



Research Article

Harnessing Artificial Intelligence for Sustainable Development in Nigerian Higher Education: The Need for a Responsive Legal and Regulatory Framework

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ABSTRACT

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Artificial Intelligence (AI) has brought revolutionary opportunities to the education system across the world, providing new solutions to pedagogy, research, and management processes. In Nigeria, where the education sector is under sieged by limited resources, poor infrastructures and lack of pedagogies, AI presents a channel through which Sustainable Development Goals (SDGs) can be accelerated by offering equal access to quality education. However, the implementation and putting AI technologies into practice are still disjointed due to the lack of an all-inclusive legal and regulation framework. This paper explores the current situation with AI in the context of higher education in Nigeria, compares it with the trends in the rest of the world, and critically evaluates the implications on sustainable development. It highlights key legal, ethical, and governance barriers, such as privacy of data, bias in the algorithm, intellectual property, and institutional inefficiency. The paper based on the international best practices claims that a responsive legal and regulatory environment should be promoted not to only enable the responsible innovation of AI, but also to protect the rights of the stakeholders. It is suggested to develop a multi-stakeholder, proactive strategy, which implies cooperation of governmental institutions, universities, and the business world. The article concludes that, without a carefully designed legal framework, Nigeria will not only run the risk of not fully harnessing the transformative ability of AI but also intensify the level of inequalities that already exist in its educational framework. Therefore, it is necessary to reform the laws and innovate policies to make AI a tool of inclusive, ethical, and sustainable development.

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Introduction

The lightning-fast development of Artificial Intelligence (AI) technologies has opened unprecedented opportunities and, correspondingly, threats in the world of various spheres, the educational one being no exception. In the context of higher education, AI has the potential to transform the teaching and learning processes, improve the efficiency of administrative operations and improve the research capabilities. The innovations are in line with the objectives of the United Nations Sustainable Development Goals (SDGs), especially Goal 4, which emphasizes the idea that all people should enjoy quality education and lifelong learning opportunities, as they are inclusive and equitable (United Nations, 2015). Nonetheless, the realisation of these possibilities in Nigeria is limited due to the lack of infrastructures, digital illiteracy, and the lack of effective legal and regulatory framework to determine the implementation of AI in education (Olaopa, 2020).

Higher education institutions in Nigeria are faced by a combination of system-wide issues such as lack of funding, deteriorated academic standards, increased gap between the industry needs and the curriculum, and more. AI can serve as a driver of alleviating some of these problems since it can facilitate personalised learning experience, automate administrative, and aid in data-driven decision-making (Okoye and Obasi, 2022). Still, the adoption of AI in higher education in Nigeria is still at an early stage, and most of its institutions do not clearly have policies or plans to adopt the emerging technologies. Such slow adoption is further reinforced by the fear of data privacy, algorithmic bias, and ethical implementation of AI, which is still not clearly tackled in existing educational and technological laws.

The absence of a receptive legal and regulatory system has created a vacuum that might hinder both innovation and equity in the use of AI in the field of higher education in Nigeria. The uncertainty in the legal field has deterred the willingness to invest and experiment, and at the same time subjected students and

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faculty to the risks of rights infringements in the areas of data misappropriation and monitoring (Adeleke, 2021). In this regard, we need a carefully organized regulatory ecosystem, which not only will result in responsible innovation, but will also safeguard stakeholders and make sure that AI implementation in education stimulates sustainable development. This framework should be dynamic, participatory, and context oriented and put into consideration the socio political and technological realities of Nigeria.

This paper explores the intersection of AI, sustainable development, and the legal-regulatory environment of the Nigerian higher education. It argues that a legal system that is responsive constitutes a key to the maximum use of AI on promoting educational outputs in accordance with the objectives of sustainable development. The paper assesses the existing issues, outlines regulatory weak points, and offers policy suggestions to inform the ethical and successful use of AI in universities and colleges in Nigeria. Nigeria is able not only to use AI as a modernisation instrument, but as a strategic tool that can enable the country to develop in the long-term, by helping to bridge the gap between innovation and regulation.

