

USING AI-ASSISTED FEEDBACK TOOLS TO MITIGATE FATIGUE-INDUCED BIAS IN ACADEMIC ASSESSMENT AMONG LECTURERS IN NIGERIAN UNIVERSITIES

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Abstract

Fatigue-induced bias in academic assessment poses a significant challenge in Nigerian universities, where high student-to-lecturer ratios, excessive workloads, and prolonged grading sessions contribute to cognitive exhaustion, marking drift, subjectivity, and inequities in student evaluation. This paper examines the potential of AI-assisted feedback tools, including automated essay scoring (AES) and hybrid human-in-the-loop systems, to mitigate these issues by reducing lecturer cognitive load, enhancing grading consistency, and providing timely, rubric-based feedback. Findings indicate that AI tools can achieve substantial time savings (up to 70–90%), minimise scoring variance (1–2%), and alleviate fatigue-related inconsistencies, while supporting personalised learning and higher-order skill assessment. However, challenges persist, including algorithmic bias (particularly for diverse linguistic/cultural contexts), infrastructure limitations, digital divides, ethical concerns, and lecturer resistance due to perceived ease of use and trust issues. Successful adoption in Nigeria requires addressing systemic barriers, ensuring human oversight, and promoting digital literacy. The paper concludes that, with careful implementation, AI-assisted tools hold transformative potential for promoting assessment equity, reducing burnout, and improving educational outcomes in resource-constrained higher education settings.

Keywords: AI-assisted feedback, automated essay scoring, fatigue-induced bias, lecturer workload, Nigerian higher education

Introduction

The introduction of artificial intelligence (AI) into Nigeria's educational system presents hitherto unseen chances to improve feedback and assessment systems, which serve as a key mechanism for measuring student learning outcomes and academic progress. However, its reliability in Nigerian universities is often undermined by systemic pressures and human factors, particularly fatigue resulting from heavy marking loads and high student-to-lecturer ratios, which frequently exceed 1:100 in many public universities. The high student-to-teacher ratio makes it difficult for educators to provide individualised attention and thorough essay feedback. This situation is further aggravated by inadequate infrastructure and resources, which limit the capacity for effective teaching and assessment. These pressures are further compounded by administrative responsibilities and institutional demands (Osiesi et al., 2025). Prolonged grading sessions can induce cognitive exhaustion among lecturers, leading to marking drift—such as stricter scoring toward the end of grading sessions—as well as increased subjectivity or leniency under conditions of fatigue (Zakariya, 2026). Such inconsistencies threaten the reliability, fairness, and equity of assessment outcomes or the traditional assessment methods.

Okoseimiema and Ekpenyong (2025), Letam (2023), Kaborloomene (2023), and Member Terhile (2026) have also documented high levels of stress and burnout among Nigerian lecturers, largely attributable to excessive workloads. Evidence from universities in Rivers State, for instance, identifies workload intensity as a major contributor to lecturer stress and burnout, with implications for the quality of academic tasks, including grading (Kaborloomene, 2023). Similar patterns have been observed globally, where fatigue during prolonged evaluation periods has been shown to increase grading inconsistencies and bias. (Klein, 2002). In response to these challenges, emerging technologies such as Artificial Intelligence (AI)-assisted feedback tools offer promising solutions with their capabilities in automation, data processing, and pattern recognition by enabling efficient, equitable, and personalized assessment systems. Empirical studies indicate that automated or AI-assisted grading can reduce grading workloads by approximately 60% while simultaneously improving the quality, timeliness of feedback and instructional responsiveness. (Sembey, Hoda, & Grundy, 2024). These tools support lecturers by automating routine aspects of assessment and enabling more efficient instructional responses. In addition, the integration of multimedia elements—such as interactive simulations, video prompts, and case-based scenarios—enhances the capacity of assessments to measure higher-order cognitive skills, including critical thinking and problem-solving (Bennett et al., 1999; Chai, Hu, & Wu, 2024). It can help automate administrative tasks for teachers, allowing them more time with students. Additionally, AI can improve assessment methods and support the development of digital literacy and critical thinking skills among students (World Economic Forum, 2024).

