AI Writing Assistants in Tanzanian Universities: Adoption Trends, Challenges, and Opportunities

Alfred Malengo Kondoro
Hanyang University
Seoul, Republic of Korea
alfr3do@hanyang.ac.kr

Abstract

This study examines the adoption, challenges, and impact of AI writing assistants in Tanzanian universities, with a focus on their role in supporting academic writing, enhancing accessibility, and accommodating low-resource languages such as Swahili. Through a structured survey of 1,005 university students, we analyze AI usage patterns, key barriers to adoption, and the improvements needed to make AI writing assistants more inclusive and effective. Findings reveal that limited Swahili integration, affordability constraints, and ethical concerns hinder AI adoption, disproportionately affecting students in resource-constrained settings. To address these challenges, we propose strategies for adapting AI models to diverse linguistic, academic, and infrastructural contexts, emphasizing Swahili-language support, AI literacy initiatives, and accessibility-focused AI development. By bridging these gaps, this study contributes to the development of AI-driven educational tools that are more equitable, contextually relevant, and effective for students in Tanzania and beyond.

1 Introduction

AI-powered writing assistants are increasingly used in higher education to enhance academic writing, research, and content generation by improving grammar, coherence, and fluency (Rahmi et al., 2024; Widiati et al., 2023; Song and Song, 2023). While these tools are highly effective in high-resource languages such as English, French, and Mandarin, they perform poorly in low-resource languages like Swahili due to a lack of linguistic datasets. This often results in AI-generated content that is inaccurate or contextually irrelevant for Swahili-speaking users (Shikali and Mokhosi, 2020; Wanjawa and Muchemi, 2020; Murindanyi et al., 2023; Mathayo and Kondoro, 2024).

Wanjawa et al. (2022) noted that AI models trained predominantly on English struggle with Swahili's morphological complexity, syntax, and academic vocabulary, making them less effective for formal academic writing in Tanzanian universities.

Despite the global rise in AI writing assistant adoption, there is limited research on their effectiveness in non-Western academic settings, particularly among Swahili-speaking students in Tanzania. Maginga et al. (2024) demonstrate the importance of localized Swahili-language AI training in improving contextual understanding and communication, showing how general AI models often fail to account for linguistic and cultural nuances relevant to Swahili-speaking users. In addition to linguistic limitations, students face infrastructural barriers, affordability constraints, and ethical concerns that hinder effective use of AI writing tools (Carroll, 2018; Voss et al., 2023). These challenges disproportionately impact students who rely on Swahili for academic communication and coursework, thereby limiting equitable access to AI-driven educational support.

Tanzania's language policy further complicates the adoption of AI writing tools. While Swahili serves as the medium of instruction in primary and secondary education, English takes over at the university level, creating a linguistic divide that students must learn to navigate (Tibategeza and du Plessis, 2012). This transition often places Swahili-speaking students at a disadvantage, particularly when using AI tools that are optimized for English-language input and academic conventions. As Mwansoko (2003) explains, Swahili has developed its own formal academic register, characterized by distinct syntactic, lexical, and morphological features; yet these are frequently overlooked by AI models primarily trained on English, limiting the relevance and accuracy of AI-generated academic content for Tanzanian users.

Given these challenges, it is critical to explore how AI writing assistants can be adapted to bet-

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ter serve students who use low-resource languages in resource-constrained environments. This study addresses this gap through three central research questions:

1. **How can AI writing assistants support student learning and academic outcomes, particularly for Tanzanian university students?**
2. **How can AI tools be improved to better serve low-resource languages such as Swahili?**
3. **What strategies can enhance AI writing assistant accessibility and inclusivity in resource-constrained settings?**

These questions are vital as AI continues to shape academic learning globally, yet its limitations for low-resourced languages users remain underexplored. By understanding the experiences of Swahili-speaking students, we aim to develop more inclusive AI tools that address linguistic and infrastructural inequities.

To investigate these questions, we conducted a structured survey involving 1,005 university students across Tanzania. The goal was to assess their adoption patterns, challenges, and expectations regarding AI writing assistants. Moussa and Belhiah (2024) and Yu and Canton (2023) highlight that university students are key users of digital learning tools and play a pivotal role in shaping institutional adoption trends. Similarly, Shibani and Shum (2024) argues that students' experiences with AI can influence policy, curriculum development, and workforce readiness.

Findings from this study will contribute practical recommendations to improve AI writing assistants for Swahili speakers, while also addressing issues of accessibility, equity, and linguistic inclusiveness in AI-powered education (Lee, 2024; Vassel et al., 2024; Sabharwal and Sahni, 2024).

