



Ensuring Equity and Inclusivity in AI-Powered Educational Assessments: A Case Study of Policy and Practice in Nigeria

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Abstract

Artificial intelligence (AI) and computer-based testing (CBT) are increasingly central to educational assessment in Nigeria, promising efficiency, transparency, and fairness. However, concerns about equity and inclusivity persist, especially for rural learners and students with disabilities. This study critically examines how Nigeria's education policies and practices address fairness in AI-enabled assessment, with particular attention to alignment with international ethical standards. A qualitative desk review was conducted, and policy documents, annual reports, and empirical studies published between 2015-2024 were analysed. Ribble Digital Equity Framework (2012) and UNESCO AI and Education: Guidance for Policymakers (2021) provided the analysis, focusing on access, participation, empowerment, and ethical use. As results reveal, the Nigerian policy texts express general commitments to digital access but do not provide specific mechanisms for the equitable integration of artificial intelligence. Students in rural areas are disproportionately marginalised by infrastructure shortages, such as low internet access and computer illiteracy. Students with disabilities, especially the visually impaired, experience systemic marginalisation because of the uneven distribution of assistive technology, resulting in poorer admission performance. Compared with UNESCO standards, Nigeria's regulatory frameworks lack algorithmic transparency, non-discrimination, and inclusive design. The paper finds that, although Nigeria's assessment system remains primarily CBT-based, existing disparities in infrastructure, digital literacy, accessibility, and disability accommodation present significant risks for future AI-enabled assessment adoption. The findings suggest that, unless accompanied by deliberate safeguards relating to inclusive design, algorithmic accountability, accessibility, and digital capacity building, future AI-enabled assessment systems may reproduce or amplify existing educational inequalities rather than mitigate them.

Keywords: Artificial Intelligence, Computer-Based Testing, Equity, Inclusivity, Digital Divide, Educational Policy.

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INTRODUCTION

Over the last few years, there has been a growing momentum toward the incorporation of artificial intelligence (AI) into the field of educational assessment. Adaptive testing, automated scoring and learning analytics are creating a paradigm shift in the assessment of learning, making possible levels of efficiency, scalability and personalized feedback to learners hitherto unattainable. The shift is part of the broader digital change in the education sector and reflects a growing need to support individualised learning experiences and policy interventions that are evidence-based. However, even under the overlay of excitement, there are some underlying issues of fairness, accessibility and equity that are especially relevant issues in situations of infrastructural and social inequity. The promise of AI in assessment is not abstract. A systematic review by Bulut, Beiting-Parrish, Casabianca, Slater, Jiao, Song, and Fabiyi (2024) highlights AI's capability to deliver consistent scoring, immediate feedback, and resource-efficient evaluation across large cohorts. Complementing this, Holstein and Doroudi (2021) emphasise that AI holds transformative potential for more inclusive educational systems, only if its deployment is consciously designed to counteract, rather than replicate, structural inequities.

In the Nigerian context, the shift to computer-based testing (CBT) by the Joint Admissions and Matriculation Board (JAMB) represents a major milestone. CBT mainly describes the computer-based administration and delivery of assessments, while AI-based assessment includes functions like AI-supported proctoring, learning analytics, AI learning models, algorithmic functionality, intelligent feedback systems, predictive analytics, and automated scoring (UNESCO, 2021; Bulut et al., 2024). However, modern studies begin to take a step back to appreciate the CBT platforms as the backbone of the overall assessment landscape integrated with artificial intelligence in today's digital era (Holstein & Doroudi, 2021; Bulut et al., 2024). However, modern studies begin to take a step back to appreciate the CBT platforms as the backbone of the overall assessment landscape integrated with artificial intelligence in today's digital era (Holstein & Doroudi, 2021; Bulut et al., 2024). AI-driven assessment systems are still nascent in Nigeria. Yet, there are already forms of digital automation, biometric verification, data-driven monitoring, and technology-supported examination management that are already used in the large-scale computer-based assessment platforms, especially those used by JAMB and other examination bodies, which create the institutional and technological conditions for future AI integration (Agbarakwe & Chibueze, 2024).

