

Policy Recommendations for Equitable AI-Driven Education in sub-saharan Countries: Ensuring Accessibility and Fairness

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Abstract

Social inequality significantly hold back of development, particularly in Sub-Saharan Africa. The rise of Artificial Intelligence has motivated governmental initiatives to democratize access, aiming to bridge the educational gap stemming from socioeconomic disparities. Developing nations are increasingly integrating AI into education to accomodate to diverse learning needs, ensuring inclusivity. This study investigates policy recommendations to improve equitable access to quality education in areas where social status dictates educational opportunities. It explores how AI can mitigate the impact of social inequality on educational attainment, offering pathways to create a more inclusive and effective educational landscape. By leveraging AI, this research aims to provide actionable insights for policymakers and educators seeking to level the playing field and foster sustainable educational development

Keywords: Artificial Intelligence, Policy Making, social economic

1. Introduction

Education is key for global development. Many government invest more in the education system fo their country to build a strong and intellectual youth. However developing countries have remained behind in the race of providing quality and accessible education, where few have the privilage to get access to quality education. In some region of developing countries classes are crowed with only one teacher and this result into failing of the teacher to accomodate and adjust to each student learning capability or need. In addition student with specific need faces challenges more due to lack of skilled and specific accomodation in many instutions. With the development of Technology and the development of Artificial intelligence there is a possibility to mitigate the gap of access to quality education. The advantage of AI is that it adjust content based on the student learning capability and need

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, moreover it provides personalized feedback that teachers mostly fails to give. Developed countries have started integrating such system in their education system to improve quality and better experience of learning. At the top comes south Korea Kim and Kwon (2023) which has conducted testing of integrating AI in K-12. Morocco has conducted a study to understand the advantage that AI and ML can improve in the education sytem they find out the AI has the potential to improve education system by shifting towards adaptive learning and adapting to various learning style and pace of students Ejjami (2024).

Related Work

1.1 Education in Africa

Africa face challenge of infrastructure especially in low incame and rural regions, these challenges after student from different social economic backgrounds and student with diasbilies to recieve proper education. However even those few that are fortunate to have access to the education teacher do not have the capacity to accomodate to their specific needs. In 2020 with the rise of the Pandemic COVID-19 education has increased the number of challenges, specifically in South-Africa, research shows that with the lock down and infrastructure issue to completely accommodate online learning was challenging Duby et al. (2022). Quality education is not just about accessing but also about the content and the enviroment of learning including teacher ability Odeyemi et al. (2024). Feedback is important especially in education, In many africa countries teacher to student ratio is not balanced where a teacher fails to give specific and personalized feedback to students, this also include that the teacher can not properly adjust to every student specific need and learning capability. This feeling result in stigma where student with special and specific need tend to quit school because they feel forgotten in the education. Integration of AI in education has bridge this gap, many countries in Africa have started integrating this solution in their education system and other have included it in the their Ai Policy drafts. Onesi-Ozigagun et al. (2024), Ehsan et al. (2024) the author argues that integrating AI and Machine Learning in their education system has revolutionized the experience and increase student participation in class. The author point that using AI in education can enhanced identification of those at risk of falling behind, enabling targeted interventions to support vulnerable communities.

2. Methodology and Data Collection

This study, conducted in Rwandan higher education institutions, focuses on exploring the perspectives and challenges associated with AI education tools among both local and international students from sub-Saharan countries. The research employed a two-phase survey approach, utilizing questionnaires distributed through WhatsApp groups to gather data from a diverse sample of Bachelor's and Master 's-level students, which included both open-ended questions and multiple-choice questions. The first survey aimed to gauge students' perceptions of AI-driven tools, identify access challenges, and explore their nature. The second survey delved deeper into the specific tasks for which students utilized AI-driven tools and investigated how they validated the responses obtained from these tools.

The scope of this study was further expanded to assess students' interest in receiving training or attending educational workshops on the effective use of AI-driven tools. This comprehensive approach allowed us to gain insights into the current state of AI tool usage in higher education and to identify potential areas for policy recommendations and support. Importantly, the survey was designed with ethical considerations, ensuring anonymity and protecting participants' personal data. This methodological approach provides a robust framework for understanding the intersection of AI technology and education in the context of Rwandan higher education institutions and the broader sub-Saharan African region.

