



# Asian Journal of Distance Education

## Assessing Awareness and Usage of AI Tools Among Faculty and Learners in Higher Education Institutions in Sub-Saharan Africa

Jeketule Soko, Judith Pete, Grace Mureithi

**Abstract:** This study reports on awareness and usage of artificial intelligence (AI) tools among faculty and learners in Sub-Saharan African higher education institutions. It summarizes which tools respondents recognize, which tools they mostly use, why they use them, and the benefits they perceive. A descriptive, cross-sectional survey design was employed, analyzing responses from N = 315 participants across public, private, and technical/vocational institutions in Sub-Saharan Africa. Results indicate high visibility of general-purpose generative tools (for example, chat-based assistants), strong use of writing and assessment support, and learner focus on idea generation, writing help, and exam preparation. Reported benefits center on time savings, access to information, and improved clarity in writing and learning tasks. Differences between faculty and students suggest the need for role-specific capacity building, clear academic integrity guidance, and alignment of AI use with learning outcomes. The study aimed to explore patterns of AI awareness, use, and perceived benefits while interpreting adoption behavior through the lens of the Diffusion of Innovation theory. Limitations include reliance on self-reports and aggregate tables. The study concludes with practical suggestions for training, policy, and curriculum integration in resource-constrained contexts.

**Keywords:** AI in higher education, Sub-Saharan Africa, faculty, students, awareness, usage, academic integrity, teaching, learning, diffusion of innovation

### Highlights

What is already known about this topic:

- Generative AI tools are widely visible in global higher education.
- Students often use AI for idea generation, writing help, and study support.
- Faculty use AI for research, content, and curricula generation

What this study contributes:

- Current snapshot of tool awareness and actual use in Sub-Saharan HEIs.
- Side-by-side view of faculty versus student purposes and perceived benefits.
- Actionable recommendations for training and assessment integrity.

Implications for theory, practice, and/or policy:

- Diffusion of Innovation helps explain clustering around a few high-utility tools.
- Institutions can target role-specific capacity building and transparent policies.
- Integration into curricula should align AI use with learning outcomes.



## Introduction

This section frames the problem and the scope of the study. Globally, artificial intelligence (AI) has transformed teaching, learning, and research, influencing content creation, assessment, and student support across higher education institutions. The integration of AI technologies such as ChatGPT, Grammarly, and Microsoft Copilot has reshaped academic workflows, with universities worldwide experimenting with AI-driven tutoring, assessment tools, and administrative automation. However, these advancements are not evenly distributed across regions, with disparities in infrastructure, access, and policy contributing to differing adoption trajectories. AI tools are increasingly used in teaching, learning, and research. In Sub-Saharan African higher education, adoption is growing but uneven due to access, cost, policy, and skills differences. Understanding awareness (what people know) and usage (what people do) informs decisions on training, licensing, academic integrity, and curriculum design. The article presents a descriptive snapshot of recognition of tools, mostly used tools, purposes of use, and perceived benefits among faculty and learners. We deliberately adopted simple language approach to make the findings accessible to diverse readers and apply Rogers' Diffusion of Innovation theory to interpret adoption patterns. This theoretical lens helps explain why a small set of tools dominates academic practice by highlighting factors such as perceived usefulness, ease of use, and observability. The aim of this study is to examine the levels of AI awareness, patterns of usage, and perceived benefits among faculty and students in Sub-Saharan Africa. Specifically, the study seeks to: (1) identify the most recognized and frequently used AI tools; (2) compare AI use between faculty and learners; and (3) explore the benefits and challenges associated with AI adoption in higher education.

## Literature

Studies across higher education report a rapid and visible uptake of generative AI tools, with common uses in idea generation, drafting, and study support, but they also flag risks around integrity and assessment. Large reviews map a rapid growth of AI research and practice in universities and note that a small set of tools dominates everyday use because they are easy to access and fit many tasks (Bond, 2024; Zawacki-Richter et al., 2019). Policy and sector reports echo these observations, they describe widespread classroom exposure, uneven preparedness, and the need for guidance on safe and effective use (OECD, 2023; UNESCO, 2023). Additionally, they appreciate opportunities for inclusivity while worried of ethical, linguistic, and infrastructural inequalities. Student survey data likewise shows routine use for writing and learning tasks, driven by speed and convenience (HEPI, 2025). Together, this literature explains why awareness and use often cluster around high-utility assistants and writing tools.

