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Faculty and Students Preparedness for Artificial Intelligence (AI) integration in Higher Education Institutions across Sub-Saharan Africa

Jeketule Soko

Abstract: This study examines how faculty and students in Sub-Saharan African higher education are engaging with artificial intelligence (AI) in their academic practices. Specifically, the study sought to: assess faculty and students' confidence and access in using artificial intelligence tools in higher education across Sub-Saharan Africa; examine patterns of training, self-learning, and institutional support shaping AI preparedness; identify training needs and preferred learning modalities for effective and responsible AI use, and analyze challenges, ethical concerns, and attitudes influencing AI adoption in higher education. Using a descriptive cross-sectional design, survey data were collected from 315 participants across public, private, and technical/vocational institutions. Quantitative items were analyzed with descriptive statistics, and open-ended responses were thematically analyzed. Findings show that formal AI training remains limited (most respondents report no structured training), while self-learning and peer support are the dominant modes of skill acquisition. Reported barriers include unreliable connectivity and data costs, uneven device access, skills gaps, concerns about accuracy and "hallucinations," assessment integrity, plagiarism, and privacy. Attitudes toward AI are generally positive but cautious: participants value productivity, idea generation, and writing support, yet worry about overreliance and erosion of originality. Interpreted through Diffusion of Innovation, adoption appears early-to-mid stage, high perceived advantage but constrained by institutional preparedness. The study concludes that universities should (a) build tiered AI-literacy programs that progress from foundations to applied, role-specific competencies; (b) embed integrity-by-design assessment practices and clear disclosure/ethics policies; (c) invest in enabling infrastructure and equitable access; and (d) integrate AI across curricula and professional development. These steps would align day-to-day practices with policy, strengthen institutional capacity, and support responsible, context-appropriate AI use in the region.

Keywords: Artificial Intelligence Adoption, AI Literacy, Institutional Preparedness, Self-Directed Learning, Ethical AI Use, Academic Integrity, Digital Inequality, Higher Education in Africa, Faculty Development, Student Preparedness

Highlights

What is already known about this topic

- Generative AI is increasingly used in higher education, mainly for writing and productivity tasks.
- Students use AI for learning support and drafting, while faculty use it for teaching and assessment preparation.
- Policy frameworks highlight both benefits and risks, including integrity, bias, privacy, and access issues.

What this study contributes

- Shows that AI adoption in higher education is largely self-directed and tool-driven, with limited formal training and uneven institutional support.
- Identifies key AI challenges and links them to practical strategies for capacity building and policy development.

Implications for theory, practice, and/or policy

- Institutions should embed tiered, role-specific AI literacy programs, integrity-by-design assessment models, and transparent disclosure and ethics policies.
- Policy actors should align institutional frameworks with continental and global strategies for responsible and equitable AI integration.

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Introduction

Artificial intelligence (AI) is rapidly transforming teaching, learning, and research in higher education. Tools such as ChatGPT, Grammarly, Microsoft Copilot, and Google Bard have become integral to academic work by supporting writing, feedback, and personalized learning (Bond, 2024; Zawacki-Richter et al., 2019). Globally, universities are adopting AI-driven systems for content creation, grading, tutoring, and administration (OECD, 2023; UNESCO, 2023).

However, in Sub-Saharan Africa, AI integration remains uneven due to infrastructural limitations, high connectivity costs, limited technical training, and the absence of clear institutional policies (Soko, Pete, & Mureithi, 2025). These gaps constrain both faculty and students, leading to inconsistent engagement with AI tools and ethical uncertainties in their use.

Understanding how educators and learners acquire AI skills, confront challenges, and perceive ethical concerns is crucial for guiding training, governance, and curriculum design. This is particularly important in Sub-Saharan Africa, where awareness and actual usage tend to cluster around a few high-utility tools and vary by role and purpose (Soko, Pete, & Mureithi, 2025; Soko, 2026). AI engagement involves multiple dimensions—technological access, digital competence, institutional support, and responsible use (Bozkurt & Sharma, 2024). For faculty, preparedness relates to pedagogical integration in teaching and assessment, while for students it involves responsible and effective application in learning and research (Bozkurt & Zawacki-Richter, 2021). Research in teacher education further suggests that familiarity with AI, trust in its outputs, and the continued need for human validation are key factors shaping adoption and acceptance (Vinci & Berardi, 2025).

Guided by Rogers' (2003) *Diffusion of Innovation* theory, this study examines how faculty and students in Sub-Saharan African higher education institutions engage with AI. Specifically, it aims to: assess faculty and students' confidence and access in using artificial intelligence tools in higher education; examine patterns of training, self-learning, and institutional support shaping AI preparedness; identify training needs and preferred learning modalities for effective and responsible AI use, and analyze challenges, ethical concerns, and attitudes influencing AI adoption in higher education.

Literature

Global Context

Globally, artificial intelligence (AI) is reshaping teaching, learning, and research in higher education. Universities increasingly use AI tools for content generation, tutoring, feedback, and research support. Studies show that adoption centers on accessible, high-utility tools such as ChatGPT, Grammarly, Microsoft Copilot, and Google Bard due to their ease of use and cross-disciplinary relevance (Bond, 2024; Zawacki-Richter et al., 2019). These trends reflect Rogers' (2003) Diffusion of Innovation attributes of relative advantage and observability—users adopt tools that visibly improve productivity and learning outcomes.

In advanced contexts, AI enhances learning analytics, adaptive instruction, feedback automation, and accessibility for diverse learners (OECD, 2023). Tools like Grammarly, Pigai, and Criterion have improved writing quality and linguistic accuracy (Ding, Shang, & Ma, 2024; Dizon, 2024), while surveys in Europe and North America highlight AI's growing role as an academic companion valued for speed, convenience, and idea generation (HEPI, 2025).

Despite these benefits, scholars warn of ethical and equity challenges. Inaccurate AI-text detection, potential bias, and opaque algorithms threaten academic integrity and trust (Liu, Tan, & Jiang, 2024; Erol, Aydemir, & Koc, 2025). Bozkurt and Sharma (2024) stress that sustainable adoption requires

transparency, explainability, and human oversight. Accordingly, UNESCO (2023) and the OECD advocate for human-centered, ethical AI that upholds inclusion, fairness, and privacy.

Overall, global research indicates rapid but uneven AI diffusion. The literature consistently calls for structured training, institutional capacity building, and ethical frameworks—foundations essential for adapting AI use to resource-constrained regions such as Sub-Saharan Africa.

African Context

Across Africa, the discourse on artificial intelligence (AI) in education is emerging within the broader digital transformation agenda. The African Union's Continental AI Strategy (2024–2030) promotes ethical governance, innovation, and human capital development, emphasizing equitable access and localized solutions. Yet, within higher education, AI adoption remains fragmented and largely experimental (Bozkurt & Zawacki-Richter, 2021).