Automated grading systems operate using machine learning algorithms to evaluate student responses, particularly in large classes where manual grading is time-consuming. These systems can assess multiple-choice, true/false, and essay-based questions with considerable accuracy by analysing keywords, argument structures, and content relevance (Nicolas et al., 2020). By automating routine evaluation processes, such systems save time, improve consistency in scoring, and provide timely feedback that supports student learning and progress.

More broadly, AI-assisted assessment tools—including automated essay scoring (AES), platforms such as Gradescope or locally adapted systems, and intelligent feedback mechanisms—have the potential to reduce fatigue-related variability in grading. These technologies can deliver immediate, rubric-based feedback while still allowing lecturer oversight through hybrid or human-in-the-loop models (Yakubu, Zohaib, Uthman & Septian, 2024). By reducing the cognitive burden associated with large-scale grading, they contribute to more consistent and equitable assessment practices. Against this backdrop, this paper examines the potential of AI-assisted feedback tools to mitigate fatigue-induced bias in higher education assessment within the Nigerian context. Specifically, it explores the mechanisms through which these technologies address grading fatigue, reviews relevant empirical evidence, and discusses contextual challenges and implementation pathways for Nigerian universities.

Theoretical Framework

This study integrates Cognitive Load Theory (CLT), the Technology Acceptance Model (TAM), and algorithmic fairness frameworks to explain how artificial intelligence (AI)-supported assessment can improve grading practices in higher education. The CLT, developed by John Sweller (1988, 2011), posits that working memory has limited capacity and that excessive cognitive demands can impair performance. In higher education, prolonged grading and feedback responsibilities impose substantial intrinsic and extraneous cognitive loads on lecturers, often leading to fatigue, reduced attention, and inconsistencies in grading decisions. In Nigerian universities, heavy workloads and large class sizes further intensify this burden, contributing to burnout and reduced assessment quality (Osiesi et al., 2025; Eli-Chukwu et al., 2024). AI-assisted grading tools may help reduce extraneous load by automating routine tasks such as initial scoring and feedback generation, allowing lecturers to focus on deeper evaluation. However, the adoption of such technologies depends on lecturers' perceptions. The Technology Acceptance Model, proposed by Fred Davis (1989), explains that technology use is influenced by perceived usefulness and perceived ease of use.

In Nigerian universities, lecturers may perceive AI grading tools as useful for reducing workload and improving grading consistency, though infrastructural limitations and digital literacy gaps may hinder adoption (Eli-Chukwu et al., 2024; Zakariya, Alotaibi, Alrashood & Alrosaa, 2026). Finally, algorithmic fairness frameworks emphasise transparency, bias mitigation, and human oversight in AI-

based assessments. Tools such as AI Fairness 360 and Fairlearn support bias detection and mitigation, ensuring equitable outcomes for diverse student populations (Eli-Chukwu et al., 2024; Arshad, Misbah, Ansa & Naeem, 2025). Together, these perspectives provide a comprehensive framework for understanding how AI-assisted grading can reduce cognitive load, gain acceptance among lecturers, and maintain fairness in student evaluation.

Empirical Evidence from Nigeria and Contextual Studies

Cognitive fatigue has been widely recognised as a factor that impairs judgment and decision-making, often resulting in grading drift and inconsistencies during prolonged assessment tasks (Zakariya, Alotaibi, Alrashood, & Alrosaa, 2026). In the Nigerian higher education context, excessive workloads and large class sizes contribute significantly to lecturer burnout, which in turn increases subjectivity and variability in grading practices (Osiesi et al., 2025; Eli-Chukwu et al., 2024). These challenges are particularly pronounced during high-stakes examinations, where lecturers must evaluate large volumes of scripts within limited timeframes. Under such conditions, fatigue-related errors are more likely to occur, thereby threatening the reliability and fairness of assessment outcomes. Beyond concerns about grading consistency, the heavy workload associated with evaluating open-ended responses also shapes the types of assessments instructors adopt. Heinrich et al. (2025) observed that grading and providing detailed feedback on short-answer responses is highly time-consuming. As a result, instructors in large classes often rely more heavily on multiple-choice assessments, which are easier to grade but may limit opportunities for students to develop higher-order and critical thinking skills.