Therefore, this research work does not equate the concept of CBT with AI-based assessment. Instead, CBT is analysed as the predominant modality of digitally mediated assessment in Nigeria and as a pivotal point of analysis for issues of equity, access, participation, governance and inclusion that may be explored before broader use of AI tools. In 2014, the national university entrance examination migrated entirely from paper-based formats to computerised administration, aiming to reduce malpractice and speed result processing (Abubakar & Adebayo, 2014). Yet, research reveals that this change has not been uniformly beneficial. Abdulkareem and Lennon (2023) found that, although all students in private schools indicated prior familiarity with computers, only around 89 percent of students in public schools had familiarity with computers, with those with lower experience being prevalent in rural areas. The authors also found a positive relationship between computer familiarity and high-test scores, thus suggesting that a digital divide could be influencing performance results. On the same note, Ogechukwu (2019) documented that in Anambra State, poor power supply, poor computer infrastructure and logistical weaknesses directly influenced student performance in the case of computer-based testing. The findings highlighted highlight the fact that despite the good intentions of shifting to digital formats, it has not been supported by infrastructure improvements, thus casting doubt on equity of access.

Inclusion challenges extend further for visually impaired candidates. In 2015/2016, the Joint Admissions and Matriculation Board (JAMB) conducted a pilot programme that included assistive technologies, namely the BrailleNote Apex and NVDA screen-reader software, to make it possible to participate in a computer-based testing environment (Johnson and Akindoju, 2023). However, 2017 saw the abolition of these accommodations in the name of standardisation, thus reinstating paper-based testing among the visually impaired students, and leading to a significant drop in the admission rate (Akinola, 2023). Whereas visually impaired candidates using ICT-assisted testing achieved an admission rate of 71 per cent, the rate plummeted to 45 per cent under the reverted system. Although some concessions, such as lower registration fees and extra time, are now offered (Ikpefan, 2025), the continued exclusion from accessible digital formats indicates systemic oversight and the marginalisation of candidates with special needs.

Beyond infrastructure and accessibility, emerging discussions in policy and innovation circles raise questions about the broader inclusion of AI-driven assessment systems in Nigerian higher education. Agbarakwe and Chibueze (2024) explore how AI could streamline grading, feedback mechanisms,

and even remote proctoring. However, they caution that high costs, variable digital literacy, and opaque algorithmic mechanisms threaten both accessibility and fairness if not carefully managed. Meanwhile, Ojokheta and Omokhabi (2023) call for a robust policy framework to guide inclusive AI adoption, highlighting the need for targeted funding, ethical standards, and stakeholder involvement to ensure equitable outcomes. Despite the richness of these individual studies, important limitations remain. Several reviews and empirical investigations focus on technical efficacy, logistical constraints, or candidate experience, but few marshalled an integrated perspective centred on equity.

Although there has been a proliferation of literature on computer-based testing in Nigeria, the major focus of previous research has been on implementation challenges, infrastructural readiness, candidate experiences, and digital literacy concerns (Abdulkareem & Lennon, 2023; Ogechukwu, 2019). These studies give valuable insights into digital assessment but don't often consider this development in the context of AI readiness, ethical governance and digital equity. There is little clarity on whether current policies and implementation practices will be adequate to tackle equity and inclusivity issues in the context of future AI integration, as AI-powered assessment systems are expected to be built on existing CBT systems. Additionally, there is no systematic study that has analysed Nigerian education assessment policies from the combined lens of Ribble's Digital Equity Framework (2012) and UNESCO's AI and Education: Guidance for Policymakers (2021). This gap is particularly important because weaknesses currently observed within CBT environments may become amplified as assessment systems become increasingly automated and algorithmically driven.

Purpose of the Study

This research seeks to explore the equity and inclusivity of digitally mediated assessment environment in Nigeria, especially the computer-based testing as the dominant assessment technology and its implications for the future adoption of AI. The study centres on the impact of national policies, infrastructures and implementation practices on equitable participation of different learner groups. Specifically, the study aims to:

- i. To analyse Nigeria's national education and digital policy frameworks to determine the extent to which they embed principles of equity, accessibility, and inclusion within computer-based assessments as a foundation for AI-enabled assessment readiness.

- ii. To evaluate the extent to which current computer-based assessment implementations in Nigeria reflect inclusive principles, particularly for underserved populations, in the context of emerging AI-driven assessment practices.
- iii. To propose actionable recommendations for enhancing the equitable use of computer-based assessments across the Nigerian education system as a pathway towards AI-enabled assessment readiness.

Research Questions

Three research questions were answered in this study as follows:

- i. How do existing Nigeria's national education and digital policy frameworks embed principles of equity, accessibility, and inclusion within computer-based assessments as a foundation for readiness towards AI-enabled assessment environments?
- ii. To what extent do current implementations of computer-based assessments in Nigeria reflect inclusive principles for underserved populations in preparing for emerging AI-driven assessment practices?
- iii. How can equitable access to and use of computer-based assessments across the Nigerian education system be enhanced to build readiness for AI-enabled assessment?

