

INCLUSIVE AND EQUITABLE QUALITY EDUCATION IN THE 21ST CENTURY: NECESSITY FOR DIGITAL INNOVATIONS IN NIGERIAN HIGHER EDUCATION

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Abstract

In every society, the fundamental of inclusive and equitable quality education cannot be exaggerated. The integration of Artificial Intelligence (AI) in higher education has emerged as a transformative approach to addressing various educational challenges. This study is therefore examining the potential of Artificial Intelligence tools in the higher education in the 21st century focusing on goal 4 of United Nations Sustainable Development Goals (SDG). The study is a position paper. The contents discussed under the following sub-headings: inclusive and equitable quality education in Nigerian education, the concept of artificial intelligence (AI), goal 4 of united nations sustainable development goals, the integration of artificial intelligence (AI) for inclusive and equitable quality education, challenges of AI in higher education and government roles for sustaining expansion of digital innovations in Nigerian higher education.

Theoretical framework adopted were Institutional Theory (IT) by Selznick (1949) and The Diffusion of Innovation (DOI) Theory by Everett Rogers in 1962. The suggestions were made that there is need to adoption AI as teaching strategy in our tertiary institutions especially, to cope with the various challenges which may hinder the physical classroom teaching, there is need for the Ministry of Education to organize conferences, seminars and workshops for both teachers and the students on the effectiveness of AI in education and the governments should assist in providing enabling environment for the effectively implementing the AI strategies in our tertiary institutions.

Keywords: Artificial Intelligence (AI), Digital Innovations, Higher Education in the 21st Century, Inclusive and Equitable Quality Education

Introduction

In recent time, Artificial Intelligence (AI) has emerged as a powerful instrument for improving educational system. This tool was designed to imitate how a human does, such as speaking human mind, work for human based on the instruction. In essence, this technological innovation has been proved to be useful in all facet of life. There is transformative development in all sectors of the economy particularly industries and education are no exception. Education sector in particular, any problem on education can be investigated on using technological tool most especially the trending one, AI to find lasting solution to it. AI, in the view of many people is the ability of machines or computers to think and act as humans do, represents the efforts towards computerized systems to imitate the human mind and actions (Wartman & Combs, 2018). The development of AI systems and technologies in what has been referred to as the “4th Industrial Revolution” has ushered in new opportunities and threats to developing countries. AI systems are machine-based systems

that can, for a given set of human-defined objectives, make predictions, recommendations, or decisions influencing real or virtual environments. AI is designed to operate with varying levels of autonomy (Yeruva, 2023). AI system' to refer to digital and/or data-driven technologies, such as those used for automated decision making, diagnosis, predicting and forecasting, and pattern recognition.

With AI potentially speeding up global progress towards the achievement of the Sustainable Development Goals, countries that are unable or unwilling to take advantage of the opportunities may find themselves falling even further behind, thereby exacerbating global inequality. Various surveys of global readiness for AI innovations have found African countries, particularly those in sub-Saharan Africa, to be mostly not ready to take advantage of the technology revolution for economic growth and development. In Oxford Insight's 2020 AI Readiness Index, which assessed how well governments are positioned to take advantage of AI transformation, Nigeria ranked 138 of 172 countries. Thus, AI has the potential to revolutionize the way we learn and teach, making it more personalized, engaging, and efficient, (Alneyadi, Wardat, Alshannag, and AbuAl-Aish, 2023). The content is heightened under the following sub-heading: The Concept of AI Landscape in Nigeria, Goal 4 of United Nations Sustainable Development Goals (SDG), Integration of Artificial Intelligence (AI) for Inclusive & Equitable Quality Education, The Theoretical Framework: Social Constructionism, Challenges of AI in Education and Government Responsibilities/Roles for Sustaining Expansion of AI in Nigeria.

The concept of inclusive education includes all learners within the school arena. It covers children excluded on the basis of language, gender, ethnicity, disability and other factors; it can focus on children with disabilities only. At the same time,

children may be affected by more than one issue. According to Preston & Hammond (2002), making schools inclusive for boys and girls with disabilities improves them for all learners, including students facing exclusion because of other challenges, or more than one issue. According to UNESCO (2005), inclusion in education is recognition of the right to education and its provision in non-discriminatory ways. It is a common vision which covers all people. In addition. It is a belief that schools and other places of learning have a responsibility to educate all children (and adults) in line with human rights principles.

