Review

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Abstract

Despite Generative artificial intelligence (GenAI) opportunities, African *Higher Education Institutions (AHEIs)* still face distinctive GenAI adoption challenges. This systematic literature review examines the opportunities, ethical concerns, and preparedness of *AHEIs* for GenAI's adoption.   The search was conducted on May 27, 2025 from 2022 to 2025. Only the 39 peer-reviewed journal articles and conference proceedings that met the inclusion criteria were included. Findings showed that studies are mostly distributed across South Africa, Egypt, and Nigeria. Furthermore, transformational teaching and learning, research enhancement, and Promotion of equity were the major GenAI's opportunities. However, several challenges, including academic misconduct, bias, and the digital divide, remain. In addition, *AHEIs'* preparedness for GenAI integration remains inconsistent; hence, addressing these challenges to maximize GenAI's is crucial.

Keywords: generative AI; higher education; Africa; ethical concerns; institutional readiness

Introduction

Generative artificial intelligence (GenAI) tools, such as ChatGPT, Bard, and Gemini, are rapidly transforming higher education by enabling personalized learning, automating administrative tasks, and enhancing research productivity (Francis et al., 2025). In Africa, these technologies demonstrate potential to expand access to research knowledge and support equitable knowledge production through digital innovation (Hombana, 2025). They also offer the potential to improve curriculum design, expand cross-border research collaboration, and support students with diverse learning needs through AI-driven adaptive tools (Apata et al., 2025).

Despite these opportunities, African higher education institutions face distinctive challenges that influence the adoption and impact of GenAI. Persistent digital divides limit reliable internet access and access to high-performance computing (Faloye & Ajayi, 2021; Barton et al., 2009). Policy frameworks often lag behind technological innovation, leaving many universities without clear governance structures to guide the responsible use of AI (Maina & Kuria, 2024). Moreover, Africa's language diversity poses barriers because most GenAI models are trained on languages from the Global North, limiting inclusivity and contextual relevance (Brokensha & Senekal, 2023). These

contextual differences highlight the importance of examining how opportunities, ethical concerns, and readiness for GenAI integration vary across African settings.

At the same time, ethical and practical concerns have emerged. The use of AI-generated content challenges norms of authorship and assessment integrity, while algorithmic bias risks reproducing inequities for underrepresented African languages and contexts (Baha & Okolo, 2024; Izevbigie et al., 2025). Privacy and data protection issues remain unresolved, and limited faculty training and infrastructure continue to hinder responsible adoption. As institutional policies and governance frameworks trail the rapid adoption of technology, educators and students are often left without clear guidance on the effective and ethical use of GenAI (Wakunuma & Eke, 2024).

This paper conducts a systematic review to address three research questions:

1. What is the geographic distribution of studies on generative AI in African higher education?
2. What opportunities have generative AI tools created for higher education in Africa?
3. What ethical concerns are raised in the literature regarding the use of generative AI among African university students and institutions?
4. To what extent are African higher education institutions prepared for adoption, based on policies, infrastructure, and faculty readiness?

Theoretical Framework

This review is explained by the Technology Organization Environment (TOE) framework, first proposed by Tornatzky and Fleischer (1990) to explain how organizations adopt and implement new technologies. TOE highlights how adoption decisions are influenced by three interconnected areas: the technological characteristics and benefits of the innovation, the organizational structures and capacities that support or constrain its use, and the wider environmental context, including regulatory systems, cultural values, and societal expectations.

This framework is well-suited for understanding the adoption of generative AI in African higher education because it brings together the three core themes of this study. Opportunities such as enhanced teaching and learning, new research collaborations, and expanded access to knowledge align with the technological aspect. Ethical concerns, including academic integrity, algorithmic bias, and data privacy, reflect the influence of environmental norms and governance systems. Institutional preparedness, including policy development, digital infrastructure, and faculty readiness, relates to the organizational aspect. By applying TOE, this review situates the emerging use of generative AI within the realities of African higher education systems, providing a structured yet flexible lens for understanding both its potential and its challenges (Baha & Okolo, 2024).

Methodology

Systematic Review Approach

We conducted a systematic review to synthesize evidence on opportunities, ethical concerns, and institutional preparedness related to generative AI in African higher education. We followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2009 guidelines, which emphasize transparency, replicability, and critical appraisal of included studies (Moher, 2009).

Search Strategy

We searched six academic databases: Education Source Ultimate, Web of Science, Academic Search Ultimate, ERIC, PsycINFO, and Humanities Source Ultimate. The search strategy combined terms for generative AI tools, education levels, geographic locations, and thematic interests (Table 1). We conducted the search on May 27, 2025, and limited it to publications from 2022 to 2025 because GenAI tools, such as ChatGPT, only became publicly accessible in late 2022. Studies within this period reflect the most recent evidence on their educational applications, ethical considerations, and

institutional readiness. We applied filters to include peer-reviewed journal articles and conference papers published in English.

Table 1. Search Terms and Strategy (Conducted May 27, 2025).