THEORETICAL FRAMEWORK

This study is guided primarily by the Digital Equity Framework (Ribble, 2012), which centres on three interlinked pillars: access, participation, and empowerment. Access encompasses not only physical availability of technology but also affordability, connectivity, and digital literacy, factors that determine whether individuals can meaningfully engage with AI-enabled assessment. Participation emphasises the inclusion of historically marginalised groups such as rural learners and persons with disabilities, ensuring they are not merely present but actively involved. Empowerment focuses on enabling learners and institutions to not just use digital tools, but to reshape and benefit from them in ways that strengthen agency and fairness. In this study, the Digital Equity Framework provides a structured lens to evaluate whether Nigeria's AI-enabled and computer-based assessments really promote equity. It allows the desk review to unpack whether national policies and documented

implementations merely offer nominal infrastructure (access), or truly promote equitable engagement (participation) and capacity-building or autonomy (empowerment). For example, policies that mandate CBT infrastructure without addressing assistive technologies or digital training for rural candidates would signal gaps across all three pillars.

Complementing this lens, UNESCO's *AI and Education: Guidance for Policymakers (2021)* offers normative principles around the ethical deployment of AI in education. It emphasises non-discrimination, data privacy, respect for diversity, transparency, and inclusivity in AI design and governance (UNESCO, 2021). Through this policy guidance, the study gains an evaluative standard against which to judge Nigerian policy texts and implementation reports. If, for example, a policy fragment promotes computer-based assessments without safeguards for algorithmic fairness or learner privacy, UNESCO's guidance helps highlight that deficiency. The relevance of these frameworks extends beyond fully operational AI systems. Ethical governance, transparency, accessibility, inclusion, and learner empowerment should be integrated throughout the digital transformation process and not just once AI is deployed (UNESCO, 2021). Using these frameworks, therefore, can provide understanding of Nigeria's readiness for the equitable use of AI. Current digital assessment practices thus provide a clue as to whether future AI-based assessment systems will positively or negatively impact educational equity.

METHODOLOGY

This study adopted a qualitative desk review strategy, drawing exclusively on secondary data. A qualitative approach was appropriate as the aim was to interpret how policies and official documents addressed equity and inclusion in AI-enabled and computer-based assessment, rather than to measure variables numerically. The unit of analysis was policy and strategy documents produced by government agencies and relevant non-governmental bodies concerned with education and digital innovation in Nigeria. To ensure uniformity, the study focused on annual publications because they are systematically produced, comparable across years, and provide comprehensive updates rather than fragmented information.

The document search was conducted between January and March 2025 using official government repositories, UNESCO databases, UNICEF archives, and JAMB publications. Documents published between 2015 and 2024 were purposively selected, since 2015 marked the complete migration of the Joint Admissions and Matriculation Board (JAMB) to computer-based testing,

representing a significant policy shift. A clear inclusion criterion was applied: (1) the document had to be published annually within the 2015–2024 timeframe; (2) it had to address educational assessment, digital transformation, or AI-related reforms; (3) it had to be issued by a recognised government agency or reputable non-governmental/international body; and (4) it had to be publicly available from official websites or verified repositories (See Table 1). An initial pool of 23 potentially relevant documents was identified. Following application of the inclusion and exclusion criteria, six documents were retained for detailed analysis. Documents that were ad hoc, irregular, or quarterly in nature were excluded to maintain consistency and comparability across cases.

Table 1: Selected Documents for Review

S/N	Document Title	Publisher	Year	Link
1	National Policy on Inclusive Education in Nigeria	Federal Ministry of Education (Nigeria)	2004 (revised 2023)	https://education.gov.ng
2	National Digital Economy Policy and Strategy (2020–2030)	Federal Ministry of Communications and Digital Economy	2019	https://ndep.gov.ng
3	JAMB Annual Report	Strategic Roadmap for Inclusive Access to Quality Higher Education	2024–2028	https://jamb.gov.ng
4	AI and Education: Guidance for Policymakers	UNESCO	2021	https://unesdoc.unesco.org/ark:/48223/pf0000376709
5	Annual Report: Inclusive Education in Nigeria	UNICEF Nigeria	2020–2024 (annual)	https://www.unicef.org/nigeria
6	National Policy on Education (6th Edition)	Federal Ministry of Education (Nigeria)	2013 (revised 2015)	https://education.gov.ng

The sufficiency of the sample was not based on numbers, but on information redundancy. The selected documents are the main policy documents and institutional reports that guide education assessment, educational transformation through digitisation, inclusive education and education developments related to AI in Nigeria. Further screening did not bring up any significant themes other than the ones identified. Document analysis was used to examine the selected materials.