2 Related Works

AI-powered writing assistants have been widely adopted in higher education for improving grammar, fluency, coherence, and overall academic writing quality, particularly in high-resource languages such as English (Rahmi et al., 2024; Syarifah and Fakhruddin, 2024; Zhao, 2022). These tools support personalized feedback, scaffold writing support, and structure planning. However, concerns persist about misinformation, over-reliance, academic dishonesty, and loss of critical thinking (Negeri et al., 2024; Pramjeeth and Ramgovind, 2024).

Studies from Tanzania have highlighted both enthusiasm and caution in AI adoption: while students find AI tools helpful, faculty members express skepticism, citing concerns over academic integrity, job security, and data misuse (Mambile and Mwogosi, 2025). These findings echo trends in South African institutions, where AI adoption is increasing but still hindered by infrastructural limitations, ethical uncertainty, and inequities in access (Mbangeleli and Funda, 2024; Funda and Mbangeleli, 2024). Research shows that AI tools have the potential to improve student engagement, personalization, and administrative efficiency, yet their integration requires ethical frameworks and national policies that address data governance, transparency, and fairness (Afolabi, 2024; Opesemowo and Adekomaya, 2024).

Swahili, though one of Africa's most widely spoken languages, remains underrepresented in natural language processing (NLP) due to limited annotated datasets and digitized academic resources (Shikali and Mokhosi, 2020; Wanjawa and Muchemi, 2020; Mathayo and Kondoro, 2024). These limitations continue to affect the performance of AI models in tasks such as translation, summarization, question answering, and academic content generation (Wanjawa et al., 2022). Recent research has explored various strategies to overcome these challenges, including retrieval-augmented generation(RAG), hybrid summarization frameworks, and multilingual pretraining adapted to African languages (Ndimbo et al., 2025; Alghamdi et al., 2024). Efforts to address Swahili's morphological complexity, particularly in verb forms have also contributed valuable linguistic resources for improving tokenization and syntactic modeling (Mathayo and Kondoro, 2024). While these developments offer promising directions, most AI tools remain poorly aligned with Swahili's academic writing norms, highlighting the need for more targeted adaptation and fine-tuning for educational use cases (Mwansoko, 2003).

At a continental level, scholars are calling for the development of linguistically inclusive AI models. Kshetri (2024) and Shahid et al. (2025) argue that low-resource language users remain disadvantaged due to colonial data gaps and systemically biased LLM training pipelines. Raychawdhary et al.

(2024) demonstrates how language-adaptive pretraining improves NLP outcomes across African languages, including Swahili, but stresses the need for broader investment in multilingual AI resources. These studies reinforce the urgent need to adapt generative AI to the context and complexity of languages like Swahili.

Ethical concerns also dominate the discourse on AI in African education. Scholars emphasize the importance of embedding AI ethics education in university curricula and creating institution-specific policy frameworks that guide responsible AI use (Holmes et al., 2021; Ahmed et al., 2025; Ayandibu, 2024). In Nigeria and Kenya, for instance, the absence of national AI regulation has raised alarms about data privacy, algorithmic bias, and transparency in automated decision-making (Afolabi, 2024; Wang'ang'a, 2024). These issues are especially critical in regions where students face high digital vulnerability due to weak infrastructure and limited AI literacy (Chisom et al., 2024; Maina and Kuria, 2024).

While prior research has investigated AI adoption in African education and the development of NLP for low-resource languages, few studies have directly focused on Swahili academic writing support. Much of the current literature concentrates on machine translation, sentiment analysis, or chatbot development, with little attention given to academic genre conventions, citation generation, or discipline-specific writing (Murindanyi et al., 2023; Raychawdhary et al., 2024). Our study fills this gap by examining how Swahili-speaking university students use AI writing assistants in academic settings, what barriers they face, and how AI systems can be redesigned to align with linguistic, cultural, and infrastructural realities in Tanzania.

This work contributes to ongoing efforts to make AI more inclusive, particularly in underrepresented language contexts. By grounding our analysis in the lived experiences of Tanzanian university students, we offer new insights into AI accessibility, trust, and ethical concerns, and we propose practical strategies for integrating Swahili into AI-powered academic tools. Our findings support broader calls for African-led AI development that prioritizes language equity, student-centered design, and sustainable AI literacy programs in higher education.

3 Methodology

3.1 Survey Design and Structure

This study employed a structured online survey to investigate the adoption and use of AI writing assistants among university students in Tanzania. The survey was designed based on the *Unified Theory of Acceptance and Use of Technology 3 (UTAUT3)* framework, incorporating best practices from prior studies on AI in education (Rahmi et al., 2024; Shibani and Shum, 2024). The questionnaire was structured into four key sections:

1. **Demographics**: Collected participants' university affiliation, year of study, academic discipline, and gender.