Evidence from universities in Kenya, Nigeria, and South Africa shows growing use of generative AI tools, but most engagement is self-initiated driven by students and faculty through peer learning, online tutorials, and social media. Formal institutional training and policies are still limited (UNESCO, 2023). This self-learning trend reflects strong individual motivation but weak systemic support.

Persistent infrastructural and socio-economic barriers, such as poor internet connectivity, device scarcity, and high data costs, continue to restrict access and constrain the trialability and compatibility dimensions of innovation diffusion (Rogers, 2003). These conditions, coupled with limited digital literacy, heighten risks around plagiarism, misinformation, and ethical misuse (Bozkurt & Sharma, 2024; Baidoo & Bondzie, 2025).

Nonetheless, policy efforts are emerging. The African Union and several national agencies are integrating AI capacity building into teacher education and research policy frameworks (AU, 2024; UNESCO, 2023). At the same time, institutional policy readiness remains limited, with fewer than one-third of respondents in a recent Sub-Saharan African study reporting clear institutional AI policies, despite strong concern about plagiarism, privacy, and bias (Soko, 2025). While these initiatives signal growing continental commitment, the gap between strategic intent and institutional implementation remains wide, highlighting the urgent need for coherent training systems, ethical standards, and curriculum reform to support responsible AI integration in African higher education.

Gaps and Context for the Present Study

Across Africa, discourse on artificial intelligence (AI) in education is gaining momentum within the digital transformation agenda. The African Union's Continental AI Strategy (2024–2030) emphasizes ethical governance, innovation, and equitable access, yet higher education adoption remains fragmented and largely self-driven (Bozkurt & Zawacki-Richter, 2021).

Evidence from Kenya, Nigeria, and South Africa shows increasing experimentation with generative AI tools, mostly through peer learning and online self-training, rather than structured institutional programs (UNESCO, 2023). This pattern signals individual initiative but limited systemic preparedness.

Infrastructural and socio-economic barriers, unreliable connectivity, limited device access, and high data costs, restrict diffusion and reinforce inequities. Combined with low digital literacy, these factors amplify risks of plagiarism, misinformation, and ethical misuse (Bozkurt & Sharma, 2024).

Continental and national policy efforts, such as AI capacity-building initiatives in teacher training and research, show growing commitment (AU, 2024; UNESCO, 2023). However, a policy–practice gap

persists, underscoring the need for coherent training systems, ethical frameworks, and curriculum integration to advance responsible AI use in African higher education.

Theoretical Background

This study is grounded in Rogers' (2003) Diffusion of Innovation (DOI) theory, which explains how new technologies spread through social systems. Adoption depends on five attributes, relative advantage, compatibility, complexity, trialability, and observability, that influence how individuals and institutions decide to adopt or reject innovations. In higher education, these attributes help explain how faculty and students engage with AI tools based on perceived usefulness, simplicity, and visible benefits (Bond, 2024; Bozkurt & Sharma, 2023a).

Relative advantage reflects efficiency and productivity gains; compatibility relates to alignment with teaching and learning practices; and complexity captures how easy or difficult AI tools are to use. Trialability and observability explain why accessible tools like ChatGPT diffuse rapidly, users can easily experiment and witness tangible benefits such as improved writing or faster feedback.

The DOI framework aligns with this study's objectives by linking training patterns to trialability and complexity, challenges and ethics to compatibility and confirmation, and policy implications to observability and perceived advantage. However, in resource-constrained settings like Sub-Saharan Africa, diffusion is shaped not only by perception but also by systemic factors, limited infrastructure, high data costs, weak digital skills, and policy gaps (Bozkurt & Zawacki-Richter, 2021).

Accordingly, this study adopts a contextualized view of DOI, integrating its explanatory strength with socio-technical and ethical realities. It interprets AI engagement as an early diffusion phase, marked by enthusiasm, self-learning, and uneven institutional readiness, offering a lens to understand how preparedness evolves across faculty and students.

Methodology

Research Design

The study adopted a descriptive cross-sectional survey design to examine how faculty and students engage with artificial intelligence (AI) in higher education across Sub-Saharan Africa. This design enabled the collection of data from diverse respondents at one point in time, capturing prevailing training modes, ethical challenges, and institutional capacity (Bond, 2024). The approach integrated quantitative and qualitative data to provide a comprehensive picture of AI engagement and readiness.

Participants

A total of 315 respondents participated, drawn from public (57%), private (33%), and technical/vocational (10%) institutions. The sample comprised 173 students (55%) and 141 faculty members (45%), with balanced gender representation (52% male, 48% female). Students were mainly undergraduates (79%), while faculty included Lecturers (57%), Tutorial Fellows (21%), Senior Lecturers (15%), and Professors (6%). Although the survey included 315 respondents, only 180 participants provided usable responses to the open-ended items; therefore, the qualitative thematic analysis was based on this subsample. Participation was voluntary and based on accessibility, ensuring representation across institution types and academic levels typical of exploratory educational research.

Data Collection Tools and Procedures

Data were collected using a structured online questionnaire consisting of 28 items divided into four thematic sections:

- Demographic Information (6 items) including role (faculty/student), institution type, gender, and academic level.
- AI Access and Confidence (7 items) – measuring respondents' awareness, confidence, and access to AI tools.
- Training and Institutional Support (7 items) – examining participation in formal training, self-learning practices, and institutional guidance.
- Challenges, Ethical Concerns, and Attitudes (8 items) – exploring perceptions of accuracy, plagiarism, academic integrity, and privacy risks.

The instrument included 20 closed-ended Likert-scale items measured on a four-point scale (Strongly Agree, Agree, Not Sure, Disagree) and 8 open-ended questions designed to capture participants' experiences and perspectives regarding AI use in higher education.

Items were developed based on existing literature on artificial intelligence adoption in education and digital competence frameworks (Bozkurt & Sharma, 2024; UNESCO, 2023; OECD, 2023). The questionnaire was reviewed by two educational technology experts to ensure clarity and relevance. A pilot study involving 15 participants was conducted to test reliability and wording, leading to minor adjustments before final distribution.

The survey was distributed through institutional mailing lists, academic networks, and professional online platforms. Participation was voluntary and anonymous, and respondents were informed about the purpose of the study and data confidentiality before completing the questionnaire.

Data Analysis

Quantitative data were analyzed using descriptive statistical techniques, including frequencies, percentages, to summarize patterns of AI use, training exposure, and institutional support among participants. These analyses were conducted to identify general trends in confidence, access, and attitudes toward artificial intelligence tools.

Qualitative responses from open-ended questions were analyzed using thematic analysis following Braun and Clarke's (2006) six-step framework, which includes:

1. Familiarization with the data through repeated reading
2. Initial code generation
3. Searching for patterns and themes
4. Reviewing and refining themes
5. Defining and naming themes
6. Producing the analytical narrative

Two independent researchers coded the qualitative responses to improve analytical reliability. Coding discrepancies were discussed and resolved through consensus. The qualitative analysis generated recurring themes such as self-directed learning, institutional capacity gaps, ethical concerns, and infrastructure limitations.

