journal of ethics in higher education

Africa Dreams of Artificial Intelligence

A Critical Analysis of its Limits in Open and Distance Learning

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December 2024.

Keywords

Artificial intelligence, open and distance learning, Africa, teaching and learning, AI in research, didactic methodologies and philosophy of education.

Abstract

Artificial intelligence (AI) has recently emerged as a transformative force in teaching and learning practices, with profound implications for open and distance learning (ODL), which relies heavily on technology. Despite its global impact, the extent of African societies' engagement with AI remains trivial. This paper critically reflects on the ethical, legal, social, pedagogical and technological implications of AI in ODL in sub-Saharan Africa, drawing insights from the Nigerian experience. Adopting the scoping review methodology, the paper explores and synthesises existing literature to foreground a critical analysis of the implications of AI in the African context.

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To quote this article: Olojede, T., Olakulehin , F. K. 2024. "Africa Dreams of Artificial Intelligence. A Critical Analysis of its Limits in Open and Distance Learning". *Journal of Ethics in Higher Education* 5(2024): 159–181. DOI: 10.26034/fr.jehe.2024.6869

1. Introduction

The advent of technologies in classrooms dates back to the 19th and 20th centuries with the invention and use of wireless telegraph and electronic television (Malekos, 2023). However, the application of artificial intelligence in education is as old as the birth of artificial intelligence (AI) itself. One may claim that education is the first field of knowledge implied in the enterprise of AI when one considers the proposal that birthed AI at the Dartmouth conference of 1956. The proposal claims that a machine can adequately replicate all learning facets or other characteristics of intelligence (McCarthy et al., 1955). Thus, education has been an integral part of AI since its inception. Beyond the mere mention of 'learning', the work of Alan Turing is foundational to the use of computers in teaching and learning. This is especially evident in his 'Imitation Game' popularly known as the 'Turing Test' and the later 'reversed Turing Test' (Turing, 1950).

Programmed Logic for Automatic Operations (PLATO) is another early instance of AI in the 1960s that used computer-assisted instruction (CAI); it was equally employed as a research tool to investigate people's learning patterns. Many colleges, schools and vocational training institutions utilise it (Jones, 2015). The 20th century witnessed the emergence of learning management systems. In contrast, the 21st century marked a great turning point with the development of massive open online courses (MOOC) (Moe, 2015 & Doroudi, 2022) and the revolutionary ChatGPT, a large language model of OpenAI. The advent of ChatGPT has exhumed the conversation about whether a machine can have human-level intelligence, which Turing's imitation Game answered in the affirmative.

2. Statement of the Problem

The growth and expansion of artificial intelligence exert significant pressure on higher education institutions globally and justifiably. Students of higher education institutions and the professoriate have had to grapple with the emergence of AI in different ways. Much has been said about the potential of artificial intelligence to power our universities, transforming the way

research, education and the administration of higher education institutions (HEIs) are carried out. As a model that offers the ability to create content, simulate scenarios, and assist in research and decision-making, AI can and is revolutionising the design and delivery of open and distance learning in previously unimagined ways. On the one hand, there are many ways that AI impacts open and distance learning (ODL) and optimises its distinctive features. On the other hand, it exerts more pressure on ODL in the arena of ethics and quality assurance than may be visible in the conventional HE context. Academics in ODL may find AI helpful for generating learning content, providing personalised learning support and designing assessment options, while distance learners themselves would use AI, especially GenAI for assignments, essays, and generally as solutions to the rigorous academic demands of their distance learning courses. This opens up new vistas of debate. Is AI just speaking to AI? That is, when AI is used to create content, and develop assessments by one party and AI is used to produce assessment responses by the other party, are we not creating a scenario where AI is merely engaging AI? What are the ethical issues at play in this scenario? What are the implications of using AI in this way for the survival of the ODL community of practice? Would academics/ distance education survive the coming revolution in self-aware learning content systems? While there are discussions and proposals of ethics of artificial intelligence in education (AIED) in general, we are looking at this specifically in the context of ODL. These and other issues will be examined in the course of this paper.