2. **AI Usage and Adoption**: Examined AI tool usage frequency, primary applications (e.g., writing assistance, research, coding), and access barriers.

3. **Technology Adoption Constructs (UTAUT3)**: Measured factors such as *performance expectancy, effort expectancy, social influence, facilitating conditions, price value, hedonic motivation, and habit*.

4. **Trust and Ethical Considerations**: Investigated students' concerns about trust, plagiarism, privacy, and AI-generated content reliability (Lee, 2024; Voss et al., 2023).

To ensure a comprehensive understanding, the survey incorporated various question types, some of which are outlined in Table 1.

The full survey instrument is provided in the Appendix for transparency and reproducibility.

3.2 Participant Recruitment and Sampling

A convenience sampling approach was used to recruit participants through *WhatsApp Messenger groups* following a "do it and refer a friend" strategy. The survey was specifically limited to university and college students in Tanzania. No restrictions were placed on university type, but given the online distribution method, participation was likely skewed towards students with digital access.

The survey was conducted over four weeks, from January 10 to February 4, 2025, receiving 1,005 valid responses from students across various academic disciplines. Table 2 summarizes participant demographics.

Survey Section	Sample Question
Demographics	- What is your academic discipline? - What year of study are you in?
AI Usage	- How frequently do you use AI tools like ChatGPT for academic purposes? (Daily, Weekly, Monthly, Rarely, Never) - What are your primary use cases for AI tools? (Writing assistance, Research, Coding, etc.)
Technology Adoption	- AI tools help me complete tasks faster and more efficiently.
Challenges	- Infrastructure limitations prevent me from fully utilizing AI tools.
Trust & Ethics	- I trust AI tools like ChatGPT to provide accurate and unbiased information. - What is the biggest challenge you face when using AI tools?

Table 1: Sample survey questions used in the study, categorized by survey section and question type.

Category	Percentage (%)
Gender	
Male	35.9
Female	63.5
Prefer not to say	0.6
Year of Study	
Professional Courses	1.94
Diploma	4.79
Undergraduate	86.14
Postgraduate	7.14
How long have you been using AI Services?	
Less than year	3.08
1 year	6.37
2 years	25.87
3 years	41.79
4 years	17.91
5 years and above	4.78
Never	0.20

Table 2: Participant demographics across gender, year of study, and university type.

3.3 Enhancing Reproducibility

To ensure transparency and allow for replication, several methodological details are provided. The survey was conducted online via Google Forms and distributed primarily through WhatsApp Messenger groups. A snowball sampling approach was employed, wherein participants were encouraged to share the survey with their peers, facilitating broader participation. Data collection took place over a period of four weeks, from January 10 to February 4, 2025.

In terms of ethical considerations, all participants provided informed consent before taking part in the study. The survey introduction clearly explained how their data would be used, emphasizing that participation was voluntary and that respondents could opt in or out freely. To protect confidentiality, no personally identifiable information was collected, ensuring full anonymity. Additionally, all responses were securely stored on an encrypted cloud platform with access restricted to the research team, safeguarding data integrity. By detailing these measures, the study upholds transparency, replicability, and ethical integrity in AI adoption research.

4 Results and Discussion

4.1 Supporting Learning Processes and Academic Outcomes

Our findings indicate that **85%** of surveyed students use AI writing assistants for academic tasks, with **32.2%** using them daily and **36.4%** on a weekly basis. The most common applications include writing assistance, research support, coding help, and content summarization. Students frequently rely on AI tools for brainstorming and structuring essays, refining their writing style, and improving coherence in their academic work. Engineering and computer science students reported using AI for debugging, code generation, and understanding programming concepts. Additionally, AI tools were widely used for summarizing complex research papers, simplifying academic language, and assisting students in exam preparation. These patterns are visually illustrated in Figure 1, which shows a clear majority of students using AI tools regularly.

Despite these advantages, a significant portion

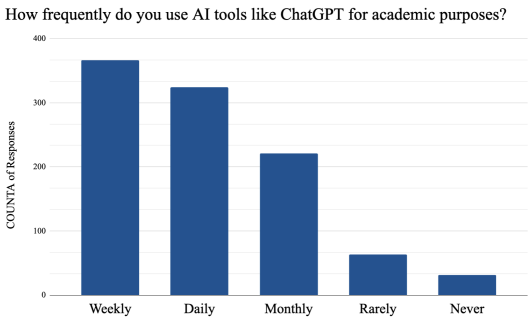

Figure 1: Frequency of AI Tool Usage for Academic Purposes among Tanzanian University Students.

of students expressed concerns about the depth and accuracy of AI-generated content. One student commented,

> "Sometime am not getting the right answer."