In response to these challenges, Artificial Intelligence (AI)-assisted assessment tools have emerged as potential mechanisms for improving both the efficiency and consistency of grading processes. These tools use natural language processing (NLP) and machine learning algorithms to evaluate student responses based on predefined rubrics while also generating automated feedback. Empirical evidence suggests that AI-assisted grading systems produce very low scoring variance—typically between 1% and 2%—compared with the higher levels of inconsistency often observed in manual grading (Yakubu et al., 2024; Arshad, 2025). In addition, these systems offer substantial efficiency gains, with reported time savings ranging from 70% to 90% in grading tasks.

Evidence from the Nigerian context further supports the usefulness of these technologies. Yakubu et al., (2024) found that automated essay scoring (AES) significantly reduced grading time and minimised subjectivity in large classes. Similarly, Eli-Chukwu et al. (2024) reported that AI-assisted assessment systems reduce human errors and biases while streamlining grading processes. Lecturers in these studies generally expressed positive perceptions of such tools, particularly for their potential to enhance fairness and alleviate workload pressures. International evidence reinforces these findings. Randomised controlled trials and

other global evaluations demonstrate that standardised AI-assisted grading systems can improve scoring consistency and mitigate the effects of human fatigue and bias in large-scale assessment contexts (Heinrich et al., 2025). Heinrich et al. (2025) further showed that AI-assisted systems can approximate the quality of grading typically achieved by instructors in small classes, suggesting their potential to maintain grading quality in large-enrollment courses. Supporting this, Muhammad et al (2024) document successful implementations across countries such as the United States, China, Japan, Spain, and Germany, as well as emerging adoption in African contexts, including South Africa, Kenya, and Egypt. Across these settings, AI systems consistently reduce grading time, enhance objectivity, and provide more timely and detailed feedback to students.

Additional empirical evidence highlights the broader pedagogical benefits of automated grading systems. Shabir and Abida (2024), using an exploratory approach based on classroom observations before and after the integration of automated grading systems, reported a reduction in grading time from 15 hours per week to 9.75 hours (a 35% decrease). The study also found improvements in student engagement, with assignment submission rates increasing from 70% to 88% and class participation rising from 65% to 81%. These findings suggest that automated grading not only reduces teacher workload but also enhances student motivation and participation.

However, despite these advantages, the growing use of AI in educational assessment raises important concerns regarding reliability, transparency, and fairness. Arshad et al. (2025) found discrepancies between AI-generated and human-assigned grades, particularly across gender, ethnicity, and language backgrounds. Although time efficiency gains of up to 70% were reported, accuracy varied across disciplines, and fairness concerns were especially significant for non-native English speakers. A key issue underpinning these concerns is algorithmic bias, which can arise when AI systems are trained on datasets that reflect existing social or cultural biases or fail to account for learner diversity. As noted by Qaisar and Noman (2024), such biases may lead to systematically unfair outcomes for underrepresented groups. Ensuring transparency in AI decision-making processes, as well as the use of diverse and representative training datasets, is therefore essential for building trust and accountability in AI-driven assessments. Continuous monitoring and evaluation are also necessary to identify and mitigate emerging biases.

Relatedly, the broader adoption of digital assessment technologies such as computer-based testing (CBT) provides important contextual insight. Yusuf (2026), drawing on the Technology Acceptance Model, found that lecturers perceive CBT as useful for improving efficiency, accelerating feedback, and enhancing assessment management. However, concerns persist regarding infrastructure adequacy, assessment authenticity, and equity. The study also showed that perceived ease of use significantly influences acceptance, with

digitally skilled lecturers reporting more positive experiences. The growing adoption of CBT is further driven by its scalability and alignment with institutional priorities for cost-effective, high-volume testing (Nurpeisova et al., 2023). In Nigeria, the planned transition to mandatory CBT by 2027 reflects its potential to standardise assessment practices, reduce examination malpractice, and improve administrative efficiency (Tyohemba, 2025).