More so, it is a continuous process of addressing and responding to the diversity of needs of all learners– regardless of factors such as disability, gender, age, ethnicity, language, HIV status, geographical location and sexuality recognising that all people can learn. However, Okwudire and Okechukwu (2008) in Sambo & Gambo (2015) saw inclusive education in higher education as the progressive increase in the participation of students, in reduction of their exclusion from the cultures, curricula, and communities of local schools. They further explained that with inclusive education, all students in a school regardless of their strength or weakness in any area become part of the school community. It is a place where children are seen as equal members of the classroom without being marginalized. In recent time, there is need for the provision of inclusive education with clear and comprehensive legal protection and security backing yet due to governmental policies and cultural constrains, such decree did not succeed (Usani and Ginika (2024). This is a big problem for most special education and non-special education school administrators in Nigerian. The notion of inclusive education was initially thought to be a concept in Nigerian educational system. However, inclusive education has since then witnessed some tremendous improvements in the last decade

despite cultural, social-economic, and political constraints (Eskay, 2009).

According to the National Policy on Education (FRN, 2014), education should be free and right to every Nigerian child. However, in recent times, such services seem to be unavailable to all children particularly the special children. Among the factors responsible are poor government policies, large students' enrolment, poor educational facilities, inadequate funding, poor educational planning and poor leadership factor among others. Global Education Monitoring Report (2016). There is need to engage disabled child to take part in the inclusive education project, the project that would stimulate local service provision through lobbying, advocacy, working with parents and other activities to ensure that they become sustainable over time (Baker, Smith & Green, 2020). These improvements began from the provision of Section 8 of the National Policy on Education since 1977 and have provided support mechanisms for children with disabilities. Because of governmental policies and cultural constraints, inclusive.

It is essential that some strategies which encompass everybody have to be implemented in order to make inclusive education a reality in Nigeria. Some of the strategies identified by Eluemuno, Anokam, Ipem, Eluchie and Mary (2022) was to identify children's needs and rights: A project typically begins with a baseline study to identify children with disabilities who do and do not attend school, support services, education and social policies, and barriers to inclusion in an area. Inclusion starts at this point, with the baseline study as a participatory process involving children, parents and families, teachers, community leaders and local organisations. According to UNESCO (2005), inclusion is the recognition of the right to education and its provision in non-discriminatory ways, common vision which covers all people, a belief that schools

and other places of learning have a responsibility to educate all children (and adults) in line with human rights principles and a continuous process of addressing and responding to the diversity of needs of all learners-regardless of factors such as disability, gender, age, ethnicity, language, HIV status, geographical location and sexuality- recognising that all people can learn.

Concept of Artificial Intelligence (AI)

AI has to do with the development of systems and machines that can simulate intelligent human behaviour, such as learning, reasoning, and problem-solving. It involves the use of algorithms and complex mathematical models to enable machines to learn and improve their performance autonomously and the fundamental purpose of AI is to enable machines to exhibit traits specific to human intelligence (Mircea, 2023). In the rapidly evolving landscape of education, the integration of Artificial Intelligence (AI) has emerged as a transformative force, reshaping traditional paradigms, and offering novel opportunities for personalized and efficient learning experiences. As educational institutions strive to meet the diverse needs of learners, AI technologies present innovative solutions to enhance adaptability, engagement, and student success in the educational institutions especially tertiary institutions. According to the International Finance Corporation (IFC, 2018), AI is an integral part of the solutions for eradicating poverty and increasing shared prosperity as it lowers the cost of and barriers to providing private sector solutions, has greater reach than traditional solutions, and drives investment opportunities in emerging markets. AI technologies are already contributing to resolving various development challenges such as financial inclusion. AI also holds great promise to address other Sustainable Development Goals (SDGs) particularly those faced by individuals at the “bottom of the pyramid” by providing AI-as-service solutions or generating data on micro-

levels using mobile phones and other electronic devices. In recognizing the potential benefits of using AI in education, (Shrivastava et al, 2023) asserted that AI encourages personalized learning and that is one of the greatest advantages of AI in education which can lead to better student outcomes, as students can learn at their own pace and in a way that suits their learning. In this regard, there will come a time in which only a good and competent teacher will remain in teaching because the trend at which AI is moving, it gradually substituting human efforts. Henceforth, human will be needed a little or be needless. To support this fact, (Manyika et al, 2017) emphasize that good teachers will continue to exist in the future, teaching classes designed to boost students' affective intelligence, creativity, and communication. Artificial intelligence is of immense advantages to education system, this assertion was buttressed with the submission of (Bahrani, Gombos, and Cree, 2018) that AI can provide better data analysis, enabling educators to make data-driven decisions. It can also improve student engagement by providing interactive and engaging learning.