Topic	Search terms
Generative AI	("generative AI" OR "large language models" OR "LLMs" OR "ChatGPT" OR "Bard" OR "Gemini" OR "NotebookLM" OR "Consensus app" OR "Meta LLaMA" OR "language models" OR "AI-generated content" OR "natural language generation" OR "text generation")
Education Level	("higher education" OR "tertiary education" OR "universities" OR "college students" OR "postsecondary education" OR "academic institutions")
Geographic Location	("Africa" OR "Sub-Saharan Africa" OR "East Africa" OR "West Africa" OR "North Africa" OR "Nigeria" OR "Ghana" OR "Kenya" OR "South Africa" OR "Ethiopia" OR "Uganda" OR "Tanzania" OR "Egypt" OR "Senegal" OR "Rwanda" OR "Botswana")
Thematic Focus	("opportunities" OR "benefits" OR "impact" OR "use cases" OR "ethics" OR "academic integrity" OR "plagiarism" OR "AI misuse" OR "policy" OR "infrastructure" OR "training" OR "faculty readiness" OR "AI governance")

Data Sources

We retrieved 110 records into Covidence, which automatically removed 28 duplicates, leaving 82 records for title and abstract screening. Thirty-one studies were excluded as irrelevant, and two independent raters reviewed 51 full-text articles. Covidence automatically calculated interrater reliability, which indicated almost perfect agreement ($\kappa = 0.94$). Twelve articles were excluded (e.g., conceptual papers, studies without full-text access, those not focused on generative AI or higher education, non-English articles, and non-peer-reviewed sources), leaving 39 studies for the final synthesis (Figure 1). We extracted data on study context (country), AI tools, study focus, and key findings related to opportunities, ethical concerns, and institutional readiness (Table 3). Detailed inclusion and exclusion criteria are provided in Table 2.
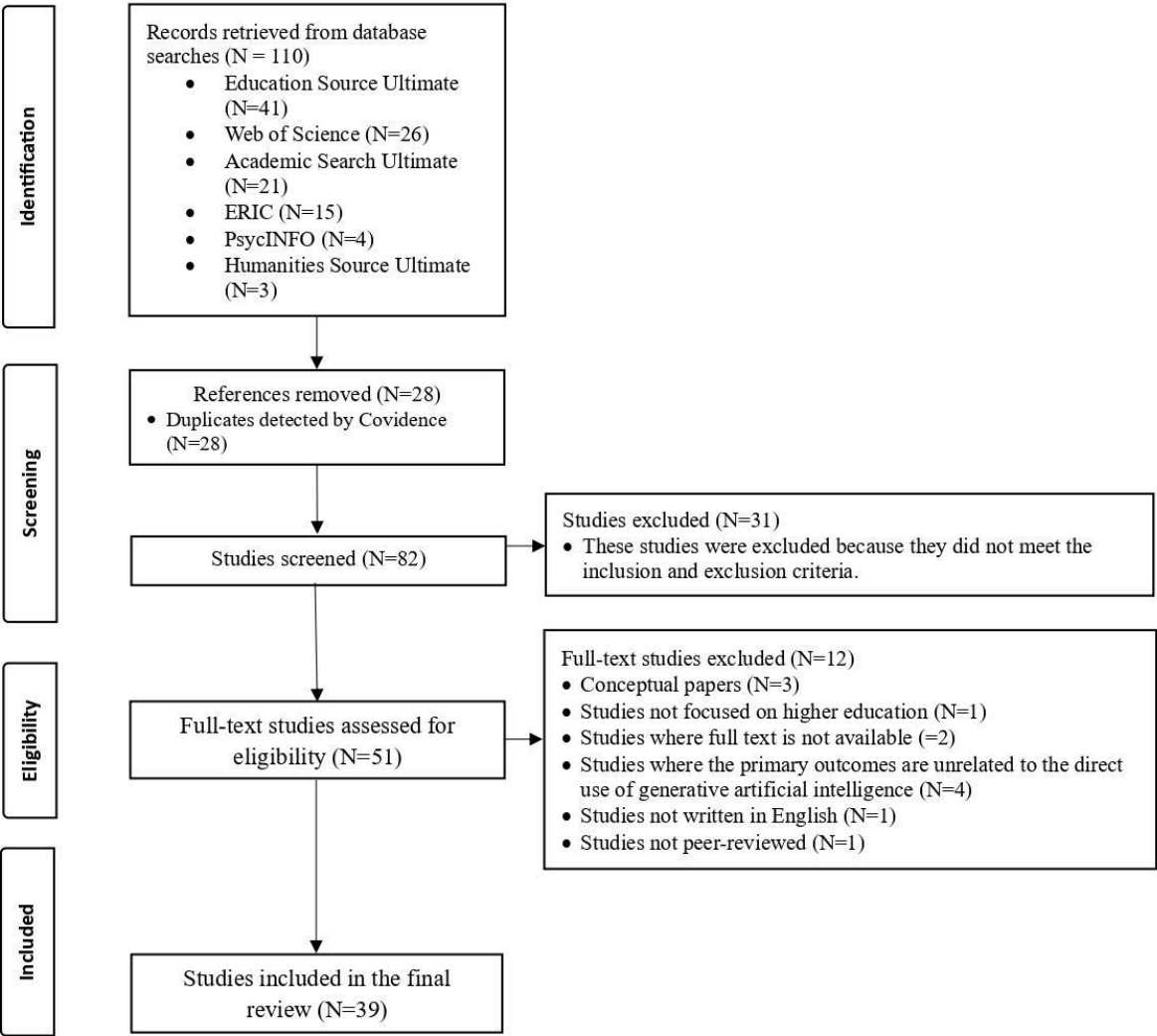
Figure 1. PRISMA flow diagram of study selection process **Note.** Adapted from Moher et al. (2009). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. PLoS Med, 6(7), e1000097. https://doi.org/10.1371/journal.pmed.1000097.

