AWARENESS AND UTILISATION OF ARTIFICIAL INTELLIGENCE AS A PEDAGOGICAL TOOL AND CATALYST FOR ENHANCING PRE-SERVICE TEACHERS' QUALITY

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Abstract
As the paradigm in education is shifting from knowledge-oriented curriculum in education, to skills and critical thinking. So also, is the preparation of teachers is shifting from knowledge based, to pedagogical oriented curriculum so as to be able to enhance classroom interactions and support learners learning. This paper therefore, is set out to critically discuss the emergence of AI tools as a pedagogical innovation for teaching, as well an important pedagogical tool to support the preparation of quality pre-service in the nation's teacher preparation schools. The paper started with discussions on what education is generally, and the specialised education called teacher education. It further discussed what AI is, the importance of AI in the educational process and why teacher education should adopt AI pedagogical in the preparation of pre-service teachers, to enhance their quality. The paper however, recommended amongst others that, an awareness capacity building workshops should be organised for teacher educators, capacity building workshop should be organised for the pre-service teachers on how to responsibly make use and adopt AI tools to enhance and support their learning. Government should also make provision to ensure constant and stable electricity to support the use of digital technologies that enabled the adoption of AI as a pedagogical tool amongst others.

Keywords: Education, Teacher Education, Pre-service Teachers, Artificial Intelligence, Pedagogy

Introduction
Education is one of the greatest things that human has developed for their continued progress, it is the only potent instrument for social re-construction where a social order characterised by such values as integrity, morality, creativity, industry and self-reliance are preached. The concept of

Education has attracted different definitions by scholars, and these definitions varies from one scholar to the other as perceived by each one. In the word of Khoyaled (2023), education stands as the bedrock of societal advancement and individual flourishing, serving as the bedrock for economic prosperity, social mobility, and cultural enrichment. While to Akinkotu and Olufowobi (2016), both sees education as a process of transferring or impacting knowledge to individuals in the society. This is will enable them to understand what is expected of them or what they should know. It was on the basis of this that it was reported that, education is crucial in the development of a nation, and without which the nation cannot progress meaningfully (Meroyi, 2016).

However, despite the differences in people's perceptions and conceptions of the concept of education, education can be observed to be a life-long process, which aim at impacting knowledge and skills needed to live a meaningful life and for an individual to be fully integrated into his/her immediate environment and the whole world at large. For it has been observed that the world's most difficult problems are confronted using education. (Amiaya, 2015). Teacher education is one of those types of education to advance the country.

Teacher Education
An effective and efficient teacher preparation programme is a very vital instrument for the development and transformation of any nation. In other to emphasis the importance of teacher education is why the national Council for Accreditation of Teacher Education NCATE (2006), reported that high quality pre-service teacher preparation provides beginning teachers with the knowledge and skills needed for effective teaching in today's heterogenous classroom.

To Ubogu (2020), teacher education is the professional education of teachers, aimed at developing attitudes, knowledge and skills that are productive and in line with societal demands. It was for this reason that Adebola and Cias (2022) posited that, the overall quality of education is primarily determined by the quality of professional teachers, which is also determined by the quality of training process they were exposed to.

The National Policy on Education (2013) asserted that no nation can achieve economic, social and technological progress and self-sufficiency without a good system of education to sustain its achievement. Emphasising the importance of teacher quality, was why it was also clearly stated in section 9(57) of the National Policy on Education that teacher education will continue to be given a major emphasis in all our educational planning, and maintain that's no education system can rise above the quality of its teachers., (FGN). It was however in recognition of this, that the policy identified the goals of teacher education to include the following:

1 Produce a highly motivated, conscienscious and efficient classroom teachers for all levels of the nations educational system; and
2 Further encourage the spirit of enquiry and creativity in teachers.

Hanging on this, to further stress the importance of teacher education in Nigeria is why the National Teacher Education Policy (2009), in its articulation of the vision and goals of teacher education in Nigeria in section 7.1 (ii) of the policy;

States that teacher education in Nigeria is to produce quality, high skilled, knowledgeable and creative teachers, based on explicit performance standard through pre-service and in-service programmes, who are able to raise a

generation of students who can compete globally.

