**Journal of Technology-Assisted Learning**
ISSN 3089-7408 (online) & 3089-7394 (print)
March 2026, Vol. 2, No. 1, pp. 1–14

Scientia Publica Media

**Review Article**

# The Impacts of Artificial Intelligence on Higher Education: A Tanzanian Context

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**Abstract**
Artificial Intelligence (AI) is increasingly transforming higher education across the globe by reshaping teaching, learning, research, and institutional management. In developing countries such as Tanzania, the integration of AI into Higher Education Institutions (HEIs) presents both significant opportunities and complex challenges. Despite the presence of infrastructural and resource limitations, AI has the potential to revolutionize the educational landscape by improving access to quality learning materials, supporting data-driven decision-making, and enhancing administrative efficiency. This study explores the multifaceted impacts of AI on Tanzanian HEIs, with a specific focus on its current applications, benefits, challenges, and policy implications. The research draws upon recent empirical studies and secondary data to analyze how AI technologies such as intelligent tutoring systems, predictive analytics, and automated assessment tools contribute to personalized learning experiences and improved academic outcomes. Moreover, the study identifies the major barriers to AI adoption, including inadequate technological infrastructure, limited institutional capacity, insufficient AI-related policies, and persistent ethical concerns surrounding data privacy and algorithmic bias. Findings reveal that although AI adoption in Tanzanian HEIs is on the rise, the implementation remains fragmented and uneven across institutions. To fully harness AI's transformative potential, the study recommends the development of comprehensive national AI policies, investments in digital infrastructure, and targeted capacity-building programs for educators and administrators. Additionally, the research emphasizes the need for ethical frameworks that promote fairness, inclusivity, and transparency in AI utilization. Overall, this paper underscores the necessity of a strategic and policy-driven approach to ensure that AI contributes effectively and equitably to the advancement of higher education in Tanzania.

**Keywords:** Artificial Intelligence, Higher Education, ChatGPT, Tanzania, HEIs, Universities

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**Received**
July 12, 2025
**Accepted**
November 21, 2025
**Published**
March 16, 2026

**Citation**: Mduwile, P., Goswami, D., Ibrahim, D., Lufunga, J., & Baruah, N. (2026). The impacts of artificial intelligence on higher education: A Tanzanian context. *Journal of Technology-Assisted Learning, 2*(1), 1–14.

DOI: 10.70232/jtal.v2i1.12



## 1. INTRODUCTION

Artificial Intelligence (AI) is transforming higher education by redefining teaching, learning, and administrative processes. As a rapidly evolving technology, AI encompasses systems that mimic human intelligence, enabling tasks such as personalized learning, automated grading, and data-driven decision-making. Globally, higher education institutions (HEIs) are leveraging AI to enhance academic outcomes, streamline operations, and address challenges like large class sizes and limited resources. In Tanzania, a country with a burgeoning higher education sector, AI presents a unique opportunity to address longstanding systemic issues while navigating context-specific challenges.

Tanzania's higher education landscape is characterized by rapid growth, with over 50 universities and colleges serving a growing student population. However, the sector faces significant hurdles, including inadequate infrastructure, limited funding, and unequal access to quality education, particularly in rural areas. These challenges are compounded by large student-to-lecturer ratios and a reliance on traditional teaching methods, which often struggle to meet diverse learner needs. AI offers solutions to these issues through tools like intelligent tutoring systems, adaptive learning platforms, and administrative automation, which can improve efficiency and personalize education (Vincent et al., 2025).

The adoption of AI in Tanzanian HEIs is still in its infancy but shows promising growth. For instance, tools like ChatGPT and Grammarly are increasingly used by students to enhance academic writing and access educational resources. A study by Stuart (2024) at Kampala International University in Tanzania (KIUT) found that 77% of students were aware of AI tools, with 65% actively using them for academic tasks. Such tools enable personalized learning experiences, allowing students to receive tailored feedback and resources that align with their learning pace and style. Additionally, AI-driven analytics can support institutions in optimizing resource allocation, predicting student performance, and improving retention rates.

Despite its potential, AI integration in Tanzanian HEIs faces significant barriers. Limited internet connectivity, unreliable electricity, and inadequate hardware restrict access to AI tools, particularly in rural institutions. Ethical concerns, such as plagiarism, data privacy, and over-reliance on AI, also pose challenges. For example, the widespread use of generative AI tools raises questions about academic integrity and the development of critical thinking skills. Furthermore, the absence of AI policies in Tanzanian HEIs, as noted by Matto and Ponera (2025), creates uncertainty about ethical use and data governance, hindering effective implementation.

The global context provides valuable insights for Tanzania. Countries like South Africa and Kenya are beginning to integrate AI into higher education, with applications ranging from virtual assistants to predictive analytics. However, Africa accounts for only 2% of global AI in education (AIEd) research, indicating a need for localized studies. Tanzania, with its unique socio-economic and educational landscape, requires tailored strategies to harness AI's benefits while addressing its risks. This includes developing infrastructure, building AI literacy among faculty and students, and establishing policies to guide ethical use (Khoalenyane & Ajani, 2024; Ogalo & Mtenzi, 2025).

This paper investigates the impacts of AI on Tanzanian higher education, with a primary research aim to provide a comprehensive synthesis of AI's applications, benefits, challenges, and policy implications in the Tanzanian context, thereby informing strategies for equitable and effective integration. To achieve this aim, the study is guided by the following specific research questions:

1. How is AI being used in Tanzanian HEIs?
2. What are the benefits and challenges of AI integration in this context?
3. What policy frameworks are needed to ensure effective and ethical AI adoption?

By synthesizing recent empirical research and policy analyses, the paper provides a comprehensive overview of AI's transformative potential in Tanzania's higher education sector. It also offers recommendations for stakeholders, including educators, policymakers, and institutional leaders, to navigate the opportunities and challenges of AI integration.