Table 2. Inclusion and Exclusion Criteria.

Criteria	Inclusion	Exclusion
Publication Type	Peer-reviewed journal articles, conference papers	Reviews, conceptual papers, logs, opinion pieces, non-scholarly sources, editorials, book reviews
Language	English	Non-English publications (unless translated)
Time Frame	2022-2025	Articles published before 2022
Geographical Focus	Studies conducted in or focused on Africa	Studies with no relevance to African contexts
Educational Level	Higher education: universities, colleges, polytechnics, teacher education	Studies do not focus on higher education (e.g., K–12 education,

		corporate training, or informal learning settings)
AI Tools Used	Focus on GenAI tools (e.g., ChatGPT, Bard, Gemini, LLaMA, Consensus App, NotebookLM)	Studies do not focus on AI or use only traditional AI (e.g., expert systems, predictive analytics)
Methodology	Empirical studies (qualitative, quantitative, or mixed).	Technical engineering papers without relevance to educational use or context

Table 3. Characteristics of Included Studies on Generative AI in African Higher Education.

References	Country	AI Tools Used	Focus	Key Findings
Abdaljaleel et al. (2024)	Egypt	ChatGPT	Determinants of attitude and usage; validation of the TAME-ChatGPT scales.	Students showed positive attitudes toward ChatGPT driven by ease of use, perceived usefulness, social influence, and low perceived risk. Usage was relatively high, highlighting the need for AI literacy and tailored institutional policies.
Combrinck (2024)	South Africa	ChatGPT, Julius AI	Integration of generative AI in mixed methods research data analysis (tutorial and case study)	Demonstrated how ChatGPT can assist with qualitative coding, quantitative descriptive analysis, and integration of mixed methods data. Found descriptive statistics outputs to be reliable, and qualitative coding moderately aligned with human coding

				when trained with examples.
Indrawati et al. (2025)	Botswana	ChatGPT	Adoption determinants (UTAUT2) using survey (n=518) and SmartPLS	Personalized support is seen to improve learning performance. Digital divides and resource constraints limit equitable uptake. Personal innovativeness and performance expectancy were the strongest predictors of adoption; social influence and resource availability mattered less; the model explained of the variance in intention/usage, which calls for training and infrastructure upgrading.
Maphoto et al., 2024	South Africa	ChatGPT, DWAs/APTs/AWE	Lecturers', students', markers' views on academic writing	GenAI positively impacted teaching/learning, motivating students, and reducing monotony in large ODeL cohorts. Risks of misconduct/over-reliance; Turnitin limitations with AI-generated text highlighted.

				Advocates for human–AI collaboration frameworks and critical pedagogy to guide use.
Venter et al., 2025	South Africa	Conversational AI (ChatGPT, Claude, Gemini, Copilot)	Use in teaching/research; mixed-methods; activity theory	CAI supports qualitative analysis (theme discovery, time savings). Academics raise ethics and alignment-to-education concerns. Younger academics used CAI more for research than teaching; usage varied by faculty (science for teaching; business for research).
Ya'u & Mohammed, 2025	Nigeria	AI-assisted writing tools (Grammarly, QuillBot, Turnitin feedback; LLMs)	Usage, proficiency effects, ethics (quantitative, n=350)	Heavy uptake (75% users) mainly for grammar (85%) and sentence structuring (70%); 65% believe AI enhances writing. 47% associate AI with plagiarism and 49% with harm to originality (risk of dependence and weakened independent literacy). Recommends structured integration that couples AI with

				critical-thinking instruction.
Sallam et al., 2025	Egypt	ChatGPT	Apprehension scale development/validation (FAME) and anxiety toward GenAI (n=587)	Prior use of ChatGPT was linked to lower apprehension. Apprehension was neutral on average; Mistrust scored highest, then Ethics; pharmacy & medical laboratory students were most apprehensive. The scale confirms a valid, reliable FAME tool; it urges curricula that blend technical proficiency with ethics.
Ahmad et al., 2024	Egypt, Sudan	ChatGPT, Bard AI, Bing AI, Chatsonic, Writesonic, OpenAI Playground, Claude, Socratic, Jasper, Falcon LLM, LaMDA2	Awareness, benefits, threats, attitudes, satisfaction	Users reported greater benefits than non-users. ChatGPT used by 81% of AI-aware respondents; results signal a readiness gap and need for awareness/skills programs.
van den Berg & du Plessis (2023)	South Africa	ChatGPT	Contribution of generative AI (ChatGPT) to lesson planning, critical thinking, and openness in teacher education	ChatGPT can generate basic lesson plans, worksheets, and visual presentations, saving teachers time and promoting openness and

