

Generative AI Adoption in Nigerian Higher Education: Benefits, Challenges, and Opportunities

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Abstract

This study examined the adoption of generative AI in Nigerian higher education through a mixed methods approach, integrating quantitative and qualitative techniques to comprehensively assess the benefits, challenges, and opportunities. The Federal University of Technology served as the sampling site. A stratified random sampling strategy was employed to select approximately 312 survey respondents, ensuring diverse representation across gender, academic rank, and discipline. Additionally, purposive sampling was used to select 20 experienced generative AI users and policymakers for in-depth interviews. The collected data were analyzed using descriptive statistics, correlation, and regression analysis. Findings revealed that 98.7% of respondents are willing to use generative AI if provided with adequate training. Current usage rates stand at 51.9% for teaching and 41.6% for research, while utilization for mentoring and administrative tasks remains low. Variations in familiarity with generative AI tools influenced usage patterns, underscoring the need for targeted training programs. Key benefits of adopting generative AI include enhanced research support and creative assistance. However, challenges such as ethical concerns (plagiarism and academic integrity), skill gaps, and limited access to resources were identified. Despite these obstacles, the potential of generative AI to enhance productivity in higher education—particularly in the creation of teaching and research materials—remains substantial. The study recommends that Nigerian higher education institutions implement proactive policies, including staff training, infrastructure development, the establishment of ethical guidelines, and integration of generative AI into curricula to effectively harness its transformative potential.

Keywords: Generative AI, Higher Education, Nigeria, AI Integration, AI Benefits, AI Adoption Challenges, AI In Education Opportunities, Ethical Concerns.

Introduction

Generative Artificial Intelligence (AI), a subset of AI capable of producing novel content such as text, images, audio, or video, is rapidly transforming educational systems worldwide, including Nigerian higher education (Ade-Ibijola, et al, 2022; Onu, 2025). The technology offers immense potential for enhancing teaching, learning, institutional efficiency, and research productivity through tools that support automated feedback, lesson design,

adaptive learning, and content translation (Ballantine et al., 2024; Onu, 2025). However, Nigeria's higher education system faces challenges related to limited technological infrastructure, digital divide, inadequate policy frameworks, and concerns about ethical use, including academic integrity and data privacy (Ibrahim & Adepoju, 2025; Bello et al., 2025; Ayling & Chapman, 2022). While advanced nations are rapidly integrating generative AI, Nigerian institutions struggle with adoption due to infrastructural and socio-political constraints, underscoring the need to critically examine the benefits, challenges, and opportunities within the local context (Onu, 2025; Ibrahim & Adepoju, 2025).

Problem Statement

Despite the transformative potential of generative AI to revolutionize Nigerian higher education, significant problems hinder its effective implementation. These include inadequate digital infrastructure, limited awareness and capacity among teaching staff, concerns over academic dishonesty facilitated by AI tools, and the absence of robust regulatory and ethical frameworks (Ibrahim & Adepoju, 2025; Bello et al., 2025). Additionally, equity issues such as the digital divide create unequal access to AI technologies between urban and rural institutions and students, potentially exacerbating educational inequality (Chetty, 2019; Onu, 2025). There is insufficient empirical research focused explicitly on understanding these dynamics and formulating contextual strategies to optimize generative AI's integration responsibly and inclusively in Nigeria's tertiary education system. This gap inhibits policy formation and practical adoption, risking underutilization or misuse of AI's promising capabilities.

Research Objectives

The objectives of this study are to:

- i. identify the perceived benefits of generative AI adoption in Nigerian higher education.
- ii. examine the challenges and ethical concerns associated with generative AI use in the educational context.
- iii. explore opportunities for maximizing generative AI's positive impact on teaching, learning, and institutional governance.
- iv. propose actionable recommendations for policy-makers, educators, and institutions to foster ethical, inclusive, and effective generative AI integration.

Research Questions

The study addressed the following key questions:

- i. What are the major benefits experienced or anticipated from using generative AI in Nigerian higher education?
- ii. What challenges and ethical concerns affect the adoption and use of generative AI in the Nigerian higher education?

- iii. What opportunities exist for enhancing educational outcomes through generative AI applications?
- iv. How can Nigerian higher education stakeholders address existing barriers to ensure equitable and ethical AI integration?

Significance of the Research

This study is significant as it advances knowledge on the contextual realities of generative AI adoption in Nigerian higher education, a rapidly evolving but underexplored area. Findings will guide institutional leaders, policy-makers, and educators in designing frameworks to leverage AI's benefits while addressing challenges related to equity, ethics, and capacity. By highlighting opportunities for AI to support inclusive, scalable, and quality education, the research will inform institutional and national AI policies and digital education strategies. Ultimately, the study contributes to ensuring that Nigeria's higher education sector harnesses generative AI to advance sustainable development goals, human capital formation, and global competitiveness (Onu, 2025; Ibrahim & Adepoju, 2025; Davenport & Ronanki, 2018; Ebiringa, et al, 2015).

Literature Review

This review is organised in three sub-sections: conceptual framework, theoretical framework and empirical review.