The significance of this study lies in its focus on a developing country context, where AI's potential is underexplored. By examining Tanzania's unique challenges and opportunities, the research contributes to the global discourse on AIEd while providing actionable insights for local stakeholders. The findings underscore the need for strategic investments in infrastructure, policy development, and capacity building to ensure that AI serves as a tool for equitable and inclusive education in Tanzania.

## 2. LITERATURE REVIEW

### 2.1. Global Perspectives on AI in Higher Education

Artificial intelligence in education (AIEd) comprises a broad spectrum of applications, including intelligent tutoring systems, learning analytics and prediction models, automated assessment tools, and

adaptive learning environments. A systematic review by Zawacki-Richter et al. (2019) identified four principal domains of AI implementation in higher education: profiling and prediction, assessment and evaluation, adaptive learning systems, and intelligent tutoring systems. Collectively, these applications facilitate personalized learning experiences, optimize administrative efficiency, and contribute to improved student performance. For example, intelligent tutoring systems deliver individualized feedback, while predictive analytics are employed to detect students at risk and support timely academic interventions (Chu et al., 2022). At a global level, AI has been widely acknowledged for its capacity to enhance student engagement, alleviate academic workload, and enable evidence-based decision-making in educational institutions (Al-Zahrani, 2024a).

Despite these benefits, ethical considerations remain central to international AIEd discourse. Concerns related to data privacy, algorithmic bias, and excessive dependence on AI technologies pose substantial challenges to their effective implementation. Holmes et al. (2022) caution that although AI can improve efficiency, it may inadvertently undermine essential human dimensions of education, including critical thinking development and emotional support. In addition, disparities in digital infrastructure and access to AI technologies intensify educational inequalities, particularly in developing contexts. These global perspectives offer an important analytical lens for examining both the opportunities and constraints of AI adoption in Tanzania.

### 2.2. AI in African Higher Education

AI adoption in African higher education is limited, with only 2% of global AIEd studies originating from the continent (Zawacki-Richter et al., 2019). Despite this, some African countries are making strides in AI integration. In Kenya, for example, generative AI usage is high, with 63% of students and faculty utilizing tools like ChatGPT for academic tasks (Ochieng, 2024). However, research on AI's impact remains scarce, and infrastructural challenges, such as unreliable internet and limited hardware, hinder adoption. South African HEIs have begun integrating AI for administrative tasks and personalized learning, but ethical concerns, including data privacy and algorithmic fairness, remain significant barriers (Naicker & Naidoo, 2023; Sokhulu et al., 2025).

The African context highlights the need for localized AIEd strategies. Unlike developed countries with robust technological infrastructure, African nations face unique challenges, including resource constraints and low digital literacy. These factors necessitate tailored approaches to AI integration, focusing on affordability, accessibility, and context-specific applications. Tanzania, as part of this broader African landscape, shares these challenges but also presents unique opportunities due to its growing higher education sector.

### 2.3. AI in Tanzanian Higher Education

In Tanzania, AI adoption in HEIs is gaining traction, particularly among students. A study by Stuart (2024) at Kampala International University in Tanzania (KIUT) found that 77% of students were aware of AI tools, with 65% using platforms like ChatGPT (83.8%) and Grammarly (63.1%) to enhance academic writing and access educational resources. These tools improve academic competency by providing instant feedback and tailored content. Similarly, Sarakikya and Kitula (2024) reported that AI platforms in Arusha-based HEIs support language learning and content development, particularly for English proficiency, which is critical for academic success in Tanzania.

Despite these advancements, challenges persist. Mambile and Mwogosi (2025) highlight that infrastructural limitations, such as unreliable internet and inadequate hardware, restrict AI adoption, particularly in rural institutions like Moshi Cooperative University (MoCU). Ethical concerns, including plagiarism, data privacy, and over-reliance on AI, are also prevalent. For instance, the widespread use of generative AI raises questions about academic integrity and the development of self-directed learning skills. Additionally, Matto and Ponera (2025) found that none of the eight Tanzanian HEIs studied had established AI policies, attributing this gap to rapid technological advancements, lack of expertise, and limited leadership focus.

The Tanzanian context underscores the need for a balanced approach to AI integration. While AI tools offer significant benefits, such as improved learning outcomes and administrative efficiency, their effective implementation requires addressing infrastructural, ethical, and policy-related barriers. This literature review highlights the gap in localized AIEd research in Tanzania and sets the stage for analyzing its applications, benefits, and challenges in the subsequent sections.

## 3. METHODOLOGY

This study adopted a qualitative approach, synthesizing findings from recent empirical research and policy analyses on AI in Tanzanian higher education. Only peer-reviewed articles were selected to ensure methodological rigor, reliability, and validity, as these sources undergo formal evaluation processes that minimize bias and enhance credibility. Grey literature, reports, and preprints were excluded because they often lack the same level of scrutiny and may contain preliminary or unverified findings. Given the rapidly evolving nature of AI research and the prevalence of unreviewed claims, this exclusion helped maintain the robustness and trustworthiness of the synthesis. However, it is acknowledged that this decision may have limited the inclusion of emerging or non-traditional insights, which future studies could incorporate to provide a broader perspective.

The time frame of 2019 to 2025 was chosen to capture the most recent developments in AI in education, aligning with the surge in applications following major advancements in generative AI technologies such as ChatGPT (released in late 2022). This period ensures that the reviewed literature reflects contemporary trends while providing a relevant post-2010s baseline for comparison. The dataset was collected in August 2025, prior to the conclusion of the year, and included published articles, accepted preprints, or in-press works that were available in academic databases at the time of data collection. No projected or speculative studies were included; only those with confirmed publication or acceptance status.