Theoretical and Conceptual Framework.

Conceptual Framework

The theoretical basis of this research is on the nexus of Artificial Intelligence (AI), sustainable development, and transformation of higher education. Generally speaking, the term AI can be described as the process of simulating human intelligence via machines, specifically computer systems, which include learning, reasoning, and self-correction (Russell & Norvig, 2016). In the realm of post-secondary education, AI is being widely used to complement adaptive learning systems, automate bureaucracy, support students, and streamline research in academia. These applications align with the larger aims of United Nations Sustainable Development Goals (SDGs), in particular, Goal 4 (quality education) and Goal 9 (industry, innovation, and infrastructure) by supporting access to equitable and high-quality learning opportunities using technological innovation (UNESCO, 2021).

According to the Brundtland commission, sustainable development is a type of development that meets the present needs without affecting the ability of future generations to meet their own needs (WCED, 1987). In educational systems, sustainability is a notion that can be understood as access, equity, quality, and relevance. Implementation of AI in the Nigerian higher education system has the potential to hasten sustainable education in the country through curbing challenges such as lack of teachers, poor learning results, and inefficiency in administration. However, the implementation of AI should be informed by a legal-regulatory environment that promotes ethical application, equity, and responsibility, especially on data management, academic independence, and institutional independence.

Theoretical Framework

The research takes the Technological Determinism Theory and Innovation Diffusion Theory as the main theoretical perspective. According to technological determinism, the evolution of technology creates change in the society, which affects the social structure, social institutions and social values (Smith and Marx, 1994). In this context, the theory describes the dynamics of the development of artificial intelligence that redesigns the field of education and demands the change of the policy and governance frameworks. The deterministic view forms the basis of the argument that with the continued development of

AI, the legal and institutional frameworks of the Nigerian higher education will have to evolve in response to the new realities.

Besides this, the Innovation Diffusion Theory by Rogers (2003) provides a complementary approach through the focus on the process of adoption of innovations in the social system over time. The theory outlines five phases of adoption that include knowledge, persuasion, decision, implementation, and confirmation and they each have factors that are perceived usefulness, compatibility, complexity, and observability. In the context of higher education in Nigeria, institutional inertia, a vague legal situation, and the absence of awareness about the benefits and risks associated with AI are the primary factors that led to the slow implementation of AI. As a result, a responsive legal system can serve as a tool of governance, as well as, a driver of speeding up the spread of AI technologies in universities and colleges.

Combining these theoretical and conceptual knowledge, the current paper provides a multidimensional basis of understanding how Nigeria can use AI to achieve sustainable development by using its system of higher education. It highlights the need to match technological innovation with legal evolution so that AI's implementation could benefit the development of AI usage as ethical, inclusive, and development-focused.

Literature Review

AI in Higher Education: Trends in AI in Higher Education around the World.

Due to the increasing use of Artificial Intelligence (AI) across the world, the higher education scene is changing. AI is being used in universities in technologically advanced countries to tailor the learning process, improve the administrative environment, and increase student engagement. As an example, AI-based systems including intelligent tutoring systems, virtual teaching assistants, and predictive analytics are used in case of academic performance and retention in institutions in the United States and China (Zawacki-Richter et al., 2019). Equally, research support, plagiarism detection, and even curriculum design are also being done using AI applications. Such innovations allow institutions to be responsive to a wide range of needs of learners besides enhancing the efficiency of institutions.

In the United Kingdom and in some European Union countries, AI is already embedded in the strong policy provisions governing data privacy, transparency of the algorithms, and ethical considerations in education (Holmes et al., 2021). Such frameworks are in place to make sure that technological innovation is not used at the expense of core academic principles and student and teacher rights. The trend in the world indicates a close connection between active governance and the proper use of AI in learning. Through these experiences, it is important to highlight the necessity of developing countries like Nigeria to not only embrace AI tools but establish the legal and regulatory framework to allow the ethical and impactful application of the AI tools.