3. Significance

AI's dynamic and emerging nature makes it a fertile ground for research studies to generate literature addressing some pressing concerns, particularly educational ones. To this end, while there are a few works that address specific issues such as ethical or pedagogical or technical implications in education in general, this study, however, interrogates the quintuplet issues of ethical, legal, social, pedagogical and technical implications of artificial intelligence in higher education specifically as it pertains to open and distributed learning.

4. Methodology

The methodological approach adopted for this study involves a scoping review of available literature. The aim is to comprehensively explore and synthesise existing literature on the research topic, providing a solid foundation for the following critical analysis. The scoping review identifies the breadth of available literature on the research topic, offering an overview of key concepts, existing gaps, and potential themes within the field. The identification of relevant literature was undertaken using a broad exploration approach, which involves a search of electronic databases such as Google Scholar, Semantic Scholar, Scopus, and Web of Science, which were interrogated using relevant keywords and controlled vocabulary related to the research topic. Additionally, hand-searching of reference lists and citation tracking were employed to examine pertinent literature thoroughly. Inclusion criteria were defined to encompass studies relevant to the key research focus, which is a critical analysis and reflection on the ethical, legal, social, pedagogical and technological implications of AI in ODL. Sources included peer-reviewed articles, conference proceedings, and grey literature. Publications were excluded if they were older than five years; did not align with the research focus; or lacked sufficient methodological rigor. Data retrieval incorporated a systematic extraction of pertinent meta-data from the identified studies, such as the design, key findings, and the methods adopted. The data were charted and synthesised to provide an overview of the existing literature landscape. The scoping review findings were analysed thematically, allowing for the identification of common themes, patterns, and gaps within the literature. This analysis informed the development of the systematic review protocol. Data extraction involved systematically retrieving relevant information from selected studies, including key findings and methodological details. The synthesised data were then subjected to thematic analysis, allowing for the identification of overarching themes and patterns across the body of literature.

5. Scope and Limitations

While this study might have ramifications for other levels and forms of education, likewise to campus-based conventional institutions, this study focuses on the implication of AI in higher education, specifically in open and distributed learning spaces. The concern of the paper is on the ethical, legal, social, pedagogical, and technical implications; it does not, if at all, directly concern economic, political, cognitive or neurological implications, except where they have implications for the ethical, legal, pedagogical and technological issues. The study is limited, on the one hand, by the nascent nature of the boom and application of AI in education generally and open and distance learning specifically. On the other hand, the study is limited by the available regulations and publications around and on AI generally and specifically, in the sub-Saharan African context at the time of this study. Another limitation of this study is that it is devoid of a specialised appraisal of AI in one particular institution and country, given that the levels of AI technological adoption and utilisation vary significantly by country and, thus, by institution. It thus stands the risk of over-generalisation. However, given the analysts' familiarity with the contemporary Nigerian context, significant reference was made to the implications of AI for ODL in Nigeria as a foil for analysing the wider sub-Saharan African landscape.

6. Literature Review

Implications of Artificial Intelligence for Open and Distance Learning

As observed earlier, AI has wide-ranging and far-reaching implications for education and research, especially in ODL, with its massive reliance on technology. In line with the purpose of this paper, the critical implications of AI for higher education and open/distance learning in the sub-Saharan African context are examined in this section through the ethical, legal, social, pedagogical and technical lenses.

Ethical

The application of AI in education, using various generative AI, virtual reality, metaverse, and augmented reality, is revolutionising how teaching, learning and assessments are done. The reason for this is because of the wide-ranging implications it has for teaching, learning and assessment and especially the issue of academic integrity that accompanies its use (Popenici, 2023; Nature, 2023; Göçen & Aydemir, 2020; Sharma, 2021). Given this, the need to spell out what is acceptable and unacceptable of its use becomes pertinent; hence, there is a need to examine its various implications, particularly in education and, more particularly, in open and distributed learning spaces.