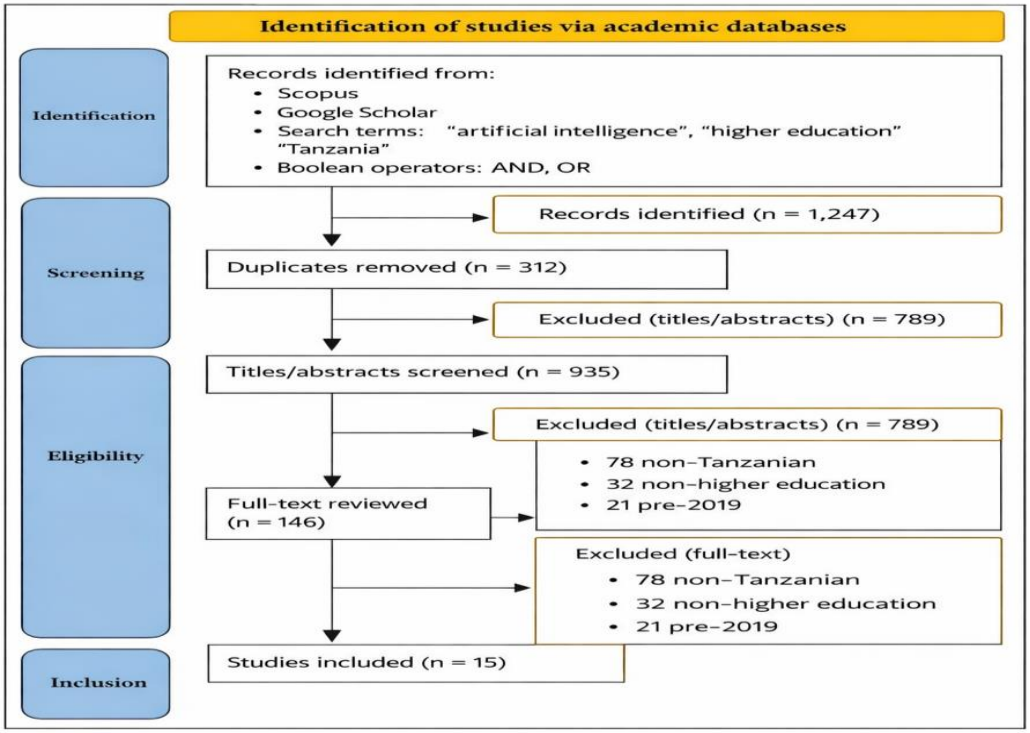


**Figure 1.** PRISMA Flow Diagram for Identification of Studies via Academic Database

Data were sourced from reputable academic databases such as Scopus and Google Scholar, using a search strategy aligned with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines to ensure transparency and reproducibility. The search employed key terms "artificial intelligence," "higher education," and "Tanzania" combined with Boolean operators (AND, OR) to refine results. The keyword "higher education" was used instead of "university" to encompass all post-secondary institutions, including colleges, ensuring comprehensive coverage. Inclusion criteria comprised: (1) peer-

reviewed articles published between 2019 and 2025; (2) studies addressing AI applications, benefits, challenges, or policies in higher education; and (3) research relevant to Tanzania or comparable African contexts. Exclusion criteria included non-English publications, studies unrelated to higher education, non-peer-reviewed sources, and papers lacking empirical or analytical depth.

**Table 1.** Identification of Studies via Academic Databases

| Stage | Number of Records | Details |
|---|---|---|
| Records identified | 1,247 | |
| Duplicates removed | 312 | |
| Titles/abstracts screened | 935 | |
| Excluded (titles/abstracts) | 789 | |
| Full-text reviewed | 146 | |
| Excluded (full-text) | 131 | 78 non-Tanzanian, 32 non-higher education, 21 pre-2019 |
| Studies included | 15 | |

The PRISMA process identified 1,247 records, of which 312 duplicates were removed. After screening 935 titles and abstracts, 789 were excluded for irrelevance. A full-text review of 146 articles led to the exclusion of 131 (78 non-Tanzanian focus, 32 non-higher education scope, 21 pre-2019 publications). Ultimately, 15 studies met all inclusion criteria and were subjected to thematic content analysis. Both inductive coding (emerging themes such as applications and benefits) and deductive coding (based on global AI in education frameworks) were applied to identify recurring themes, contextual challenges, and policy implications in Tanzanian higher education.

## 4. AI APPLICATIONS IN TANZANIAN HIGHER EDUCATION

### 4.1. Personalized Learning

AI enables adaptive learning systems that tailor educational content to individual student needs, addressing the limitations of traditional, one-size-fits-all teaching methods. At Kampala International University in Tanzania (KIUT), tools like ChatGPT and Grammarly are widely adopted, with 83.8% of students using AI for academic tasks such as content development and writing enhancement (Stuart, 2024). These platforms analyze student performance data to provide personalized feedback, recommend targeted resources, and adapt learning materials to individual learning paces and styles. For instance, intelligent tutoring systems can identify a student's strengths and weaknesses in real time, offering customized exercises to improve specific skills, such as critical thinking or problem-solving. This personalization is particularly valuable in Tanzania, where large student-to-lecturer ratios often exceed 50:1 restrict individualized instruction. By delivering tailored learning experiences, AI helps bridge this gap, enabling students to achieve better academic outcomes and fostering self-paced learning, which is critical for addressing diverse learner needs in Tanzanian HEIs.