Despite these promising developments, the integration of AI and related digital technologies in Nigerian higher education is not without challenges. Adeyemi, Alanamu, Obisesan, and Racheal (2025) identify critical barriers, including infrastructure limitations, digital inequality, ethical concerns, and resistance to technological adoption. While AI holds significant potential to transform assessment and instructional practices, its successful implementation will depend on addressing these systemic constraints, strengthening digital literacy among educators, and ensuring equitable access to technological resources.

Some AI Tools Deployed in Higher Education for Assessment

One of the most notable implications of integrating Artificial Intelligence (AI) into assessment practices is the improvement in efficiency and consistency (Agbarakwe & Chibueze, 2024). AI tools are capable of processing and grading large volumes of student work within a short period, thereby reducing the time and effort required from educators. Automated grading systems, such as Gradescope and Turnitin Revision Assistant, employ machine learning algorithms to evaluate written assignments and provide consistent and objective feedback (Nguyen et al., 2022). This consistency helps promote fairness in grading by minimising human bias and errors. Moreover, by handling repetitive and time-consuming tasks, AI tools allow educators to devote more attention to higher-value instructional activities, such as curriculum development and personalised student support. This shift can enhance the overall quality of education by enabling educators to engage more meaningfully with students and address individual learning needs.

Beyond improving grading efficiency, AI-driven assessment systems also support personalised learning experiences. Intelligent tutoring systems (ITS) and adaptive learning platforms, such as Carnegie Learning MATHia and Knewton, adjust instructional content based on students' real-time performance data. These systems provide immediate and tailored feedback, enabling students to better understand their strengths and areas for improvement (Pane et al., 2022). By adapting instructional materials to different learning styles and learning paces, AI technologies can promote deeper understanding and improved retention of course content. Personalised feedback also encourages learners to take greater responsibility for their learning. With access to detailed insights into their academic performance, students can identify areas that require improvement and seek additional resources or assistance when necessary. This proactive approach promotes self-regulation and intrinsic motivation, which are essential attributes for lifelong learning.

In addition, the use of AI in assessment generates large volumes of data that can support evidence-based decision-making in educational institutions. Learning analytics and predictive modelling tools, such as IBM Watson Education and Microsoft Azure Machine Learning, analyse data generated through learning management systems (LMS) to identify trends and patterns in student performance (Huang et al., 2019). These data-driven insights enable educators and administrators to make more informed decisions regarding curriculum design, instructional strategies, and resource allocation. For instance, predictive analytics can help identify students who are at risk of academic failure at an early stage, allowing institutions to intervene with targeted support services. By addressing learning challenges proactively, institutions can improve student retention and graduation rates. Furthermore, data insights can highlight effective teaching practices and identify areas where professional development may be required, thereby supporting continuous improvement in instructional quality.

Conclusion

The unrelenting pressures of oversized classes, chronic under-resourcing, and mounting administrative burdens have long compromised the reliability and fairness of assessment in Nigerian universities. Fatigue-induced marking drift, heightened subjectivity, and the gradual erosion of lecturer well-being are not merely operational inconveniences; they directly undermine the credibility of academic credentials and the equity of student outcomes. This paper has demonstrated that AI-assisted feedback technologies, grounded in Cognitive Load Theory, the Technology Acceptance Model, and algorithmic fairness principles, offer a robust and contextually viable pathway to alleviate these systemic strains.