Table 2: Analytical Coding Framework

Framework	Theme	Indicators
Ribble	Access	Connectivity, Infrastructure, Digital Literacy
Ribble	Participation	Rural Inclusion, Disability Inclusion
Ribble	Empowerment	Skills Development, AI Readiness
UNESCO	Fairness	Bias Prevention
UNESCO	Transparency	Algorithmic Accountability
UNESCO	Inclusion	Universal Design
UNESCO	Privacy	Data Governance

A hybrid coding approach was adopted. Codes were developed using a deductive approach based on Ribble's Digital Equity Framework and UNESCO's AI guidance, and codes were developed inductively, capturing emerging themes from the documents. Decisions regarding coding were repeatedly checked against the source documents and theoretical constructs to increase the credibility. Throughout the analysis the coding decisions and development of the theme was documented in an audit trail. Findings were also compared with empirical literature to strengthen analytical validity.

RESULT

Policy Analysis Matrix

Table 3: Analytical Matrix

Policy		Access	Participation	Empowerment	Fairness	Transparency
Inclusive Policy	Education	✓	✓	Partial	Weak	Absent
Digital Policy	Economy	✓	Partial	Partial	Weak	Absent
JAMB Roadmap		✓	Partial	Weak	Weak	Absent
UNICEF Reports		Partial	✓	Partial	Moderate	Weak

Research Question One: How do existing Nigeria's national education and digital policy frameworks embed principles of equity, accessibility, and inclusion within computer-based assessments as a foundation for readiness towards AI-enabled assessment environments?

The findings reveal that Nigeria's key policy instruments, including the National Policy on Inclusive Education in Nigeria (Federal Ministry of Education), the National Digital Economy Policy and Strategy 2020–2030 (Federal Ministry of Communications and Digital Economy), the National Policy on Education (6th Edition) (Federal Ministry of Education), and annual reports by JAMB and UNICEF Nigeria, collectively acknowledge equity and accessibility as critical priorities. However, their treatment of AI-enabled and computer-based assessments remains fragmented when compared to the international standard provided in UNESCO's AI and Education: Guidance for Policymakers (2021). UNESCO (2021) stresses the importance of equity-oriented assessment design, advising governments to “reaffirm that technological breakthroughs in the field of AI in education are an opportunity to improve access to education for the most vulnerable groups” (p. 25). Nigerian frameworks echo this aspiration. The National Policy on Inclusive Education in Nigeria similarly commits to “ensuring that learners with disabilities and those from disadvantaged backgrounds are not excluded from assessment and certification processes” (Federal Ministry of Education, p. 14). This alignment demonstrates convergence around inclusion, though UNESCO provides more concrete AI-driven strategies than Nigeria's broad declarations.

Accessibility is another shared concern. UNESCO highlights the need to “employ open-source strategies of sharing data and algorithms to incubate local innovations, and mitigate the digital divide between countries and within groups of learners” (p. 36). In parallel, Nigeria's National Digital Economy Policy and Strategy (2020–2030) emphasizes bridging infrastructural and digital literacy gaps, promising that “all citizens will have affordable access to broadband, digital tools, and platforms to participate fully in education and assessment” (Federal Ministry of Communications and Digital Economy, p. 27). Yet, where UNESCO directly links these strategies to AI-enabled learning and assessments, Nigerian documents still frame access more generally in terms of ICT and broadband.

Teacher empowerment is also central. UNESCO advises to “update teachers' frameworks and training programmes with reference to the UNESCO ICT Competency Framework for Teachers”

(p. 38). In Nigeria, the National Policy on Education (6th Edition) similarly requires that “teachers are equipped with digital skills necessary for curriculum delivery, assessment, and learner support in a technology-driven environment” (Federal Ministry of Education, p. 56). This shows intent, but without the explicit AI-centred assessment focus that UNESCO advocates. Finally, UNICEF Nigeria’s Annual Report on Inclusive Education stresses that “data protection, fairness, and transparency in technology-enabled learning and testing environments are critical for safeguarding children’s rights” (UNICEF Nigeria, p. 12). This resonates with UNESCO’s call to “follow international guidelines created by expert groups around wider AI data issues” (p. 36).

Research Question Two: To what extent do current implementations of computer-based assessments in Nigeria reflect inclusive principles for underserved populations in preparing for emerging AI-driven assessment practices?