The Nigerian Proceeding and Problems

Compared to the world trends, the implementation of AI in Nigerian institutions of higher learning is scanty and unequal. Majority of universities and polytechnics have old-fashioned infrastructure, limited funding, and weak internet connectivity which hinder the implementation of high-tech digital technologies like AI (Adeoye and Alani, 2020). Moreover, most institutions do not have technical knowledge and strategic foresight to utilize AI solutions to their advantage. Even though there are some innovation pockets, e.g., automated grading systems or chatbot-based student support in several of the private

universities, none of those is nationally coordinated and many are not, at most, institutionally sustainable.

One of the biggest obstacles to the adoption of AI in Nigeria is the lack of a unified national policy or framework that would discuss the role of AI in education. There are no sufficient provisions regarding the development of AI, ethical issues, and data protection in the existing educational policies and ICT policies, which are specific to the field of higher education (NITDA, 2021). Also, there is a common fear regarding the privacy of data, intellectual property, and the possibility that AI will increase inequality among students and institutions. The lack of a receptive and inclusive regulatory system makes attempts to use AI to achieve sustainable development in higher education disjointed and unsuccessful.

Strategic Advancement Opportunities

Nonetheless, Nigeria has considerable opportunities in using AI to transform education. The country has the human resource and market potential to drive the demand of smart technologies in the field of education because it comprises of young people and is a developing digital economy. The development of an ecosystem of AI oriented towards local pedagogical and infrastructural contexts through collaborative work of universities, technological startups, and government agencies can be achieved. Nevertheless, achieving these opportunities will demand purposeful legal and policy actions, which will facilitate investment, secure ethical use of AI, and protect educational equity (Olayemi, 2022). Through such comparisons, Nigeria can follow a path, where AI will be an instrument of delivering inclusive and sustainable development of education globally.

Legal and Regulatory Environment in Nigeria

Summary of Current Legal and Policy tools

The legal and policy landscape of Artificial Intelligence (AI) in Nigeria is poorly developed, especially in terms of its implementation in learning institutions. Although the general laws are concerned with technology and data regulation, such as National Information Technology Development Agency (NITDA) Act 2007, the Nigeria Data Protection Regulation (NDPR) 2019, and the Cybercrimes (Prohibition, Prevention, etc.) Act 2015, the tools do not specifically target the use of AI in learning institutions (NITDA, 2019). An example is the NDPR, which offers data privacy and protection instructions but does not include clauses on the accountability of the algorithms, automated decision-making, and consent procedures in the AI-based academic systems.

In NITDA, the Nigerian government published a draft National Artificial Intelligence Policy (2021), which presents strategic objectives of the AI integration in the various sectors of the economy, including the education sector. Nonetheless, this policy is still in its infancy and is yet to be institutionalized in form of legislation. The policy does not have a regulatory strength to direct and conform AI application in institutions of higher learning without a binding legal support. In addition, in Nigeria, the National Policy on Education (NPE) lacks directives and guidelines on how AI should be integrated into the education system, which means that educational institutions have no systematic plan of digital transformation (Federal Ministry of Education, 2014).

Loopholes and Regulatory issues

One of the regulatory pitfalls is the widespread lack of transparency and alignment between the governmental agencies that should control the applications of artificial intelligence (AI) to the educational industry. Although information and communication technology (ICT) and academic quality assurance are supposed to be under the National Information

Technology Development Agency (NITDA) and the National Universities Commission (NUC), respectively, there still is a lack of a collaborative framework that covers the nexus of AI, education, and legal regulation in detail. Such fragmentation leads to inconsistency in policy development as well as enforcement, thus hindering organizational adherence to standards and weakening technological adoption capacity (Ayo and Folorunso, 2020).