Despite this growth, most existing studies analyze AI adoption from a pedagogical or technological readiness angle, often overlooking the socio-economic and institutional conditions that shape use in low-resource environments. This is particularly relevant in Sub-Saharan Africa, where digital divides, funding constraints, and policy ambiguity hinder equitable integration of AI in higher education. Recent work in African open universities highlights that institutional support and learner-centered design are critical for effective digital experiences (Soko, Nabwire, & Gachanga, 2024), underscoring the importance of contextualized strategies for AI adoption in Sub-Saharan Africa.

Work in distance and open education provides a useful lens for these patterns. Editorials and reviews in the Asian Journal of Distance Education argue that generative AI has become a co-creator in online learning, supporting content creation, tutoring, and course operations when used with care (Bozkurt & Sharma, 2023a, 2023b). Similarly, Göçmez (2023) found that AI applications in open and distance education have grown steadily between 2007 and 2021, but *evaluation designs remain underdeveloped, calling for more contextual research*.

From a theoretical perspective, these patterns align with Rogers' (2003) Diffusion of Innovation theory, which posits that adoption depends on five perceived attributes: relative advantage, compatibility,

complexity, trialability, and observability. The clustering of awareness and use around a few dominant AI tools in higher education illustrates these principles—tools like ChatGPT and Grammarly spread rapidly because they are perceived as advantageous, easy to use, and highly visible in academic networks.

Nevertheless, the literature reveals a persistent gap: while global analyses describe “what” AI tools are being used and “how” they influence learning, few studies explain “why” certain tools dominate or “how” these trends manifest in African higher education contexts. This gap justifies the present study, which examines AI awareness, usage patterns, and perceived benefits among faculty and learners in Sub-Saharan Africa, interpreted through the Diffusion of Innovation framework.

Across sources, there is broad agreement that clear policy, trustworthy systems, and basic skills training are needed. UNESCO’s guidance stresses transparency, privacy, and human oversight; the OECD highlights guardrails and educator capacity; and distance-education scholars call for trust, credibility, and explainability as core design and policy principles (Bozkurt & Sharma, 2024; OECD, 2023; UNESCO, 2023). Studies on AI-text detection warn that detectors can be unreliable or biased, so integrity work should focus on assessment design, disclosure norms, and academic writing support rather than detection alone (Erol et al., 2025; Liu et al., 2024).

Context matters for sustained use. Syntheses of distance-education systems show that adoption depends not only on tool features but also on local support, fit with tasks, and infrastructure—factors that are especially salient in resource-constrained settings (Bozkurt & Zawacki-Richter, 2021; Xiao, 2018). Much of the empirical base still comes from well-resourced regions; comparative evidence from Sub-Saharan Africa that looks at faculty and students together and links awareness to concrete use cases remains limited.

Together, the reviewed studies demonstrate that clear policy, trustworthy systems, and capacity building are prerequisites for effective AI integration. This research contributes to filling the contextual and theoretical gap by offering empirical evidence from African higher education institutions, where AI adoption is still in its formative stages.

### ***Theoretical Background***

Diffusion of Innovation (DOI) theory, proposed by Rogers (2003), explains how new ideas, practices, or technologies spread within a social system. Adoption depends on five key attributes: relative advantage, compatibility, complexity, trialability, and observability. These attributes influence how individuals or institutions decide whether to adopt or reject a given innovation.

In the context of artificial intelligence (AI) in higher education, DOI provides a useful interpretive lens for understanding why certain AI tools—such as ChatGPT, Grammarly, and Microsoft Copilot—have gained rapid visibility and usage, while others remain peripheral. Faculty and learners perceive relative advantage through time savings, productivity gains, and support in teaching or learning tasks. Compatibility reflects how well the tools align with users’ pedagogical practices and institutional culture, while observability explains how widespread visibility and social influence accelerate adoption.

This study interprets the clustering of AI adoption around a few high-utility tools as evidence of innovation diffusion at an early-to-middle adoption stage in Sub-Saharan African higher education through the lens of DOI. The theory also clarifies the differences between faculty and learners: educators act as change agents and early adopters in formal academic contexts, whereas students are often experimenters who diffuse new tools informally through peer learning.