This is why scholars have been trying to find a meeting point in defining teacher education. To Sonudararajion, Prabakran, Padmini, and Saravankumar (2022), teacher education is the inclusion of teaching skills, pedagogical theory and professional skills. Teacher education programmes are where prospective teachers gain a foundation of knowledge about pedagogy and subject matter, as well as early exposure to practical classroom experience. According to Cherechi (2018), teacher education is the professional knowledge and skills obtained from a professional and specialised institution to provide others with transformative, critical thinking and independent learning skills

However, Majoni (2014), posited that the process entails programme management, organisation and delivery. While services involve the maintenance of teacher education in terms of quality as well the ability to meet the needs of the society, it is also a discipline comprises of inputs, processes and output. To do this however, are teachers found teaching the would-be teachers, who are referred to as teacher educators.

Teacher Educator
A teacher educator is defined as some higher education professionals whose principal responsibilities is the preparation of in-service teachers in the universities and other institutions of teacher education, such as faculty of education in the university, colleges of education national teacher training institute, teacher training colleges etc. So, in the broad sense, teacher educator is used as generic and overarching umbrella term that encompasses all types of educational professionals who are involved in and responsible for pre-service and in-

service teacher training (Kelchtermans et al., 2018).

According to Yuan and Yang (2020), teachers teach classes, provide supervision and offer school consultancy, that is why they are referred to as professional who engage in training of prospectives teachers, they are the one referred to as educators (or, in some contexts, would-be teacher trainer). It must therefore be noted that teacher educators play an important role in both pre-service and in-service teacher education (Cochran-Smith, Grudnoff, Orland-Bank and smith, 2020). It was on this basis that White (2014) grouped teacher educators based on institutions of higher learning that provide pre-service teacher training to those who provide in-service teacher training schools. This paper, however focuses on teacher educators working with pre-service teachers. using different teaching methods to facilitate instruction in the teacher preparation institutions.

Teaching Pedagogy
Pedagogy refers to the method and practices of a teacher, this means that, when scholars refer to the pedagogy of teaching, it means how the teacher delivers the curriculum to the class. Supporting this, Omodunni (2010) notes that although the onus of learning is on the learner, whether the child learns or not also depends on the pedagogical effectiveness of the teacher in adopting appropriate methods in a way that will support, promote and facilitate learning on the part of the learners. Mo (2011) really supported the idea that using technology in teaching and learning greatly boost learners' interest and focus in class.

Pedagogy, helps educators understand best practices for instruction, but it is important that for pedagogy to be effective, it must go beyond the general best practices and consider the diverse backgrounds of the learners. That is why Shirke (2021) posited

that modern pedagogy is moving towards the learner centred approach, encouraging group projects, learning and practical uses of knowledge, while Tes (2023) indicates that pedagogy is more than content delivery, pedagogy is an intentional, evidence-based framework of how to manage teaching and learning. Therefore, pedagogy in education is the study of teaching methods that educators use to help students meet learning objectives. That is why, pedagogical approaches vary depending on the subject matter, learners' educational level and classroom dynamics, but three elements are always present, and they are, the educator, the learner and the subject matter. It was on the basis of this, that Popoola (2024) asserted that there are different pedagogies and the problem lies in the ability of the teacher to adopt relevant teaching pedagogy for a particular group of learners to maximise teaching and learning

However, technology is believed to have advanced pedagogical activities, that is why education, today is guided and driven by technology. Without technology, there will not be efficient and impactful pedagogical transactions. Teacher educators are therefore encouraged to adopt emerging technologies to enhanced their pedagogical skills.

Adoption of Emerging Technology into the Teaching Learning Process
Technologies is creating an awareness, that workplace as well teaching and learning requirements during classroom interactions are changing so rapidly that learners must begin a transition of been facilitators of learning beyond personal expertise, supported by AI driven technology, to allow learners flexibility in gaining skills and pursuing their passions. The rapid advancement of emerging technologies and their integration into various aspects of our daily lives, including the education sector, is making their integration in teaching and

learning process a necessity and not a choice for educators, considering the level of influx of technology (Edeh, 2019). Supporting this assertion is why Brown and Martinez (2023) in their study noted that implementation of artificial intelligence in education requires a major overhaul of the traditional responsibilities of teachers.

According to Dalgaro and Lee (2020) they reported that technologies in education allows learners to work with three-dimensional models, visit virtual places, and participate in practical activities that mimic real-life situations Education using AI must evolve to support teacher educators specially to develop in individual learners' potential, as well preparing learners to become self-learners, in order for them to innovate the world tomorrow. It was on this basis that, Kukulska-Hulme and Traxler (2013) reported that portability in mobile digital devices now provides an extension of learning to the learners in that they are able to access learning materials from any location, irrespective of the classroom environment. It has therefore, been observed that AI is pushing teachers to always evolve strategies that would support personalised learning desirable for creativity, innovation, problem solving and also have more time for individual instruction. AI is forcing teachers as well teacher educators and placing on them the responsibility of evolving that which will enable them unlock individual learners' potentials and prepare them with skills needed to shape the future through innovation supported by technology.