Moreover, there is an obvious gap in law that regulates ethical usage of AI in institutions of higher learning. Such critical issues as the bias of algorithms, monitoring learners, the commercialization of information, and the rights of intellectual property in relation to AI-generated works are not completely regulated. Such areas of legal blindness place students and faculty in a legal risk of rights infringement and simultaneously hinder innovation because of the uncertainty regarding liability and data ownership. Additionally, the regulatory space has also been not able to keep up with global trends in governing educational technology, which places Nigeria in the position of disadvantage in competition.

Comparative Legal School of thought

In comparison, the law of AI use in education has been well-developed in other countries, including the United Kingdom and Canada, with systems of transparency, accountability, and user permission (Cios & Zapala, 2021). It could be used as an example, the General Data Protection Regulation (GDPR) of the European Union has the sections referring to automated decision-making and profiling that are directly applicable to educational systems based on AI. These legal frameworks can serve as an example to be followed by Nigeria, as they have adopted the regulatory tools that allow balancing innovation with the protection of rights. A comparative method can provide rather helpful conclusions about the ethical implementation of AI based on responsive, inclusive, and adaptive laws in academic institutions.

Sustainable Development implications.

Promoting Quality Education (SDG 4)

The use of AI in higher education has a significant potential to support the Sustainable Development Goal 4 (SDG 4) that prioritizes inclusive, equitable, high-quality education and lifelong learning opportunities to everyone. The personalised learning paths can be supported by AI technologies, student engagement during learning, based on intelligent tutoring system, and data analytics on academic performance and escape risks (Luckin et al., 2016). In Nigeria, where learning opportunities are limited by educational discrimination and high classroom experiences, AI may mitigate the disparity in learning, particularly in the underserved communities and students with special needs. However, the absence of a balanced regulatory framework can cause such benefits to be distributed unequally, which can only widen the existing inequalities in access and outcomes.

Encouraging Infrastructure and Innovation (SDG9)

The implementation of AI in the sphere of higher education also supports SDG 9 that encourages the building of resilient infrastructure, the promotion of inclusive industrialisation, and the development of innovation. By investing in AI-based research platforms, universities in Nigeria will be able to enhance their international research footprint, engage in interdisciplinary innovation and create data-driven policy outcomes. Also, AI can improve the efficiency of the operations by automation of such administrative processes as admissions, grading, and resource distribution (Tuomi, 2018). The realization of such benefits depends, however, on the creation of sound digital infrastructure and facilitating law ensure that will stimulate innovation and

simultaneously guarantee institutional freedom and protect intellectual property rights.

Reducing Inequalities and Ensuring Ethical use (SDG 10 & 16)

Although AI can be a potentially effective tool to democratize education access, it is just as prone to causing harm that can only worsen inequalities without restrictions. Due to algorithmic bias, lack of local language support, or unequal access to digital devices, may marginalise certain groups of students (Binns, 2018). This will affect SDG 10 (lessened disparities) especially in a nation like Nigeria where there is disparities between urban and rural schools. Additionally, the use of AI appears to bring about all three ethical and governance issues, such as surveillance, data protection, and academic freedom, which align with SDG 16 (peace, justice, and strong institutions). A dynamic legal system is, accordingly, a must in demand to make sure that AI improves, as opposed to harboring inequitable development in the sphere of higher education.

Policy Co-ordination to Long-term Development

The proposed future-focused policy integration is the only way the full potential of AI in advancing sustainable development in higher education in Nigerian is going to be achieved. In this strategy, it is necessary to create a law that entrenches ethics, defines the role of institutions, and fosters stakeholder cooperation. Without such integration, AI applications will be disjointed, underused or even harmful. Integrating AI implementation with the priorities of the country in national development and the global sustainability efforts will both enhance the quality of education and contribute to the greater activities of Nigeria in terms of turning to a knowledge-based economy and becoming a global player (Onyema, 2021).

The necessity of a Responsive Legal and Regulatory Framework

Solving Legal Uncertainties and Technological Change

With the fast development of AI, its absence of a unified legal and regulatory framework poses a challenge to institutions of higher learning that strive to deploy and implement AI-based technologies in Nigeria. Modern laws are mostly reactive and do not provide strict rules about matters of data ownership, responsibility in the context of AI-driven decisions, and intellectual property concerns in terms of AI-generated academic information (Ajulo, 2022). Such a loophole in the law is not only an obstacle to innovation, but also subjects institutions and students to fraud and abuse of rights. A receptive legal framework must, therefore, be prospective, must be sensitive to technological change, and must be responsive to the unique needs of the educational sector.