Goal 4 of United Nations Sustainable Development Goals

United Nations (2025) pointed to Goal 4 of Sustainable Development Goals in the 2030 agenda for Sustainable Development. This goal ensures **inclusive and equitable quality education and promote lifelong learning opportunity for all**. The sub sections are as follow:

- 4.1 By 2030, ensure that all girls and boys complete free, equitable and quality primary and secondary education leading to relevant and effective learning outcome.
- 4.2 By 2030, ensure that all Girls and Boys have access to quality early childhood development care and pre - primary education so that they are ready for primary education.

- 4.3 By 2030, ensure equal access for that all women and men to affordable and quality technical, vocational and tertiary education; including university.
- 4.6 By 2030, ensure that all youth and a substantial proportion of adults, both men and women, achieve literacy and numeracy.
- 4.7 By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development individual among others through education for sustainable development and sustainable lifestyle, human rights, gender equity, promotion of a culture of peace and non - violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development.
- 4a By 2030, substantially, expand the supply of quality teachers including through international cooperation for teachers' training in development country especially least developed countries and small island developing states.

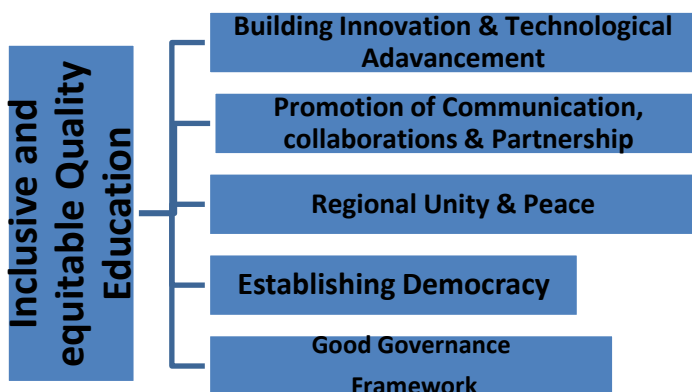


Fig. 1: Goal 4 of Sustainable Development ensures inclusive and equitable quality education and promote lifelong learning opportunity for all.

Sources: The researchers' Initiatives (2026)

From Fig. 1, it was established that education has transformed academic learning, offering both opportunities and challenges for students' development. The prospects of using artificial intelligence in teaching and learning is very paramount. AI establishes instrumentally and functionally individualized instruction, increases access to education, enhances administrative efficiency and productivity, provides teachers and learners with quick answers to issues and challenges in education as well as triggers knowledge explosion and the conducting of quality researches among other benefits. As such, it is imperative to promote its responsible use and to foster the supportive conditions to ensure that it remains a tool for improving human and social welfare.

The Integration of Artificial Intelligence (AI) for Inclusive and Equitable Quality Education

The integration of AI in education offers substantial benefits, transforming traditional teaching approaches and enhancing the overall learning experience. Personalized learning, a key advantage of AI in education, allows tailored content delivery based on individual student needs and learning preferences. This approach fosters a more effective and engaging learning environment by accommodating diverse learning styles and pacing (Harry, 2023). Moreover, AI significantly improves efficiency in education by automating routine administrative tasks. Automated grading systems, administrative processes, and data analysis contribute to time savings for educators, enabling them to focus more on personalized instruction and student support (Cavalcanti, 2021). Many researchers have worked on the ways to improve teaching and learning of which much attention was drawn on the teachers' adequacy and the quality of instructional materials. Babalola and Awolola (2016) stressed that with the help of AI, education can be made more accessible and inclusive, enabling learners of all backgrounds to access high-quality education. The adoption of AI in would without doubt bring major

transformations in the education systems and its processes. More so, on how AI leverages to support students with diverse learning needs and abilities. It was found that AI can adjust learning materials to suit the needs of students with different learning styles, it can be used to transcribe lecturers and provide captions, helping students with hearing impairments and translate learning materials into student's native language, making them more accessible (Mthima, 2015).