Therefore, to train and develop a desirable competency in today's learners, for quality, there must be the incorporation of new teaching and learning methods through information communication technologies (ICT), and the use of innovative infrastructure to improve the teaching and learning process in teacher preparation

institutions. There is the need to adopt teaching strategies that have evolved over time to accommodate the new standards in the classrooms by teacher educators to operate in remote, hybrids and in-class. Some of these strategies include:

Flipped classroom, personalised learning and content creation, efficiency and data driven instruction, engagement and accessibility, ethical and critical engagement.

Artificial Intelligence

Today, the rapid change and advancement in technology evident in everyday lives must certainly be met by the individuals, if they do not want to be left behind. The philosophy of technology is aimed at extracting natures goodwill and potentials for human needs and services. According to Britanica (2025), technology is defined as the application of scientific knowledge to the practical aims of human life. It is product resulting from such efforts, including both tangible tools such as utensils, or machines, and intangible ones, such as software. However, in today's world, one of the innovations popping its head, and taking over the world especially in education sector is the emergence of Artificial Intelligence (AI).

Information technologies, in the form of Artificial intelligence (AI) is coming out at a faster speed to revolutionised modern education, the use of AI permeating every sector and is virtually taken over all sphere of human endeavour. AI algorithm and educational robots are now an integral part of learning management and training systems, providing support for a wide array of teaching and learning activities (Costa et al.,2017; Garcia et al., 2007). Teachers, learners and educational institutions are quickly embracing Artificial Intelligence (AI) in education. AI, ordinarily connotes a thing that is not natural, it is a product of human endeavour to make life easier and

better for everyone. AI is a branch of science that mimic types of human intelligence, to do work as humans do. According to Eleyyan (2021), AI is an example of education revolution 4.0 products which are formed by computer and capable of machine-like robots to perform complex tasks, such as visual perception, speech recognition, and decision making. AI is a tool done by technology devices with automated based on human commands, prepared, formulated by men to help human solve all forms of problems (Tira, 2022).

Thomas, et al. (2024) posited that AI can learn new concepts and tasks, reason and draw useful conclusions, understand a natural language or perceive and comprehend a visual scene, using human type of reasoning. AI powered system can enhance decision-making and foster innovation by swiftly and accurately analysing vast data. They can also automate Mundane task, liberating human resources for imaginative and strategic pursuit. Additionally, AI can improve our lives through personalised medicine, environmental conservation and education as posited by (Mshesh War, 2023). It must therefore be noted that, Artificial intelligence is reshaping our world, our society. Presenting both prospects as well inherent dangers on the other side (Russel, 2019).

Utilisation of AI as Tool for Enhancing Quality Pedagogy.

The application of AI is rapidly evolving, reshaping the overall teaching and learning landscape as posited by Popenici and Kerr, (2017), thus using AI in education implies that the major stakeholders involved in quality education delivery at all levels in Nigeria, including policy makers, curriculum developers, administrators in the educational sectors, as well the teachers must begin to give serious considerations to

the use of AI in educational delivery, as an important cutting-edge technology.

The primary goal of AI is to create intelligent systems (i.e. computer programmes or machines) that are capable of intelligent behaviours, this according to (Rainer, et al., 2016) including learning, reasoning, problem-solving and creating. Statistics has it that 43% of college students in the United States use AI tools like ChatGPT and half of instructors' employ AI to develop their lesson. This is so, because AI platform can do things that are considered SMART in the teaching learning, i.e., specific, measurable, achievable, relevant and time bound (Onyeka and Angela, 2024). It also has the capacity to process a large amount of data in ways that no human being can, that is why Alex, (2024), maintains that traditional assessment cannot handle diverse and ever-increasing learners' populations like AI will do. Today's learners are internet natives, this is so because they make use of all digital technologies that the world has blessed them with, ranging from smartphones, computers and others, which has brought the world closer to them if connected to the internet, this is why the world today is referred to as a global village to them.

Therefore, in the preparation of quality pre-service teachers in the nation's teacher preparation institutions, teacher educators should as a matter of urgency be encouraged and empowered to adopt AI as an instructional pedagogy. Teacher educators should be made to be aware that AI powered systems provide a tailored content and support to students, it also helps the educators focus more on instruction by handling other responsibilities, such as grading and scheduling of students, as well offer data-driven insights into students' progress. Teacher educators should be made to be aware that AI in education offers

significant benefits if adopted during the teaching learning process in the preparation of pre-service teachers (CIS, 2023). It is therefore important for teacher educators to tap into and focus more on the equitable benefit that the AI will have, both on the teacher educators and the learners' quality.