However, the Diffusion of Innovation theory has limitations when applied to rapidly evolving digital technologies such as AI. First, it tends to assume a linear progression from awareness to adoption, which may not reflect the iterative and networked nature of modern technology uptake. Second, DOI underplays the role of structural constraints such as digital infrastructure, policy readiness, and institutional capacity, which are particularly salient in Sub-Saharan Africa.

Therefore, while DOI provides a valuable foundation for explaining adoption behavior, it is complemented in this study by a contextual understanding of socio-technical conditions that shape AI use in resource-limited educational environments. This blended perspective supports the interpretation of empirical findings and strengthens the theoretical grounding of the research.

## Methodology

### **Research Model/Design**

This study adopted a *descriptive, cross-sectional survey design* to capture a snapshot of faculty and learners' awareness and use of AI tools across Sub-Saharan African higher education institutions. The choice of descriptive design was guided by the study's exploratory purpose—to document patterns of awareness, usage, and perceived benefits without manipulating variables. This approach is suitable for identifying prevailing trends and generating insights that can inform future inferential or experimental research on AI adoption. Items included multi-select lists of familiar tools and purposes of use, a single choice for the mostly used tool, and open responses on perceived benefits. The analysis focuses on aggregate frequencies and themes available in the project materials.

### **Data Collecting Tools**

The survey instrument captured four key domains: (a) awareness of AI tools; (b) primary tools in use; (c) purposes for using AI in academic work; and (d) perceived benefits. Items were presented as structured lists with space for "other" or open-ended responses to allow qualitative elaboration. The instrument was reviewed by two educational technology experts for face validity and piloted with a small group ( $n = 15$ ) to ensure clarity and reliability before deployment.

Data were collected online through voluntary participation using a secure survey link shared via institutional mailing lists and social media platforms. No incentives were offered to maintain voluntary engagement. Ethical considerations included informed consent, anonymity, and confidentiality. Participants were informed that participation was optional, that they could withdraw at any time, and that no personally identifiable data would be stored. The study adhered to the ethical guidelines of the host institution and followed the principles of the Declaration of Helsinki for research involving human subjects.

### **Sampling**

Participants were faculty and learners enrolled in higher education institutions across Sub-Saharan Africa. They responded voluntarily to the survey. Responses came from staff and students across Sub-Saharan Africa. Counts vary by item because some respondents skipped questions. By institution type ( $N = 312$ ), most respondents were from public universities (178; 57%), followed by private universities (102; 33%) and technical/vocational institutions (32; 10%). The study by gender ( $N = 314$ ) included male respondents (165; 53%) and female respondents (149; 47%).

This sampling was non-probability and based on accessibility and willingness to participate, making it appropriate for exploratory studies but limiting generalizability. The Kenya-heavy sample is explicitly acknowledged as a limitation and should be interpreted as indicative rather than representative of the wider Sub-Saharan context.

Based on their role ( $N = 315$ ), students were 173 (55%) and faculty 142 (45%). Within faculty ( $N = 141$ ), most were Lecturers (81; 57%), followed by Tutorial Fellows (30; 21%), Senior Lecturers (21; 15%), and

Professors (9; 6%). Within students (N = 174), most were undergraduates (138; 79%) and the rest postgraduates (36; 21%).

### **Data Analysis**

Quantitative data were analyzed using descriptive statistics (frequencies and percentages) to identify dominant AI tools, usage purposes, and perceived benefits. Qualitative responses were analyzed thematically following Braun and Clarke's (2006) six-step framework—familiarization, coding, theme generation, review, naming, and reporting. Two coders independently reviewed open-ended responses, with discrepancies resolved through discussion to enhance inter-coder reliability. Themes were supported by representative quotes to ensure transparency and depth of interpretation.

### **Validity and Reliability**

The findings are limited by self-report and by reliance on pre-coded categories. We mitigated these issues by using clear definitions for each theme and by checking consistency between awareness and usage patterns across items. Reliability was further reinforced through coder agreement in qualitative analysis and through comparison of item frequencies to verify internal consistency. While generalization is constrained by non-probability sampling, the descriptive accuracy and internal coherence of results support the study's methodological robustness.

Future studies are encouraged to employ longitudinal designs to track evolving patterns of AI adoption and validate findings across diverse educational contexts. They can also carry out inferential tests on the data.

