



LEVERAGING ON GENERATIVE ARTIFICIAL INTELLIGENCE TOOLS IN ENHANCING TEACHING, RESEARCH AND ASSESSMENT OF LEARNING IN NIGERIAN TERTIARY INSTITUTIONS

Usman, Abubakar

Department of Science Education, Faculty of Education,
Gombe State University, Nigeria
abubakarusman696@gmail.com
+2348039768729

And

Bello, Adamu

Department of Educational Foundations, Faculty of Education,
Gombe State University, Gombe, Nigeria
belloadamu1031@gmail.com
+2347036112004

And

Aliyu, Amina Aji

Department of Educational Foundations, Faculty of Education,
Federal University of Kashere, Gombe State, Nigeria
Email:aminaaji5@gmail.com
Phone: +2347039566898

And

Adamu Alkali Usman

Department of Environmental Foundations, Faculty of Education,
Federal University of Kashere, Gombe State, Nigeria
08136105269/08027913761
usmanadamualkali@gmail.com

Abstract

This paper examined how Nigerian tertiary institutions can leverage GenAI to enhance teaching, research, and assessment while attending to ethical, infrastructural and pedagogical safeguards. Drawing on recent empirical studies and policy analyses, the study offers evidence-informed recommendations for responsible and contextually appropriate implementation that promotes quality, equity, and academic integrity. Generative Artificial Intelligence (GenAI) is reshaping teaching, research, and assessment in tertiary education, offering transformative opportunities for improving pedagogy, scholarly productivity, and learning evaluation. In Nigerian higher institutions, where challenges such as high student–staff ratio, limited learning resources, and inadequate research infrastructure persist, GenAI provides scalable solutions that enhance instructional delivery and academic efficiency. In teaching, GenAI supports educators by automating routine tasks, generating personalised learning materials, and offering timely, detailed feedback that strengthens student engagement and self-regulated learning. As a research tool, GenAI accelerates literature discovery, facilitates synthesis, support methodological design and streamline qualitative and quantitative analysis, although human oversight remains essential to ensure accuracy and research integrity. In assessment, GenAI enables automated scoring, item generation, and consistent feedback while emerging frameworks such as the AI Assessment Scale (AIAS) demonstrate its potential to improve learning outcomes and reduce academic misconduct. However, concerns regarding fairness, transparency, data privacy and academic integrity underscore the need for strong institutional



policies and ethical governance. Collectively, GenAI offers significant potential to transform Nigerian tertiary education when thoughtfully and responsibly integrated.

Keywords: GenAI, Teaching, Research, Learning

Introduction

Generative Artificial Intelligence (GenAI) has swiftly arisen as a transformative influence in higher education, providing innovative capabilities for content creation, individualised instruction, automated evaluation, and research support. Recent systematic reviews and empirical research illustrate how GenAI and Large Language Models (LLMs) are transforming educational practices, evaluation frameworks, and institutional operations in universities globally.

Ebiringa, Ikerionwu, Erike and Asiegbu (2025) stated that in the context of Nigerian tertiary institutions universities, polytechnics, and colleges of education, the potential benefits of GenAI are particularly salient. Nigerian higher education faces persistent structural constraints, including high student–staff ratio limited access to contemporary learning resources, underdeveloped research infrastructure, and uneven digital capacity. These conditions constrain the adoption of learner-centred pedagogies, slow research productivity and complicate timely diagnostic assessment. Recent studies examining AI adoption in Nigerian higher education identify both opportunities for pedagogical innovation and significant implementation barriers that require contextualised policy responses.

In terms of pedagogy, GenAI systems can help instructors by automating repetitive chores (such as creating syllabuses, providing formative feedback, and providing scaffolded explanations), facilitating differentiated instruction through adaptive content, offering

multilingual and accessible resources that increase engagement. When properly incorporated into curriculum, GenAI offers students personalised study pathways, quick formative feedback, and simulation-based learning that can promote higher-order thinking. Recent research on GenAI in higher education has documented these instructional suitability (Peters & Olojede, 2025).

GenAI has the potential to alleviate resource constraints for Nigerian researchers and postgraduate students by speeding up literature synthesis, helping with research design and data analysis, and streamlining article draughting. Empirical research, however, cautions that relying on GenAI without methodological supervision may raise issues with quality, reproducibility, and transparency. or instance, Empirical research shows that unmonitored use of generative AI can compromise research quality, reproducibility, and transparency. For example, a systematic review by Adel and Alani (2025) that generative AI often produces high rates of hallucinations and inaccuracies, which can propagate errors into systematic literature reviews, undermining methodological rigour and trustworthiness without structured human oversight and verification procedures.