### 4.2. Assessment and Evaluation

AI-powered assessment tools, such as automated grading systems, are gaining traction in Tanzanian HEIs, offering efficient and objective evaluation methods. These systems can grade multiple-choice exams, assess written assignments, and provide instant feedback, significantly reducing instructors' workloads. At KIUT, preliminary adoption of automated grading tools has shown potential to streamline assessment processes, allowing faculty to focus on teaching and mentoring (Stuart, 2024). AI-driven assessment platforms also enhance objectivity by minimizing human bias in grading, which is particularly beneficial in large classes where consistent evaluation is challenging. However, concerns about the accuracy of AI assessments and the risk of plagiarism, especially with generative AI tools, remain significant. For instance, the widespread use of ChatGPT raises questions about students submitting AI-generated work, necessitating the integration of AI detection tools to ensure academic integrity. Despite these challenges, AI's ability to provide timely and consistent feedback supports improved learning outcomes in Tanzanian HEIs.

### 4.3. Administrative Efficiency

AI streamlines administrative tasks, optimizing resource allocation and decision-making in Tanzanian HEIs, where resource constraints are a persistent challenge. AI-driven analytics can forecast enrollment trends, enabling institutions to plan budgets and allocate resources effectively. For example, predictive analytics can identify patterns in student data to improve retention rates and optimize course scheduling. At Moshi Cooperative University (MoCU), early efforts to implement AI for administrative tasks, such as student enrollment and data management, have shown potential to enhance operational efficiency, despite infrastructural limitations (Mambile & Mwogosi, 2025). AI-powered chatbots are also emerging as tools to handle routine student inquiries about course schedules, deadlines, or administrative processes, reducing the workload on administrative staff. This automation allows HEIs to operate more effectively within limited budgets, addressing Tanzania's challenge of underfunded higher education systems. By leveraging AI's data-driven capabilities, institutions can make evidence-based decisions, aligning their strategies with long-term educational goals.

### 4.4. Language Learning

AI tools play a critical role in enhancing language proficiency, particularly in English, which is the primary medium of instruction in Tanzanian higher education. Platforms like Grammarly and Quillbolt support students in improving their writing, vocabulary acquisition, and communication skills, which are essential for academic success. Sarakikya and Kitula (2024) reported that AI platforms in Arusha-based HEIs significantly improved students' English proficiency, enabling them to produce higher-quality academic work and engage more effectively in coursework. These tools provide real-time feedback on grammar, syntax, and style, helping students refine their writing skills and build confidence in English-language tasks. This is particularly important in Tanzania, where many students face challenges with English proficiency due to limited exposure in secondary education. AI-driven language learning tools also offer interactive exercises and personalized content, making them accessible to students with varying levels of proficiency. By supporting language development, AI enhances students' ability to succeed in academic programs and contributes to overall educational quality.

In conclusion, AI applications in Tanzanian higher education demonstrate significant potential to address systemic challenges and enhance educational outcomes. Personalized learning systems, automated assessments, administrative analytics, and language learning tools offer innovative solutions to improve teaching, learning, and institutional efficiency. However, their effective implementation requires overcoming barriers such as infrastructural limitations, ethical concerns, and the need for AI literacy among stakeholders. By addressing these challenges, Tanzanian HEIs can fully leverage AI's transformative capabilities to create a more inclusive and effective educational environment.

## 5. BENEFITS OF AI IN TANZANIAN HIGHER EDUCATION

AI offers transformative benefits for Tanzanian HEIs, addressing systemic challenges and enhancing educational quality in a resource-constrained environment. By enabling personalized learning, increasing accessibility, supporting faculty, and improving operational efficiency, AI has the potential to revolutionize teaching, learning, and institutional management. These benefits are particularly significant in Tanzania, where large class sizes, limited funding, and unequal access to education pose persistent challenges. This section explores these benefits in detail, supported by empirical evidence, highlighting their impact on students, faculty, and institutions.

### 5.1. Enhanced Learning Outcomes

AI significantly improves academic competency by providing personalized resources and instant feedback, addressing gaps in traditional teaching methods. A study conducted at Kampala International University in Tanzania by Stuart (2024) reported that students who utilized AI-based tools, such as ChatGPT and Grammarly, demonstrated superior assessment performance compared to peers who depended exclusively on traditional learning methods. These tools analyze individual student performance

in real time, offering tailored exercises, readings, and feedback that align with each student's learning pace and style. For example, intelligent tutoring systems are capable of detecting particular areas where a student struggles, such as academic writing or analytical skills, and provide customized resources to address these weaknesses. This personalization is critical in Tanzania, where student-to-lecturer ratios often exceed 50:1, limiting opportunities for individualized instruction. Sarakikya and Kitula (2024) reported that AI platforms in Arusha-based HEIs significantly enhanced students' English proficiency, a key factor for academic success in Tanzania's higher education system, where English is the primary medium of instruction. By fostering self-paced learning and providing targeted support, AI contributes to higher retention and graduation rates, addressing Tanzania's challenge of low completion rates, which hover around 30% in some institutions (Mambile & Mwogosi, 2025). These improved outcomes demonstrate AI's potential to bridge educational gaps and enhance academic performance across diverse student populations.

### 5.2. Increased Accessibility

AI enhances access to educational resources, making learning more inclusive for underserved populations, including students with disabilities and those in rural areas. AI-driven tools, such as text-to-speech and speech-to-text applications, enable students with visual or hearing impairments to engage with course materials effectively, converting written content into audio or transcribing lectures in real time. In Tanzania, where assistive technologies are scarce, AI offers a cost-effective solution to promote inclusivity. For example, virtual assistants and AI-driven content platforms can deliver educational materials in accessible formats, ensuring that students with disabilities are not left behind. Additionally, AI-powered virtual learning environments (VLEs) that operate offline or on low-bandwidth networks address the challenge of unreliable internet connectivity in rural institutions like Moshi Cooperative University (MoCU) (Mambile & Mwogosi, 2025). These platforms provide access to high-quality resources, bridging the urban-rural divide and enabling students in remote regions to participate in modern education systems. By promoting equitable access, AI aligns with global educational goals, such as UNESCO's 2030 objectives, which emphasize inclusive and quality education for all, particularly for marginalized groups in developing countries like Tanzania.