The ethics of AI is still very much nascent, with a global consensus on its regulation. Despite this, the initial report of the AI advisory body (2023) details five guiding principles: AI ought to be administered comprehensively by everyone and for the good of everyone, the interest of the public must be central to the management of AI, the administration of AI ought to be rooted in data management and furtherance of data commons, global administration of AI is sacrosanct with a firm reliance on multi-lateral cooperation, AI administration ought to be entrenched in UN Charters and similar universal ones on human rights (AI Advisory Body, 2023). Beyond this, what there is at best are various proposals from different sectors such as academia, non-profit organisations, government, private sectors and the like. Some commonalities among the proposed ethical regulations include:

— Management and Oversight - this theme is replicated in several codes that address artificial intelligence in education (AIED). It stipulates that respect should be accorded to international laws and nations' sovereignty regarding data manipulation. It encourages the involvement of an expanded stakeholder beyond the traditional or statutory ones to include youths, children and anti-discrimination monitoring bodies and the participation of new stakeholders as the technology evolves (UNESCO, 2021). OECD (2021) report captures this idea as ethics that guides accountable management of reliable AI.

— Human Oversight/Centredness - there is a requirement on member states always to endeavour that ethical and legal accountability is attributable to physical persons and legal entities. Human oversight relates to individual human administration and comprehensive collective management/governance. Humans may employ AI systems for greater effectiveness. Still, the choice to do this in certain circumstances solely depends on humans, and AI systems can never depose the responsibility and accountability expected of humans. As a form of control, grave matters involving life and death should not be yielded to AI systems. OECD echoes several similar sentiments with the admonishments to AI actors to accord all through the life process of AI system some regard to the democratic principles such as liberty, human dignity, independence, confidentiality and privacy, secured data, non-segregation, diversity and difference, inclusivity, the principle of fairness, and the inward acknowledgement of labour rights (OECD, 2021). Consequently, AI actors are required to institute measures consistent with human ability for determination and which are both highly developed and suitable to circumstances. The Beijing Consensus noted the importance of human oversight and centredness by stressing the continuous relevance of teachers and their rights and work conditions even with the presence of machines (Beijing Consensus on Artificial Intelligence, 2019).

— Transparency and Explainability - there ought to be full disclosure to all stakeholders when AI algorithms are employed to make decisions that affect their lives; they should equally be able to make a case to delegated staff or the sector or organisation for review and reversal of untoward decisions. Explanations pertain to the comprehensibility of AI systems regarding the algorithms' inputs, outputs and operational procedures. Explanations ought to be made available to people from concerned AI practitioners when requested (UNESCO, 2021). The Beijing consensus emphasises the need for AI systems to be ethically planned, unprejudiced and easily

reviewed, with its effects on persons and society observed and appraised all through the life cycle (Beijing Consensus, 2019).

— Sustainability - is especially important because having a liveable and flourishing society is based on accomplishing interrelated goals on the socio-cultural, humanitarian, economic and environmental spectrum (UNESCO, 2021). The emergence of AI can either make or mark their achievement based on their applicability in countries with differing development rates. A constant evaluation of the impact of AI technologies on these goals should be done because of their dynamic nature and affinity with the United Nations' Sustainable Development Goals (UNESCO, 2021).

— Privacy - the need to preserve, promote and respect human dignity, autonomy and agency is at the heart of the need for privacy in AI. Data harvested ought to be properly handled in tandem with international law and stipulations of UNESCO with no prejudice to applicable domestic frameworks. AI actors need to ensure that the life cycle of AI ensures the preservation of personal information (UNESCO, 2021).