It was noted with Izevbigie, Olajide, Olaniran and Akintayo (2025) through automated scoring, framework alignment and analytics that find learning gaps at scale, GenAI has the potential to improve assessment methods. However, studies emphasising model heterogeneity and the requirement for human monitoring and validation evidence continue to cast doubt on the dependability and fairness of language model based evaluators.



Simultaneously, ethical concerns such as algorithmic bias, data privacy, academic integrity, and regulatory gaps pose significant obstacles to unregulated implementation and need to be addressed through staff training, institutional policy, and digital literacy programmes.

Generative Artificial Intelligence as a tool for enhancing teaching and learning

Generative Artificial intelligence (GenAI) has quickly become a potent instrument, especially for improving instructional strategies. Fundamentally, GenAI most especially big language models like Generative Pre-Trained Transformer assists educators by providing scalable feedback mechanisms, automating tedious chores, and facilitating personalised learning, hence transforming traditional pedagogical responsibilities (Ogunleye et al., 2024).

Automated feedback is one of the most direct advantages of GenAI for educators. Essays, problem-sets, and brief comments submitted by students can be analysed by generative AI systems, which can then produce rich feedback that identifies conceptual flaws, provides alternate explanations, and recommends next steps (Lee & Moore, 2024). GenAI ensures that students receive timely responses that enable self-regulated learning while relieving educators of repetitious grading responsibilities so that they can concentrate on more sophisticated instructional and mentoring tasks.

In addition, GenAI makes differentiated and personalised education possible. AI tools can create scaffolded practice problems, customise explanations, and modify the level of difficulty of learning materials according to the needs and performance of individual learners through adaptive prompting. This ability is particularly helpful in large courses at post-secondary institutions where teachers find it difficult to provide each student

individualised attention. Teachers may effectively reach a wider audience using GenAI, providing each student with a more individualised learning path.

Qian (2025) posited that beyond personalisation and feedback, GenAI promotes innovative, real-world learning opportunities. Using a variety of disciplinary, linguistic and cultural contexts, educators can employ AI to create case studies, simulated situation or project prompts that reflect the complexity of the real world. Project-based, problem-based or inquiry-driven pedagogies that encourage deeper thinking and transfer of learning are made possible by these AI-generated resources, which aid in the creation of more interesting context-relevant assignments.

However, the use of GenAI in teaching requires careful implementation. A systematic review of pedagogical applications in higher education found that while educators appreciate these AI tools, sustainable integration depends on instructor satisfaction, continuous usage and ethical governance (Baig & Yadegaridehkordi, 2025). Key factors that influence successful adoption of GenAI includes user trust, AI literacy, and ongoing support. Without these, GenAI risks being underused or misused.

In another dimension, Prather, Leinonen, Kiesler, et al. (2024) stated that GenAI holds immense promise for enriching teaching in tertiary education. It automates repetitive tasks, provides scalable feedback, enables personalized learning pathways, supports instructional design and empowers educators to deliver more creative and relevant learning experiences. But to realize its full potential, institutions must invest in training, infrastructure and governance. Through thoughtful implementation, GenAI can transform teaching into a more



efficient, equitable, and pedagogically powerful enterprise.

Generative Artificial Intelligence as a tool for enhancing research

Another aspect of education that GenAI contributes to its development is research. This is one of the reasons, Khalifa (2024) emphasized that Generative Artificial Intelligence (GenAI) has rapidly become an influential research tool that augments nearly every stage of the scholarly cycle: scoping and discovery, synthesis, data processing and analysis, manuscript drafting and dissemination. Through automating routine information-processing tasks, GenAI increases researcher productivity and expands the kinds of inquiries individuals and small teams can realistically pursue.

At the discovery and scoping stage, GenAI-powered engines and assistants (e.g., Elicit, SciSpace, specialised LLM pipelines) accelerate literature searches, extract salient findings and produce structured summaries that highlight methods, samples and key results dramatically reducing the time needed to map a field and identify gaps for new research (Li, 2025). These systems can also generate annotated bibliographies and suggest semantically related papers that standard keyword searches may miss, improving comprehensiveness for systematic and rapid reviews.

From another angle which comprised synthesis and writing, generative models assist researchers in drafting coherent literature-review narratives, framing research questions and producing initial manuscript sections such as introduction, methods draft, high-level discussion. Such assistance is particularly valuable for early-career researchers and multidisciplinary teams who must translate complex findings across domains (Oermann et al., 2025). On the other hand, relevant available literature stresses that AI-generated prose in

Literature in English should be treated as a starting point requiring rigorous expert revision, as models can hallucinate facts, misrepresent study details or oversimplify nuanced findings. Recent evaluations showed that language model summaries sometimes omit critical methodological caveats or overgeneralise conclusions, underlining the need for careful validation. But this does not invalidate the significant importance of GenAI in research.