				equity. Its use can enhance teachers critical thinking by requiring evaluation and adaptation of AI-generated content. Limitations include potential bias, inaccuracies, and plagiarism concerns; thus, ChatGPT should supplement, and not replace teachers.
Venter et al., 2024	South Africa	ChatGPT	Opportunities, challenges, and ethical considerations in using conversational AI in teaching, learning, and research	Many academics use CAI for research support; recognize numerous advantages for teaching/research. The study highlights ethical integration challenges in the adoption of ChatGPT.
Ivanov et al., 2024	Egypt	ChatGPT	Factors influencing adoption of generative AI through the Theory of Planned Behavior (TPB)	Perceived strengths/advantages of GenAI significantly increase attitude, subjective norms, and perceived control.
Oluwadiya et al., 2023	Nigeria	ChatGPT (43.6%); other AI (grammar checkers 62.3%)	Perceptions, benefits, and risks of AI among medical students and lecturers (10 universities)	Students reported higher prior use than lecturers and were more likely to fear dehumanized

				care, skill decline, redundancy, and patient harm (e.g., 70.6% vs. 60.8%; 79.3% vs. 71.3%). Opportunities co-existed with pronounced ethical and patient-safety concerns, underscoring a need for curriculum integration and guidance.
Adewale, 2025	South Africa	ChatGPT	ChatGPT usage among female academics and researchers	Mixed perceptions: Many used ChatGPT to support research productivity, but some feared that its unethical use could compromise integrity. ChatGPT improved productivity, but required guidelines and mentoring for ethical use and upskilling of female academics.
Hidayat-ur-Rehman & Ibrahim, 2024	Egypt	ChatGPT	Factors shaping educators' adoption (mixed-methods; 243 surveys)	Intention to use is influenced by effort expectancy, autonomous motivation, learner AI competency, and innovative behavior. Resistance arose from perceived

				unfair evaluation, overreliance, and bias/inaccuracy; concerns about fraudulent use were insignificant. The study highlights the need for training and ethical safeguards
Ojo (2024)	Nigeria	ChatGPT	Factors influencing students' adoption of ChatGPT in learning (Technology Acceptance Model)	Behavioral intention to use ChatGPT was strongly predicted by perceived usefulness, ease of use, personal innovativeness, and social influence. Perceived risk negatively influenced intention. The study highlights ethical issues (e.g., academic integrity, critical thinking) and emphasizes the need for policies and balanced use of AI.
Essien et al., 2024	Nigeria	ChatGPT	Socio-cultural influences on GenAI engagement (activity theory; 899 students, 17 universities)	Student engagement is enhanced by ease of use and alignment with educational goals. Engagement is hindered by frequent need for technical support

				and socio-cultural barriers (e.g., norms, infrastructure gaps). The study recommends user-friendly tools, robust support, and culturally aligned policies.
Baidoo-Anu et al., (2024)	Ghana	ChatGPT	Develop and validate the Students' ChatGPT Experiences Scale (SCES) and examine awareness, perceptions, and demographic differences among higher education students.	SCES supported a three-factor solution: perceived academic benefits, accessibility, attitude, and academic concerns.
Daha & Altelwany (2025)	Egypt	ChatGPT	ChatGPT use is linked to goal orientations and self-efficacy.	Students with a high learning goal orientation and academic self-efficacy were less likely to use ChatGPT frequently, whereas those with an avoidant performance orientation used it more frequently. ChatGPT use was associated with procrastination and reduced academic performance. Institutions need policies to manage misuse and promote balanced use.

| Opesemowo et al. (2024) | Nigeria | ChatGPT | Lecturers' attitudes and perceptions on ChatGPT for instructional assessment. | Lecturers had low attitudes and perceptions of ChatGPT's potential for assessment. Concerns focused on reliability, ethics, and risks to academic integrity. The study recommended targeted training to enhance lecturer readiness and improve their effective use in assessments. |
| Sevnarayan (2024) | South Africa | ChatGPT | Impact of ChatGPT in open distance e-learning (ODeL) | Students found ChatGPT more engaging/interactive, with personalized feedback and instant support; it also enhanced accessibility, including language support. Lecturers reported negative attitudes, risks of over-reliance, cheating, and authenticity issues. The study highlights the need for responsible-use guidance, lecturer training, policy, and assessment redesign to address |