The ways in which Nigeria’s documented practices and reported experiences of AI-driven and computer-based assessments reflect inclusive principles can best be understood by comparing them against UNESCO’s global benchmark on *AI and Education: Guidance for Policymakers* (2021). UNESCO sets out clear standards on equity, accessibility, and learner-centred practices, and these provide a useful lens for examining Nigerian frameworks such as the *National Policy on Inclusive Education*, the *National Digital Economy Policy and Strategy (2020–2030)*, the *National Policy on Education (6th Edition)*, the *JAMB Annual Report*, and *UNICEF’s Annual Report on Inclusive Education in Nigeria*.

UNESCO stresses the need to build inclusive capacity by ensuring that all teachers and institutions have the skills to work in AI-rich educational environments. It recommends developing AI literacy for all citizens, citing open-access tools such as *LabXchange* and the *Global Digital Library* that expand learning opportunities for diverse groups, including learners with dyslexia and literacy difficulties (UNESCO, 2021, pp. 25, 37, 39). In Nigeria, policies such as the *National Digital Economy Policy (2020–2030)* and the *National Policy on Education* also call for expanded digital literacy and integration of ICT into teaching. However, they provide limited concrete direction on how AI-specific competencies will be mainstreamed across the education system. UNICEF-supported programmes such as the *Nigeria Learning Passport* and digital birth registration initiatives (UNICEF, 2024, pp. 55, 86, 93) have contributed to bridging gaps in access, but their reach remains largely confined to pilot states or urban centres. Rural schools and educators continue to face significant challenges in capacity building, connectivity, and infrastructural readiness.

Learner autonomy presents another point of contrast. UNESCO warns against AI systems that prescribe rigid learning pathways and thereby erode learner agency, urging instead that AI be deployed to strengthen students' authority over their own learning (UNESCO, 2021, pp. 18, 24). In Nigeria, computer-based testing as implemented by the Joint Admissions and Matriculation Board (JAMB) has improved efficiency in assessment delivery, but it remains exam-focused and heavily standardised. While biometric verification and AI-supported invigilation ensure security, they do not foster flexibility, choice, or meaningful learner self-regulation. The *National Policy on Education* acknowledges the growing role of digital assessments but does not yet establish frameworks to guarantee that AI tools enhance rather than diminish autonomy, particularly for students in marginalised contexts.

Disability inclusion is also a critical issue. UNESCO highlights promising AI innovations such as *Dytective* for dyslexia, AI transcription tools for the deaf and hard of hearing, and *StorySign* for learners who rely on sign language (UNESCO, 2021, p. 25). Nigerian frameworks such as the *National Policy on Inclusive Education* recognise the need for technological solutions to reduce barriers for learners with disabilities, and UNICEF programming has explored the use of digital platforms to extend educational access. Yet in practice, the widespread adoption of assistive AI tools in Nigerian classrooms remains limited. Reports indicate that computer-based assessments, including those managed by JAMB, often fail to fully accommodate learners with visual or motor impairments. This reflects UNESCO's caution that AI, if poorly implemented, can perpetuate rather than resolve inequalities in education (UNESCO, 2021, pp. 22–23).

While widespread use of AI for assessment is not available in Nigeria yet, recent progress in the field of digital assessment has demonstrated that the future of assessment systems is likely to see more and more automation in grading, AI-assisted proctoring, predictive analysis, and learning analysis. Therefore, it is necessary to consider the possible equity issues prior to its large-scale use. UNESCO (2021) stresses that Governments need to take proactive steps to develop governance mechanisms to promote inclusion as opposed to reinforcing inequalities currently in place. One major concern relates to automated scoring systems. While AI-driven scoring tools can enhance the consistency and efficiency of large-scale assessments, the use of algorithmic scoring systems can pose a disadvantage to some linguistic, cultural, and socioeconomic groups if the training data is not representative enough (Baker & Hawn, 2022). However, in a multilingual environment like Nigeria,

where learners have different linguistic backgrounds and varying digital exposure, the use of automated scoring without sufficient bias assessment may lead to unintended variations in assessment scores.

Another issue is the use of AI-based proctoring tools. Technology using facial recognition, behavioral monitoring, or biometric verification could help enhance examination security, but it has also been blamed for its differential accuracy based on demographic groups and its potential to create difficulty for persons with disabilities (Madaio et al., 2022). The implementation of AI proctored exams without adequate inclusion measures in a context where already existing CBT environment poses challenges to the visually impaired and technologically disadvantaged learners could increase the inequity. Other concerns include learning analytics and predictive assessment systems. These technologies are founded on the assumption that they can make predictions based on a lot of learner data and use that to predict performance, progression, or risk. These systems have the potential to facilitate tailored interventions, however, there is a risk of learners being subjected to violations of their privacy, discriminatory profiling, and opaque decision-making processes due to inadequate governance frameworks, according to UNESCO (2021). Currently, there is limited guidance in the existing policy documents in Nigeria on algorithmic accountability, requirements for transparency, and learners' rights in an AI-mediated learning environment.