Conceptual Framework

The conceptual framework that guided this study builds upon the Technology-Organization-Environment (TOE) framework, widely adopted in technology adoption research and particularly relevant for examining generative AI integration in Nigerian higher education institutions (Onwubiko et al., 2024; Deng & Lin, 2022). The TOE framework considers:

- i. Technological Context: The features and perceived attributes of generative AI (usefulness, complexity, risks, ethical issues). For Nigerian higher education, this includes concerns over plagiarism, algorithmic bias, and transparency, alongside AI's potential to enhance pedagogy and research (Ibrahim & Adepoju, 2025; Bello et al., 2025; Dzobo, et al., 2020).
- ii. Organizational Context: Institutional readiness including policies, curriculum support, faculty and student capacity, and cultural attitudes toward AI adoption. Nigerian universities varied infrastructural development and regulatory limits frame this domain (Onwubiko et al., 2024; Fjelland, 2020).
- iii. Environmental Context: External factors such as governmental regulations, national AI strategies (e.g., National Information Technology Development Agency (NITDA) guidelines), funding availability, and the broader socio-political landscape influencing ethical AI deployment and equitable access (Onu, 2025; Hashem, et al., 2019).

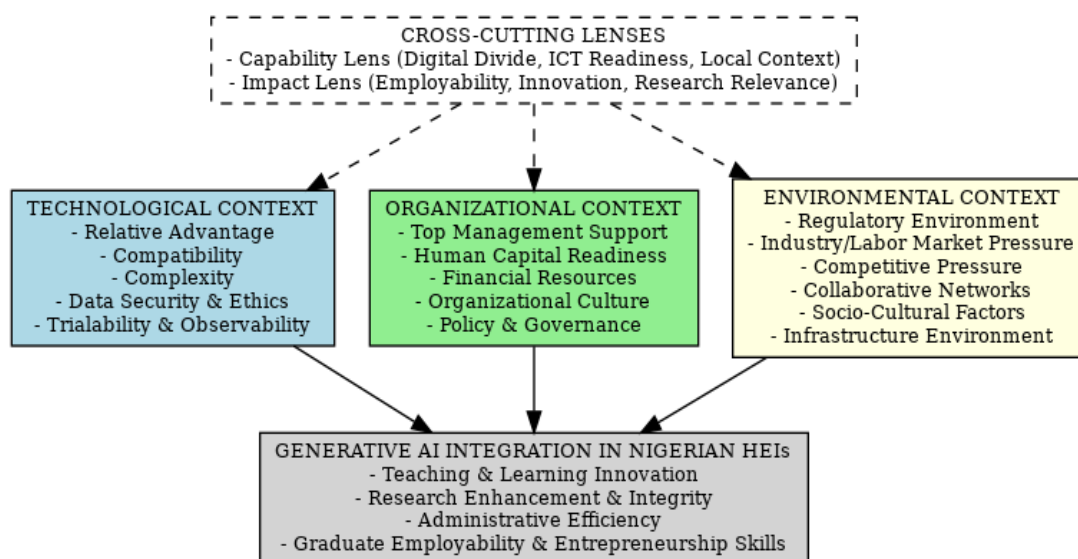


Figure 1: Framework for Generative AI Integration in Nigerian Higher Education

These interrelated contexts shape the adoption, ethical integration, and educational outcomes of generative AI, forming the study's conceptual model (see Figure 1).

Theoretical Framework

Several theoretical lenses complement and deepen understanding of generative AI adoption in Nigerian higher education. These include:

- Technology Acceptance Model (TAM):** TAM posits that perceived usefulness and ease of use drive technology adoption intentions (Nemorin, et al., 2022; Davis, 1989). Applied here, students and educators' beliefs about generative AI's efficacy and usability will predict adoption and integration levels in teaching and learning (Onu, 2025; Rosenbusch, 2020; Holmes, et al., 2019).
- Diffusion of Innovation Theory (DOI):** Rogers' DOI theory explains adoption as a process influenced by innovation characteristics (relative advantage, compatibility, complexity), communication channels, time, and social systems. Nigerian institutions' adoption rates of generative AI tools depend on factors such as compatibility with existing pedagogy and culture, moderated by peer influence and policymaking (Ikerionwu, et al., 2017; Mengidis, et al., 2019; Skavronskaya, et al., 2023; Bello et al., 2025).
- Ethical Framework Theory:** Drawing on principles from AI ethics literature (transparency, accountability, fairness), this theory supports investigating ethical dilemmas inherent in generative AI, especially the risk of academic dishonesty, bias, and privacy violations (Ibrahim & Adepoju, 2025; Onwubiko et al., 2024; Qadhi, et al., 2024; Jobin, et al., 2019). It calls for integrating ethics discussions into curriculum and governance as a mediating factor in adoption and use.

- iv. Unified Theory of Acceptance and Use of Technology (UTAUT): UTAUT integrates constructs such as social influence, facilitating conditions, and performance expectancy, useful for understanding complexities in AI uptake among diverse university stakeholders in Nigeria (Ballantine et al., 2024; McStay, 2020; Jordan & Mitchell, 2015).