### **Research Procedures**

We received project materials, prepared a coding dictionary for benefits, and generated frequency tables for tool awareness, mostly used tools, and purposes of use. We then wrote up the findings in plain English, following the Asian JDE template.

### **Limitations**

Generalization should be cautious. The dataset is not a probability sample and contains aggregates only. We did not analyze subgroup differences (e.g., discipline, institution type, or gender). Internet connectivity and access constraints may have influenced who responded and how they use AI tools.

## **Findings and Discussions**

### **Awareness and usage of AI**

The study found that awareness clusters around a small set of tools, as presented in Figure 1. ChatGPT accounts for about a third of all mentions (41%), followed by Grammarly AI (17%), Microsoft Copilot (14%), and Google Bard (10%). This pattern fits the Diffusion of Innovation view that individuals adopt tools perceived as advantageous, easy to use, and widely observable (Rogers, 2003). These findings mirror global trends where a few high-utility generative tools dominate practice due to visibility and accessibility (HEPI, 2025). Work in the distance-education field also notes that generative AI acts as a co-creator for content and study support, which helps explain why broad chat assistants sit at the top of awareness lists (Bozkurt & Sharma, 2023a; Bozkurt & Sharma, 2023b). Together, the internal counts and outside studies show a simple rule: tools that solve many tasks, quickly and visibly, spread first. Next, we connect this pattern to the different ways faculty and students report using AI.

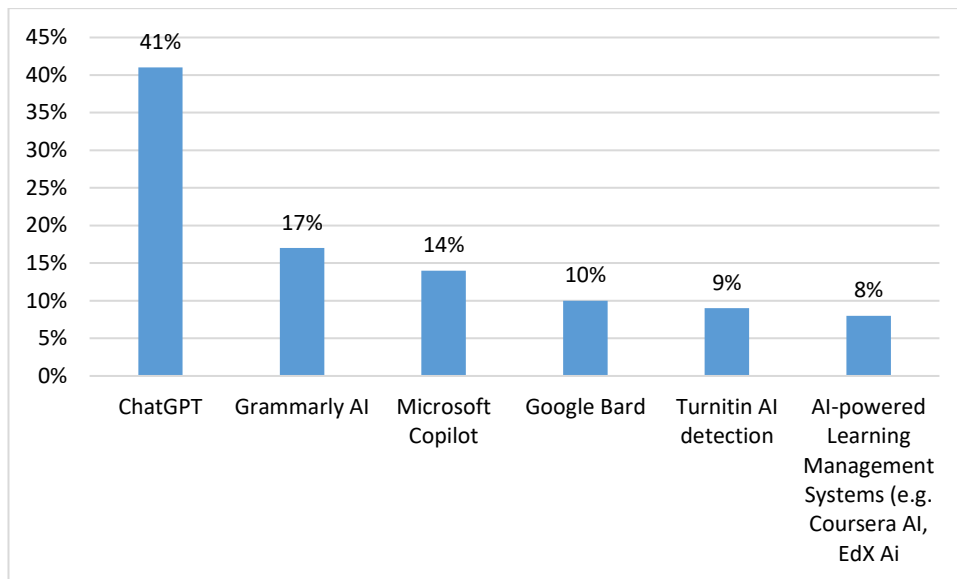


Figure 1: Awareness of AI tools

### Faculty versus student purposes of Using AI

The study found role-specific use of AI as presented in Figure 2. Faculty responses emphasize teaching material development, curriculum planning, and assessment design, while students focus on writing support, idea generation, and exam preparation. Reviews in higher education and distance learning echo this pattern—educators lean on AI for course design and assessment workflows (Bond, 2024; Göçmez, 2023; Bozkurt & Sharma, 2023a).