The integration of quantitative and qualitative findings enabled methodological triangulation, allowing statistical patterns to be interpreted alongside participants' lived experiences.

To strengthen interpretation, the study integrated quantitative and qualitative findings at the analysis stage. Quantitative results were used to identify broad patterns in confidence, access, training, and ethical concerns, while qualitative responses were used to explain, illustrate, and contextualize those

patterns. This triangulation enabled the study to compare statistical trends with participants' lived experiences and thereby provide a more comprehensive understanding of AI preparedness in higher education across Sub-Saharan Africa.

Validity and Reliability

Validity was enhanced through expert review, pilot testing, and triangulation of quantitative and qualitative findings. Reliability was supported by inter-coder agreement and consistency across related survey items. While generalizability was limited by non-probability sampling, the diversity of respondents improved representativeness across Sub-Saharan contexts.

Ethical Considerations

The study upheld research ethics through informed consent, voluntary participation, and anonymity of responses. Data were securely stored and used solely for academic purposes. The research complied with institutional ethics standards and the Declaration of Helsinki (2013), ensuring participants' rights and confidentiality throughout the study.

Findings and Discussions

This study investigated the preparedness of faculty and student for artificial intelligence (AI) integration in higher education institutions across Sub-Saharan Africa. Overall, the findings reveal a complex adoption landscape characterized by strong interest in AI tools, but constrained by limited institutional support, uneven infrastructure, and significant ethical concerns. Interpreted through Rogers' (2003) Diffusion of Innovation (DOI) framework, the results suggest that AI adoption in the region is currently at an early-to-mid diffusion stage, where perceived benefits encourage experimentation while systemic constraints limit full institutional integration.

1. Confidence and access among faculty and student regarding AI tools in higher education

The study examined faculty and student' confidence and access to artificial intelligence (AI) tools within Sub-Saharan African higher education institutions.

Confidence in Using AI

As presented in Table 1, although most respondents were aware of AI technologies, confidence levels varied considerably. Only 35.4% of participants (Strongly Agreed and Agreed) felt confident integrating AI into their academic work, while nearly half (49.3%) disagreed. The qualitative responses help explain this pattern. Participants who reported low confidence frequently linked it to limited formal training, uncertainty about correct use, and lack of institutional guidance. Comments such as "I just downloaded it and started using it with no training" and "I use AI, but I don't really know if I'm using it the right way" suggest that low confidence is not simply a matter of awareness, but also of inadequate structured support. In this way, the qualitative findings reinforce the quantitative result by showing why confidence remains uneven across the sample. Faculty members reported lower confidence than students, citing uncertainty over AI's pedagogical relevance, ethical limits, and institutional expectations. This finding is consistent with teacher-education research showing that familiarity, trust, and perceived need for human validation strongly influence educators' willingness to integrate AI into practice (Vinci & Berardi, 2025). Conversely, students exhibited greater experimentation and self-learning, often acquiring skills informally through peers, YouTube, or social media.

Table 1: Confidence in Using AI Tools

Element	Strongly Agree	Agree	Not Sure	Disagree	Total
I feel confident using AI tools in my teaching/learning	9.7	25.7	15.3	49.3	100

These findings reflect the complexity element of Rogers' (2003) Diffusion of Innovation theory, where perceived difficulty and lack of clarity hinder adoption. Faculty hesitance and student curiosity mirror the adopter categories described by Rogers—students acting as early adopters motivated by visibility and peer influence, while faculty serve as cautious evaluators awaiting institutional validation. Globally, similar trends have been documented. The HEPI (2025) survey found that students demonstrate higher confidence in using generative AI than instructors, while Bond (2024) and Zawacki-Richter et al. (2019) note that structured exposure and pedagogical guidance determine confidence more than awareness alone.

Access to AI Tools and Institutional Readiness

Access to AI tools was reported as uneven and highly dependent on digital infrastructure, connectivity, and affordability. Respondents highlighted unstable internet, costly data, and inadequate access to institutional licenses as major obstacles—particularly in technical and vocational institutions. These infrastructural constraints correspond to the trialability and compatibility attributes of the DOI framework: when users cannot easily experiment or align tools with institutional systems, adoption remains limited (Bozkurt & Zawacki-Richter, 2021; OECD, 2023).

According to Table 2, Institutional support was also found to be minimal. Only 30.2% of respondents agreed that their universities provided adequate training or support for AI use, while over 40% disagreed. This quantitative finding is further supported by the qualitative data. Many respondents described institutional support as absent, fragmented, or inconsistent, using expressions such as "There is no support from the institution" and "We are left to figure it out by ourselves." Others linked weak support to practical barriers such as lack of devices, subscriptions, and reliable internet. The qualitative evidence therefore substantiates the survey pattern by showing that perceived institutional unpreparedness is experienced both as a policy gap and as a resource gap. Similar findings have been reported in other African studies, where AI engagement is driven more by individual initiative than by structured institutional programs (UNESCO, 2023; AU, 2024). Participants' reliance on self-learning and peer networks reflects patterns observed by Bozkurt and Sharma (2024), who describe horizontal diffusion through informal communities rather than formal systems.

Table 2: Institutional Support

Element	Strongly Agree	Agree	Not Sure	Disagree
My institution provides adequate support in learning and using AI technologies	6.4	23.8	28.8	40.9

Overall, these results suggest that AI adoption in Sub-Saharan higher education remains in an early-to-middle diffusion stage—marked by enthusiasm, experimentation, and self-learning but constrained by weak institutional frameworks and infrastructural limitations. Consistent with international evidence (Bond, 2024; OECD, 2023; UNESCO, 2023), enhancing preparedness requires stronger digital infrastructure, structured AI literacy programs, and clear ethical and pedagogical guidelines to move from sporadic use toward sustainable integration. Taken together, these findings suggest that AI adoption is being driven more by individual initiative than by institutional readiness. This pattern aligns with studies showing that early AI adoption in higher education often emerges through bottom-up experimentation before institutional structures mature (Bond, 2024; HEPI, 2025). Within the DOI framework, this reflects the roles of trialability and observability: users are willing to experiment with accessible tools such as ChatGPT and Grammarly, but limited institutional support weakens broader

diffusion. The findings also indicate that low confidence is closely linked to lack of training and unclear guidance, suggesting that institutional capacity building remains essential for sustained adoption.

2. Patterns of AI training, self-learning, and institutional support among faculty and student

This objective examined how faculty and student acquire knowledge and skills related to artificial intelligence (AI), the extent of institutional support provided, and the learning pathways shaping preparedness. The findings reveal that AI learning in Sub-Saharan African higher education institutions remains largely informal, self-directed, and peer-supported, with limited structured institutional programs. This points to a bottom-up diffusion process, characterized by strong individual motivation but weak organizational reinforcement—a pattern typical of early-stage innovation adoption (Rogers, 2003).