Benefits of Using AI in Education
-Personalised learning: Learning is most of the time personalised when using AI tools, this is because AI creates adaptive learning platforms that adjust content to the level of the learners, as well the pace at which learning will take place for each learner. Learning activities is also adjusted to the individual learners needs, problems, age, maturity and learning styles. This enables individuals to maximise learning, and enhance the quality of the pre-service teachers (CIS, 2023)

-Automated Administrative Tasks: AI tools can automate grading, scheduling and other repetitive tasks. This enables the teacher educators more time to engage the pre-service teachers in other productive tasks that would enhance their quality. This will also increase time for quality instruction, student interactions and constructive engagement.

-Intelligent Tutoring System: One of the best ways to enhance learning is through mimicking the actions and behaviours of others, as educators have affirmed that practice makes perfect. AI therefore, provides customised step by step guidance and feedback, by mimicking the experience of a human tutor, even when they separated in time, space and distance. This has been discovered to help solve so many learners' problems, and enhanced their quality, of which the pre-service teachers are not left out (CIS, 2023).

-Data-Driven Insights: AI has been found out to be able to analyse learners' performance data, so as to identify struggling learners for early intervention, and appropriate therapy is recommended to

help them overcome the problem, so that no learner will be left behind. This is believed will definitely enhance the quality of pre-service teachers, because more informed decisions would have been made to solve the problems.

-Educational Content Generation: AI is capable of preparing and delivering quality educational content, just like a human being or as if there is a face-to-face interaction so that pre-service teachers do not have to wait until there is a face-to-face interaction with the tutors. This will help them learn before the classroom engagement, thereby reducing the burden of both the learners and the educators, and at the same time, enhance their quality (CIS, 2023).

Because of the different benefits that AI offers therefore, it is hoped that it would improve the pre-service teachers learning outcomes, as well enabling them to make informed decisions through data-driven insights. The benefits of AI cannot be easily quantified, even though, this also comes with challenges and risks, but the benefit to teacher educators and the pre-service teachers, so outweigh the disadvantages (CIS, 2023).

Teachers are nation builders with a strong capacity to change the society, and when teacher educators know the importance of technology and pedagogies and utilise same in preparing pre-service teachers, it will give positive change to improve the quality of pre-service teachers. From the growing realisation in this modern society, scarcely is anyone ever fully trained for the rest of his life or career. Not only must skills be continuously upgraded, new skills must frequently be acquired, if the teacher educators, teachers in preparations and educational institutions are to meet the changing demands of the internet age.

The Future of Teacher Education in the Global World

Scholars have advocated that as technological changes begin to accelerate, there is an urgent need to support the education system with managing new opportunities as well as new risks. one thing that is sure and certain, is that the future will be different from today, because change is inevitable. Therefore, it is important that teachers are able to grow and adapt with the right mix of technology solutions to support the vision of the future. Technology through Artificial Intelligence (AI) offers a unique opportunity to help education take this step up the ladder. That is why AI should be employed by teacher educators to enhance the teaching and learning process and because that is where the future is taking us to and not to replace the roles of the teacher (CIS, 2023; Popoola, 2024).

Adopting emerging technologies in education, particularly AI holds an immeasurable potential to revolutionise teaching methodologies, personalise learning experiences, as well streamline administrative processes. Integrating AI into the preparation of intending teachers will therefore require a careful consideration and strategic implementation that should not be rushed. This is because, AI has the potential to address challenges in the educational system through:

1 **Personalised learning content and experiences-** offering solutions to the challenge of catering to diverse learners needs and enabling tailored educational journey for each learner.
2 **Refined assessment and decision-** making processes, promoting more accurate evaluations and insights into student progress.
3 **Optimisation of teacher's role through automation of tasks-** alleviating administrative burdens and empowering educators to focus

more on personalised instruction and mentorship.

4 **Integration of AI into educational curricula-** presenting an opportunity for teaching, both with and about AI, equipping learners with essential skills, discernment and knowledge for the future.