In the context of research and publications, GenAI also influences peer review and editorial workflows: tools can pre-screen submissions for completeness, suggest reviewer matches or assist reviewers with clarity and language edit. Publishers in the publication industry are now already issuing guidance that permits responsible use of GenAI for manuscript preparation while requiring disclosure and human accountability to preserve research integrity (Shukla, 2024).

In the aspect of empirical analysis, Shukla, (2024) elaborated that GenAI and complementary AI tools for streamline data cleaning and feature extraction, coding of qualitative data and quantitative data and even exploratory statistical modelling. Automating repetitive pre-processing tasks lets researchers devote more attention to model interpretation, theory-building and robustness checks. Additionally, GenAI tools can help generate reproducible analysis scripts from natural-language prompts, data collected and translate high-level analytic intents into concrete code templates lowering the barrier for researchers with limited programming expertise.

Lee (2025) mentioned that through speeding up discovery, facilitating writing and synthesis, automating analytical preliminary steps, and simplifying editorial tasks, GenAI significantly improves research. Researchers must integrate AI



affordances with domain knowledge, validation procedures and clear ethical governance of AI usage in order to appropriately utilise these advantages and ensure that efficiency gains result in more rigorous, open and egalitarian scholarship.

Generative Artificial Intelligence as a tool for assessment of learning

A part from teaching in classroom and conducting research for the purpose of improving knowledge and filling educational gaps, Generative Artificial Intelligence contributes to assessment of learning. Khlaif, Z. N., Alkhouk, Salama and Abu Eideh (2025) Generative Artificial Intelligence (GenAI) is rapidly transforming how student learning is assessed in tertiary education by offering new mechanisms for feedback, grading and assessment design. One of its strongest advantages lies in automated, scalable feedback: recent research shows that GenAI systems can generate detailed timely comments on student work, reducing instructors' workload while promoting self-regulated learning. These tools can highlight conceptual misunderstandings, suggest improvements and maintain consistency in feedback, thereby fostering a more supportive educational environment.

At a more strategic level, frameworks for integrating GenAI into assessment processes are emerging. One such model defines multiple "levels" of AI involvement from minimal to full AI use enabling educators to design assessments where AI support is balanced with human judgment. A pilot implementation using this AI Assessment Scale (AIAS) showed reduced misconduct, increased student attainment and higher pass rates when GenAI was thoughtfully integrated (Furze, Perkins, Roe & MacVaugh, 2024). This suggests that structured AI-enabled assessment can improve both integrity and learning outcomes.

However, the adoption of GenAI for assessment carries risks, especially in terms of fairness, transparency and academic integrity. A growing body of research underscores institutional concerns around bias, opacity and over-reliance on automated systems. Furthermore, a comparative study between Large Language Model generated and human-assigned grades indicate that while AI grading reduces teacher workload, it should ideally complement human markers rather than replace them entirely, to ensure fairness (Ragolane, Patel & Salikram, 2024).

Ethical implementation requires institutional policies and educator training. Ardito (2023) posited that in a survey of university instructors, the perceived ease of use, performance benefits, social influence and institutional support all played significant roles in shaping educators' willingness to adopt GenAI in assessment. Such findings stress that policy frameworks, clear guidelines and professional development must accompany any rollout of AI-enhanced assessment.

It was noted that, GenAI offers powerful tools to enhance assessment in higher education by providing scalable feedback, automating grading, generating assessment items and structuring AI participation in evaluation. When carefully governed with human oversight, robust policy and ethical transparency these technologies can enrich assessment practices and promote more timely, equitable and pedagogically meaningful evaluation of student learning.

Ethical consideration of using GenAI in teaching, research and assessment of learning

The integration of Generative Artificial Intelligence (GenAI) in higher education offers significant advantages, yet it raises important ethical concerns that must be



addressed to ensure responsible usage. The following are some ethical considerations.

1. Bias, fairness, and equity: AI systems can unintentionally generate biased outputs due to underlying patterns in data and model training. In teaching, this may lead to culturally insensitive content or skewed examples. In research, biased algorithms may influence data interpretation or literature summaries. In assessment, automated grading tools may unfairly disadvantage certain groups of students. Ensuring fairness involves continuous monitoring, transparency in algorithmic design, and human oversight to validate outputs.

2. Academic integrity and misuse: One of the most pressing ethical concerns is the potential for academic dishonesty. GenAI tools can easily generate essays, solve assignments, or produce research content that students may submit as their own. This undermines learning objectives and compromises academic standards. In research, misuse may occur when scholars rely excessively on AI-generated outputs without proper verification or fail to acknowledge the use of AI tools. Institutions must therefore create guidelines that defined acceptable use and encourage transparency.