### 5.3. Faculty Support

AI alleviates administrative and instructional burdens for faculty, enabling them to focus on teaching, mentoring, and research. In Tanzanian HEIs, where faculty often manage large classes and administrative tasks with limited resources, AI-powered tools streamline workflows and enhance productivity. Automated grading systems, for instance, handle repetitive tasks like evaluating multiple-choice exams or assessing written assignments, reducing grading time by up to 30%, as observed at KIUT (Stuart, 2024). These systems allow instructors to dedicate more time to designing engaging lessons and providing personalized guidance to students. AI-driven dashboards provide real-time insights into student performance metrics, such as attendance, engagement, and assessment scores, enabling faculty to identify at-risk students and implement targeted interventions. This data-driven approach is particularly valuable in addressing Tanzania's high dropout rates, which are often linked to academic and socio-economic challenges. By reducing administrative workloads and enabling proactive support, AI empowers faculty to prioritize the human elements of education, such as fostering critical thinking and providing emotional guidance, which remain essential for holistic learning and cannot be fully replaced by technology.

### 5.4. Operational Efficiency

AI enhances institutional efficiency by optimizing resource allocation and streamlining administrative processes in Tanzania's resource-constrained HEIs. Predictive analytics can forecast enrollment trends, enabling institutions to plan budgets, allocate resources, and optimize course offerings effectively. For example, AI-driven systems can analyze historical data to predict student retention rates, helping HEIs address dropout risks proactively. At MoCU, preliminary efforts to adopt AI for administrative tasks, such as student enrollment and data management, have shown potential to improve operational efficiency, despite infrastructural limitations (Mambile & Mwogosi, 2025). AI-powered chatbots can handle routine

student inquiries about course schedules, deadlines, or administrative processes, reducing the workload on administrative staff and improving response times. This automation allows HEIs to operate more effectively within limited budgets, addressing Tanzania's challenge of underfunded higher education systems, where public funding accounts for less than 1% of GDP (Matto & Ponera, 2025). By leveraging AI's data-driven capabilities, institutions can make evidence-based decisions, aligning their strategies with long-term educational goals and improving overall institutional performance.

In conclusion, AI's benefits in Tanzanian higher education are multifaceted, addressing critical challenges while enhancing educational quality and inclusivity. Enhanced learning outcomes, increased accessibility, faculty support, and operational efficiency demonstrate AI's transformative potential. However, realizing these benefits requires overcoming barriers such as infrastructural limitations, ethical concerns, and limited AI literacy through strategic investments, policy development, and capacity-building initiatives.

## 6. CHALLENGES OF AI INTEGRATION IN TANZANIAN HIGHER EDUCATION

The integration of AI into Tanzanian HEIs offers immense potential but is hindered by significant challenges that limit its effective adoption. These challenges include infrastructure limitations, lack of AI policies, ethical concerns, limited AI expertise, and socio-economic disparities. These barriers restrict equitable access to AI tools and complicate their responsible implementation, particularly in a resource-constrained environment like Tanzania. Addressing these challenges is critical to unlocking AI's transformative benefits for teaching, learning, and institutional management. This section examines these challenges in detail, supported by empirical evidence, and highlights their implications for Tanzanian HEIs.

### 6.1. Infrastructure Limitations

Tanzanian HEIs face significant infrastructural barriers that severely restrict AI adoption, particularly in rural and under-resourced institutions. Unreliable internet connectivity, frequent power outages, and outdated or inadequate hardware are pervasive issues, especially outside urban centers like Dar es Salaam and Arusha. Mambile and Mwogosi (2025) found that at Moshi Cooperative University (MoCU), limited access to stable internet and modern devices significantly hindered AI adoption among academics and students. For instance, cloud-based AI tools like ChatGPT require consistent internet access, which is often unavailable in rural areas, where connectivity can be as low as 20% compared to 60% in urban areas (Matto & Ponera, 2025). Additionally, frequent power outages disrupt access to digital platforms, further limiting the use of AI tools that rely on a continuous power supply. The lack of modern hardware, such as computers capable of running advanced AI applications, exacerbates these challenges, particularly in underfunded institutions. These infrastructural limitations deepen the digital divide, restricting AI benefits to urban, better-resourced HEIs and marginalizing rural students and faculty, thus undermining equitable access to educational advancements.

### 6.2. Lack of AI Policies

The absence of formalized AI policies in Tanzanian HEIs creates uncertainty around ethical use, data privacy, and academic integrity, hindering effective AI integration. Matto and Ponera (2025) analyzed eight Tanzanian HEIs and found that none had established AI policies, attributing this gap to rapid technological advancements, limited institutional expertise, and insufficient leadership focus on AI governance. Without clear guidelines, institutions struggle to regulate the use of AI tools like ChatGPT, which 83.8% of KIUT students use for academic tasks (Stuart, 2024). This policy vacuum raises concerns about data privacy, as AI platforms often collect sensitive student information without clear protocols for secure data handling. Furthermore, the lack of policies on acceptable AI use leads to inconsistent practices across institutions, with some faculty embracing AI tools while others prohibit their use due to concerns about academic misconduct. This inconsistency creates confusion for students and hinders the development of a cohesive AI integration strategy, limiting its potential to enhance educational outcomes systematically.