Researchers have suggested that, Artificial Intelligence (AI) tools, if deployed appropriately, presents new opportunities and developments that holds significant promise for enhancing the effectiveness of teachers as well as outcomes for learners and at the same time, revitalising the educational system towards preparing the learners better for the demands of the 21st century. Examples of AI tools are, ChatGPT, Synthesia, Dall-E2 and bard can write essays, create images, explain complex topics and provide a step-by-step guidance for solving mathematical problems, Generative AI can mimic human logic, writing and creativity, mirroring some human through processes and putting into question, the relevance of some skills, principles, formulas and processes of classroom interactions today.

AI now, helps teachers in assessing learners more rapidly and enabling them to provide more immediate feedback, it can also enable learners to develop efficient digital literacy, critical thinking, problem solving and creativity. It can as well help personalised the learning experiences, supported by teachers, leading to improved academic performance and better adaptation to diverse learning needs (Tira, 2022).

Conclusions
AI tools have made today's classrooms globally available to learners who use different languages for learning, irrespective of whether or not they have visual or hearing impairment (COL, 2020). It is possible through AI for learners today

to get real time substitutes for everything the teacher says, using a PowerPoint plug in, like presentation translator. The personalised or customised learning that AI offers, helps to adjust to every learner's knowledge level, desired goals, and learning speed to help get the most out of learning. Most especially, to enhance the quality of pre-service teachers.

Preparing pre-service teachers requires that teacher educators should always transform their teaching pedagogy to deploy AI pedagogies to enhance their teaching and as well support their learning. Using AI tools in the preparation of pre-service teachers will improve their capacity, as teachers, competence and productivity in the preparation of pre-service teachers. This involves the use of digital applications for lesson planning, classroom interactions, classroom audio visual, classroom and behaviour management, gamification for enhanced learners' engagement, test/quiz preparations, assessments, and learning management system.

Pre-service teacher educators must transform to adopting AI as a pedagogical tool so as to have a meaningful engagement with the learners. However, as good as AI technologies are, they still portend some risks to teaching and learning as identified by scholars;

1 AI cannot be trusted to be accurate: Sharma, (2023), posited that AI tools can sometimes generate answers that cannot be relied upon to be accurate.

2 AI assisted approach requires extensive fact checking: Kacema, Plotkin, and Fehrenbacher (2023), also reported that 70% of the references cited were inaccurate in a study conducted to find out if ChatGPT could be used to assist in writing credible, peer reviewed and scientific articles.

3   AI assisted approach can help students to cheat: According to Anders (2023), a smart learner can use a ChatGPT to generate a writeup for an assignment given in class and submitted without the learner making any input. This makes the process not only constitute cheating, but it has been observed to also kills critical thinking.

Similarly, UNESCO (2023) published the risks involved in the use of Gen AI system in education, which include, the use of content without consent, unexplainable models used to generate outputs, encourages plagiarism to a great extent, pollution of AI-generated contents in the internet, incorrect generation of tests, limitation of diversity of opinions, generation of fake images amongst others.

Even though, teacher educators must be very careful in the adoption of AI tools as a pedagogical tool. It must also be noted that, teaching and learning, and the preparation of pre-service teachers can no longer be done by educators in the usual manner as well. Teacher educators around the world and in Nigeria in particular, must deploy more AI tools in the preparation of pre-service teachers for enhanced quality.

Recommendation

Since the world has been battling with series of technological changes and improvements. It is not unlikely that we would continue to witness more advanced growth and increase in technological advancement. Efforts should therefore be geared towards encouraging teachers' preparation institutions to embrace the new technologies that the world has bestowed on us, most especially, the adoption of AI tools as pedagogical innovation to enhance teaching and learning, and also to enhance the quality of pre-service teachers, as well quality of teachers when they are eventually found on the job. This is because, education, and teacher education in particular is fundamental to human, economic, social, educational and political development of any nation. So, as a matter of urgency;

-Awareness capacity building workshop should be organised for teacher educators: A serious awareness and sensitisation workshop should be organised to acquaint teacher educators with what AI is generally, and it has come to be a part of teaching and learning, and also a pedagogical tool that can make instruction easy and of good quality.

-A capacity workshop to educate educators on how AI tools can be adopted in teaching and learning to enhance quality: Most teacher educators still use the old method called the lecture method where learners are always passive in the classroom. Teacher educators should be properly trained to adopt AI technological tools to enhance their pedagogical efficiency and as well improve their teaching and the pre-service teacher's quality.

- The government should make a provision to ensure constant and stable electricity to support the use of these devices: all AI supported digital devices should be made accessible to both the teacher educators and the pre-service teachers, so that the adoption of AI tools to pedagogies will be all inclusive. It must be noted that technology will not replace teachers, but teachers who use technology will probably replace teachers who do not use.

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