— Limits on Use, Safety and Harm Prevention - while the technology of AI does not by itself bring about a thriving human and environmental ecosystem, there should be proportionality in its life cycle such that it does not go beyond what is required for the accomplishment of permissible goals and purposes fitting to a context. Procedures must be implemented to evaluate risks, and measures must be adopted to forestall the recurrence of harm if there is harm to human beings, their rights, autonomy, groups of people or society as a whole (UNESCO, 2021). OECD (2021) captures this with its emphasis that AI systems ought to perform as intended, devoid of unwarranted safety risks in all their phases.

— Inclusiveness - this behoves all AI actors to foster social justice, fairness and non-discrimination in adherence to international law. The goods of AI technologies must, therefore, be accessible to everyone with specific consideration of the needs of a diverse range of people, groups, cultures, languages, persons who are differently

> abled, girls and women, oppressed and vulnerable people or persons in vulnerable circumstances. The digital divide that might be responsible for unequal access and participation in AI technologies ought to be addressed by member states. There is a need for solidarity between technologically advanced states and the least technologically advanced states, whereby the former ensures the latter reap the goods of AI technologies in terms of access and participation in a fair and just manner, thus maintaining a just and fair world order (UNESCO, 2021).

The UNESCO Guidance for Generative AI in Education and Research (2023) discusses seven ways to manage GenAI in education. The first encourages member states to ratify and implement relevant global data protection regulations or craft new ones. The second is for governments to finance and either embrace a holistic national AI strategy or rework existing ones to incorporate novel developments in AI, such as the advent of generative AI. It is especially important to ethically manage this multi-sectorially, particularly in education. The third is to strengthen and execute specific AI ethics regulations. There is a need for more countries to both institute and enforce ethical guiding principles on AI, particularly in education, not just in terms of skill and talent acquisition but more in terms of ethical administration.

The fourth step requires other countries to urgently amend and execute extant copyright laws to administer AI-generated content. Traditional copyright laws must be revised to cater to the novel challenges GenAI brings. Only China, the EU and the United States have amended their copyright laws to take cognisance of the implications of GenAI. While the US copyright office has asserted that AI output cannot be safeguarded under copyright law and that copyright can only cover resources produced by human ingenuity, the EU, in its Act, behoves AI developers to divulge copyrighted resources utilised in the development of their systems; China nonetheless calls for tagging of results of GenAI as such while acknowledging them as products of digital composition (UNESCO Guidance, 2023).

The fifth step, based on having a detailed management structure for GenAI, equally demands GenAI systems developers tag images, videos and other content by AI in tandem with extant regulations. It suggests that more GenAI-specific frameworks should be developed to fill the lacuna in extant local guidelines and laws. The sixth step is to empower teachers, researchers, schools and educational institutions with skills for the right use of GenAI in education and research, particularly its merits, demerits and risks. The seventh step is to ratiocinate on the near-future consequence of GenAI for education and research. This is especially true in terms of how knowledge is created, imparted, and authenticated in various educational aspects (UNESCO Guidance, 2023). Given that the adoption of GenAI is still nascent and uncertainties are surrounding its long-term implications, the document recommends open, public, and inclusive discussions to include governments, private sectors, and other stakeholders for holistic contributions to amendments of regulations and policies.

More concretely, human-centredness, for instance, in ODL, implies that the entirety of the pedagogical process in terms of teaching, learning and assessment, even though distant, is designed and hinged on human supervision and not left solely to the dictates of the machine, AI. Human-centredness in teaching implies that a robot or a chatbot such as ChatGPT does not substitute the place of the teacher or tutor but rather that the traditional roles get modified where the teacher no longer takes centre stage like a sage but rather assumes the Socratic midwife who guides and helps the learner to the right use of AI in a way that is ethical and which fosters critical thinking rather than mental atrophy. Human-centredness thus implies that teachers will not be 'deleted' as feared in some quarters, and the learners are not some isolated entities. AI serves as a unitive force between the learner and the teacher and is not divisive as is usually touted. In the ODL space, it means that the curriculum and course materials are designed with the closer symbiotic relationship between the learner and the tutor aided by AI in mind.