				equity and integrity.
Yusuf et al. (2024) –(a)	Nigeria, Egypt, Kenya, Burkina Faso	ChatGPT, GrammarlyGo, Bard, DALLE, JukeBox, Synthesia, Stable Diffusion, MidJourney, ChatSonic, YouChat	Opportunities and threats of GenAI in higher education from multicultural perspectives	High awareness and positive intentions to use GenAI for information retrieval and text paraphrasing. Benefits include enhanced learning and productivity. Ethical concerns include academic dishonesty, declining cognitive skills, and culturally influenced views on responsible AI use. Emphasis on the need for robust, culturally sensitive policies for ethical integration.
Pramjeeth & Ramgovind (2024)	South Africa	ChatGPT, Copilot, Midjourney, and DALL-E	Ethical implications of GenAI tools in higher education.	The study highlighted the need for clear ethical guidelines and policies to ensure fairness and protect institutional reputations.
van Wyk et al (2023)	South Africa	ChatGPT	Views of academics on ChatGPT as an AI-based learning strategy at an open distance e-learning (ODeL) institution of higher education.	The study found three major themes that emerge from the analysis of the chat posting: awareness of ChatGPT as an AI conventional-

				based learning tool, benefits and drawbacks of ChatGPT as a conventional-based learning approach, and ChatGPT as a tool for enhancing student learning.
Ravšelj et al. (2025)	Egypt, Tanzania, Ghana	ChatGPT	Early student experiences and perceptions of ChatGPT's usage, capabilities, ethics, satisfaction, learning-outcomes, skills development, labor-market implications, and emotional responses.	ChatGPT is primarily being used for brainstorming, text summarization, and literature search. The author expressed concerns about reliability, academic integrity, and the need for AI regulation.
Eldakar et al. (2025)	Egypt	GenAI	Integrate three models into one integrated model: TAM, UTAUT, and SCT to understand how GenAI self-efficacy, perceived ethics, academic integrity, social influence, facilitating conditions, perceived risks, ease of use, and perceived usefulness influenced academic researchers' intention to adopt GenAI in research.	The study showed that GenAI self-efficacy, social influence, and perceived ethics are significantly related to perceptions of ease of use, usefulness, and intention to use GenAI. Facilitating conditions have a negative effect on perceived ease of use, and perceived risk does not affect perceived usefulness or intention to use

				significantly. Also, the study found that ethics and academic integrity affect perceptions of GenAI's usage and utility.
Yusuf et al. (2024) - (b)	Nigeria	ChatGPT	Development and validation of a five-phase framework (familiarizing, conceptualizing, inquiring, evaluating, synthesizing) to train students' critical thinking in synthesizing AI-generated texts.	The framework significantly improved students' critical thinking (CrT) scores across tasks (Practice M=2.84; Mastery M=3.68; Challenge M=4.33). In a comparative experiment, the framework outperformed a self-regulated learning model and an unstructured approach on interpretation, analysis, evaluation, inference, and explanation.
Mahfouz & AbdelMohsen (2025)	Egypt	ChatGPT	Students perceived ease of use, usefulness, ethical appropriateness, and concerns (privacy/security and impact on higher-order thinking skills) when using ChatGPT for EFL essay writing.	Students view ChatGPT as useful and easy to use. However, concerns exist about negative impacts on creativity, higher-order thinking, and scientific integrity. The paper recommendation includes regulatory

				practices, new assessment methods, and educator training to mitigate ethical risks.
Mutanga et al. (2024)	South Africa	ChatGPT	Lecturers' attitudes toward and experiences of integrating AI tools into their teaching.	Enthusiastic lecturers praised AI for providing immediate, personalized feedback and supporting interactive lesson design. Cautiously optimistic lecturers piloted AI integration as a supplement to traditional methods, stressing professional development and balance. Skeptical lecturers raised concerns over accuracy, academic integrity, and potential misuse without adequate monitoring.
Namatovu & Kyambade (2025)	Uganda	ChatGPT	Leveraging AI in academia: university students' adoption of ChatGPT for writing coursework (take home) assignments through the lens of UTAUT2	The findings show that performance expectancy, habit, and social influence significantly impact adoption, while effort expectancy and

				price value have less influence.
Singh (2023)	South Africa	ChatGPT	Maintaining the integrity of the South African university: The impact of ChatGPT on plagiarism and scholarly writing	Professors interviewed in the study expressed a welcoming stance toward generative AI tools such as ChatGPT. Rather than demonizing these technologies, they stressed the importance of educating students on how to engage with them responsibly and ethically. Much of the responsibility, they argued, falls on lecturers and academic institutions to cultivate a teaching and learning environment that embraces these tools. By integrating AI thoughtfully into pedagogy and curriculum design, universities can help shape more adaptive and forward-thinking scholarly practices