Formal and Institutional AI Training

Quantitative findings indicate that formal AI training is still rare. Only 9.7% strongly agreed and 25.7% agreed that they had received any structured training, while nearly half (49.3%) disagreed. Qualitative responses reinforce this observation, with participants repeatedly emphasizing the absence of formal exposure. As several respondents stated:

> *"None."*
> *"No formal training."*
> *"I haven't taken any training on AI."*
> *"No training, just learning from social media."*

These responses complement the quantitative pattern showing limited formal training. Whereas the survey data indicate the scale of the problem, the qualitative comments reveal its form: training is often entirely absent or restricted to isolated workshops rather than sustained institutional programs. The two strands of evidence therefore converge in showing that AI learning is largely informal and self-directed. The consistency of these responses highlights a systemic capacity gap across higher education institutions. A few isolated initiatives were noted, such as university library workshops, technology seminars, or staff induction sessions, but these were exceptional rather than widespread. One respondent explained:

> *"The university library team has taken us through several training sessions on using e-resources and AI."*
> *Another added:*
> *"AI series training by my university introduced us to generative AI tools and basic prompt writing."*

These sporadic efforts show that institutional engagement with AI training remains fragmented, often confined to specific faculties or departments. The findings align with UNESCO's (2023) Guidance for Generative AI in Education and Research, which reports that many African universities are experimenting with isolated awareness sessions rather than implementing comprehensive AI literacy strategies. Similarly, the OECD (2023) cautions that lack of coherent professional development frameworks weakens institutional capacity to manage AI adoption ethically and sustainably.

From a DOI perspective, limited training opportunities constrain both trialability and compatibility. Without regular institutional exposure, users lack opportunities to experiment safely, while weak alignment with pedagogical or research goals diminishes relevance. Studies by Bond (2024) and Bozkurt and Sharma (2023a) confirm that training and structured mentorship play a decisive role in enhancing confidence and reducing perceived complexity. In their absence, users often operate with superficial knowledge, reinforcing a digital divide between innovators and late adopters.

Self-Learning and Informal Exploration

In contrast to minimal institutional training, self-learning emerged as the dominant mode of AI engagement. The majority of participants reported learning through personal initiative, experimentation, or peer networks. Typical statements included:

> *"Self-guided."*
> *"Personal reading and self-search."*
> *"Self-taught online."*
> *"I just downloaded it and started using it with no training."*
> *"Self-learning; peer training."*

Respondents frequently cited online resources such as YouTube tutorials, open MOOCs, and informal discussion forums. As one participant explained:

> *"I learned from YouTube videos and by trying out ChatGPT to see what it could do."*
> *Another noted:*
> *"I just experimented with AI on my own—no one has formally taught me how to use it."*

A related study in Ghana similarly found that familiarity and regular use were concentrated around a small number of tools, especially ChatGPT and Grammarly, with many users relying on mobile access and limited institutional support (Baidoo & Bondzie, 2025). This reliance on informal learning reflects strong intrinsic motivation and the observability and trialability attributes of DOI (Rogers, 2003). Users are drawn to AI tools they can easily access and experiment with, often discovering their utility through direct experience. However, self-learning also introduces uneven skill development and shallow understanding of AI's ethical and epistemic limitations. Participants acknowledged these gaps, with one remarking:

> *"I use AI, but I don't really know if I'm using it the right way."*

This pattern is not unique to Sub-Saharan Africa. HEPI's (2025) global student survey reported that most student use AI without prior instruction, depending instead on experimentation. Bozkurt and Sharma (2023a) similarly observed that in developing contexts, AI adoption is often user-driven, spreading through peer imitation and digital networks rather than formal institutional guidance.

Nevertheless, informal exploration can act as a precursor to formal capacity building. It generates a culture of curiosity and early adoption that institutions can later harness through structured training. As Bozkurt and Zawacki-Richter (2021) note, informal diffusion channels—such as peer collaboration—play a critical role in sustaining innovation in low-resource environments. Yet, without formal reinforcement, the diffusion curve may plateau prematurely, leaving early adopters unsupported and the broader community disengaged. These findings show that AI adoption among faculty and students is largely self-directed rather than systematically supported by universities. This is consistent with Bozkurt and Sharma (2024), who note that digital innovations often diffuse through informal communities of practice before formal institutional arrangements emerge. However, the dominance of self-learning also produces fragmented competencies and uneven ethical awareness. UNESCO (2023) similarly cautions that self-directed AI use without structured guidance can heighten risks of misinformation, plagiarism, and inappropriate academic use.

Institutional Capacity and Preferred Training Approaches

Survey findings revealed widespread dissatisfaction with institutional support for artificial intelligence (AI) learning and capacity building. As shown in Table 3, only 6.4% of respondents strongly agreed and 23.8% agreed that their institutions provide adequate support, while over 40% disagreed. These results

indicate that AI learning across Sub-Saharan African higher education is primarily self-initiated, with minimal structured institutional involvement.

Table 3:Institutional Support for AI Learning

Element	Strongly Agree	Agree	Not Sure	Disagree	Total
My institution provides adequate support in learning and using AI technologies	6.4	23.8	28.8	40.9	100

Respondents consistently expressed frustration with the lack of institutional infrastructure, training programs, and leadership engagement. Illustrative comments included:

> *"There is no support from the institution."*
> *"We are left to figure it out by ourselves."*
> *"No workshops or guidance on using AI tools."*

Several participants also cited practical constraints such as inadequate devices and costly internet:

> *"We need laptops and internet to even start using AI tools."*
> *"Data is expensive, and sometimes AI platforms require subscriptions."*

These findings correspond with Rogers' (2003) *Diffusion of Innovation* (DOI) theory, where weak compatibility and organizational support slow innovation diffusion. Institutions act as crucial reinforcing systems—without them, adoption remains fragmented and individual-driven (Bozkurt & Sharma, 2024; OECD, 2023).

Emerging Good Practices

A few institutions demonstrated early progress through introductory seminars and workshops:

> *"My university organized seminars on using AI in teaching."*
> *"We had three half-day workshops on AI applications."*
> *"Training in using AI tools has helped me improve my daily work."*

While encouraging, these examples represent isolated initiatives rather than structured institutional frameworks. As one participant summarized:

> *"We are learning on our own because institutions have not yet caught up."*

This diffusion pattern—characterized by high trialability and observability but low systemic reinforcement—shows that faculty and student are exploring AI independently but lack consistent institutional guidance (Rogers, 2003).