The analysis thus indicates that the barriers to CBT adoption in Nigeria are mainly linked to the implementation of CBT but also point to readiness for future adoption of AI-based assessments. If AI technologies are launched without the proper regulatory, ethical and disability accommodation frameworks, the inequalities in infrastructure, accessibility and digital literacy may be exacerbated instead of mitigated. The discovery underscores the need to work on the current digital inequalities in order to pave the way for equitable AI adoption in assessment processes within the education sector.

Research Question Three: How can equitable access to and use of computer-based assessments across the Nigerian education system be enhanced to build readiness for AI-enabled assessment?

Policy and practice recommendations to promote more equitable and inclusive use of AI and computer-based assessments in Nigeria converge around four priorities: strong data privacy and governance, ethics-by-design and non-discrimination, capacity and evidence building, and systemwide coordination with transparent accountability. First, on privacy and governance,

international practice points clearly to robust legal and regulatory foundations: the guidance highlights the General Data Protection Regulation (GDPR) as a thematic example and stresses the need to “*Develop comprehensive data protection laws and regulatory frameworks to guarantee the ethical, non-discriminatory, equitable, transparent and auditable use and reuse of learners’ data*” (UNESCO, *AI and Education: Guidance for Policymakers*, p. 36). Practical steps for Nigeria are therefore to adopt/strengthen national data-protection rules modelled on GDPR principles (noting the entry “*General Data Protection Regulation*” (Accessed 28 August 2018). (p. 42)), and to operationalise the guidance to “*Inform them on how to protect their privacy and control their own data and decisions*” (UNESCO, p. 39). These measures should include clear rules on data ownership, consent, audit trails, and redress so that learning analytics and EMIS use are auditable rather than opaque.

Second, ethics and non-discrimination must be embedded in procurement, design and vendor evaluation. UNESCO recommends that the development and use of AI “*should not deepen the digital divide and must not display bias against any minority or vulnerable groups*” (UNESCO, p. 25) and to “*Foster broad corporate and civic responsibility for addressing the critical societal issues raised by AI technologies (such as fairness, transparency, accountability, human rights, democratic values, bias, and privacy)*” (UNESCO, p. 35). Nigeria should therefore adopt AI-specific procurement criteria requiring vendors to demonstrate bias testing, gender-sensitive datasets, and transparency, for example, the guidance to “*Establish AI-specific criteria based on proven pedagogical research and methodologies, to systematically and rigorously verify vendors’ claims*” (UNESCO, p. 40).

Third, capacity building and evidence generation are vital. UNESCO calls for people to gain “*core AI competencies, including understanding of how AI collects and can manipulate data*” (Foreword, p. 4) and to “*Develop comprehensive, evidence-based pilots and evaluations*” (UNESCO, p. 40). For Nigeria, this implies funding large-scale pilot evaluations, integrating AI competencies into teacher professional development, and upgrading EMIS and LMS so they “*enable the holistic transformation of EMIS and their integration with learning management systems (LMS)*” (UNESCO, *Leverage AI to Boost and Upgrade Education*, p. 37). UNICEF’s reports also demonstrate the value of digital platforms for reach, e.g. digital birth-registration interoperability and the Nigeria Learning Passport, showing that infrastructure and service delivery investments can create the conditions for inclusive AI if paired with regulation and training (UNICEF, Annual Report, pp. 86, 93).

Finally, coordination, monitoring and accountability are required. UNESCO recommends “*Interdisciplinary planning and inter-sectoral governance*” and a master plan that includes “*pilot testing, monitoring and evaluation, and building an evidence base*” (UNESCO, p. 34). Nigeria should create a cross-sector AI-education governance body that includes educators, disability advocates, data-protection authorities, telecom regulators and civil society; mandate public disclosure of pilot results; and require accessible, auditable reporting of algorithmic decisions used in high-stakes assessment.