Abdelhafiz et al., (2025)	Egypt	ChatGPT	Knowledge, perceptions, attitudes, and practices of undergraduate medical students	78.5% of students had used ChatGPT; positive perceptions, attitudes, and practices were reported; concerns existed about reliability, potential misuse, and impact on academic integrity and critical thinking.
Segbenya et al. (2024)	Ghana, Nigeria, South Africa, and Uganda.	ChatGPT, OpenAI, and QuillBot.	Modelling the influence of antecedents of artificial intelligence on academic productivity in higher education: a mixed-method approach	The study found that academics hardly use the main AI tools/platforms, and those mainly used for research and teaching-related activities were ChatGPT, OpenAI, and Quillbot. These AI tools were used mostly for general searches for information on course-related concepts, course materials, and plagiarism checks, among others. The study further revealed that challenges associated with AI usage influenced the productivity of academics

				significantly. Finally, the availability of AI tools was found to engender AI usage, but does not directly translate into the productivity of academics.
Chauke et al. (2024)	South Africa	ChatGPT	Postgraduate Students' Perceptions on the Benefits Associated with Artificial Intelligence Tools on Academic Success: In Case of ChatGPT AI tool	The study found that ChatGPT proves beneficial for postgraduate students, with some utilising the AI tool to refine their research topics before submission to their supervisors. Moreover, ChatGPT assists postgraduate students in identifying grammatical errors and paraphrasing their academic writing, contributing to the enhancement of their writing skills.
Mohlake & Mohale (2024)	South Africa	None (Questionnaire responses to learners' adaptation to blended learning using artificial intelligence)	Student Assistants' Perceived Leadership Impact of Artificial Intelligence on the Reading and Writing Landscape	An analysis of the responses from 44 language consultants revealed three key findings. First, the majority do not consider AI a threat to their job

				security. Second, while they recognize the benefits of generative AI, they acknowledge the need for substantial reskilling to use it effectively. Third, many express concern that AI use among students may hinder creativity and critical thinking, while encouraging academic laxity and plagiarism.
Yakubu et al. (2025)	Nigeria	ChatGPT and Google's Gemini	Students' behavioural intention to use content generative AI for learning and research: A UTAUT theoretical perspective	The findings showed that three of the factors, performance expectancy ($\alpha = 0.551$, $p < 0.001$), effort expectancy ($\alpha = 0.466$, $p < 0.001$), and social influence ($\alpha = 0.507$, $p < 0.001$) were observed to be determinants of behavioural intentions to use CG-AI tools. Facilitating conditions, perceived risks, and attitude towards

				technology, on the other hand, showed no significant impact on students' behavioural intention to use CG-AI tools.
Ofem et al. (2024)	Nigeria	ChatGPT	Examine students' perceptions, attitudes, and utilization of ChatGPT, and the role of sex and age in these linkages.	The study found that regardless of sex or age, students with positive perceptions of ChatGPT were more prone to use it for dishonest academic purposes. Also, a sex disparity in the direct impact of perception on ChatGPT use, which was particularly pronounced for female students. Interestingly, significant age-related differences were observed, with a stronger effect observed for younger students, and a negative direct effect of attitude on ChatGPT use for academic dishonesty was recorded, with attitude further serving as a

				significant negative mediator of the relationship between perception and ChatGPT use. This mediating effect was consistent across sexes but varied with age, being stronger among younger students than among their older counterparts.
Ringo (2025)	Tanzania	ChatGPT	Explore the effect of ChatGPT use (GPU) on the doctoral students' academic research progress (ARP) and the moderating role of hedonic gratification (HEG) in this relationship through the use of PROCESS macro and confirmatory factor analysis.	The study showed that ChatGPT use (GPU) significantly enhances academic research progress (ARP). Also, hedonic gratification (HEG) significantly moderates this relationship, with the positive effect of GPU on ARP intensifying as levels of HEG increase.
Aggarwal et al. (2025)	Ghana, South Africa	ChatGPT, Canva, Grammarly AI, Mentimeter, QuillBot, ResearchRabbit, and Scribd	The utilization of AI among academicians in audiology and speech-language therapy (ASLT)	The study showed that nearly sixty-eight percent of the academicians used AI tools in their practice, while the major concerns reported in the study were the authenticity of the data, security,

				the addition of irrelevant information, and incorrect citations.
Komba (2024)	Tanzania	ChatGPT	The influence of ChatGPT, an AI-based chatbot, on the digital learning experience of students at Mzumbe University.	The study demonstrated that ChatGPT is widely used in educational contexts and has a positive influence on students' study habits, academic performance, and understanding of course material. Students appreciated the system's simplicity, tailored instruments, and the promptness and accuracy of the responses, despite the possibility of isolated mistakes.

Note. Some studies were conducted in more than one country; only African countries were recorded in such instances.

Results

We synthesized the findings thematically and interpreted them using the TOE framework to reflect the technological opportunities created by generative AI, the environmental and ethical concerns associated with its use, and the organizational readiness of African higher education institutions to support its adoption. This structure highlights the potential of generative AI and the contextual and institutional factors that influence its integration. The synthesis begins with an overview of the geographic distribution of studies to provide insight into where generative AI research activity is concentrated across Africa, followed by thematic findings on opportunities, ethical concerns, and institutional preparedness.