Securing Ethical and Inclusive AI Implementation

One of the major reasons supporting an effective legal system is to ensure ethically sound use of AI. AI systems that are utilized in the admissions, grading, and learning analytics should be open, unbiased, and responsible. When no laws exist to govern these biases, their results might be discriminatory, especially when it comes to marginalised students (Eubanks, 2018). In a multi-ethnic society like Nigeria, where there are no control mechanisms, there is a risk of increasing the socio-educational inequalities. Therefore, an adaptable law must install ethical codes, such as transparency, accountability, non-discrimination, and human control, into every phase of AI creation and implementation in higher education.

Regulatory Harmonization and Institutional Capacity

The successful application of a reactive legal system depends on the capacity of institutions and harmonisation of the provision of regulations. The regulatory authorities including the National Universities Commission (NUC), the National Information

Technology Development Agency (NITDA), and the Federal Ministry of Education need to undertake a concerted initiative to devise policies that are consistent as well as favorable to integration of artificial intelligence (AI). Such an undertaking implies the development of legal knowledge among university leaders and educators and lets them read and utilize regulatory standards in educational settings (Okonkwo, 2021). Moreover, harmonisation of national and subnational laws will prevent the loss of AI projects due to the development of jurisdictions or incompatibility across the institutional environment.

Possibilities of Reform and Policy Innovation

To operationalise the responsive legal and regulatory framework, Nigeria needs to consider a multi-stakeholder approach which includes the government agencies, tertiary institutions of higher learning, civil society and the private technology industry. This type of cooperation will see the legal system not only act as a shield but also a catalyst. A national law or a regulatory code (in particular, related to AI in education) with additional provisions on ethical use, monitoring compliance, and resolving conflicts will significantly enhance the capacity of the Nigerian government in the realm (Adelakun and George, 2023). Also, the systems of the continuous legal reform and periodic review should be institutionalised to be aligned with the technological advancement and global best practice.

Conclusion

The integration of artificial intelligence (AI) in the sphere of higher education in Nigeria is a revolutionary chance to meet the sustainable development objectives, improve the quality of education, and upgrade the organisational processes. AI is transforming the teaching, learning, research and administration modalities globally. Although some Nigerian universities are already experimenting with AI-driven solutions, the fact that no coherent, ethical, and enforceable regulatory framework is present is still a major obstacle to full implementation and long-term effectiveness. Therefore, any meaningful educational reform based on AI should be supported by sound legal and institutional frameworks that would assume equity, data privacy, intellectual property, and AI responsibility.

As seen in this paper, legal and policy tools in Nigeria have remained weak and disjointed to respond effectively to the multi-faceted needs of AI in the education sector. In the absence of a targeted legislative and regulatory agenda, AI applications can contribute to the maintenance of existing disparities and violate the rights of learners, as well as undermine institutional credibility. Responsive legal framework is thus not only a regulatory requirement but a developmental need which makes sure that the deployment of AI is consistent with the national priorities and international best practices.

Moreover, Nigeria should use the world experience to amend its laws proactively but to technologically neutral but flexible to new innovations. The multi-stakeholder cooperation with academia, government, civil society, and the private sector is also required to ensure that legal standards are all inclusive and enforceable. Regular review cycles and capacity-building efforts should also be reflected in the policies to keep the higher education institutions agile and ethically grounded in the process of utilizing AI technologies.

Finally, to ensure the effective implementation of AI in high education in Nigeria, technological preparedness is not the sole factor, but also a legal framework that is progressive and capable of responsiveness. This type of structure will become the foundation of responsible innovation, thus making AI a potent tool of equitable, inclusive, and sustainable educational progress.

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