On the impact of AI on the personalization of learning experience. This conforms with the claim of Shrivastava et al., (2023) who found that AI can provide immediate feedback on students' works and progress, allowing for more efficient learning, it can help to recommend or adjust learning materials based on student's knowledge level and learning style and it can offer personalized tutoring for the students. More so, AI can provide students with additional support and guidance in specific subjects as well create custom learning paths for each student based on their specific strengths, weaknesses and interests. This is in line with the opinion of Sekeroglu, Dimililer and Tuncal (2019) who stressed that artificial intelligence could help teachers improve personalized education for their students. The influences of AI to the efficiency of administrative tasks in the educational institutions cannot be underestimated. The findings established that AI can automate tasks such as grading, attendance tracking and scheduling, AI can analyse large amount of data related to student performance and it can predict student's behaviour and outcomes. More so, AI can help the educators to identify at-risk students and intervene early and that AI can help to attend to large number of students at a time. Supporting this claim, Cavalcanti, (2021) said AI significantly improves efficiency in education by automating routine tasks. Automated grading systems, administrative processes, and data analysis contribute to time savings for educators, enabling

them to focus more on personalized instruction and student support.

Also, on the extent AI contribute to the student engagement and motivation in learning. It was found that it contributes to student engagement and motivation in learning. It also can help learning more engaging and relevant for students leading to increased motivation. It was revealed that AI-powered adaptive learning system can adjust the pace difficulty of learning materials, helping students to stay motivated and engaged. AI can be used to create immersive, game-like learning experiences, increasing motivation and engagement. More so, AI enables lifelong learning and continuous development in students. This study corroborates the stand of Bahrani, Gombos, and Cree, (2018) that AI can provide better data analysis, enabling educators to make data-driven decisions. In addition, AI- powered offer emotional support and mental health resources to the students. AI can also improve student engagement by providing interactive and engaging learning. In addition, AI can predict the most effective learning path for each student, based on their individual learning and create custom learning paths for each student based on their specific strengths, weaknesses and interests. This study is in line with the view of Harry, (2023) who stressed that AI in education, allows tailored content delivery based on individual student needs and learning preferences. This approach fosters a more effective and engaging learning environment by accommodating diverse learning styles and pacing).

Theoretical Framework: Institutional Theory (IT)

This theory emerged as an important field in the study of organizations, particularly in the 1940s, with the initial formulations by Selznick (1949). He introduced the notion that organizations are not merely technical systems but also social systems deeply influenced by institutional norms and values.

This pioneering approach was followed by contributions from Meyer and Rowan (1977), who observed that organizations adopt formal structures not only for efficiency but also to meet societal expectations, a phenomenon they described as ‘rational myths.’ They argued that organizational formality often serves to ensure legitimacy rather than to optimize performance. IT has been fundamental in understanding how organizations interact with their institutional structures. It offers a sociological perspective, contrasting with more technical and economic approaches that often focus on operational efficiency. North (1990), one of the leading theorists of institutional economics, expands this understanding by emphasizing that institutions, such as formal and informal norms and rules, shape economic behaviour and development over time. According to North (1990), “institutions are the rules of the game in a society that structure human interaction”, highlighting the intersection between economic and social dimensions. IT has diversified into several branches, one of the most well-known being the neoinstitutional approach promoted by DiMaggio and Powell (1983), who introduced the concept of institutional isomorphism. A significant current debate involves how organizations respond to external pressures to adopt sustainable and innovative practices. The theory suggests that compliance with environmental norms is often not just a matter of efficiency but also a response to social expectations and the pursuit of legitimacy. Recent research explores the intersection of IT and AI in organizational contexts.

The Diffusion of Innovation (DOI) Theory

The diffusion of innovation (DOI) theory was proposed by Everett Rogers in 1962 in his classic work *Diffusion of Innovations*. It seeks to explain how, why, and at what rate new ideas and technologies spread across societies and organizations. The origins of this theory date back to the early 20th century, when sociologists and anthropologists began

investigating how technological innovations, such as the use of fertilizers and new seeds, spread among agricultural communities. Rogers (2003) argues that diffusion is “the process by which an innovation is communicated through certain channels over time among the members of a social system”. This implies that the adoption of an innovation is not just an individual decision based on utility but also a social process influenced by cultural and structural factors. According to Rogers, the adoption of an innovation follows a pattern, categorizing individuals into five groups: innovators, early adopters, early majority, late majority, and laggards. In recent years, DOI has been widely applied in high-tech and digital innovation contexts. The adoption of disruptive technologies, such as artificial intelligence, blockchain, and the internet of things (IoT), has been a focus of recent studies. According to Tidd and Bessant (2020), digitalization has significantly accelerated innovation diffusion cycles, creating challenges and opportunities for companies that need to keep pace with technological change. A strong contemporary debate is related to the role of organizational culture in the adoption of innovations. Researchers such as Kovoov-Misra (2021) argued that “an organization’s culture can act as a facilitator or barrier to the adoption of innovations, depending on its openness to change”. This reflects the importance of understanding the internal context of organizations, not just the external forces that promote innovation.