The issue of privacy is especially pertinent in ODL space with its heavy reliance on technology. The privacy issue is implied in the humongous amount of data employed to train AI systems which it continually requires through learner engagements to continue to provide personalised learning to

each learner. Privacy concerns are also endemic in the 'datafication of education' found in learning analytics, which many ODL institutions employ because of its suitability for their context. While it is of utmost importance to preserve, promote and respect the dignity, autonomy and agency of learners in line with applicable ethical and legal frameworks, there ought to also be a 'limit on the use' of AI to curb and mitigate the general 'culture of surveillance' inadvertently implied in the use of various technologies for predictive learning. Limit on use pertains to not crossing a certain threshold of the use of AI. There ought to be a specified limit on collecting, using, transferring, and maintaining personal data, as well as on targeted advertisement.

The UNESCO Recommendation instead captures quite succinctly the issue of inclusion. However, its policy area six on gender leaves much to be desired with its emphases on STEM for the participation of girls and women. The need for STEAM and, much more importantly, to incentivise women and girls to take up positions in such areas is pertinent. As disciplinary silos collapse, arts and humanities offer outlets for women and girls to participate in STEM-related disciplines, which not just makes for a holistic representation of women but also makes for a humanised technology as there is more urgent need in a technology-driven world to foster meaningful collaboration amongst disciplines to ensure technology is developed and deployed for the good of humanity. We need not de-emphasise a group of disciplines to emphasise some others.

Legal

Intellectual property rights are one of the issues AI faces in education. The legal question is whether AI can create or own the patent. The US Supreme Court in 2023 refused to entertain a case brought to the U.S. Patent and Trademark Office for a patent to be issued for the creation of a Device for the Autonomous Bootstrapping of Unified Sentience (DABUS) artificial intelligence system said to have created peculiar examples wholly by itself. The justices declined the appeal because only human inventors can be issued a patent. Thus, AI systems cannot be recognised as inventors; only a human person can be an inventor (Brittain, 2023).

The issue of copyright and authorship of AI-generated content is another legal issue that has sprung up a whirlwind of ideas. The question surrounding the ongoing debate on the issue of copyright and authorship in AI is: Can the AI system be considered the author with copyright ownership of the content it generates? Traditional copyright law conceives authorship in terms of human agency and innovation/creative powers of the mind as fundamental to authorship; legal luminaries, however, argue that humans ought to possess rights of ownership since they are central to the creation and modification of the AI systems. The third camp to the debate opines that given that an AI system independently produces content free of human management and interference, it should, therefore, be acknowledged as a creator and as a probable copyright owner (Copping & Ezra, 2023).

Implied in copyright issues are infringement concerns because of the risk of inadvertent copyright violation given the vast amount of content the AI system is 'tutored' on, especially when the system has been trained on copyrighted materials. Adequately giving credit to AI-created works is also concerning. Attributing properly acknowledges intellectual property rights and fosters transparency in recognising inputs from various sources. Another issue worth mentioning is liability for the outputs of large language models. Whom should we hold responsible for the generation of defamatory or violating content? This becomes problematic because of its automated nature (Ahuja, 2023).

Social

AI can foster collaboration and social learning in ODL settings despite the physical and spatial distance. Intelligent chatbots and virtual assistants can facilitate discussions, answer queries, and provide a sense of community among learners. In the ODL context, the theories of transactional distance and the community of inquiry are frameworks that crystallise the relationship between instructional design and delivery. They help to understand the effects of students' contentedness on their academic performance. Both the transactional distance and community of inquiry framework are concerned with reducing social and psychological distance, which often leads to phenomena such as drop-outs and attrition in distance education.

Transactional distance is a perceived cognitive and communication lacuna where misapprehension could thrive between the instructor and the learners (Moore, 2018).