Another added,

> "They are not detailed when searching for relevant topics... you need to pay expensively to access additional features."

These quotes reflect students' frustration with the limitations of free or general-purpose AI tools, especially regarding their reliability in producing accurate and context-rich academic responses. Such concerns align with a growing body of literature highlighting the issue of hallucinations in large language models (LLMs), where AI-generated outputs may appear fluent and coherent yet contain factual errors or misleading information (Guerreiro et al., 2023; Perkovic et al., 2024; McIntosh et al., 2024). This issue is particularly problematic in academic contexts, where precision and evidence-based writing are essential.

A smaller but notable group raised concerns around over-reliance and ethics. One student remarked,

> "It reduces my critical thinking skills because I rely on AI to structure my essays instead of thinking through them myself."

Another simply noted,

> "Ethically, AI shouldn't be trusted full."

These quotes reflect broader concerns about cognitive offloading and diminished critical thinking when students rely heavily on AI (Fan et al., 2022; Nguyen et al., 2024). Scholars emphasize that the opacity of AI systems complicates accountability and autonomy, especially when learners lack insight into how outputs are generated (Osasona et al., 2024; Ashok et al., 2022). Broader ethical risks such as bias, privacy, and inequality are especially pronounced in education, where students may uncritically trust AI-generated content (Huang et al., 2023). These concerns underscore the need for clear institutional guidelines and AI literacy to ensure responsible and informed use.

To address these challenges, universities should introduce AI literacy programs that promote responsible use and encourage verification of AI outputs. Developers, on the other hand, must enhance transparency by enabling citation generation and explanation features in AI tools.

4.2 Developing AI Writing Assistants for Underrepresented Languages and Writing Tasks

A key finding from the survey is that **68.8%** of students expressed a preference for Swahili integration in AI tools, with **31.7%** strongly agreeing and **37.1%** agreeing. This preference is clearly depicted in Figure 2, which shows the distribution of student responses across the Likert scale.

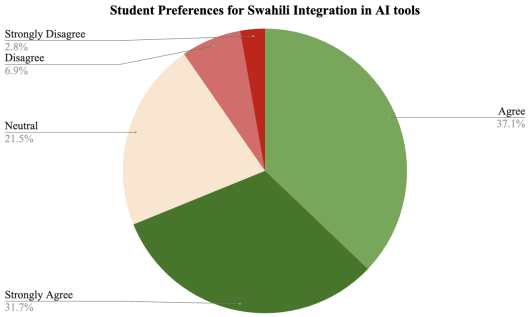

Figure 2: Student Preferences for Swahili Integration in AI Tools. Based on Likert scale survey responses.

Many students cited difficulties with AI-generated content that does not align with Tanzanian academic and cultural expectations. One respondent noted,

> "AI-generated responses often lack local context and do not fit Tanzanian academic writing conventions."

Another shared,

> "Most AI-generated information is too Eurocentric, making it hard to use for our coursework, which requires African and Tanzanian perspectives."

Student concerns about AI-generated content lacking Tanzanian relevance reflect broader research showing that most AI systems embed Western cultural norms, often misaligning with local academic expectations (Prabhakaran et al., 2022; Tao et al., 2023). This is especially limiting in disciplines reliant on contextualized writing. Users in collectivist societies, like Tanzania, often prefer AI that aligns with communal values, yet current tools rarely meet this need (Barnes et al., 2024). Despite the strong overall preference for Swahili integration, 21.5% of students remained neutral, while 9.7% expressed no desire for its inclusion.

To improve Swahili representation in AI, developers should collaborate with Tanzanian universities to create high-quality Swahili datasets and train AI systems on localized academic corpora. Equally important, greater support should be directed toward community-led initiatives such as Masakhane and AfricaNLP, which play a crucial role in advancing African language technologies through grassroots research, open collaboration, and regional expertise (Orife et al., 2020).

4.3 Accessibility and Inclusion Challenges in AI Adoption

Accessibility remains a major barrier to AI adoption among Tanzanian university students, particularly those from underprivileged or rural backgrounds. Many reported struggling with the high cost of subscriptions, poor internet connectivity, and a lack of personal digital devices. One respondent stated,

> "Poor network accessibility and data costs make it hard to use AI tools effectively."

Another shared,

> "I struggle to access AI tools because of high subscription fees and unstable internet."

Others called for more institutional support, with one participant suggesting,

> "Increase awareness and friendly subscriptions."