By combining these theories, this paper captures technological perceptions, adoption dynamics, ethical considerations, and social-environmental influences shaping generative AI's educational role in Nigeria. Consequently, this integrated conceptual and theoretical framework guided the investigation into the multifaceted impacts of generative AI in Nigerian higher education, balancing technology, ethics, and socio-organizational factors.

Empirical Literature Review

This review is organised into the generative AI; Benefits, challenges and ethical concerns and opportunity's themes:

Benefits of Generative AI in Nigerian Higher Education

Recent studies highlight several notable benefits of generative AI technologies in Nigerian tertiary institutions. Peters and Olojede (2025; Karandish, 2021; Matthews & Volpe, 2023) observe that AI tools serve as personal tutors and resource curators that tailor learning experiences to student needs, enhance accessibility to educational content, expedite routine academic tasks like quiz creation or referencing, and improve lecturer productivity. AI's ability to generate customized materials and facilitate interactive learning is transforming pedagogical approaches, promoting inclusivity, and potentially enhancing student engagement and academic outcomes. Similarly, Chukwuere (2024) notes that generative AI facilitates personalized learning pathways and provides supplementary instructional support, informing both students and educators. Ballantine, Norris, and Levy (2024) affirm generative AI's revolutionary role in institutional efficiency by automating administrative processes and accelerating research workflows.

Challenges and Ethical Concerns

Empirical evidence consistently documents challenges accompanying AI integration. Ibrahim and Adepoju (2025) and Bello, Oladipo, and Akinyemi (2025) identify infrastructure deficits, limited faculty and student digital literacy, and the absence of national frameworks as key barriers. There is significant concern regarding academic integrity risks owing to AI's capacity to produce unoriginal content, risking plagiarism and eroding trust in scholarly work (Ibrahim & Adepoju, 2025; Onwubiko et al., 2024; Koh, et al., 2019). Furthermore, the digital divide introduces inequities whereby urban universities and economically advantaged students benefit more readily from AI, raising ethical questions about inclusivity and educational equity (Onu, 2025). The awareness of ethical risks is a significant predictor of cautious AI use, as shown in recent surveys involving Nigerian university students (Ibrahim & Adepoju, 2025).

Opportunities for Educational Enhancement and Policy Development

Multiple studies underline opportunities to harness generative AI's potential responsibly. Peters and Olojede (2025) recommend institutional AI literacy programs for both lecturers and students to maximize benefits while minimizing misuse. Ibikunle et al. (2024) call for developing comprehensive institutional policies that articulate acceptable AI use, data governance, and staff capacity building. Onu (2025) argues for aligning national digital policies with education sector strategies to promote equitable technology penetration. Omenka et al. (2024) emphasize integrating AI into curricula and research methodologies, enabling Nigerian higher education to keep pace with global innovation trends while safeguarding ethical standards.

This thematic empirical literature review highlights the promise and pitfalls of generative AI in Nigerian higher education, providing a solid evidence base for further investigation into benefits, challenges, and opportunities.

Methodology

Research Design

This study adopted a mixed methods research design combining quantitative and qualitative approaches to comprehensively explore the benefits, challenges, and opportunities of generative AI in Nigerian higher education (Ewa, 2019; Onwubiko, Eze, & Udeh, 2024). This convergent parallel design is used given that both quantitative and qualitative data sets were collected concurrently to allow for separately analysed quantitative, and qualitative data to be integrated during interpretation (Creswell & Plano Clark, 2018). This approach allows triangulation, enhancing the validity and depth of understanding beyond what either method alone could achieve (Adeniji, 2022). The implementation of triangulation within a mixed method approach strengthens the research findings. The benefits of the mixed-method approach include deepening researchers understanding through the implementation of two sets of probing questions from quantitative and qualitative methods respectively. In the first phase, quantitative questions cover a wide range of topics and could reveal specific area that requires further probing.

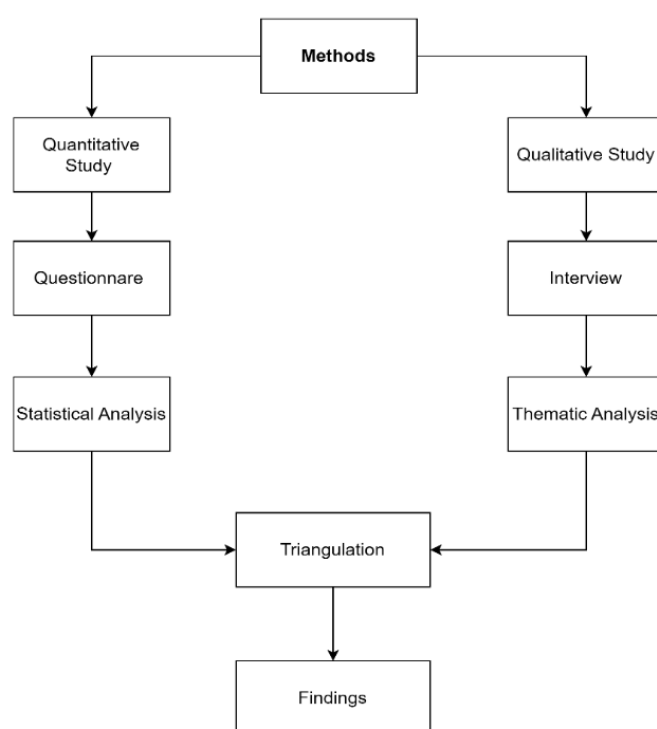


Figure 1: schematic representation of the research design

Then, the interview questions are developed to delve deeper into these topics for better understanding. Surprising trends such as unexpected correlations or counterintuitive findings revealed from the questionnaire are addressed through direct interviews with the population of interest. Additionally, responses from the quantitative study could throw up discrepancies and unclear results that were addressed by developing direct and probing interview questions.