Challenges of AI in Higher Education

Many challenges may be emanated in adopting AI in education particularly higher education, theses can be ranging from malpractices as the students may take this advantage to cheat during examination, plagiarism as many researchers may use the intelligence system to solve for any problem and publish verbally without much effort and undoubtedly reduce professional skills (Annuš, 2023). Artificial intelligence will equally reduce greatly the curiosity to learn by the students as

many of them will prefer to solve any task being given using AI instead of searching different materials to solve a particular educational problem. In this regard, AI is seen to encourage indolence among students. As a result of AI, it is obvious that teachers and instructional materials would always remain inadequate for teaching and learning process. The traditional and the old teaching alternative method is thus suppressed by the adoption of technological based teaching and learning. Hence, the need to investigate the need for Artificial Intelligence and its implications on the teaching and learning processes in the school system. In furtherance to this, Blerta, Florije, and Agron (2024) stressed that ethical concerns loom large, particularly in the realms of data privacy and the potential for biases in AI algorithms, raising questions about fairness in educational outcomes. Additionally, the growing reliance on AI may lead to a loss of human interaction, impacting the development of crucial social skills among students. However, another aspect is the concern that integrating AI systems into teaching and learning may put human participation at danger. In other words, integrating Artificial Intelligence will undoubtedly decrease promote better involvement in the teaching process. This study is therefore sought to examine the potential of Artificial Intelligence tools in coping with challenges faced in the educational setting. These limitations such as poor altitude to reading, low demand for teachers, inadequate personal skills development, addiction to AI machines, unavailability of professional teachers, students' diverse learning and abilities among others. Artificial Intelligence (AI) has been identified as a potentially highly costly to acquire and maintain. The current low level of technological advancement is another factor in Nigeria tertiary institutions. Thus, it appears to be far-reaching tool in the process to eradicate poverty and achieve the UN Sustainable Development Goals.

Government Roles for Sustaining Expansion of Digital Innovations in Nigerian Higher Education

The roles of government cannot be overlooked in the sustaining AI in Higher education, among the major responsibilities include the following:

- Government at all levels should invest heavily in the higher education sector system for rapid development.
- Need to upgrade sustainable technology by embedding world class ICT infrastructure into higher education.

Government Roles for Sustaining Expansion of AI in Higher Education		
*Provision of Basic ICT Facilities	* Adequate Funding	* Inclusion of AI Contents in the Curriculum
*Training of Personnel Regularly	*Promoton of Public - Private Investment	*Organising Seminar & Workshops
*Promotion of Technology Development in all Sectors	* Provision of Regular Power Supply	* Inclusion of AI Contents in the Curriculum

Fig. 1: Government Roles for Sustaining Expansion of AI in Higher Education
Sources: The researchers’ Initiatives (2025)

- Need to encourage digital literacy, expansion of broadband network and partnerships with local and international ICT companies across the country.

- Government should improve the labour force by providing work-based AI training opportunities for all particularly adults.
- The governments and should assist in providing enabling environment for the effectively implementing the AI strategies in our tertiary institutions.
- There is need for the Ministry of Education to organize conferences, seminars and workshops for both tutors and the students on the effectiveness of AI in education.
- Education stakeholders such as cooperate organizations/philanthropists/Donators- should provide a useful tool for assessment of needs and the targeted delivery of development interventions.

Conclusion

Conclusively, Artificial Intelligence (AI) has been identified as a potentially less costly and far-reaching tool in the work to eradicate poverty and achieve the UN Sustainable Development Goals. However, a great deal of work needs to be done in and by developing countries to take advantage of the opportunities provided by AI and close the inequality gap. It is obvious that government cannot do it alone in this regard, hence the need to look for good alternative. The role of AI in teaching is important because of the numerous relevant skills that can be acquired as a vocational area. Though same factors were identified to hinder skills development and possession in tertiary institutions, if put under check the measures enumerated such as adequate personnel and equipped laboratory with ICT facilities, revitalizing Education for skill acquisition and global relevance will be achieved in tertiary institutions.

Recommendations

- 1) Emphasis should be more on teaching and developing practical AI skills in tertiary institutions that would cope

with the various challenges which may hinder the physical classroom teaching.

- 2) There is need for public awareness on AI as teaching strategy. This will promote support for AI among other educational stakeholders.
- 3) It is expected that workshops, training and seminars should be organized for lecturers and students from time to time update their AI competencies.

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