Preferred Training Formats and Content

Respondents expressed a strong demand for structured, hands-on, and ethical AI training. They requested programs combining conceptual understanding with practical application, delivered progressively from basic to advanced levels:

> "Training should start from what AI is and how it works."
> "We need proper training on how to use AI effectively and ethically."
> "Step-by-step training, from beginner to advanced levels, would be useful."

Many preferred blended formats—combining in-person workshops with online modules—to encourage collaboration and applied practice:

> *"Physical workshops are better because we can practice, not just listen."*

These preferences align with global research showing that participatory and practice-based learning enhances digital confidence and ethical awareness (Bond, 2024; OECD, 2023). UNESCO (2023) likewise emphasizes "practical digital literacy" that merges competence with critical understanding. Find the summary in Table 4.

Table 4: Preferred AI Training Formats and Content

Training Dimension	Participant Preference	Illustrative Quotations
Format	Blended or face-to-face sessions	"Physical workshops are better because we can practice."
Content Focus	Ethics, responsible use, and plagiarism prevention	"We need proper training on how to use AI effectively and ethically."
Progression	Stepwise, beginner to advanced	"Step-by-step training, from beginner to advanced levels, would be useful."
Certification	Recognized, skill-based credentials	"We should get certificates to show AI competence."
Peer Learning	Train-the-trainer approach	"If they can train me, I will train others better."

From Fragmentation to Systematic Capacity Building

The convergence between the quantitative and qualitative evidence is also visible in participants' training preferences. Quantitative trends indicate low institutional support, while qualitative responses show a clear demand for structured, practical, and ethically grounded training. Comments calling for "step-by-step training," "physical workshops," and "proper training on how to use AI effectively and ethically" help explain what respondents believe is currently missing. This integration of findings suggests that the identified training gap is not only about access, but also about the nature and quality of support required. The strong demand for structured, practical, and ethical training demonstrates both recognition of AI's value and awareness of its complexities. However, the current landscape remains dominated by self-learning and informal peer networks, resulting in uneven competencies and ethical ambiguities.

From a theoretical perspective, this represents a mid-level diffusion bottleneck: users are experimenting (high trialability) and seeing visible results (observability), but institutional compatibility and reinforcement mechanisms remain weak. As OECD (2023) and Bozkurt & Sharma (2024) observe, innovation in low-resource contexts often flourishes informally but falters without coordinated policy and faculty development.

To enhance preparedness, institutions must evolve from ad hoc workshops to systematic AI capacity-building ecosystems that combine foundational literacy, ethics, and pedagogy. Training should be embedded within curricula, faculty induction, and continuing professional development programs.

Strategic Directions

Based on the findings and supported by the literature, the following strategic directions emerge for promoting sustainable institutional adoption:

1. Establish structured AI literacy frameworks integrated into staff and student development programs.
2. Develop train-the-trainer models to cascade skills within departments and promote peer mentorship.
3. Embed AI ethics and integrity training into teaching and research policies.
4. Offer blended, certification-based courses combining conceptual understanding and practical exercises.

These measures would strengthen the compatibility and confirmation stages of diffusion—transforming individual curiosity into organizational competence and embedding AI use as a normal academic practice (Rogers, 2003; UNESCO, 2023).

As one participant aptly summarized:

> *"If they can train me, I will train others better."*

This peer-learning ethos provides a practical entry point for universities to institutionalize capacity building and ensure that AI adoption grows from experimentation to sustained, ethical integration.

3. Training needs, preferred AI learning modalities, and implications for practice and policy

The fourth objective focused on identifying what kinds of AI training faculty and student considered most beneficial, how they preferred such training to be delivered, and what implications these needs hold for institutional and policy planning. The findings show a strong demand for structured, progressive, and ethically grounded AI literacy programs, emphasizing both basic awareness and applied competence. Participants expressed a collective desire to move from fragmented, self-taught learning toward institutionalized and certified training.

This growing appetite for structured learning reflects the persuasion and implementation stages of Rogers' (2003) *Diffusion of Innovation* theory, where early adopters, having experimented independently, begin calling for reinforcement through formal systems and organizational policies.

Foundational Literacy and Responsible Use

A dominant theme across responses was the call for foundational AI literacy training. Many participants emphasized the need to "start from the basics," arguing that before using AI effectively, users must first understand what it is, how it works, and its ethical implications. Their statements reveal a desire for gradual, scaffolded learning:

> *"Training should start right from what AI is, how to use it, and its benefits."*
> *"We need to understand AI properly before applying it."*
> *"Structured step-by-step courses—from beginner to advanced—would help us learn systematically."*
> *"Knowing how to use AI responsibly should come before using it for assignments or teaching."*

These calls highlight a need for conceptual clarity, echoing UNESCO's (2023) guidance that foundational literacy must precede applied competence to ensure ethical and equitable use. Participants envisioned training that combined theoretical grounding with applied exercises, including prompt generation, data interpretation, and citation verification. This approach reflects DOI's concept of *complexity reduction*: as understanding deepens, perceived difficulty decreases, promoting broader diffusion.

Faculty respondents particularly emphasized responsible and ethical AI use. Several mentioned concerns about plagiarism, copyright, and originality, underscoring the need for ethics modules:

"Training should include how to use AI ethically and avoid plagiarism."
"We must learn what is acceptable and what is not."
"It is important to know how to verify AI-generated content before using it."

This aligns with Bozkurt and Sharma's (2024) argument that responsible AI adoption requires developing "trust, transparency, and ethical competence" within institutions. It also reflects UNESCO's (2023) call for training that integrates privacy, data literacy, and academic integrity.

AI for Research, Academic Writing, and Referencing

Another central need was research-oriented AI training, particularly in writing, literature review, and referencing. Many respondents viewed AI as a potential tool to enhance research efficiency but admitted lacking the skills to use it effectively. Their voices were emphatic:

"AI training should focus on research writing, citation, and data analysis."
"We need to learn how to use AI in referencing and avoiding plagiarism."
"AI for literature review—how to search, summarize, and organize information."
"Training on research and referencing using ChatGPT and Grammarly would be very useful."
"I would appreciate training on how to track plagiarism and improve academic writing."

These sentiments reflect a desire to integrate AI into core academic practices. The most frequently mentioned tools for research support were ChatGPT, Grammarly, Copilot, Turnitin, and EndNote—all perceived as improving productivity and writing quality. This aligns with empirical findings that writing-support AI tools can enhance structure and clarity, especially for second-language student (Ding, Shang, & Ma, 2024; Dizon, 2024).

From a DOI perspective, this indicates a transition from *trialability* to *compatibility*: as users recognize how AI aligns with academic tasks, they seek institutional reinforcement to sustain adoption. Bond (2024) similarly found that structured AI training linked to academic writing and research increased educators' confidence and ethical use of generative tools.