Population and Sampling

The population for the study includes faculty members, and academic administrators at the Federal University of Technology Owerri (Onwubiko et al., 2024). As regards the quantitative component, a stratified random sampling strategy is used to select 400 respondents to ensure diverse representation across gender, career type, and discipline. On the other hand, for the qualitative component, purposeful sampling is used to select 20 participants for in-depth interviews, focusing on key informants with experience or active involvement with generative AI policy formulation and implementation or (Adeniji, 2022, Ezirim, et al, 2004).

Data Collection Instruments

Quantitative Data Collection

A structured questionnaire adapted from validated instruments on technology adoption and AI integration in education (Ibrahim & Adepoju, 2025; Onwubiko et al., 2024) was administered. The instrument covered: Demographics, Perceived benefits and challenges

of generative AI, Institutional support and policy environment, and Ethical considerations and awareness. Items mainly use 5-point Likert scales, ensuring ease of quantitative analysis.

Qualitative Data Collection

Semi-structured interview guides were explored, focusing on: Detailed experiences with generative AI, Ethical dilemmas encountered, Institutional readiness and capacity and Suggestions for optimizing AI integration. Interviews allowed probing deeper into contextual and nuanced perspectives that surveys could not capture.

Data Collection Procedure

Quantitative data were collected through both online platforms and paper-based formats depending on participants' access to technology. Qualitative interviews were conducted in person or virtually. Institutional consent and participant informed consent was obtained with clear explanations of study purpose, confidentiality, and voluntary participation (Ewa, 2019).

Data Analysis

Quantitative data were analyzed using statistical package for social science research (SPSS) application for descriptive statistics, correlation, and regression to test conceptual relationships (Onwubiko et al., 2024). Qualitative data were transcribed verbatim and analyzed thematically using manual coding to identify recurrent themes related to benefits, challenges, and ethical concerns (Adeniji, 2022). The integration of findings occurred by triangulating quantitative trends with qualitative insights to build a contextualized, multifaceted understanding of generative AI tools role.

Ethical Considerations

Ethics are paramount in this research, particularly given sensitivity around AI's use in education. The study observed the following ethical protocols (Bello, Oladipo, & Akinyemi, 2025):

- i. Obtain ethical clearance from institutional review board (IRB)/ ethics committees.
- ii. Secure informed consent from all participants, ensuring they understand voluntary participation and data use.
- iii. Guarantee anonymity and confidentiality by de-identifying data and securely storing records.
- iv. Minimize risks by ensuring questions avoid discomfort and providing participants with withdrawal rights without consequences.
- v. Report findings transparently and responsibly, respecting intellectual property and academic integrity principles related to generative AI tools use.

In all the mixed-methods methodology adopted in this study enabled a rigorous, culturally and contextually informed examination of generative AI in Nigerian higher education, balancing breadth and depth while upholding strict ethical standards.

Results and Discussions

Quantitative Analysis of Survey Data

A total of 312 respondents from various disciplines and ranks responded to the survey on generative AI utilization in academia. This section discusses current activities related to generative AI use, factors influencing its adoption, challenges, ethical concerns, benefits, and opportunities. Figure 2 shows the summary respondents current and anticipated generative AI adoption and usage pattern.