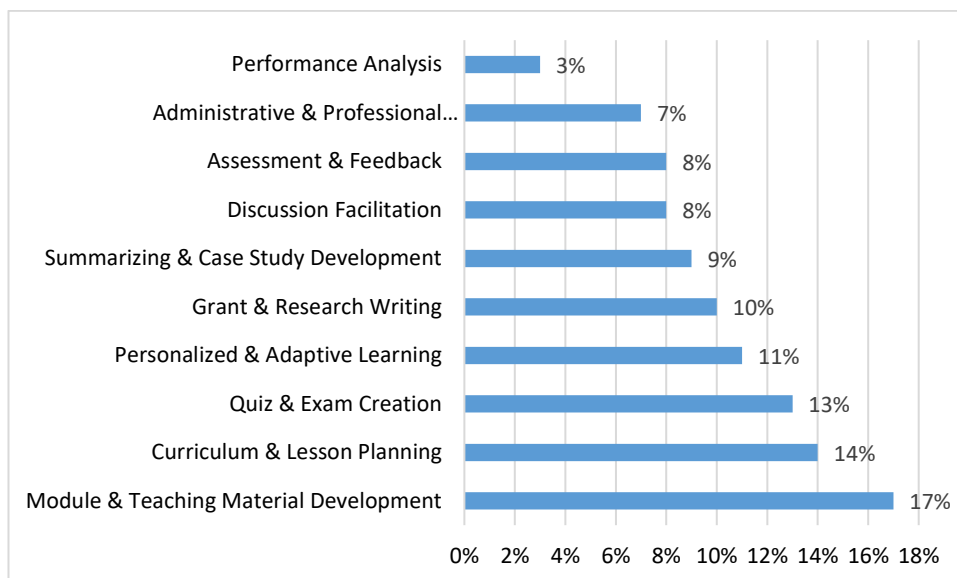


Figure 2: Faculty's Purposes of AI use

Students mainly use AI for idea generation, writing help, summarizing, study guides, and exam preparations as presented in Figure 3. This aligns with broader findings where students use AI to write, organize notes, and support personal study (Bond, 2024; Göçmez, 2023; Bozkurt & Sharma, 2023a). The match between these external findings and the study's counts suggests the patterns reflect everyday roles rather than local quirks. Next, we look at reported benefits and why they reinforce this adoption curve.

A comparative analysis shows overlapping but distinct motivations: both groups seek efficiency and clarity, yet faculty primarily use AI to enhance productivity and pedagogical design, whereas students employ it as a learning and study companion. This dual-use dynamic positions faculty as “early majority adopters” and students as “innovators” or “early adopters” in DOI terms, suggesting a complementary diffusion process where student enthusiasm influences faculty experimentation.

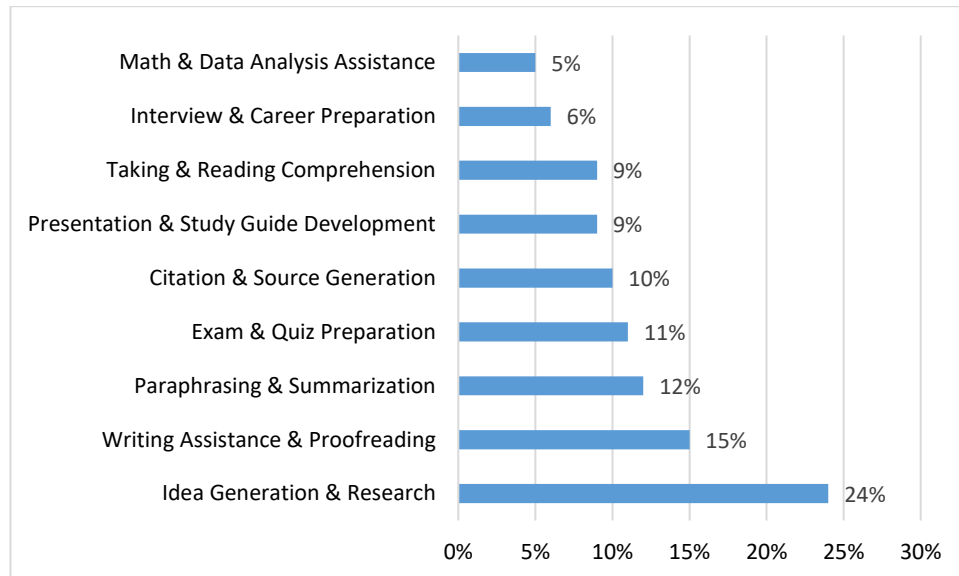


Figure 3: Students' Purposes of AI use

### **Perceived benefits of AI.**

Ten main benefit categories emerged from qualitative responses from the open-ended question “Why do you use AI or what are the benefits of AI?” as presented in Figure 4. The biggest win, for both faculty and students, was time saving and speed (22%): quicker starts, faster drafting, and rapid answers. Next was research help—finding sources, scanning literature, and generating references (18%)—followed by easy access to information and resources (14%) and a clearer understanding of tough concepts (13%). Respondents also highlighted convenience in daily work (8%) and fresh ideas when they felt stuck (8%). Other mentions included accuracy checks (6%), help with writing and editing (5%), better organization of notes and arguments (3%), and support for creating teaching and assessment materials (3%). These themes reflect the relative advantage attribute of DOI—users perceive clear functional benefits that improve task performance. The comments that follow show these points in the respondents' own words. Figure 2. Perceived benefits of AI.