The theory underscores social exchange instead of technological interaction in understanding the relationship between tutors and learners separated in time and space. The community of inquiry model produces an engaging and robust socio-constructivist learning experience through three interrelated constructs – social, cognitive, and teaching presence. The pedagogical shift involves transmitting knowledge and cultivating collaborative and social learning experiences, enriching the educational journey for all participants. The social implications of AI in this context derive from its functionality in enabling distance learners to exhibit greater autonomy over their learning and social experiences. As some analysts have argued, AI is likely to have various significant social consequences based on geography. People's conceptions and views of AI tend to be deeply influenced by culture and society (Hagerty & Rubinov, 2019). Peer social support is one of the hallmarks of broad and multifaceted social support systems that enhance individual well-being and group relations, influencing various aspects of human life, society, and the economy, and the evolution of AI into most facets of human life threatens important human relationships in unimaginable ways. Apart from issues such as privacy concerns, which have become centre-stage, almost at par with the dominance of AI, there are also concerns about potential redundancies created at the lower and middle levels of the teaching and research roles. The development of virtual AI assistants means that these teachers will not be required for some roles, and some functions previously performed by research assistants will suddenly disappear. There is also the threat of virtual assistants becoming too mechanical and disembodied and unable to demonstrate humanity and empathy; some learners may sorely need to adjust to the challenges and biases associated with their learning experiences (Sætra & Fosch-Villaronga, 2021).

Pedagogical

In examining the pedagogical implications of AI for teaching and learning in the open and distance context, it seems necessary to extend beyond the often-

touted affordances and drawbacks of AI. Undoubtedly, there are new possibilities for teaching and learning, especially for an innovative mode of education such as ODL, which privileges flexibility and adaptability above traditional elements of education delivery, with pedagogical considerations of incorporating AI in the teaching and learning process. Those are of utmost importance. Pedagogy lies at the heart of effective teaching and learning. In the realm of ODL, where geographical distances and diverse learner needs prevail, educators face unique challenges. Incorporating AI introduces exciting new dimensions to pedagogy, assessment and learner engagement, promising enhanced personalisation, interactivity, and efficiency (Han et al., 2023). However, this requires carefully examining how AI aligns with established pedagogical principles.

One of the goals of ODL is the democratisation of education, making learning accessible to many learners across multiple locations. Indeed, the key features of ODL, such as Enhanced Access, Equity and Equality, Openness and Flexibility, Elaborate Learner Support Systems, Quality Self-Learning resources, Authentic Assessment, Social Justice, Inclusive Participation, and Learner Centredness are amenable to functionalities of Generative AI models. Generative AI impacts ODL and optimises its distinctive features in many ways. In content generation and curation, AI provides an automated instructional delivery which may support academics in developing course materials and lectures, enabling them to focus on more interactive and engaging aspects of the teaching and learning process. As mentioned earlier, AI can also support the design and development of authentic assessments, producing a range of questions for tutor-marked assignments and examination items to create a more robust, personalised, and error-free assessment model.

Another key pedagogical consideration is the potential for AI to facilitate personalised learning experiences. AI algorithms can analyse individual learner data, adapting content and assessments to cater to each student's pace, preferences, and learning style. This may also have implications for the social dimensions of open and distance learning interaction. Personalisation fosters a more engaging and effective learning journey, addressing the diverse needs of ODL students scattered across the learning locale. Thus, AI offers distance

learners who often operate asynchronously real-time feedback, eliminating the spatial gap between tutors and distance learners. AI-powered automated assessment tools can offer immediate insights into student performance, enabling timely interventions and support (Naidu & Sevnarayan, 2023). This responsiveness contributes to a more supportive and dynamic learning environment. However, the provenance of the content database may limit this phenomenon. Databases in developing countries are still heavily dependent on the Global North, which implies that when the AI is interrogated, the responses often derive from existing databases from the Global North - resulting in outcomes that lack a deep root in the local context.