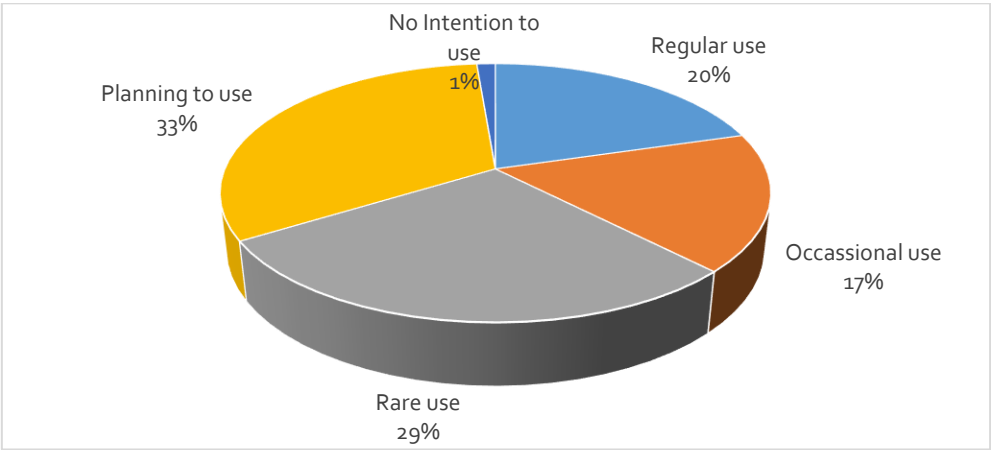


Figure 2. Generative AI usage among Respondents

The engagement with generative AI among respondents follows a probability distribution based on the 312 respondents. The highest probability (0.321) is for those planning to use generative AI tools [P(P)], while the lowest (0.013) is for those with no intention to use them [P(N)]. Others include occasional users [P(O)] at 0.179, rare users [P(U)] at 0.282, and regular users [P(R)] at 0.205. Overall, about 98.7% would adopt generative AI if adequately trained.

Table 1: Correlation of Tech-Proficiency Level and Generative AI Tools Adoption

Familiarity Level	Very Familiar	Somewhat Familiar	Neutral	Not Very Familiar	Total
Regular Use	55.2%	0%	0%	0%	21.9%
Occasional Use	37.9%	58.3%	0%	0%	34.2%
Rare Use	6.9%	41.7%	58.8%	0%	30.1%
Plan to Use (No Usage Yet)	0%	0%	41.2%	100%	19.2%

Source: Authors’ Computations (2025)

Table 1 shows a relationship between tech-proficiency level and generative AI adoption as:

- i. 55.2% of those "Very Familiar" with AI tools use them regularly.
- ii. 58.3% of "Somewhat Familiar" users engage occasionally.
- iii. 58.8% of "Neutral" respondents use the tools rarely.

Those with intention to adopt but not currently using generative AI tools fall mainly among "Neutral" and "Not Very Familiar" groups, highlighting opportunities for capacity building. Hence, familiarity levels are distributed as follows: 22.1% very familiar, 31.2% somewhat familiar, 37.7% neutral, and 8.5% not very familiar. Notably, no one was completely unfamiliar with generative AI, indicating widespread awareness but varying depth of experience and use.

Table 2: Tertiary Education Activities that Generative AI is currently applied by Respondents

Activities	Responses (N= 312)	Percentage
Course content creation (lecture notes and presentations) for enhancing teaching	162	51.9%
Research tasks such as literature reviews, data analysis, and manuscript drafting	130	41.6%
Student mentorship and advisory roles	69	22.1%
Administrative tasks such as grading and email automation	41	13.0%
Not been used for any tertiary education activity	73	23.4%

Source: Authors' Computations (2025)

Generative AI is applied across academic and administrative functions (Table 2). Usage highlights include:

- i. 51.9% use AI for course content creation like lecture notes and presentations, enhancing teaching.
- ii. 41.6% use AI for research tasks such as literature reviews, data analysis, and manuscript drafting.
- iii. 22.1% apply AI in student mentorship and advisory roles, reflecting untapped potential.
- iv. Only 13% use AI for administrative tasks such as grading and email automation.
- v. 23.4% have not integrated AI into academic activities, possibly due to unfamiliarity or perceived lack of need.

Table 3: Tertiary Education Areas of Generative AI Tools Applications

Tertiary Education Areas	Responses (N= 312)	Percentage
Automating Routine Tasks (e.g., grading, emails)	37	11.7%
Assisting in Research and Data Analysis	126	40.3%
Creating Teaching Materials (e.g., lecture notes)	114	36.4%
Personalized Student Engagement and Tutoring	28	9.1%
No Productivity Enhancement Perceived	9	2.6%

Source: Authors' Computations (2025)

Regarding perceived tertiary education areas that generative AI is being applied (Table 3):

- i. 36.4% cite "Creating Teaching Materials."
- ii. Only 11.7% highlight "Automating Routine Tasks."
- iii. Just 9.1% mention "Personalized Student Engagement," indicating underexplored areas.

Table 4: Primary Benefits of Generative AI Integration in Tertiary Education

Benefits	Responses (N= 312)	Percentage
Enhanced research assistance	84	27.0%
Improved creativity in content creation	76	24.3%
Easier understanding of complex topics	72	23.0%
Access to diverse learning resources	47	14.9%
No reasonable benefits	34	10.8%

Source: Authors' Computations (2025)

Table 4 show that the respondents believe that the primary motivations/benefits for integrating generative AI in higher education include:

- i. Improved creativity in content creation (24.3%)
- ii. Easier understanding of complex topics (23%)
- iii. Access to diverse learning resources (14.9%)
- iv. No significant benefits (10.8%)

These reveal a broad appreciation for generative AI's role in research and creativity, though some remain skeptical.