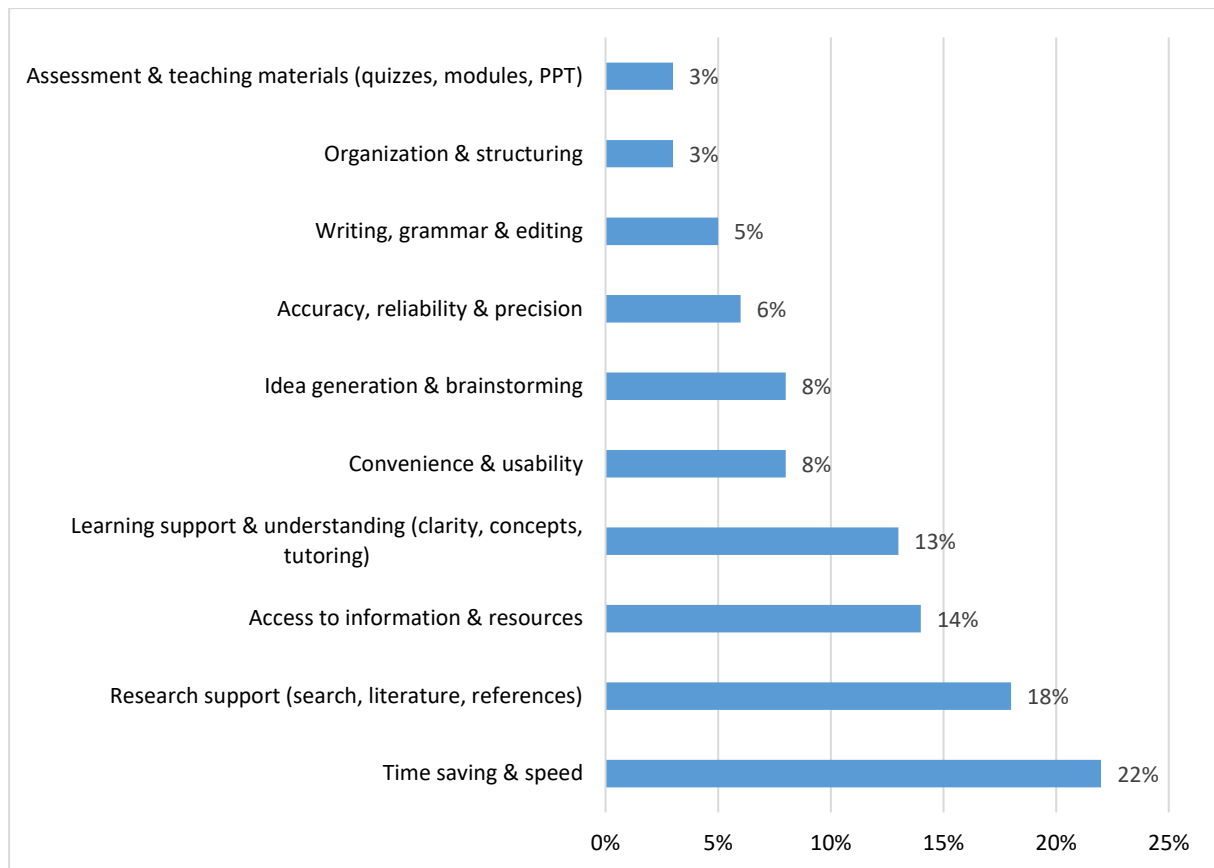


Figure 4: Perceived Benefits of AI

Time saving & speed (22%).

Respondents most often pointed to faster work and quicker answers. They repeatedly emphasized efficiency, describing AI as *fast*, *convenient*, and *effective in supporting research and writing processes*. Like one respondent reported that AI cuts the time needed to start, draft, and finish tasks.