Empirical evidence consistently shows that well-designed AI tools—ranging from rubric-based automated essay scoring to hybrid platforms such as Gradescope and Turnitin Revision Assistant—can slash grading time by 60–90 %, reduce inter-rater variance to negligible levels (1–2 %), and deliver immediate, personalized feedback that enhances student motivation and higher-order skill development. Nigerian-specific studies (Yakubu et al., 2024; Eli-Chukwu et al., 2024) and global randomized trials corroborate these gains while underscoring that the greatest returns occur when AI augments rather than replaces human judgment. Hybrid human-in-the-loop models preserve contextual nuance and cultural sensitivity—critical in a multilingual, multi-ethnic educational landscape—while freeing lecturers to engage in deeper mentoring and curriculum innovation.

Nevertheless, successful integration is not automatic. Digital infrastructure deficits, algorithmic biases against non-native English varieties, and uneven lecturer digital literacy remain formidable obstacles. The recommendations advanced here—phased pilot implementation, mandatory capacity-building programmes, diverse dataset training, transparent explainable-AI protocols, and strategic adoption of affordable open-source or freemium tools—provide a

pragmatic roadmap that aligns with Nigeria's national digital-education ambitions (including the planned 2027 mandatory computer-based testing transition).

Ultimately, the judicious deployment of AI-assisted assessment is not merely a technological upgrade; it is a moral and pedagogical imperative. By reducing cognitive overload on lecturers, minimizing fatigue-driven inequities, and restoring consistency and timeliness to feedback processes, these tools can help Nigerian universities reclaim their core mission: producing graduates who are fairly assessed, meaningfully supported, and equipped with the critical-thinking skills demanded by a rapidly evolving knowledge economy. Future research should rigorously evaluate large-scale implementations through longitudinal mixed-methods designs, paying particular attention to long-term effects on lecturer well-being, student equity, and institutional culture. When infrastructure, training, and ethical safeguards converge, AI-assisted feedback will cease to be an experimental luxury and become an indispensable pillar of quality, equitable higher education in Nigeria.

Recommendations

To effectively deploy AI-assisted feedback tools and mitigate fatigue-induced bias in Nigerian universities, the following actionable recommendations are proposed:

1. **Adopt hybrid human-in-the-loop models** — Prioritise tools that combine AI automation with lecturer oversight, such as Gradescope (widely used for rubric-based grading and feedback in large classes) or Turnitin's Revision Assistant (for essay feedback and plagiarism checks). These allow initial AI scoring and suggestions, followed by human review to ensure fairness and address contextual nuances, reducing full reliance on algorithms while cutting grading time by 60–90% (Sembey et al., 2024; Agbarakwe & Chibueze, 2024).
2. **Implement phased rollout strategies** — Begin with pilot programs in select departments or courses with high marking loads (e.g., large-enrollment general education classes), as recommended in Nigerian-specific studies (Yakubu et al., 2024). Gradually scale based on feedback, starting with formative assessments before summative ones, to build trust and allow for adjustments. Collaborate with technology providers for localised adaptations, including support for Nigerian English variants and multilingual capabilities where relevant.
3. **Invest in infrastructure and capacity building** — Universities and government stakeholders should prioritise reliable internet, power backups, and device access in public institutions to overcome digital divides (Adeyemi et al., 2025). Offer mandatory professional development training on AI tools, digital literacy, and bias awareness, emphasising perceived ease of use to boost acceptance per TAM (Yusuf, 2026; Zakariya et al., 2026).
4. **Ensure ethical and bias-mitigation practices** — Use diverse, representative datasets for training or fine-tuning AI models to minimise biases related to language, ethnicity, or gender (Arshad et al., 2025; Qaisar & Noman, 2024). Incorporate transparency features (e.g., explainable AI outputs) and regular

audits, with clear policies for human appeals and data privacy aligned with national guidelines.

5. **Explore accessible and low-cost options** — For resource-constrained settings, consider free or freemium tools like EssayGrader.ai (rubric-based essay grading with limited free monthly submissions) or open-source explorations (e.g., LLM-based frameworks adaptable via local fine-tuning). Institutions could partner with ed-tech initiatives in Africa (e.g., pilots in South Africa or Kenya using similar tools) for cost-effective implementation.

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