DISCUSSION OF FINDINGS

Discussion of Research Question One Findings

The results show a very big gap between the policy goals and implementation realities of Nigeria's digital assessment system. Equity, accessibility and inclusion are key themes in national policy documents, but the process of how this can be translated into practice is not fully developed. In the light of the Ribbles (2012) Digital Equity Framework, it is clear that Nigeria's policy pays very little attention to participation and empowerment and focuses more on enhancing access by expanding infrastructure and providing ICTs. This imbalance matters because merely having access to education does not necessarily mean that children receive the same educational experiences. A significant disconnect between policy goals and institutional practice is discovered. For instance, inclusive participation in digital assessment is a policy priority; however, evidence of CBT implementation shows that digital assessment disparities between rural and urban learners persist, as a result of poor internet connectivity, lack of reliable power supplies, and variations in digital literacy (Abdulkareem & Lennon, 2023; Ogechukwu, 2019). The results indicate that policy commitments are often made at a declarative level, without any accompanying policy frameworks to tackle structural inequalities. From governance, another ever important gap could be the lack of explicit provisions concerning the accountability, transparency and AI ethics of algorithms. While Nigeria's policy frameworks promote digital transformation, they do not often outline the monitoring mechanisms for future assessment systems that will be powered by AI to ensure that they are not biased, discriminatory, or exclusionary. Against the backdrop of UNESCO's (2021) recommendations for ethical AI use, transparency, accountability and fairness are fundamental. Thus, it is not only a technological problem, but also an institutional problem, involving policy implementation, resource allocation and regulatory preparedness.

Discussion of Research Question Two Findings

The results indicate that the assessment of inclusive digital transformation is mainly partial. Although CBT has helped in the administration, reduced examination malpractice, and speeded-up result transmittal, it has not yielded same and equitable results among learner groups (Abubakar & Adebayo, 2014; Abdulkareem & Lennon, 2023). This is a significant difference between technological efficiency and educational equity. The system can be efficient and perpetuate inequalities at the same time. Assessment technologies, in line with UNESCO's (2021) stance on equitable digital transformation, must be considered not just for their effectiveness in their operation, but also for their ability to enable a fair approach to participation across diverse learner groups.

This is demonstrated by the experiences of learners and students in rural communities who have disabilities. While the policy framework promotes and proffers inclusion, many candidates face challenges due to poor infrastructure, inconsistent power supply, low digital literacy and inadequate assistive technologies (Ogechukwu, 2019; Abdulkareem & Lennon, 2023; Akinola, 2023). The findings in this study suggest that students from urban and better resourced learning environments are more likely to have prior experience with digital technologies, and thus to be more successful in adapting to CBT environments (Abdulkareem & Lennon, 2023). Likewise, there has been an inconsistent provision of assistive aids and devices for the visually impaired candidates to support their participation in the digital assessment (Akinola, 2023; Alabi and Mutula, 2020). The results indicate that there is still uneven involvement among social groups. In reality, the provision of assessment opportunities is affected by the wider socioeconomic and infrastructural context, that impacts on the learners' capacity to successfully interact with digital technologies.

In addition, the results indicated that Nigeria's ongoing CBT ecosystem provides key insights on readiness for future AI based assessment adoption. Building ethical and inclusive AI requires the availability of equitable digital foundations, as UNESCO (2021) puts it. Therefore, ongoing issues around accessibility, student support, disability support and readiness to use digital tools in the current CBT systems can also pose further or even greater challenges when implementing AI-based assessment technologies without proper safeguards in place. International research suggests that without explicit attention to accessibility, representation, and fairness in algorithmic system implementation, they can perpetuate inequalities (Baker & Hawn, 2022; Baker, 2023; Madaio et al.,

2022). Equity, therefore, must not be taken for granted with technological innovation but rather be seen as a goal of governance that must be pursued through deliberate policy action, institutional commitment, ongoing tracking, and monitoring (UNESCO, 2021; Ojokheta & Omokhabi, 2023).

Discussion of Research Question Three Findings

The findings from this study point to a shift from technology adoption to an equitable and accountable digital assessment system. The result indicates that a significant number of the challenges identified in the existing CBT environment in Nigeria have more to do with the nature of governance, institutional capacity, resource allocation and effectiveness of implementation, and are less technological in nature. This means that a policy that simply seeks to increase the availability of digital infrastructure may not meet the needs of those with deeper inequities in the participation in assessment and results. All the recommendations together address the three interrelated areas of access, participation, and empowerment as described in the Digital Equity Framework by Ribble (2012). The call for expanded digital infrastructure, enhanced connectivity, and increased accessibility measures directly addresses the issue of equitable access by minimizing barriers to access for rural learners and students with disabilities. The findings of this study showed that the differences in access to electricity, access to the internet, digital literacy and access to assistive technology continue to affect candidates' experiences and performance in CBT environments (Ogechukwu, 2019; Abdulkareem & Lennon, 2023; Akinola, 2023). If these basic obstacles are not overcome, future digital and AI-driven assessment efforts could fall short of equitable results.