### 6.3. Ethical Concerns

Ethical issues, including plagiarism, data privacy, and over-reliance on AI, pose significant challenges to AI integration in Tanzanian HEIs. The widespread use of generative AI tools like ChatGPT raises concerns about academic integrity, as students may submit AI-generated work without proper attribution, undermining independent learning and critical thinking skills. Stuart (2024) noted that 7.7% of KIUT students expressed concerns about over-reliance on AI, which could diminish their ability to develop self-directed learning skills. Data privacy is another pressing issue, as AI tools often collect and store sensitive student data, yet Tanzania lacks robust data protection frameworks to regulate these platforms (Holmes et al., 2022). This raises risks of data breaches or misuse, particularly with cloud-based tools hosted outside Tanzania. Additionally, algorithmic bias in AI systems could inadvertently perpetuate inequalities, such as favoring urban students with better access to technology, further marginalizing rural or low-income students. These ethical concerns necessitate clear guidelines and detection tools to ensure responsible AI use while preserving the human elements of education, such as critical thinking and creativity.

### 6.4. Limited AI Expertise

A lack of AI proficiency among faculty and students significantly limits the effective integration of AI in Tanzanian HEIs. Many educators and students lack the technical skills needed to use AI tools effectively or understand their ethical implications, as highlighted by Mambile and Mwogosi (2025). For instance, faculty at rural institutions like MoCU often lack training in AI applications, making it challenging to incorporate tools like intelligent tutoring systems or automated grading platforms into their teaching. Similarly, students with limited digital literacy may struggle to navigate AI tools, reducing their ability to benefit from personalized learning resources. This expertise gap is compounded by the absence of structured training programs in most Tanzanian HEIs, leaving stakeholders ill-equipped to handle the complexities of AI integration. Without adequate training, the potential of AI to enhance teaching and learning remains underutilized, and the risk of misuse, such as over-reliance on AI for academic tasks, increases, further complicating its adoption.

### 6.5. Socio-Economic Disparities

Socio-economic disparities exacerbate the challenges of AI integration, creating inequities in access to AI tools and deepening the digital divide. In Tanzania, where a significant portion of the population lives below the poverty line, many students, particularly in rural areas, cannot afford devices like smartphones or laptops required to access AI platforms. Mambile and Mwogosi (2025) noted that rural students at MoCU face significant barriers to accessing cloud-based AI tools due to limited financial resources and inadequate infrastructure. This disparity restricts AI benefits to urban, wealthier students, perpetuating educational inequalities. Additionally, the high cost of internet data and unreliable connectivity further limit access for low-income students, who may spend a significant portion of their income on data bundles. These socio-economic challenges highlight the need for affordable, offline, or low-bandwidth AI solutions to ensure equitable access across diverse student populations.

In conclusion, the integration of AI in Tanzanian higher education is hindered by infrastructure limitations, a lack of AI policies, ethical concerns, limited AI expertise, and socio-economic disparities. These challenges restrict equitable access and effective implementation, particularly in rural and under-resourced institutions. Addressing these barriers requires strategic interventions, including investments in infrastructure, development of AI policies, implementation of training programs, and promotion of affordable AI solutions. By overcoming these challenges, Tanzanian HEIs can harness AI's transformative potential to create a more inclusive, efficient, and innovative educational system.

## 7. POLICY PERSPECTIVES

The integration of AI in Tanzanian HEIs requires robust policy frameworks to ensure ethical, equitable, and effective implementation. The absence of formalized AI policies in Tanzanian HEIs creates significant barriers, leaving institutions without clear guidelines on ethical use, data governance, and

academic integrity. This section examines the current state of AI policies in Tanzanian HEIs, identifies key factors hindering policy development, and provides comprehensive recommendations to address these gaps, fostering a sustainable and inclusive approach to AI adoption in higher education.

### 7.1. Current State of AI Policies

The lack of formalized AI policies in Tanzanian HEIs is a critical barrier to effective AI integration. Matto and Ponera (2025) analyzed eight Tanzanian HEIs and found that none had established AI policies, attributing this gap to rapid technological advancements, limited institutional expertise, and insufficient leadership focus on AI governance. This policy vacuum creates uncertainty around critical issues such as data privacy, academic integrity, and the responsible use of AI tools like ChatGPT and Grammarly, which are widely used by students (Stuart, 2024). Without clear guidelines, institutions struggle to regulate AI use, leading to inconsistent practices and potential misuse. For instance, the absence of policies on data management raises concerns about how student data is collected, stored, and processed by external AI platforms, particularly those hosted outside Tanzania, where data protection regulations may differ. The AI adoption framework by Kurup and Gupta (2022) highlights that organizational culture, technology readiness, and environmental factors such as resource constraints and limited infrastructure significantly influence policy development in Tanzanian HEIs. Additionally, the rapid pace of AI innovation outstrips institutional capacity to develop responsive policies, exacerbating the challenge of ensuring ethical and equitable AI use.

### 7.2. Factors Hindering Policy Development

Several factors contribute to the absence of AI policies in Tanzanian HEIs. First, limited institutional expertise in AI technologies restricts the ability of HEIs to formulate informed policies. Many administrators and faculty lack the technical knowledge required to address complex issues like algorithmic bias or data security, as noted by Mambile and Mwogosi (2025). Second, resource constraints, including limited funding and inadequate infrastructure, divert institutional focus from policy development to more immediate operational needs (Xuan Vu, H. 2024). For example, rural institutions like Moshi Cooperative University (MoCU) prioritize basic infrastructure improvements over AI governance (Mambile & Mwogosi, 2025). Third, the lack of national-level guidelines on AI in education creates a fragmented approach, with individual institutions left to navigate AI integration without a unified framework. Finally, the absence of leadership prioritization, as highlighted by Matto and Ponera (2025), means that AI policy development is often deprioritized in favor of addressing traditional educational challenges, such as funding shortages or faculty recruitment. These factors collectively hinder the establishment of comprehensive AI policies, leaving Tanzanian HEIs vulnerable to ethical and operational risks.