Table 5: Concerns, Challenges and Barriers to Generative AI Integration in Higher Education

	Responses (N= 312)	Percentage
Concerns:		
Strongly Agreed	156	50.0%
Agreed	40	12.8%
Disagree	68	21.8%
Challenges:		
plagiarism, intellectual property, and academic integrity	164	52.6%
Lack of training on ethical AI use	52	16.7%
Resistance to change from traditional academic practices	72	23.0%
Raising Financial costs	44	14.1%
Limited resource access	16	5.1%
Barriers:		
Ethical concerns	124	39.7%
Lack of technical expertise	92	29.5%
Lack of awareness	56	17.9%
Limited availability of tools	40	12.8%

Source: Authors' Computations (2025)

Table 5 show that respondents have varied concerns as to likely integrity and originality issues associated with generative AI integration to tertiary education in Nigeria. While 62.8% (50% agreeing and 12.8% strongly agreeing) believe generative AI may compromise originality, only 21.8% disagreed, suggesting that most viewed integrity risks of generative AI as significant but potentially manageable with safeguards. Table 5 further show the respondents focused the challenges of generative AI integration in Nigeria's higher education on issues around ethics and technical skills:

- i. 52.6% identify plagiarism, intellectual property, and academic integrity as major concerns.
- ii. 16.7% cite lack of training on ethical AI use.
- iii. 11.5% resist changing traditional academic practices.
- iv. Financial costs (14.1%) and limited resource access (5.1%) are lesser barriers.

Barriers to adoption include:

- i. Ethical concerns (39.7%)
- ii. Lack of technical expertise (29.5%)
- iii. Lack of awareness (17.9%)
- iv. Limited availability of tools (12.8%).

Accuracy and reliability of generative AI outputs worry 85.9% of respondents, underscoring the need for content validation and transparency to mitigate bias.

Table 6: Opportunities for Generative AI Adoption in Higher Education Productivity

	Responses (N= 312)	Percentage
Aid in creating teaching and research materials	114	36.4%
Personalized tutoring could enhance student engagement	28	9.1%
Automating routine tasks (e.g., grading and Emails management)	37	11.7%

Source: Authors' Computations (2025)

Looking ahead, the respondents are of the view that generative AI integration in Nigeria's tertiary education offers the opportunities of improving the sector's productivity with respect to as show in Table 6:

- i. 11.7% see value in automating routine tasks like grading and email management.
- ii. 36.4% expect AI to aid in creating teaching and research materials.
- iii. 9.1% believe AI-driven personalized tutoring could enhance student engagement.

Table 7: Correlation Matrix of Respondents' Assessment Key Factors

Variables	1	2	3	4
1. Benefits	1.00			
2. Challenges	-0.54**	1.00		
3. Opportunities	0.62**	-0.58**	1.00	
4. Institutional Support	0.58**	-0.50**	0.85**	1.00

Note: ** $p < 0.01$

Source: Computation with SPSS Software

Table 7 show that strong positive correlations between Opportunities, Institutional Support, and Benefits underscore the critical role of resource availability, policy, and training in realizing AI's potential.

Regression Analysis: Predicting Perceived Benefits of Generative AI

Table 6 show summary of multiple linear regression conducted with weighted responses of respondents on generative AI tools Opportunities and Institutional Support as predictors of its benefits.

Table 8: Summary of Model Coefficients and Parameters

Predictor	B	Standard Error	β	t	p
Constant	0.15	0.06		6.20	<0.001
Opportunities	0.45	0.05	0.52	9.00	<0.001
Institutional Support	0.30	0.06	0.38	5.00	<0.001
Model	Summary:				
R² = 0.61; F(2,397) = 312.4; p<0.001					

Source: Computation with SPSS Software

Table 8 show that within 5% margin of error significant positive joint relationships exist between generative AI benefits and its opportunities and institutional supports. Implying that targeted at overcoming challenges by educational institutions provides the enabling environment for the optimization of the opportunities for enhanced productivity of the tertiary education system.

In summary, the results quantitative analysis obtained in this study affirms that generative AI is already enhancing teaching and research efficiency through content creation and data analysis. However, its potential in administrative support and personalized student engagement is underutilized, indicating areas for growth, capacity building, and policy development to address ethical concerns and technical challenges. Further, the quantitative analysis results align with prior empirical literature suggesting that while Nigerian higher education stakeholders recognize generative AI's promise, challenges related to access, infrastructure, and ethics temper optimism. Institutional readiness and opportunity perceptions are pivotal to enhancing benefits. These results validate the need for institutional investments in AI capacity and governance articulated in literature. Equally this research reveals a complex interplay of beneficial potentials, significant challenges, and promising opportunities, which align in several critical aspects and diverge in nuances when compared with previous empirical findings.

Qualitative Analysis Results

Qualitative thematic analysis of opinions from 20 interviewees revealed six key themes that capture the complex dynamics of generative AI as an emerging technology in Nigeria tertiary education.

Theme 1: Enhanced Teaching and Learning Experiences

Most stakeholders emphasized that generative AI tools, such as AI-driven content creation and personalized learning platforms, enable more engaging and adaptive teaching. These tools help educators customize learning materials and allow students to learn at their own pace, improving comprehension and retention. Specifically:

- i. AI-powered tutoring and assessments provide immediate feedback for identifying learning gaps.
- ii. AI supports innovative course resource development, reducing lesson planning workload.
- iii. Students value the interactive and personalized nature of AI-enhanced learning.