AI for Teaching, Assessment, and Learning Integration

Educators in particular highlighted the importance of training on AI integration into teaching, assessment, and learning design. Respondents described interest in using AI to design lesson plans, grading tools, and interactive learning materials:

"Using AI to develop learning modules, set assignments, and mark scripts would help."
"We need to know how to integrate AI into curriculum design and assessments."
"AI should support teachers in making learning more engaging and efficient."
"Training on how to ensure learning is taking place despite AI assistance would be valuable."

Such insights correspond with the *compatibility* and *relative advantage* dimensions of DOI—AI is perceived as compatible with institutional goals of efficiency and learning quality when properly aligned with pedagogy. Bozkurt and Sharma (2023a) argue that in distance and open education, AI functions best as a co-creator in teaching and assessment when faculty are trained to use it intentionally. This perspective reinforces the need for pedagogical frameworks that connect AI adoption to learning outcomes rather than tool fascination.

Ethical and Professional Competence

Beyond technical proficiency, participants emphasized ethical understanding and professional discernment. They called for training that addresses privacy, intellectual property, and responsible use:

> *"Training should focus on the ethical and safe use of AI."*
> *"We need to know how to handle data privacy and consent when using AI."*
> *"Institutions should teach us how to detect and prevent plagiarism."*
> *"We should be guided on how to use AI without compromising originality."*

These voices reinforce Bozkurt and Sharma's (2024) recommendation for "explainable and trustworthy AI ecosystems" built on institutional ethics, as well as Erol, Aydemir, and Koc (2025), who stress that punitive detection mechanisms must be complemented by user education on integrity and citation ethics.

The qualitative data, therefore, point to a two-tiered ethical need: first, to establish clear institutional policies and honor codes; and second, to train users to apply ethical judgment when employing AI for writing, research, or teaching. As one respondent succinctly put it:

> *"We are not against AI; we just want to know how to use it correctly."*

Access, Infrastructure, and Institutional Support

Participants also underscored that access and infrastructure are prerequisites for training success. Many expressed frustration that enthusiasm for AI was not matched by institutional investment:

> *"Access to paid versions would help—they are smarter and more reliable."*
> *"We need computers, internet, and institutional licenses for tools."*
> *"AI should be integrated in our labs and libraries."*
> *"Universities should organize regular workshops and provide digital gadgets."*

These comments echo the *compatibility* and *trialability* constructs of DOI, showing that training cannot be effective without enabling environments. The OECD (2023) and African Union (2024) both stress that infrastructural readiness and equitable access underpin sustainable AI adoption. Institutions must therefore align training programs with resource provision to ensure inclusivity.

Preferred Learning Modalities

When asked about preferred training modes, participants favored interactive, hands-on learning. Many suggested blended formats combining workshops, online modules, and certification:

> *"Face-to-face training with practical exercises works best."*
> *"Workshops and seminars should be regular."*
> *"We need certified courses that can enhance our CVs."*
> *"Online tutorials are good, but physical classes are more effective."*

These findings indicate that respondents no longer seek only access to AI tools; they seek structured institutional frameworks that can guide meaningful and responsible use. This pattern reflects a shift from experimentation toward implementation and confirmation within the DOI process, where users begin to demand visible support systems, training pathways, and policy clarity. The findings are also consistent with wider evidence showing that sustainable AI integration depends on institutional coherence, equitable access, and continuous professional development (UNESCO, 2023; OECD, 2023). These preferences mirror DOI's *observability* dimension—visible, participatory training experiences reinforce motivation and social diffusion. They also align with Bond (2024) and Bozkurt and Sharma

(2023a), who emphasize that active, contextual learning produces stronger and more sustainable AI competence than one-off awareness sessions.

Overall, this objective reveals a strong and forward-looking demand for structured, progressive, and ethically grounded AI literacy programs. Faculty and student have moved beyond basic awareness and now seek institutional arrangements that build competence, support integrity, and connect AI use to teaching, learning, and research goals. This suggests that universities should establish tiered AI training pathways—from foundational literacy to advanced applications—and embed them in curricula, staff development, and professional certification. As one participant aptly concluded:

"If we are trained properly and guided, AI can make education better for everyone."

This captures a central message of the study which is the meaningful AI integration requires not only enthusiasm, but also preparation, guidance, and institutional commitment.

4. Challenges and attitudes toward AI use among faculty and student

This objective explored the barriers, ethical considerations, and attitudes that shape how faculty and student engage with artificial intelligence (AI) in higher education institutions across Sub-Saharan Africa. The findings indicate a dual reality: while respondents recognize AI as a powerful educational ally, they also struggle with significant obstacles, including limited access, technical competence gaps, ethical dilemmas, and inadequate policy guidance. Their voices reveal both optimism and anxiety capturing the transitional nature of AI diffusion in higher education as institutions grapple with innovation, control, and trust.

Access, Connectivity, and Cost Barriers

As indicated in Table 5, most respondents (73.3%) agreed that poor connectivity and high data costs limit their effective use of AI. These barriers were most pronounced in rural and vocational institutions. Respondents lamented inconsistent internet and high costs, which made AI access sporadic rather than routine:

"Sometimes I have to wait till night to use ChatGPT when data is cheaper."
"Internet is expensive, and connections drop in the middle of work."
"Only those with laptops and Wi-Fi can benefit fully; others just hear about it."

Table 5: Reported Access and Connectivity Challenges

Element	Strongly Agree	Agree	Not Sure	Disagree	Total
I face challenges using AI due to internet or data cost limitations	31.2	42.1	14.5	12.2	100.0

The qualitative findings provide direct contextual support for this result. Respondents explained that high data costs, unstable connectivity, and unequal access to devices limit regular AI use in practice. Statements such as "Sometimes I have to wait till night to use ChatGPT when data is cheaper" and "Only those with laptops and Wi-Fi can benefit fully" illustrate how infrastructural barriers shape day-to-day use. Thus, the qualitative data deepen the quantitative result by demonstrating how access challenges are experienced in actual learning environments. These access barriers reflect the "trialability" and compatibility challenges within Rogers' (2003) *Diffusion of Innovation (DOI)* framework. Users are eager but constrained by weak infrastructure, similar to patterns identified by OECD (2023) and UNESCO (2023), which cite digital inequities as a key inhibitor of AI integration in African education systems.

Digital Literacy and Tool Overload

Respondents frequently acknowledged limited digital skills and confusion in choosing among multiple AI platforms. Several participants highlighted uncertainty about how to begin using AI tools or how to distinguish credible ones:

> *"Poor knowledge on how to use… not knowing how to use it."*
> *Another confessed:*
> *"I am confused on which one to use. There are too many tools available, and it's overwhelming."*
> *A student explained:*
> *"I only know how to use ChatGPT because others seem too technical."*
> *Others mentioned lacking confidence to explore beyond basic text tools:*
> *"There are new AI platforms every day—I feel left behind."*
> *"I want to learn, but I don't know where to start."*

These experiences demonstrate the complexity dimension of DOI when technologies seem difficult or unclear, adoption declines. Bond (2024) and Bozkurt & Sharma (2023a) similarly report that without structured institutional training, educators experience "tool fatigue," leading to fragmented and inconsistent use.