As stated earlier, pedagogical considerations of AI in teaching and learning are crucial in the open and distance learning delivery mode. AI systems provide constructive support for e-learning and teaching, comprising individualised studying, automating evaluation and administrative activities, and creating authentic and scenario-based assessments. Nonetheless, despite the promising nature of AI, the effect of AI systems on the cultural values and social expectations relating to students' engagement with their tutors is still uncertain – especially in a developing world context like Nigeria's. In online learning, the interaction between students and instructors in the form of feedback, support, and presence significantly affects students' contentedness and academic performance. As a result, determining how students and instructors understand the effects of AI systems on their relationships is critical to recognising issues and challenges, including barriers that limit the ability of AI systems to fulfil the expectations of students and instructors. The pedagogical implications of AI in ODL unfold in three broad ways: teaching, learning and assessment.

As demonstrated earlier, AI has contributed immensely to developing content that is adaptable to the needs of learners in real time and can address the diverse needs of individuals. One key limitation that may be underscored is the weakness of AI in producing content that has contextual relevance to the context of a developing country like Nigeria.

Technological

Integration of AI in ODL has far-reaching technological implications, innovating and revolutionising ODL by evolving solutions to enhance the learning experience. Without a doubt, this impacts the technological aspects of ODL (Dogan et al., 2023). A much-touted advantage of AI for ODL is personalised learning. It enables AI algorithms to analyse student data and use them to create individualised learning pathways based on each learner's unique characteristics and needs. This enables learners to access instructional content that aligns with their characteristics and needs to enhance effective and efficient learning experiences. Similarly, AI-powered adaptive learning platforms continuously measure learners' progress and modify the difficulty levels and learning content to reflect ability levels and needs (Bozkurt & Sharma, 2023). Adaptability responds to learner diversities, ensuring each learner is appropriately engaged and supported throughout the ODL course. The possibility of AI automating assessment processes, including grading and providing constructive feedback, is another critical implication for ODL. This reduces the burden on instructional facilitators and allows for faster feedback cycles, enhancing the overall learning experience for distance learners. Other features, such as intelligent tutoring systems, natural language processing (NLP), and predictive analytics, can potentially increase ODL delivery efficiency when properly designed and implemented.

Meanwhile, the technological implications of AI in the context of ODL are transformative, offering opportunities to enhance personalisation, engagement, and overall learning outcomes (Uunona & Goosen, 2023). Careful consideration must be given to ethical concerns and the need for continuous monitoring and improvement in applying AI technologies in ODL delivery. One area that continues to challenge users is the implications for the socio-cultural context. There is an assumption that players in ODL in the Global South have the same digital literacy skill levels as those in the Global North, yet this is not necessarily the case. What this means is that despite the sophistication of the best algorithms of AI adopted and deployed for various ODL functions, there is a need for operable social justice mechanisms which keep the needs of the most diverse learners at the back of the mind so that they are not inadvertently left out of the intellectual orbit of an AI-driven ODL

delivery process that does not take their digital literacy limitations into account.

7. What does it add up to? A reflexive analysis of AI in education and research

Many of the above principles on how AI ought to be engaged in education are undoubtedly apt and commendable. At the risk of rehashing what has already been discussed, the need to situate humans at the centre of AI administration has become imperative; likewise, the recommendation to have a pellucid algorithm and one that can easily be explained. These principles are at the heart of adequate regulation of AI in education. Despite this, there are issues to be addressed in regulating AI in education.

The first pertains to the proliferation of principles and the potential for confusion on which to adopt. There is a need for a global body such as UNESCO to sit together with other regional groups to harmonise its different regulations and those of regional groups to have some global consensus regarding a comprehensive document on AIED. As it stands, it is confusing as to which of the different proposals to go with when searching for AIED principles. A second area where more work needs to be done is rectifying the shortfall in some of the proposals discussed. The various implications of AI are felt in teaching, learning and assessment. Yet, none of these documents takes the pains to analyse its principles singly or collectively with recourse to each of these aspects of learning for a more comprehensive and easily understandable application of AI in education. There is a need to transcend the abstract theorisation of how AIED should be administered to practical analyses that employ case studies or role plays for students/learners. For instance, what does human oversight mean (and each of the principles) in employing AI in various teaching, learning, and assessment components? While naysayers might see this breakdown as needless or redundant, domesticating the principles by relating them to how they concretely impact teaching, learning, and assessment would go a long way in fostering the understanding of all the stakeholders.