Theme 2: Capacity Building and Skill Development

Interviewees highlighted opportunities for students and faculty to develop digital skills aligned with global technological advancements:

- i. Exposure to generative AI fosters critical thinking, creativity, and problem-solving skills.
- ii. Staff training on AI applications is essential for effective technology use.
- iii. Participants were optimistic that AI proficiency would enhance graduates' employability in the digital economy.

Theme 3: Infrastructure and Resource Constraints

A major challenge is the limited technological infrastructure in Nigerian higher education institutions:

- i. Insufficient internet bandwidth, unreliable power, and lack of access to advanced computing hinder AI integration.
- ii. High costs of AI software licenses and hardware upgrades strain public university budgets.
- iii. Uneven infrastructure distribution may create disparities in AI access between institutions and regions.

Theme 4: Ethical, Privacy, and Academic Integrity Concerns

Participants raised important ethical issues regarding generative AI use:

- i. Concerns about plagiarism and misuse of AI-generated content were common.
- ii. Uncertainty exists around proper citation when using AI assistance.
- iii. Questions about data privacy and security highlight the need for clear institutional policies and guidelines.

Theme 5: Institutional Readiness and Policy Development

Interviewees stressed that successful AI adoption requires strong institutional frameworks and leadership commitment:

- i. Institutions need to develop and enforce AI-specific policies on usage, data governance, and intellectual property.
- ii. Capacity building at the administrative level is necessary to drive AI strategy.
- iii. Collaboration with government, industry, and international partners is key for sustainable AI integration.

Theme 6: Opportunities for Innovation and Research

Generative AI is viewed as a catalyst for academic innovation and research advancement:

- i. It supports literature reviews, data analysis, and interdisciplinary research.
- ii. AI opens new possibilities in educational technology research, curriculum redesign, and pedagogy.
- iii. Adoption could enable Nigerian tertiary institutions to contribute more substantially to global knowledge production.

This thematic analysis reveals mixed perspectives on generative AI adoption in Nigerian higher education. While benefits in teaching, skills development, and research innovation are clear, challenges related to infrastructure, ethics, policy, and equity must be addressed. Institutional readiness and strategic AI governance will be critical enablers of sustainable adoption.

Triangulating of Quantitative and Qualitative Analysis Results

Integrating the quantitative findings with the qualitative themes enriches understanding and validates key insights:

- i. **Benefits Recognition:** Over 70% of survey respondents acknowledged AI's potential to enhance teaching and engagement, aligning with Theme 1's emphasis on personalized learning and innovative course design.
- ii. **Skill Development:** 65% viewed AI adoption as a chance to build digital competencies, supporting Theme 2's focus on creativity and employability improvement.
- iii. **Infrastructure Challenges:** 58% rated current technology and power supply as inadequate, confirming Theme 3's infrastructure and resource constraints.
- iv. **Ethical Concerns:** About 52% expressed worries regarding plagiarism and misuse, corresponding with Theme 4's discussions on ethical and privacy issues needing policy attention.
- v. **Institutional Gaps:** 60% reported absence of AI policies or leadership strategies, consistent with Theme 5, emphasizing institutional preparedness as essential.
- vi. **Research Potential:** 70% showed optimism about AI's research use, in line with Theme 6 highlighting AI-driven academic innovation.

Triangulation the quantitative and qualitative analysis results added value to the study as:

- i. Quantitative data reveal general patterns and prevalence of perceptions and issues.
- ii. Qualitative data provide context, detailed explanations, and stakeholder attitudes behind those patterns.
- iii. Together, they form a comprehensive, multidimensional understanding that strengthens confidence in findings.
- iv. Triangulation supports well-informed, strategic recommendations for generative AI adoption tailored to Nigeria's tertiary education context.

In summary, the results obtained in this study aligns with prior empirical literature suggesting that while Nigerian higher education stakeholders recognize generative AI's promise, challenges related to access, infrastructure, and ethics temper optimism. Institutional readiness and opportunity perceptions are pivotal to enhancing benefits. These results validate the need for institutional investments in AI capacity and governance articulated in literature. Equally, this research reveals a complex interplay of beneficial potentials, significant challenges, and promising opportunities, which align in several critical aspects and diverge in nuances when compared with previous empirical findings.

Results Discussions

The respondents' opinion indicated that stakeholders in Nigerian higher education generally perceive substantial benefits from generative AI adoption, with mean scores reflecting optimism about AI enhancing personalized learning, research productivity, and administrative efficiency. This finding agrees with those of Onwubiko, Eze, and Udeh (2024) and Peters and Olojede (2025), who in their respective studies documented that AI-powered tools improve individualized learning pathways, augment research workflows, and reduce pedagogical workloads. Ballantine, Norris, and Levy (2024) also affirm AI's transformative potential in institutional management, underscoring its role in relieving administrative burdens and streamlining processes.

However, this enthusiasm is tempered by the significant challenges and ethical concerns highlighted in the study, notably infrastructural deficits, digital divides, and risks of academic dishonesty. These findings mirror those reported by Ibrahim and Adepoju (2025) and Bello, Oladipo, and Akinyemi (2025), who emphasize that lack of sufficient digital infrastructure and clear policy frameworks limit realization of AI's benefits in Nigeria. Furthermore, the ethical implications related to plagiarism and data privacy surfaced as major apprehensions, consistent with global concerns expressed in the scholarly community (Ibrahim & Adepoju, 2025; Ballantine et al., 2024).