RQ1: Geographic Distribution of Studies on GenAI in African Higher Education

The geographic distribution of studies is presented in Table 4 and illustrated visually in Figure 2 (proportions) and Figure 3 (absolute counts). Although only 39 studies were included, some studies were conducted in more than one country, resulting in a total frequency count of 49. South Africa (n = 15), Egypt (n = 11), and Nigeria (n = 10) were the most represented, followed by Ghana (n = 4), Tanzania (n = 3), Uganda (n = 2), and Botswana, Burkina Faso, Kenya, and Sudan (n = 1 each).
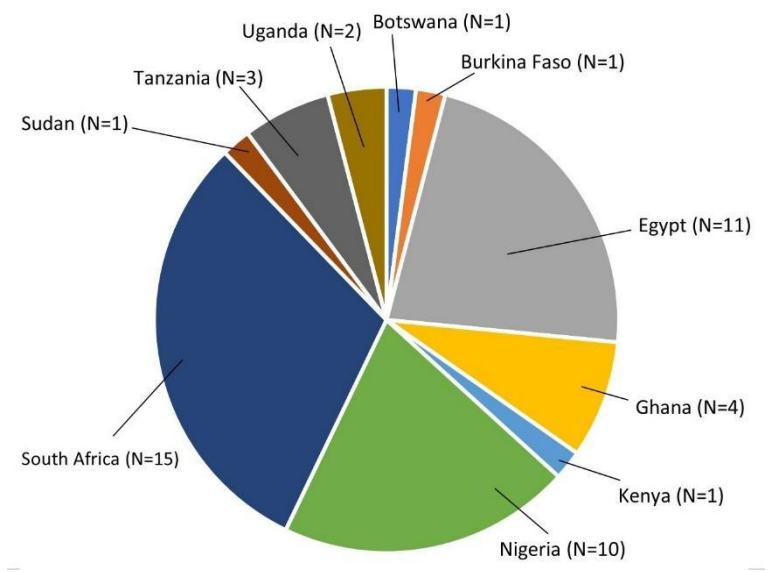
Figure 2. *Proportion of studies by country (N = 49). Note.* Some studies were conducted in more than one African country; only African countries were counted, resulting in a total frequency of 49 from 39 included studies.
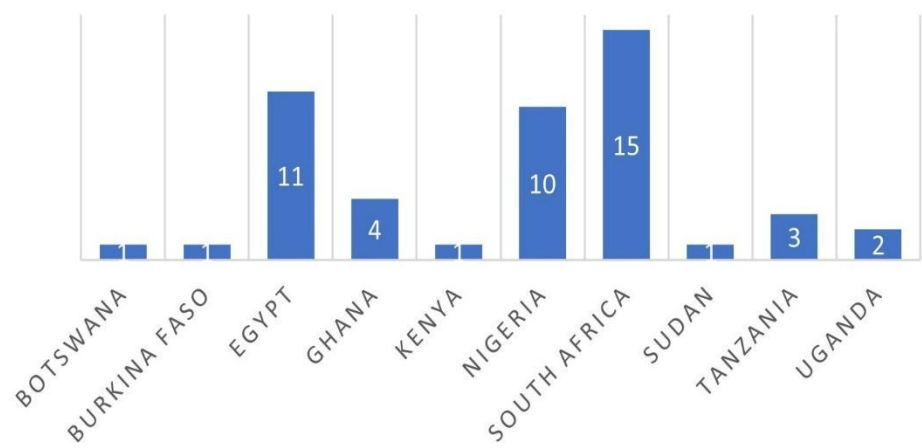

Figure 3. *Number of studies by country (N = 49). Note.* Some studies were conducted in more than one African country; only African countries were counted, resulting in a total frequency of 49 from 39 included studies.

Table 4. Geographic Distribution of Studies on Generative AI in African Higher Education.

S/N	Country	Frequencies
1	Botswana	1
2	Burkina Faso	1
3	Egypt	11
4	Ghana	4
5	Kenya	1
6	Nigeria	10
7	South Africa	15
8	Sudan	1
9	Tanzania	3
10	Uganda	2
	Total	49

Note. Some studies were conducted in more than one African country; therefore, the total frequency (49) exceeds the number of included studies (39).

RQ2: Opportunities of GenAI in African Higher Education

Our review shows that GenAI is reshaping how African universities teach, learn, and conduct research.

Transforming Teaching and Learning: AI-powered tools enhance instructional delivery and personalize learning experiences. Adaptive platforms and tutoring systems provide real-time feedback and customized learning paths, supporting self-paced learning (Abdaljaleel et al., 2024; Sallam et al., 2025). Chatbots and predictive analytics improve student engagement and reduce faculty workload (Venter et al., 2025; Ringo, 2025). In South Africa, AI integration in distance learning boosts motivation and reduces learning monotony (Maphoto et al., 2024). Nigerian universities report improved efficiency in large classes, with AI delivering instant writing feedback (Ya'u & Mohammed, 2025; Essien et al., 2024). In Ghana and Tanzania, students attribute stronger study habits and academic performance to AI's simplified explanations and tailored support (Baidoo-Anu et al., 2024; Komba, 2024).