Research support—search, literature, references (18%).

Participants highlighted AI's usefulness in locating sources, scanning literature, and generating references, noting its reliability and ability to streamline academic research. One respondent pointed out that AI was a strong helper for finding sources, scanning literature, and generating references.

Access to information & resources (14%).

Users appreciated easy and centralized access to academic materials and answers, describing AI as a *comprehensive and fast information gateway* that simplifies study and research. They valued easy, centralized access to materials and answers.

Learning support & understanding (13%).

Many used AI to grasp concepts, clarify notes, and learn difficult topics. Many reported that AI clarifies complex concepts, offers examples, and simplifies study materials, thereby *enhancing comprehension and learning efficiency*.

Convenience & usability (8%).

Tools were praised for being simple, handy, and easy to fit into daily work. Tools were perceived as *user-friendly*, *versatile*, and adaptable to different tasks, making teaching, research, and learning *easier and more manageable*.

Idea generation & brainstorming (8%).

Respondents turned to AI to spark ideas and overcome block. Respondents used AI to *spark ideas*, *develop research topics*, and *overcome creative blocks*, citing its role in guiding thought processes and exposing them to new perspectives.

Accuracy, reliability & precision (6%).

Some highlighted confidence and correctness (while noting limits elsewhere). They valued AI's perceived *accuracy and clarity* in providing information, using it to validate or cross-check their own work for confidence and precision.

Writing, grammar & editing (5%).

Many used AI to improve language, structure, and polish. Faculty and students alike turned to AI to *refine language*, *correct grammar*, *paraphrase*, and *enhance fluency*, especially for academic and second-language writing.

“Organization & structuring (3%).

AI helped arrange notes, arguments, and outputs in a clearer way. AI was noted for helping users *arrange notes*, *arguments*, and *presentations logically*, supporting efficient content structuring.

Assessment & teaching materials (3%).

A smaller group used AI to design resources and assessments to *design quizzes*, *presentations*, *rubrics*, and other teaching resources, improving productivity in instructional design.

Overall, these themes show that AI tools are primarily valued for enhancing efficiency, clarity, and access to information rather than for enabling creativity or deep pedagogical transformation. Condensed examples illustrate these perceptions:

- “Using AI saves a lot of time.”
- “Quick access to information sources, especially in research.”
- “Helps to understand concepts better.”

These findings show that both faculty and learners value AI primarily for its cognitive and procedural efficiency rather than for creative transformation. This aligns with global surveys indicating that time-saving and writing assistance dominate user motivations (HEPI, 2025). The thematic patterns further suggest that AI adoption in Sub-Saharan African higher education remains in an early phase—characterized by surface-level use focused on productivity and convenience rather than deep pedagogical integration. As Rogers (2003) explains, early adopters often exploit an innovation's most visible advantages before progressing to complex applications, underscoring the need for capacity-building initiatives that move beyond tool familiarity toward strategic, outcome-oriented use. Empirical evidence supports these observations: systematic reviews show that automated writing evaluation tools such as Grammarly enhance surface-level accuracy and support revisions, particularly for second-language learners (Ding et al., 2024; Dizon, 2024). Similarly, student surveys highlight speed and efficiency as primary drivers of sustained AI use (HEPI, 2025). The relationship is clear—when tools accelerate drafting, editing, and learning processes, users continue to rely on them, reinforcing concentrated awareness and usage around a few versatile AI platforms.

### ***Integrity and Policy Implications of Using AIs***

The study found notable attention to assessment integrity tools alongside chat and writing assistants (for example, Turnitin AI detection appears in the awareness list) among the top six showing growing attention to ethical and academic integrity issues. Research cautions that AI-text detectors can be unreliable or biased, particularly with paraphrased outputs and for some language backgrounds (Liu et al., 2024; Erol et al., 2025). Therefore, institutions should move from punitive detection toward constructive integrity frameworks that emphasize transparency, student support, and ethical literacy.

Bozkurt and Sharma, (2024) argue that trust, credibility, and transparency should guide AI adoption and policy in distance education, rather than sole reliance on detection. These findings explain why the study's implications stress targeted training, clear policies, and course-level guidance that align AI use with learning outcomes.