### 7.3. Recommendations for Policy Development

To address the policy gap and facilitate responsible AI integration, Tanzanian HEIs must adopt a multi-faceted approach that balances ethical considerations, infrastructural needs, and capacity building. The following recommendations provide a roadmap for policymakers, institutional leaders, and stakeholders to foster ethical and equitable AI adoption:

**Formulate Comprehensive AI Policies:** Tanzanian HEIs should develop institution-specific AI policies that address ethical concerns, such as plagiarism, data privacy, and algorithmic bias. These policies should outline acceptable use cases for AI tools, establish protocols for secure data handling, and define consequences for misuse. For instance, policies could mandate the use of AI detection tools like Turnitin to identify AI-generated content, ensuring academic integrity. Policies should also align with national data protection regulations to safeguard student information and build trust among stakeholders.

**Invest in Infrastructure:** Government and institutional investments in reliable internet, stable electricity, and modern hardware are critical to supporting AI adoption. Rural institutions like MoCU face significant barriers due to infrastructural limitations (Mambile & Mwogosi, 2025). Public-private partnerships with tech companies could fund initiatives to expand broadband access and provide affordable

devices, ensuring equitable access to AI tools across urban and rural HEIs. Such investments would create a foundation for effective policy implementation by enabling consistent access to AI technologies.

**Implement Training Programs:** Comprehensive training for faculty and students is essential to enhance AI literacy and readiness. Many educators and students in Tanzanian HEIs lack the technical skills to effectively use AI tools or understand their ethical implications (Mambile & Mwogosi, 2025). Training programs, developed in collaboration with international organizations or tech companies, should focus on practical applications, such as integrating AI into curricula, and ethical considerations to prevent misuse. Workshops and online courses could build capacity, enabling faculty to design AI-enhanced teaching methods and students to use AI tools responsibly.

**Leverage AI Detection Tools:** Implementing AI content detectors is crucial to mitigate plagiarism risks associated with generative AI tools like ChatGPT, which 83.8% of KIUT students use (Stuart, 2024). Tools like Turnitin, with integrated AI detection capabilities, can help institutions maintain rigorous academic standards. HEIs should integrate these tools into assessment processes and educate students on ethical AI use to foster independent learning and academic integrity.

**Establish National AI Guidelines:** The Tanzanian government, in collaboration with HEIs, should develop national guidelines for AI in education to provide a unified framework. These guidelines should address data governance, ethical use, and equity, ensuring consistency across institutions. National policies could also facilitate resource sharing and collaboration, enabling smaller or rural HEIs to benefit from AI advancements.

**Promote Stakeholder Collaboration:** Engaging stakeholders, including faculty, students, administrators, and tech industry partners, is essential for effective policy development. Collaborative efforts can ensure that policies are inclusive, addressing the needs of diverse student populations and aligning with Tanzania's socio-economic context. For example, involving students in policy discussions can provide insights into their experiences with AI tools, ensuring that policies are practical and student-centered.

These recommendations aim to create a robust policy framework that supports AI's transformative potential while addressing Tanzania's unique challenges. By prioritizing policy development, infrastructure investment, and capacity building, Tanzanian HEIs can ensure that AI is implemented ethically and inclusively, aligning with global educational goals such as UNESCO's 2030 objectives for equitable education. This approach will enable HEIs to harness AI's benefits, such as enhanced learning outcomes and operational efficiency, while mitigating risks like data privacy breaches and academic misconduct.

## 8. CASE STUDY: KAMPALA INTERNATIONAL UNIVERSITY IN TANZANIA

A study by Stuart (2024) at Kampala International University in Tanzania (KIUT) provides valuable insights into the impact of AI on academic competency. The research revealed that 77% of KIUT students were aware of AI tools, with 65% actively using platforms like ChatGPT (83.8%) and Grammarly (63.1%) to enhance academic writing and access educational resources. These tools enable students to receive instant feedback on assignments, improve English proficiency, and access tailored content, which is particularly critical in Tanzania, where English is the primary medium of instruction. The study found that students using AI tools demonstrated higher academic performance, particularly in writing-intensive courses, highlighting AI's potential to address gaps in traditional teaching methods.

However, the study also identified barriers to AI adoption. Approximately 7.7% of students used AI tools infrequently due to limited access to reliable internet, inadequate hardware, and concerns about over-reliance on AI, which could undermine independent learning skills. Ethical challenges, such as plagiarism risks associated with generative AI tools, were also noted, emphasizing the need for clear guidelines on responsible use. The study recommends integrating AI into the KIUT curriculum through structured training programs for students and faculty to maximize benefits while addressing ethical concerns. Additionally, it suggests investing in infrastructure to ensure equitable access, particularly for students in resource-constrained settings. This case study underscores the transformative potential of AI in Tanzanian HEIs while highlighting the need for strategic interventions to overcome adoption barriers.

## 9. ETHICAL AND SOCIAL IMPLICATIONS

The integration of AI in Tanzanian higher education raises significant ethical and social implications that must be addressed to ensure responsible and equitable use. A primary concern is data privacy, as AI tools like ChatGPT and Grammarly often collect sensitive student information, raising risks of data breaches or misuse, particularly in the absence of robust data protection frameworks in Tanzania. Algorithmic bias is another critical issue, as AI systems may inadvertently perpetuate inequalities if trained on biased datasets, potentially disadvantaging certain student groups, such as those from marginalized communities. Holmes et al. (2022) emphasize that AI's efficiency must not overshadow the human elements of education, such as critical thinking and emotional support, which remain essential for holistic learning.