Enhancing Research and Academic Processes: AI streamlines research tasks such as idea generation, literature review, data analysis, and manuscript drafting (Adewale, 2024; Segbenya et al., 2024). Postgraduate students use ChatGPT to refine research topics and improve writing clarity (Chauke et al., 2024). Faculty automate routine tasks, freeing time for mentoring and collaboration (Mutanga et al., 2024; Ahmad et al., 2024). In qualitative research, AI coding enhances pattern recognition and analysis depth (Combrinck, 2024; Venter et al., 2025). Uganda-based studies note AI's value for essay writing and information synthesis (Namatovu & Kyambade, 2025).

Promoting Equity and Expanding Access: AI has the potential to reduce educational disparities by offering low-cost, adaptive learning resources and bridging gaps in institutions with limited instructional capacity (Indrawati et al., 2024; van den Berg & du Plessis, 2023; Baidoo-Anu et al., 2024). These advancements are especially significant for underserved communities, enabling learners in remote and resource-constrained areas to access quality education opportunities previously out of reach.

RQ3: Ethical Concerns Regarding the Use of GenAI in African Higher Education

Despite these benefits, several ethical challenges remain prominent.

Academic Misconduct: Plagiarism and academic dishonesty are widespread concerns in this era of GenAI. A study reveals nearly half of Nigerian students link AI use with reduced originality (Ya'u & Mohammed, 2025). Faculty fear overreliance on AI tools undermines skill development and authentic learning, while institutions struggle to distinguish AI-generated content from student work (Maphoto et al., 2024; Mutanga et al., 2024; Ofem et al., 2024; Abdelhafiz et al., 2025).

Bias, Reliability, and Privacy: AI-generated content often contains superficial or inaccurate information and can perpetuate biases embedded in training data, marginalizing African languages and contexts (Segbenya et al., 2024; Aggarwal et al., 2025). Students also express concern over unclear data privacy and security practices (Combrinck, 2024; Mahfouz, 2025). These concerns highlight the need for localized AI training data and stronger institutional policies to ensure accuracy, fairness, and data protection.

Human Skills Decline: We found in our review that overreliance on GenAI may reduce critical thinking, independent writing, and cultural expression (Ivanov et al., 2024; Ahmad et al., 2024). South African students fear AI alters personal writing styles (Maphoto et al., 2024), while Nigerian medical students worry about loss of clinical skills and empathy (Oluwadiya et al., 2023).

Digital Divide: Limited internet connectivity, high broadband costs, and inadequate devices remain major barriers, risking deeper educational inequalities rather than narrowing them (Indrawati et al., 2024; Baidoo-Anu et al., 2024; Namatovu & Kyambade, 2025). Addressing this gap requires

targeted investment in digital infrastructure and affordable connectivity solutions to ensure equal access to AI-enabled education.

RQ4: Preparedness of African Higher Education Institutions for GenAI Adoption

Institutional readiness for AI integration remains inconsistent.

Policies and Governance: Few universities have formal AI policies, and where present, they are often reactive and not tailored to specific contexts. Recommendations include developing clear, context-sensitive guidelines and incorporating AI literacy and ethics into curricula (Ya'u & Mohammed, 2025; Segbenya et al., 2024; Pramjeeth & Ramgovind, 2024; Mohamed Eldakar et al., 2025).

Infrastructure and Resources: Digital infrastructure limitations, such as high internet costs, unreliable connectivity, and limited device availability, hinder adoption. AI detection tools, though useful, are often cost-prohibitive for many institutions (Combrinck, 2024; Namatovu & Kyambade, 2025; Sevnarayan, 2024).

Faculty Capacity: Faculty attitudes vary, with many lacking AI literacy or training (Mutanga et al., 2024; Aggarwal et al., 2025). In Nigeria, fewer than 5% of medical faculty have received AI training, resulting in students often being more knowledgeable than instructors (Oluwadiya et al., 2023). Professional development and mentoring initiatives are recommended to increase adoption and responsible use (Opesemowo et al., 2024).

Scholarly Significance of the Study

This study offers one of the first systematic reviews focused on GenAI adoption in African higher education, highlighting opportunities, ethical concerns, and institutional readiness. While global discussions on AI in education are expanding rapidly, there is a paucity of research addressing how these technologies intersect with the unique contexts of African institutions. The review contributes to scholarship through the TOE framework, which provides a structured understanding of technological benefits, organizational challenges, and environmental conditions influencing AI adoption.

The analysis shows how GenAI can support personalized learning, automate academic and administrative processes, and enhance research productivity. It also raises critical ethical concerns such as academic integrity, bias, and data privacy. The mapping of geographic distribution and contextual gaps highlights inequities in AI integration, particularly within resource-constrained and policy-lagging settings.

These contributions are significant because they inform theory, policy, and practice. Theoretically, the review extends the application of the TOE framework to emerging AI contexts in developing regions. For policymakers and educational leaders, the findings offer actionable insights on capacity building, infrastructure development, and regulatory frameworks required for equitable AI adoption. For researchers, the synthesized evidence base highlights priority areas for future empirical study and supports a more inclusive and context-sensitive global dialogue on AI in higher education.

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