3. Data privacy and security: GenAI systems often rely on vast data sets that may include personal, sensitive or institutional information. When educators or researchers input students' data, manuscripts or unpublished findings into public AI platforms, there is a risk of data leakage or unauthorized access. Protecting confidentiality is essential, especially in assessment and research involving human participants. Institutions must ensure that AI platforms comply with data protection laws and encourage users to avoid uploading identifiable or confidential information.

4. Human oversight and responsibility: AI tools should augment not replace human expertise. Overreliance on GenAI can

weaken critical thinking, reduce instructional quality and compromise research validity. In assessment, human judgment is still necessary to evaluate creativity, context and higher order reasoning. Therefore, educators and researchers must maintain responsibility for final decisions, ensuring that AI remains a supportive tool rather than an autonomous evaluator.

5. Transparency and explainability: GenAI tools often operate as “black boxes,” making it difficult for users to understand how decisions are made. In assessment, a lack of explainability may cause students to distrust AI-generated feedback. In research, unexplained AI-generated claims can compromise methodological rigour. Educators and researchers must be transparent about when and how AI is used and maintain the ability to justify.

Conclusion

While GenAI offers transformative benefits for teaching, research and assessment in higher education, its adoption must be guided by strong ethical practices. Ensuring fairness, transparency, data privacy, academic integrity and sustained human oversight is essential for leveraging GenAI responsibly and effectively to enhance learning outcomes and promote equitable trustworthy educational innovation.

References

- Adel, A., & Alani, N. (2025). *Can generative AI reliably synthesise literature? Exploring hallucination issues in ChatGPT*. *AI & Society*, 40, 6799–6812. <https://doi.org/10.1007/s00146-025-02406-7>
- Ardito, C. G. (2023). *Contra generative AI detection in higher education assessments*.
- Baig, M. I., & Yadegaridehkordi, E. (2025). *Factors influencing academic staff*



- satisfaction and continuous usage of generative artificial intelligence (GenAI) in higher education. *International Journal of Educational Technology in Higher Education*, 22, Article 5.
- Ebiringa, O. T., Ikerionwu, C. O., Erike, A. I., & Asiegbu, B. C. (2025). Generative AI Adoption in Nigerian Higher Education: Benefits, Challenges, and Opportunities. *African Journal of Humanities and Contemporary Education Research*, 20(1), 285–304.
- Furze, L., Perkins, M., Roe, J., & MacVaugh, J. (2024). The AI Assessment Scale (AIAS) in action: A pilot implementation of GenAI supported assessment.
- Izevbigie, H. I., Olajide, O., Olaniran, O., & Akintayo, T. A. (2025). The ethical use of generative AI in the Nigerian higher education sector. *World Journal of Advanced Research and Reviews*, 25(3), 847–853.
- Khalifa, M. (2024). *Using artificial intelligence in academic writing and research*. ScienceDirect.
- Khlaif, Z. N., Alkouk, W. A., Salama, N., & Abu Eideh, B. (2025). Redesigning assessments for AI-enhanced learning: A framework for educators in the generative AI era. *Education Sciences*, 15(2), 174.
- Lee, S. S., & Moore, R. L. (2024). Harnessing generative AI (GenAI) for automated feedback in higher education: A systematic review. *Online Learning*, 28(3), 82–104.
- Li, Y. (2025). *Enhancing systematic literature reviews with generative AI*. PubMed Central.
- Oermann, M. H. et al. (2025). *Using Artificial Intelligence for Scholarly Writing*. PubMed Central.
- Ogunleye, B., Zakariyyah, K. I., Ajao, O., Olayinka, O., & Sharma, H. (2024). *A Systematic Review of Generative AI for Teaching and Learning Practice* (preprint).
- Ogunleye, B., Zakariyyah, K. I., Ajao, O., Olayinka, O., & Sharma, H. (2024). A systematic review of generative AI for teaching and learning practice. *Education Sciences*, 14(6), Article 636.
- Peters, O., & Olojede, H. T. (2025). Influence of Generative Artificial Intelligence (GenAI) in Nigerian Higher Education. *Àgídìgbò: ABUAD Journal of the Humanities*, 13(1), 233–244.
- Prather, J., Leinonen, J., Kiesler, N., et al. (2024). Beyond the hype: A comprehensive review of current trends in generative AI research, teaching practices, and tools.
- Qian, Y. (2025). Pedagogical applications of generative AI in higher education: A systematic review of the field. *TechTrends*, 69, 1105–1120.
- Ragolane, M., Patel, S., & Salikram, P. (2024). *AI Versus Human Graders: Assessing the Role of Large Language Models in Higher Education*. *Asian Journal of Education and Social Studies*, 50(10), 244–263.
- Shukla, S. (2024). The Role of Gen AI in The Data Dependence Graph Generation. *International Journal of Engineering Technology Research & Management (ijetrm)*, 8(3).