Regionally, this finding aligns with the African Union's Continental AI Strategy (2024), which advocates for capacity building, local policy innovation, and ethical governance. Thus, Sub-Saharan universities can play a central role in operationalizing these principles through institutional AI-use policies and educator training.

### ***Theoretical and Practical Integrations of Using AIs***

From a theoretical standpoint, the results reaffirm the utility of Diffusion of Innovation in interpreting early AI adoption patterns while also revealing its contextual limits. While the five attributes—relative advantage, compatibility, complexity, trialability, and observability—help explain dominant tool usage, they must be understood alongside socio-economic constraints such as infrastructure and digital literacy.

Practically, the findings suggest that professional development programs should move beyond tool introduction to focus on pedagogical alignment and ethical decision-making. Curriculum designers should integrate AI literacy into foundational courses, emphasizing prompt engineering, source validation, and disclosure ethics. Policy-wise, ministries of education and higher education councils can leverage these insights to develop regional guidelines for responsible AI adoption in teaching and learning.

In summary, awareness and use of AI tools among faculty and learners in Sub-Saharan Africa follow predictable diffusion patterns but remain limited in depth and critical engagement. This underscores the need for context-sensitive strategies that combine innovation theory with socio-technical realities to ensure equitable and sustainable AI integration.

### **Conclusion and Suggestions**

This study examined awareness, usage, and perceived benefits of artificial intelligence (AI) tools among faculty and learners in Sub-Saharan African higher education institutions, interpreting the findings through the Diffusion of Innovation (DOI) framework. Results indicate that a small number of general-purpose and writing-support tools—particularly ChatGPT, Grammarly, and Microsoft Copilot—dominate both recognition and day-to-day use, reflecting DOI's principles of relative advantage, observability, and compatibility.

Faculty and students use AI differently: faculty primarily integrate AI into teaching material development, lesson planning, and assessment design, while students employ it for idea generation, writing improvement, and exam preparation. These patterns highlight distinct but complementary adoption trajectories shaped by role expectations and exposure to innovation. Both groups reported time savings, enhanced access to information, and clearer communication as the most valued benefits, showing that AI supports productivity and learning efficiency in higher education.

The findings contribute to theory by demonstrating that DOI effectively explains early-stage AI adoption patterns in education, yet contextual realities, such as limited infrastructure, uneven policy guidance, and digital literacy gaps, require an expanded interpretation that integrates socio-technical considerations. Practically, the study underscores the need for targeted professional development,

institutional AI-use policies, and curricular integration of AI literacy to foster responsible and equitable use across learning environments.

Policy implications extend to national and regional levels, where ministries of education and higher learning councils can align institutional practices with the African Union's Continental AI Strategy (2024). By promoting ethical governance, transparent guidelines, and digital capacity building, these bodies can create enabling ecosystems for sustainable AI integration.

Future research should build on these findings through mixed-method and longitudinal studies that capture evolving patterns of AI awareness, evaluate pedagogical impacts, and test interventions for ethical and effective AI adoption. Comparative research across countries and institution types would also enrich understanding of cultural, infrastructural, and policy variables influencing diffusion dynamics in Africa.

In conclusion, the study affirms that while AI adoption in Sub-Saharan African higher education remains in its formative stage, strategic investment in capacity building, ethical frameworks, and localized research will accelerate responsible innovation and bridge the global digital divide.

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#### **Author's Contributions (CRediT)**

Jeketule Soko: Conceptualization, methodology, formal analysis, investigation, data curation, visualization, writing—original draft preparation, writing—review and editing; Judith Pete; supervision, project administration, writing—original draft preparation; Grace Mureithi; writing—review and editing. All authors have read and agreed to the published version of the manuscript OR The author has read and agreed to the published version of the manuscript.

### Sustainable Development Goals (SDGs)

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

### Authors' Disclosures

Based on Academic Integrity and Transparency in AI-assisted Research and Specification Framework (Bozkurt, 2024c), the authors of this paper acknowledge the use of ChatGPT4.0 in facilitating various stages of writing and ideation for this paper. All contributions from the AI were reviewed, critically edited, and validated by the human authors to ensure academic rigor and adherence to ethical standards. The authors also assessed and addressed potential biases inherent in the AI-generated content. The final content, conclusions, and assertions in this paper are the sole responsibility of the human authors.

### Data Accessibility Statement

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

### Ethics and Consent

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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The authors have no competing interests to declare.

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