In addition, in AIED discourse, education is often treated as a single whole with principles to guide AIED discussed with such an assumption. However, there is a need to properly disambiguate education into its various sectors, such as primary, secondary, and tertiary education, with a consideration of those with special learning abilities / or gifted learners. As this is done, principles to guide AI ought to be tailored to these different sections of education and learners. What applies in one educational sector might apply in another; however, it would be a gross over-generalisation if we assume, for instance, that the same human oversight required for preschool kids applies to college students.

Regarding the legal implications of copyright laws, the idea pushed by those who opine that AI systems autonomously create content devoid of human intervention is arguable. This is because AI is not self-created; it is brought about through the ingenuity of its efficient cause - humans. It appears spurious to think that AI systems should be copyright owners because they produce content free of human intervention. The machine learning component of AI would not have been possible if the efficient cause had not instigated it in the first place. Further, although humans are central to creating and fine-tuning AI systems, it does not accord them the right to ownership. In the case of large language models, the data they are trained on is gotten from the works of several other authors, which in itself springs up copyright issues.

8. Conclusion

The dream of AI in ODL in sub-Saharan Africa, particularly in Nigeria, is characterised by ambitious promises and confounding challenges, almost in equal dimensions. Although the potential benefits seem quite obvious, there are critical limitations in the areas of infrastructure, culture, ethics, and pedagogy that have negative impacts. As has been shown in this paper, there is an imperative for a comprehensive analysis of possible mechanisms that can be used to harness AI for African education systems generally and open and distance learning specifically in its current state. Such situation analysis will move the practice of open and distance learning in Africa closer to the system's aspirations. Thus, the critical analyses and reflections on the

ethical, legal, social, pedagogical, and technological implications of AI in Open and Distance Learning in a developing country like Nigeria that have been undertaken in this paper underscore the multifaceted nature of this transformative integration. As practitioners continue to examine the evolving landscape of AI-enhanced education, it becomes evident that the ethical considerations surrounding learner data, privacy, and algorithmic biases demand serious attention.

As practitioners, we have the ethical responsibility of ensuring that AI deployment for ODL in a developing country like Nigeria is infused with an adequate dose of transparency, fairness, and accountability. The governance protocols for protecting learners' data and privacy concerns must be a priority. Thus, appropriate safeguards and ethical principles must be outlined and shared across all levels of users to minimise the possible risks. Closely linked to broad ethical issues is the legal consideration, which relates to the intersection of AI and education concerning copyright, intellectual property, agency of LLM and the attendant regulatory issues. Thus, beyond adherence to ethical considerations, it is essential to balance adopting innovative solutions with compliance with existing legal provisions to ensure that AI applications in ODL do not conflict with national regulations and international conventions.

Regarding the socio-cultural and economic issues surrounding AI-driven solutions, there is a need to ensure that AI's benefits in ODL are appropriate and equally responsive, accessible and inclusive to diverse categories of users across the ODL space. This close attention to social justice will eliminate the possibility of reproducing existing social inequalities in the AI-driven ODL milieu. On the pedagogical issues, it is predictable that the integration of AI will prompt a reconsideration of traditional teaching and learning methodologies. However, the mantra of claiming that AI would facilitate personalised learning experiences and adaptability must be taken beyond the level of rhetorics; ODL practitioners must be deliberate in infusing social presence into the technological augmentation and ensuring that critical attention is given to the preservation of meaningful personal engagements in teaching and learning process. Technological advancements in AI demand continuous reflection on the implications of adopting cutting-edge

technologies. A nuanced understanding of the possible prejudices embedded in algorithms and the need for ongoing technological literacy becomes paramount to exploiting the goods of AI while preventing unintended consequences.

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10. Short biography

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