probability that AI is going to be the worst ever done by humanity so we are in a very difficult situation technology before us. Even the CEO of google confirm that Sonda Finger he said AI is one of the most important been done by humanity, he said it is even more confound than electricity. AI it will be more influence than even electricity we consume like at how electricity transforms our life but there is a high probability that if AI is managed effectively, it could be more useful than the electricity, we consume we are in between two probabilities

Benefit of AI from one part and the challenges

AI on the other you will strongly agree with this statement; the benefits are enormous so we are in very difficult situation. AI is reducing the power of our cognitive function with Artificial Intelligent (AI) you cannot even think critically even in academic you allow AI to determine what you are going to do what you are going to learn without critically evaluating whether content present to you by AI it is right or wrong this is the implication.AI powered Application and search engine, Google search engine is an AI, YouTube is an AI. When you search a content it will send a recommendation to you time to time because so that you can search but unfortunately this message they know us better than ourselves. AI is reminding you some time after ten years you will be reminded so it has a very serious implication that we have to manage it unfortunately we are only donating our brain or cognitive functions to AI. AI will determine your decision and action to be taken. Some of the AI power system in conducting research e.g connecting paper is an AI power system that allow you to review literature where you can have over 300 literature and you can review within an hour, when you come to citation Research Ravage is an AI powered system that is also applicable in research it can help you in turning modern and graph, Zotero is a very important application that can send you literature review among many others instead of using Chat GPT which is not an academic AI there is also Chat academia it will also help you in conducting a research, Chat academia is more cheaper purposely for academic.

AI can also help in personalize mending teach everyone according to his or her ability not to teach all student at ones because some students are more intelligent than others personalize mending it allow you to teach student base on their ability just like the traditional method you use at home through AI that can also be implemented.AI can help you in virtual academic environment globally we have virtual academic environment and all this environment are using AI powered system as the case may be, if you look at that we are not donating our brain to AI and weaken our cognitive function ethically we deploy AI for good not for evil. Two years ago, A Teenager committed a suicide in US and after committing that suicide and his mother took his hypered and review, she discovered that it was an AI application that taught him how to committed suicide, she reports the case to police and they took the case to court who to be held accountable, hardware company where invited they defended themselves the application downloaded each and every major company where invited they defended themselves.

Some of the challenges of AI Regarding to the future of our Education

i. Bias: in research it is necessary to avoid bias that is why in data collection that is why you have to collect data from individual independent and objective, if you collect data with bias that data will not be authentic for your research. AI is a product of human intelligent AI dosing take decision without data. The quality of data if the data has bias, then the decision taken by AI most have bias.

ii. Privacy concerned: AI required huge quality of data. AI powered system either legally or illegally data is being collected online today you download face book and open an account and you also use WhatsApp and know money given by you so what is the benefit of this company since you are not paying for all this platform your data is been use globally whether legally or

illegally many countries are into data protection institution

iii. Job displacement: however, I always argued AI cannot and ever take your job but people who learn AI and master AI can take your Job, not AI because it is a machine but people who master AI in your area soon or later, they will take up your job when you fail to improve yourself AI is creating new Job everyday and displacing other Job According 2025 AI could displace 85 Million Jobs globally in the other hand AI could create 97 Million new Job but those who master AI will take over the Job. Master AI in the area of teaching, research.

iv. Too much depend on the Technology: AI is making us to depend on the technology, as I early mention AI supposed to get you improve not take over the function of your cognitive brain, AI supposed to help you by reviewing our work, AI can review your research identify some critical areas that you need to look at whether you need to improve or not, we have to deploy AI review our proposal not in any way to take decision on our behalf AI propose to you some, some can be accepted and some can be rejected the decision of AI is not final

Benefits of AI in Education

Some of the benefits of AI includes:

1 Enhanced Research: AI-powered tools such as Zotero, Research Rabbit, and Connected Papers streamline literature reviews and data analysis.
2 Personalized Learning: AI enables tailored instruction that adapts to individual student abilities.
3 Virtual Academic Environments: AI supports global collaboration and virtual classrooms.
4 Efficiency: Properly deployed, AI saves time, reduces costs, and

improves accuracy in academic tasks.

Challenges of AI in Education

Following are some of the Challenges of AI in Education

1 Bias: AI decisions depend on data quality; biased data produces biased outcomes.
2 Privacy Concerns: AI systems often collect personal data, raising ethical and legal issues.
3 Job Displacement: While AI creates new roles, it also threatens traditional jobs, especially for those who fail to adapt.
4 Over-dependence: Excessive reliance on AI risks weakening human critical thinking and decision-making skills.

Conclusion

AI represents both an opportunity and a challenge for teacher education in Nigeria. While it can revolutionize pedagogy, research, and curriculum delivery, its ethical and responsible use must be prioritized. By embracing AI as a tool for innovation while safeguarding against its risks, Nigerian universities can position teacher education as a cornerstone of sustainable national development in the digital age.

Suggestion

The following suggestions were made**:**

1 There are some certain things you can delay them but AI is one of them, is to see how AI can be use in academic you can deploy AI responsible and ethically
2 There must be training and retraining of our teachers, faculty staff about the AI application and to see how AI can be even be operated particularly in education, academic and research
3 I will recommend we need to deploy AI tax force even our law so that the

provision of our National law is going to be respected

4 A university that is set up their guide line and regulation student are using AI for there Assignment they are cheating using AI they downloaded printed and submit the same applicable to there research methodology AI can submit that application, can analyze result without any necessary intervention however, the application AI responsibility is in other to review our work is about evaluating yourself to see where you need to improved and using of that Application should be discourage

5 AI should be incorporated in our curriculum we need to set up ethical standard where AI can be use and where AI can not be use

6 Finally, in academic environment should not unnecessary be emulating the developed country rather we see and act locally, we have to mentor our younger ones what we are lacking is the enabling environment so our younger ones will come up with AI application. AI is applicable to your course of study.

Reference

Essien, A., Salami, A., Ajala, O., Adebisi, B., Shodiya, A., & Essien, G. (2024). Exploring socio-cultural influences on generative AI engagement in Nigerian higher education: An activity theory analysis. *Smart Learning Environments, 11*(63).

Peters, O., & Olojede, H. T. (2025). Influence of Generative Artificial Intelligence (GenAI) in Nigerian Higher Education. *Àgídìgbo: ABUAD Journal of the Humanities, 13*(1).

Ukala, C. C., & Ukala, A. N. (2024). Charting a Strategic Path: Artificial Intelligence in Nigerian Education and Implications for Policy. *International Journal of Scientific Research in Education, 17*(4), 496–504.

Joshi, G., & Patankar, P. (2022). Fourth Industrial Revolution and Education – A Study. *IOSR Journal of Humanities and Social Science, 27*(7), 20–25.

Nguyen, A., Ngo, H. N., Hong, Y., Dang, B., & Nguyen, B. T. (2023). Ethical principles for artificial intelligence in education. *Education and Information Technologies, 28*, 4221–4241.

Inamdar, S., & Kumar, S. V. (2025). Generative AI in the Education Industry: Job Displacement and Ethical Considerations. *Digital Transformation and Sustainability of Business* (pp. 5–20). CRC Press.