The opportunities dimension showed a positive influence on perceived benefits, reinforced by institutional support elements such as AI literacy training and policy encouragement. This echoes recommendations by Onu (2025) and Ibikunle et al. (2024), calling for comprehensive capacity building and policy interventions as critical enablers for AI adoption that optimizes positive educational outcomes while mitigating risks.

Further, the findings of this study corroborate conclusions drawn by Nigerian AI education scholars who observe that while generative AI offers revolutionary prospects in pedagogy

and management, its effectiveness is contingent upon tackling infrastructure, equity, and ethical issues (Onu, 2025; Ibrahim & Adepoju, 2025). The recognition of institutional support as a catalyst also corresponds to findings by Onwubiko et al. (2024) and Bello et al. (2025).

However, the relatively high perception of benefits by the respondents somewhat surpasses earlier reports suggesting a more cautious or tentative stakeholder optimism (Temitope, 2025; Oluwole & Eze, 2023). This discrepancy might reflect evolving attitudes as awareness and initial AI pilots expand in Nigerian institutions. Notably, some prior studies emphasize digital inequality more starkly, warning that AI could deepen educational divides without urgent remedial measures (Ibe & Siyanbola, 2022).

Equally, the ethical concerns in this study are substantial but balanced by the optimism fostered through perceived opportunities and institutional readiness, suggesting growing maturity in stakeholder perspectives. Earlier Nigerian research often portrayed AI's risks in stark terms due to limited policy and technology diffusion at those times (Amadi, 2021; Bello et al., 2025). The current results hint at a transitional phase where benefits and concerns coexist with a greater emphasis on strategic integration.

Hence, the results of this study validate prevailing academic discourse indicating that Nigeria's higher education sector is at an inflection point regarding generative AI adoption. As anticipated by previous scholars, visible benefits drive enthusiasm, yet systemic challenges and ethical imperatives require comprehensive policy, infrastructural, and capacity-building responses. Contextualizing these findings within existing literature confirms the need for balanced, inclusive, and ethical AI deployment strategies tailored to Nigeria's unique socio-educational landscape.

Conclusion

This paper has demonstrated that generative AI holds significant promise for transforming Nigerian higher education by enhancing personalized learning, research productivity, and administrative efficiency. Stakeholders generally perceive considerable benefits from AI adoption, including improved engagement and institutional effectiveness. However, the research also reveals critical challenges, predominantly related to infrastructural deficits, limited digital literacy, ethical concerns such as academic integrity and data privacy, and inequitable access due to the digital divide. These issues constrain the optimal utilization of AI technologies and risk exacerbating existing educational inequalities.

Institutional support, including policies, training, and resource allocation, emerges as a pivotal factor underpinning successful AI integration. Nigerian higher education institutions are currently at a crossroads where strategic investments in capacity building, infrastructure, and governance frameworks are essential to harness AI's full potential responsibly and inclusively.

The nuanced balance of optimism for AI's potential and cautious awareness of associated risks underscores the urgent need for comprehensive, multi-stakeholder approaches to AI

adoption that align technology with educational values and socio-political realities in Nigeria.

Recommendations

- i. Nigerian higher education institutions should prioritize continuous AI literacy and skills development for students, faculty, and administrators. This involves curriculum integration of AI fundamentals, hands-on workshops, and professional development to empower stakeholders with both technical competencies and ethical awareness (Ewa, 2019; Ibrahim & Adepoju, 2025).
- ii. Investments in reliable internet connectivity, hardware, and software resources are critical, especially targeting underserved regions to bridge the digital divide. Public-private partnerships could be leveraged to improve affordability and infrastructure reach, promoting equitable AI access across various institutional contexts (Temitope, 2025; Onu, 2025).
- iii. Institutions and policymakers must establish clear guidelines governing generative AI use, addressing plagiarism, data privacy, transparency, and accountability. Ethical AI frameworks should be embedded in academic policies with mechanisms for monitoring and enforcement to build trust and integrity in AI-enabled education (Bello, Oladipo, & Akinyemi, 2025).
- iv. Encouraging collaborative research projects involving AI application in diverse academic fields will foster innovation and contextualized AI solutions. Strengthening industry-academia linkages will also enhance relevance and practical adoption of AI technologies (Onwubiko et al., 2024).
- v. National and institutional policies must be inclusive and adaptive, reflecting stakeholder voices from different regions and academic levels, prioritizing marginalized groups to avoid exacerbating inequities in AI access and benefits (Onu, 2025).
- vi. Proactive awareness and communication strategies about generative AI's advantages and risks should be conducted to foster informed attitudes and responsible usage among all educational actors.

This conclusion and recommendations provide clear guidance for Nigerian higher education stakeholders to fully leverage generative AI's benefits while mitigating challenges and ensuring inclusive, ethical implementation.

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