Accuracy, Reliability, and "Hallucination" Concerns

As shown in Table 6, nearly 69% of respondents agreed or strongly agreed that they were concerned about the accuracy and reliability of AI-generated information. Participants recounted frustrations with false or outdated results and fabricated citations:

> *"AI is fast but not always right, you have to cross-check everything."*
> *"Sometimes it gives wrong answers confidently, it can mislead you."*
> *"It can give you made-up points, sometimes the books or authors don't exist."*
> *"Information can be exaggerated, not very correct, or out of context."*
> *"Sometimes the responses are shallow and repetitive."*
> *"Gen-AI hallucinates, I once got wrong results for my topic."*
> *"You can't always tell if what it gives you is true."*

Table 6: Concerns About AI Accuracy and Reliability

Element	Strongly Agree	Agree	Not Sure	Disagree	Total
I worry about the accuracy and reliability of AI-generated information	27.8	41.0	18.2	13.0	100

The qualitative responses strongly reinforce the quantitative concern about reliability. Participants did not merely report abstract worry; they described specific experiences with fabricated citations, inaccurate answers, and misleading outputs. Expressions such as "AI is fast but not always right" and "sometimes the books or authors don't exist" demonstrate how concerns about reliability emerge from actual use. This confirms that the survey pattern reflects lived academic experiences rather than hypothetical perceptions alone. These findings highlight the need for critical AI literacy that goes beyond technical use to emphasize verification, accuracy, and responsible interpretation. Bozkurt & Sharma (2024) and Dizon (2024) argue that explainable AI where algorithms' reasoning is visible—can enhance user trust and reduce misinformation risks. These concerns align with studies documenting the limitations of generative AI models. Liu, Tan, and Jiang (2024) demonstrated that AI detectors and generators both produce inaccuracies, while Erol, Aydemir, and Koc (2025) confirmed that existing

verification systems are unreliable, particularly with paraphrased or localized content. Such experiences reduce perceived relative advantage and increase risk perception, discouraging adoption. One student summarized this tension aptly:

> *"AI is fast but not always right, you have to cross-check everything."*

These findings underscore the need for AI literacy that emphasizes critical evaluation, citation verification, and data awareness, echoing Bozkurt and Sharma's (2024) call for "explainable and trustworthy AI" in education.

Overreliance, Creativity, and Learning Quality

A recurring ethical concern was the fear that AI could encourage intellectual complacency, reducing creativity and deep thinking. Participants voiced anxiety that dependence on AI diminishes learning quality and originality:

> *"AI weakens the mind, no opportunity to allow my mind to work."*
> *"Learners become lazy; they stop reading and reflecting."*
> *"It blocks creativity and originality."*
> *"Some students just copy-paste answers; they don't think anymore."*
> *"AI is making people skip the process of learning."*

Faculty respondents, in particular, expressed frustration with what they perceived as overuse of AI by students. One lecturer stated:

> *"Sometimes I receive assignments that look too polished. You can tell AI was used, but detecting it is not easy."*
> *Another added:*
> *"It is worrying when students depend entirely on AI, education loses its human touch."*

This apprehension reflects global trends where educators fear that AI undermines critical thinking and authorship (HEPI, 2025; UNESCO, 2023). In DOI terms, this skepticism relates to compatibility—the extent to which AI use aligns with institutional norms and values. When AI appears to contradict academic integrity or intellectual rigor, adoption slows despite visible advantages.

Ethics, Plagiarism, and Privacy Concerns

As summarized in Table 7, 72.5% of respondents agreed or strongly agreed that they were concerned about plagiarism, privacy, or data misuse. Many cited confusions about acceptable AI use and lack of policy clarity:

> *"Ethical concerns with plagiarism… wondering if it's ethical to use AI."*
> *"We don't know the rules, some lecturers say don't use it; others encourage it."*
> *"Privacy concerns are real; we don't know who reads what we type."*
> *"AI doesn't understand our local context; it's biased towards Western examples."*

Table 7:Ethical and Privacy Concerns

Element	Strongly Agree	Agree	Not Sure	Disagree	Total
I am concerned about plagiarism, data privacy, or misuse when using AI tools	34.5	38.0	17.2	10.3	100

The qualitative data also clarify the meaning of the reported ethical concerns. Respondents linked plagiarism and privacy anxieties to uncertainty about institutional rules, inconsistent lecturer expectations, and limited knowledge of how AI systems handle user data. Comments such as "We don't know the rules" and "We don't know who reads what we type" show that ethical concern is intertwined with policy ambiguity and limited digital literacy. In this respect, the qualitative findings help explain why ethical concern was so prominent in the survey data. These findings align with Bozkurt and Sharma (2024) and UNESCO (2023), who highlight weak ethical frameworks as a systemic challenge in emerging regions. The African Union (2024) similarly calls for regional AI governance policies to address issues of fairness, privacy, and contextual relevance. These voices highlight widespread confusion and the absence of formal ethical policies. Bozkurt and Sharma (2024) argue that without transparent guidelines, AI adoption risks fostering mistrust between learners and educators. Likewise, Erol et al. (2025) found that detection tools alone cannot ensure integrity; universities must promote ethical use through pedagogy and shared norms rather than punitive surveillance.

Privacy concerns also featured prominently. Some users worried about data collection and ownership:

> *"We don't know where our data goes when we use AI."*
> *"I fear giving personal or research information to AI platforms."*

These apprehensions reflect UNESCO's (2023) emphasis on data protection, transparency, and informed consent as foundational to ethical AI use in education.

Cultural and Linguistic Limitations

Participants also identified cultural and linguistic biases in AI systems. Many felt that AI tools misrepresented African realities or lacked localized content. As respondents noted:

> *"Local content is very minimal or misrepresented."*
> *"AI doesn't give relevant information about our region."*
> *"It struggles with African names and languages."*
> *"When I ask about African culture, it gives irrelevant answers."*

This concern echoes scholarly observations that global AI models often reflect Western-centric datasets, limiting their cultural applicability (Xiao, 2018; Bozkurt & Zawacki-Richter, 2021). The African Union's (2024) Continental AI Strategy similarly calls for local content development to ensure that AI supports regional knowledge systems. Without localization, AI may reinforce existing epistemic hierarchies, reducing its compatibility with African educational contexts.

Attitudes Toward AI: Optimism and Caution

Despite these challenges, most participants viewed AI positively when used responsibly. Quantitative findings as presented in Table 8 show that 55% strongly agreed and 33.9% agreed that AI enhances learning and teaching effectiveness, while only 3.4% disagreed.