These challenges are visualized in Figure 3, which categorizes the most common barriers raised in open-ended survey responses.

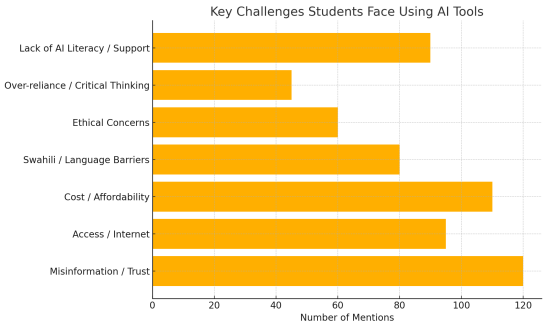

Figure 3: Key Challenges Students Face When Using AI Tools, based on qualitative responses.

In addition to affordability and infrastructure limitations, students highlighted gaps in institutional support. Fewer than 25% reported receiving formal AI training or encouragement from lecturers to engage with AI tools. Students with disabilities also expressed concerns about the lack of accessibility features, such as screen readers and voice input, which hinder equal participation.

Figure 4 presents a word cloud capturing the most frequently mentioned themes in student feedback, further emphasizing recurring concerns around cost, internet access, and inclusivity.

Figure 4: Word Cloud of Student Responses on AI Challenges and Improvements. Larger words indicate more frequent mentions.

These findings echo broader concerns in the literature about digital divides in low-resource settings, where infrastructural and economic barriers limit access to educational technologies (Kivaisi et al., 2023; Xu, 2024). To address these disparities, we recommend the development of lightweight, offline-compatible AI models, subsidized access through universities, and inclusive AI literacy programs that support students across all backgrounds

and abilities.

5 Conclusion

This study provides a comprehensive examination of the adoption, challenges, and opportunities associated with AI writing assistants in Tanzanian universities. The findings reveal high levels of student engagement with AI tools particularly for academic writing, research, and coding but also surface critical barriers that hinder equitable and effective use. These include limited support for Swahili and other low-resource languages, infrastructure and cost-related accessibility issues, and ethical concerns related to over-reliance, misinformation, and academic integrity. Three core insights emerge from this research. First, linguistic gaps persist: although a majority of students prefer AI tools that support Swahili, most current systems lack adequate localization for Tanzanian academic contexts. Second, accessibility remains a challenge: unstable internet access, high subscription costs, and the digital divide disproportionately affect students in rural or low-income settings. Third, institutional support is inconsistent: students lack structured AI literacy programs, and few universities have established clear guidelines on ethical AI use or integration into curricula.

To address these gaps, we recommend several targeted interventions. Policymakers and universities should establish national and institutional frameworks for AI ethics and digital inclusion. This includes investing in localized Swahili-language AI datasets, promoting open-source AI development, and ensuring affordable or subsidized access to AI tools for students. Universities should embed AI literacy training into academic programs, encouraging responsible and critical use of AI writing assistants. AI developers, in turn, must create lightweight, offline-compatible models that are inclusive of low-bandwidth users and students with disabilities. Broadly, this study underscores the need for AI technologies that are not only accessible, but also contextually and culturally relevant. By bridging linguistic and technological divides, AI writing assistants can serve as inclusive tools that support learning across diverse educational contexts. For regions like Tanzania and the broader Global South this research contributes to growing calls for AI systems that promote ethical innovation, educational equity, and digital justice in low-resource settings.

Limitations

While this study offers valuable insights into the adoption and challenges of AI writing assistants in Tanzanian universities, it is not without limitations. The use of convenience and snowball sampling via WhatsApp may have introduced selection bias, favoring digitally connected and AI-aware students while underrepresenting those from rural areas or with limited internet access. The data is self-reported, which may be affected by recall and social desirability bias, and the absence of interviewer support could have led to varied interpretations of survey items. Although the survey included open-ended questions, the qualitative data was limited in depth and could be enriched by follow-up interviews or focus groups to capture more nuanced perspectives, particularly from students with disabilities or those using Swahili in academic contexts. Additionally, the study is geographically limited to Tanzanian universities and does not account for educator or institutional viewpoints, which are vital to understanding broader AI policy and integration. Finally, while ChatGPT and similar tools were referenced, the study did not conduct a comparative analysis of different AI platforms or evaluate their technical accuracy, especially in low-resource language settings. These limitations suggest opportunities for deeper, more inclusive future research.

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Appendix A: Survey Instrument

The full student survey used in this study is available at the following link: https://forms.gle/JEfp3MbH42Uwq78d8

This includes all demographic, Likert scale, multiple-choice, and open-ended questions used to assess AI writing assistant usage, accessibility, and attitudes.