Recommendations also focus on participation, including by highlighting inclusive design, disability accommodation, and involving stakeholders in assessment governance. Results from this study show that while policy language is inclusive, many pupils, particularly those from marginalized communities, continue to struggle with it in practice (Alabi & Mutula, 2020; Akinola, 2023). This implies that inclusion is not about having access to assessment platforms, but about enabling the participation of all learners in these platforms in a meaningful and fair way. In line with UNESCO's (2021) guidance, any measure taken with regard to equitable participation needs to be “deliberate” and must not further discriminate or exclude people while trying to address existing issues through technological systems. The recommendations, as viewed from the perspective of empowerment, emphasize the need for digital literacy, institutional readiness, transparency and accountability. These results suggest that most students have not experienced digital assessment technologies much before, which makes it difficult for them to be confident and able to navigate the assessment environment

efficiently (Kayode, 2019; Abdulkareem & Lennon, 2023). Likewise, there are few clear frameworks for education institutions to assess new technologies in an equity-oriented lens. UNESCO (2021) claims that 'responsible digital transformation' is not just about technological innovation, but also building human capacities, ethical governance structures and mechanisms for public accountability.

One of the significant implications of these results is that Nigeria's existing CBT environment must be considered as a stepping stone for future AI based adoption of assessment and not as a standalone. While fully developed AI assessment systems are still scarce in the context of Nigerian education, global evidence shows that AI technologies are generally added on top of the existing digital assessment platforms (Holstein & Doroudi, 2021; Bulut et al., 2024). Unresolved issues regarding accessibility, participation, transparency, and governance in existing CBT systems could be exacerbated in future assessment systems powered by AI, unless appropriate solutions are put in place. This supports the idea that the successful implementation of AI will require more than technological progress, it will require how much the current digital assessment systems already have a sense of fairness and inclusivity.

CONCLUSION

This study examined the level of equity and inclusivity in the evolving digital assessment landscape in Nigeria, both in policy and in practice. The results show that national policies are well committed to inclusion and accessibility, but there is much to be done in terms of the implementation, especially in terms of infrastructure, digital literacy, connectivity, and disability accommodation. Based on the definition of digital equity from Ribble and the principles of AI governance from UNESCO, the study identified that current activities tend to take a more expansive approach to access, rather than addressing participation, empowerment, transparency and accountability. While the majority of the assessment process is still CBT in Nigeria, there are some challenges in this digital ecosystem that can provide some insight to preparedness for the adoption of the AI-based assessment. Enhancing equity in existing CBT systems is thus crucial for promoting responsible, inclusive and ethical implementation of AI in educational assessment.

RECOMMENDATIONS

Based on the findings of this study, the following recommendations were advanced:

Table 4: Policy Recommendations for Equitable AI-Enabled Assessment in Nigeria

Recommendation	Responsible Actor(s)	Implementation Steps	Expected Outcome
1. Establish Comprehensive Data Protection and Ethical AI Regulations	Federal Government of Nigeria (National Assembly, NITDA, Federal Ministry of Education)	• Draft and pass GDPR-aligned laws tailored to educational data. • Create clear guidelines on data ownership, consent, algorithmic audits, and redress mechanisms. • Mandate education agencies and private vendors to comply with transparent reporting and accountability.	Stronger trust in AI systems; protection of learner data; reduction in misuse and bias in AI-enabled assessments.
2. Invest in Digital Literacy and Assistive Technologies for Inclusive Participation	Federal Ministry of Education, State Ministries of Education, JAMB, WAEC, NECO	• Introduce nationwide digital literacy programmes for teachers and students. • Subsidise assistive devices (screen readers, Braille displays, adaptive software) in examination centres. • Regularly audit CBT centres for accessibility compliance.	Equitable participation of rural learners and students with disabilities; improved confidence and fairness in CBT performance.
3. Create an Inter-Sectoral AI in Education Governance Body	Federal Government of Nigeria in collaboration with UNESCO, UNICEF, ICT Regulators, Civil Society	• Form a multi-stakeholder body with educators, disability advocates, civil society, ICT regulators, and examination bodies. • Oversee pilot evaluations of AI-based assessment tools. • Develop and publish transparency standards for algorithmic use in education. • Align national policies with UNESCO's global ethical AI guidelines.	Coordinated, transparent, and inclusive governance of AI in education; evidence-based policies that balance innovation with equity.

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