In Tanzania, where digital literacy is still developing, ensuring equitable access to AI tools is a pressing social challenge. The digital divide, exacerbated by unreliable internet and limited access to devices, restricts AI benefits to urban, better-resourced institutions, deepening educational inequalities. For instance, rural students at institutions like Moshi Cooperative University (MoCU) face significant barriers to accessing cloud-based AI tools (Mambile & Mwogosi, 2025). Additionally, over-reliance on AI tools risks diminishing students' self-directed learning and critical thinking skills, particularly when generative AI is used to produce academic work without proper attribution. To address these implications, Tanzanian HEIs must implement AI detection tools, develop ethical guidelines, and invest in digital literacy programs to ensure AI enhances education without compromising integrity or equity.

## 10. FUTURE DIRECTIONS

The future of AI in Tanzanian higher education lies in leveraging advanced technologies to address systemic challenges and align with global educational goals. Developing adaptive learning systems tailored to individual student needs can enhance academic outcomes, particularly for diverse learners in resource-constrained settings (Xuan Vu, H. 2024). Virtual assistants, offering 24/7 support for student queries, and collaborative AI tools, such as platforms for group projects, hold promise for improving engagement and accessibility, especially in rural areas with limited infrastructure. AI-driven virtual learning environments (VLEs) that operate offline or on low-bandwidth networks can bridge the digital divide, ensuring equitable access to education (Mambile & Mwogosi, 2025).

Tanzanian HEIs should align AI strategies with UNESCO's 2030 objectives, focusing on equitable access and quality education. Research should prioritize process-based frameworks to predict AI's impact across diverse demographics, addressing Tanzania's unique socio-economic and cultural context. Investments in infrastructure, such as reliable internet and affordable devices, are critical to scaling AI adoption. Additionally, fostering public-private partnerships with tech companies can support the development of localized AI tools and training programs to build AI literacy among faculty and students. By pursuing these directions, Tanzanian HEIs can harness AI's transformative potential to create an inclusive, innovative, and sustainable higher education system.

## 11. CONCLUSION AND RECOMMENDATIONS

AI holds transformative potential for Tanzanian higher education, offering innovative solutions to long-standing challenges such as resource constraints, large class sizes, and unequal access to quality education. By enabling personalized learning, streamlining administrative processes, and enhancing accessibility, AI can significantly improve academic outcomes and promote inclusivity, particularly among underserved populations. Empirical studies, such as Stuart (2024) at Kampala International University in Tanzania (KIUT), reveal that AI tools like ChatGPT and Grammarly enhance students' academic writing and overall performance, while also supporting faculty through automated grading and data-driven insights. However, effective AI integration remains constrained by infrastructural limitations, ethical concerns, inadequate policies, and limited technical expertise among faculty and students. Addressing these barriers is critical to achieving equitable and sustainable AI-driven education across Tanzania's HEIs.

The practical implications of these findings extend directly to educational policy, curriculum reform, and institutional management. Policymakers should prioritize the establishment of comprehensive national frameworks that mandate AI governance, data security, and ethical standards across all HEIs. Such policies

would guide the responsible use of AI tools, promote academic integrity, and ensure consistency in implementation across institutions. At the institutional level, universities and colleges should embed AI literacy modules into their curricula, equipping students with practical competencies in data analysis, digital ethics, and AI-assisted learning tools. Curriculum design should integrate hands-on applications of AI technologies, for example, using generative AI for writing enhancement, research support, and collaborative learning while emphasizing critical thinking and ethical usage. This would enable graduates to engage productively with emerging technologies in academic and professional settings.

From an administrative perspective, HEIs can operationalize these findings by leveraging AI in institutional planning and student support. AI-driven analytics can optimize resource allocation, forecast enrollment trends, and personalize student interventions to improve retention and performance. Moreover, by adopting AI-powered management systems, institutions can streamline operations and free up staff to focus on academic quality and student engagement. Faculty development programs should also be strengthened through continuous professional training in AI pedagogy, enabling instructors to integrate AI tools into teaching effectively and ethically.

To harness AI's potential while mitigating its risks, this study proposes the following recommendations for Tanzanian HEIs, policymakers, and educators:

1. Develop Comprehensive AI Policies: Establish national and institutional AI frameworks addressing data privacy, plagiarism, algorithmic bias, and ethical use. These should be enforced through AI detection tools such as Turnitin and guided by national data protection laws.
2. Integrate AI Literacy into Curricula**:** Introduce AI education as a cross-disciplinary module in undergraduate and postgraduate programs to enhance digital competency and promote ethical use.
3. Invest in Digital Infrastructure: Prioritize reliable internet, affordable devices, and electricity stability through public-private partnerships to enable equitable AI adoption, especially in rural institutions.
4. Enhance Faculty Capacity: Implement regular workshops, training, and certification programs for educators to develop skills in AI pedagogy and digital ethics.
5. Promote Inclusive Access: Provide subsidized technology and low-bandwidth AI platforms to support students from low-income and remote areas.
6. Align with Global Standards: Align Tanzania's AI education strategies with UNESCO's 2030 Agenda for equitable and quality education, while adapting them to local socio-cultural contexts.

In conclusion, the integration of AI into Tanzania's higher education system should be guided by a balance of innovation, ethics, and inclusivity. By translating these research insights into practical action through policy reform, curriculum enhancement, and institutional investment, Tanzania can foster a higher education ecosystem that is technologically advanced, socially equitable, and globally competitive. The successful implementation of these measures will not only bridge the digital divide but also position Tanzanian HEIs as leaders in responsible AI adoption across Africa's educational landscape.

**Acknowledgments.** We thank Tanzania government through the Ministry of Education, Science and Technology, Gauhati University, Institut Teknologi Bandung, and Catholic University of Allied Science and Health for providing the necessary facilities and resources to conduct this research.

**Research Ethics.** Ethical considerations were followed by the researchers.

**Data Availability Statement.** All data can be obtained from the corresponding author.

**Conflicts of Interest.** The author declares no conflicts of interest.

**Funding.** This research received no external funding.

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