Table 8:Attitudes Toward AI in Teaching and Learning

Element	Strongly Agree	Agree	Not Sure	Disagree	Total
AI enhances learning and teaching effectiveness	55.0	33.9	7.7	3.4	100

The qualitative findings add nuance to this positive survey trend. Although most respondents viewed AI as useful for productivity, writing, and idea generation, many also expressed caution about overreliance, reduced creativity, and erosion of originality. This suggests that positive attitudes toward AI are

conditional rather than uncritical. The integrated evidence therefore points to a pattern of cautious optimism: respondents recognize the value of AI, but also expect ethical safeguards, human oversight, and clearer institutional guidance. This aligns with earlier regional findings showing that perceived benefits of AI in Sub-Saharan higher education center on time savings, writing support, idea generation, and improved access to information (Soko, Pete, & Mureithi, 2025). As reflected in Table 1Table 8, respondents overwhelmingly recognized AI's benefits for productivity, comprehension, and creativity. Participants remarked:

"Using AI saves a lot of time."
"AI helps me summarize notes faster and understand complex concepts."
"It helps in generating ideas for assignments."
"I use AI to improve my English writing."
"AI improves productivity and creativity when used well."

However, others remained cautious, emphasizing the importance of ethics and human presence:

"AI is good but must be used ethically."
"I don't think AI can replace human teachers."
"Ethics and values are easily eroded through AI."
"They are not the same as learning from an actual human being physically."

These mixed views suggest that faculty and student are navigating the persuasion stage of diffusion (Rogers, 2003), balancing perceived advantages with moral and contextual concerns. Bond (2024) and HEPI (2025) describe this as "cautious optimism" a readiness to adopt AI tempered by ethical reflection and trust considerations.

Taken together, the findings in Tables 3–8 reveal that while AI adoption is gaining traction, it remains hindered by connectivity barriers, limited literacy, and ethical uncertainty. Faculty and student recognize AI's relative advantage such as speed, efficiency, and creativity but face constraints of complexity, compatibility, and institutional support.

This reflects a transitional phase in the Diffusion of Innovation process, where users are persuaded of AI's value yet lack enabling conditions for full implementation. Consistent with UNESCO (2023), Bozkurt & Sharma (2024), and OECD (2023), the findings call for:

1. Comprehensive AI literacy and ethics programs for faculty and students.
2. Institutional and policy frameworks clarifying acceptable use.
3. Investment in infrastructure and contextual adaptation to promote equitable, responsible AI integration.

As one participant summarized:

"AI is not the problem, the problem is how ready we are to use it responsibly."

This statement encapsulates the transitional nature of AI preparedness in Sub-Saharan higher education balancing promise with prudence, opportunity with obligation.

Conclusion and Recommendations

This study examined the preparedness of faculty and student in Sub-Saharan African higher education institutions for the integration of artificial intelligence (AI) into teaching, learning, and research. Guided by Rogers' (2003) Diffusion of Innovation (DOI) theory, it analyzed confidence, access, training, challenges, and institutional capacity.

Findings portray a higher education landscape marked by enthusiasm and experimentation but constrained by infrastructure, training gaps, and ethical uncertainty. Faculty and students are engaging with AI primarily through self-learning—via peers, social media, and online tutorials—reflecting strong motivation but weak institutional reinforcement. Limited policies, inadequate connectivity, and uncertainty about academic integrity and privacy continue to impede diffusion.

Despite these constraints, attitudes toward AI remain highly positive. Participants value its efficiency, creativity, and learning support but call for structured training, ethical guidance, and institutional policies. The study situates AI adoption in an early diffusion phase, where perceived advantages drive curiosity but systemic readiness lags behind.

From a theoretical perspective, DOI effectively explains this transition: relative advantage and observability accelerate uptake, while complexity, low compatibility, and limited trialability hinder broader adoption. The findings extend DOI by highlighting the centrality of context particularly infrastructure, ethics, and policy in shaping diffusion in resource-constrained settings.

Overall, AI preparedness in Sub-Saharan higher education is enthusiastic but uneven a stage of active curiosity constrained by systemic gaps. Moving from isolated use to institutional integration requires coordinated action in capacity building, infrastructure, policy, and curriculum design.

Recommendations

1. Institutional Capacity Building

Universities should establish structured AI training frameworks that progress from foundational literacy to advanced, discipline-specific applications. Programs should integrate technical, pedagogical, and ethical dimensions**,** using workshops, blended modules, and certification to enhance confidence and responsible use.

2. Policy and Ethical Frameworks

Develop clear institutional and national policies governing AI use in teaching, research, and assessment. Frameworks should address plagiarism, authorship, privacy, and academic integrity**,** aligning with the African Union's (2024) Continental AI Strategy and UNESCO's (2023) ethical guidelines.

3. Infrastructure and Resource Investment

Governments, universities, and partners should invest in digital infrastructure, affordable connectivity, and AI tool access. Reliable internet and device availability will enhance inclusivity and trialability, especially in under-resourced areas.

4. Integrating AI into Pedagogy and Curriculum

Embed AI literacy and ethics across curricula at all levels. Faculty development should focus on integrating AI in teaching, assessment, and research to improve relevance and compatibility with institutional goals.

5. Localized Research and Knowledge Development

Support contextual research on AI in African education, emphasizing local languages, cultural adaptation, and inclusivity. Regional collaboration can foster indigenous solutions and reduce reliance on imported AI models.

6. Regional Collaboration and Policy Dialogue

Encourage partnerships among ministries, accreditation bodies, and professional networks to harmonize AI governance and certification frameworks across the continent.

Implications for Theory, Practice, and Policy

The study reaffirms the usefulness of the *Diffusion of Innovation* framework in explaining early-stage AI adoption while emphasizing the need to incorporate socio-technical and ethical factors for developing contexts. Practically, AI adoption depends on infrastructure, institutional readiness, and policy clarity as much as individual motivation. For policymakers, building enabling ecosystems—through training, digital infrastructure, and ethical governance—is essential for equitable and sustainable AI integration. As one respondent summarized:

> *"AI is here to stay; the question is not whether to use it, but how to use it wisely."*

Future Research Directions

Future research should employ longitudinal and comparative studies to track changes in AI competence and ethics over time. Cross-country analyses and experimental training interventions could further illuminate how structured AI literacy influences teaching effectiveness and learner outcomes.

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About the Author(s)

Jeketule, Soko; Tangaza University, Kenya, jeketule@gmail.com, ORCID https://orcid.org/0000-0001-7427-9188

Author's Contributions (CRediT)

Jeketule Soko: Conceptualization, methodology, formal analysis, investigation, data curation, visualization, writing—original draft preparation, writing—review and editing. The author has read and agreed to the published version of the manuscript.

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This study is linked to the following SDG(s): Quality education (SDG 4) and Reduced inequalities (SDG 10),

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Data Accessibility Statement

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

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Please identify whether ethical approval was obtained for the work described in this article. If not, please identify whether a waiver was received, explain any ethical measures, or if an ethics review was not applicable.

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