3. Results and Discussion

The first survey received 22 participants at both bachelor's and master's levels from different institutions. This suggests that their heightened engagement with AI-driven tools may stem from their advanced academic requirements, research obligations, and exposure to emerging technologies within their specialized curricula. The higher participation rate among master's students could also indicate that graduate-level programs are incorporating more technology-intensive methodologies, pushing students to explore AI solutions for complex academic tasks. The survey achieved gender parity among respondents, strengthening the validity of the findings and providing balanced insights into how different genders perceive and utilize AI tools in academic settings. Equal representation allows for a more comprehensive understanding of potential gender-specific challenges or preferences in AI tool adoption in higher education. Table 1-2 illustrate these demographic distributions, highlighting proportional representation across academic levels, genders.

Gender	Bachelor	Master	Total
Male	26	28	54
Female	22	24	46

Table 1: Distribution of Gender Across Degrees

The analysis of AI tool accessibility across universities located in subsaharan region revealed significant institutional disparities in implementation and access. Higher institution (Masters Degree institution) emerged as a leading institution, with the highest number of participants (12 students), showing mixed levels of accessibility. While 6 students reported full access to AI tools, four faced limited access, and one reported no access, suggesting varying level of Digital Literacy, even within the same institution.

Overall, accessibility patterns revealed that while most students reported having access to AI tools, a significant portion faced limited access, with a small number reporting complete inaccessibility. These findings highlight the need for targeted interventions, including institutional awareness campaigns, infrastructure development, and standardized access policies across universities. The data support observations about awareness challenges and suggest systemic barriers in AI tool access across Sub-saharan higher education institutions.

AI Tools	Usage Frequency (%)
OpenAI ChatGPT	90
Microsoft Copilot	50
Grammarly	50
Claude AI	70
Scite	40
Perplexity	10

Challenge	Bachelors	Masters
Accessible	6	6
Limited	3	4
Not Accessible	1	1

Table 2: Left Table describe the percentage usage of AI-driven tools in Higher instution by our participants.Right table Quantitative description of accessibility challenges of Participant to access AI driven tools

We identified three main challenges that university students face while accessing Ai-driven tools. We combined these themes as follows:

- **High Cost:** 65% of the participants face cost-related issues, including subscription fees and internet costs required to access AI-driven tools. However, most of these tools do not offer offline access.
- **Privacy Concerns:** 45% of the participants have concerns about privacy. This includes how their data are used when creating accounts on AI-driven tools, and the personal information they provide while interacting with AI models.
- **Limited Personalization:** 35% of the participants raised concerns about the lack of customization in AI-driven tools. This includes the ability to personalize tools according to cultural contexts and norms.

Our goal was to understand the main task that participants felt needed support from the AI-driven tools. We analyzed this and found that research and code learning are the main tasks that students feel would benefit from the support of an AI-driven tool.

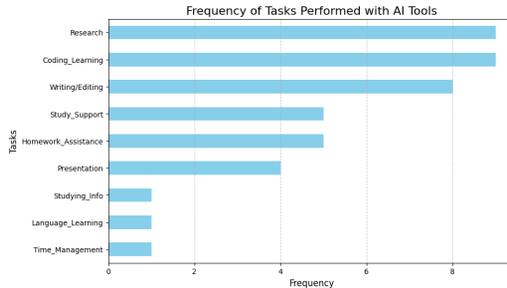


Figure 1: Task where AI driven tool is required

Given the increasing prevalence of Large Language Models in AI-driven educational tools and documented concerns regarding their propensity to generate inaccurate or fabricated information (i.e., "hallucinations") Dahl et al. (2024), we aim to investigate how students engage with and validate the responses provided by these tools. Specifically, it explores the cognitive and metacognitive strategies students employ when presented with

AI-generated content, and the extent to which they critically evaluate the veracity and reliability of such information Matthews (2024).

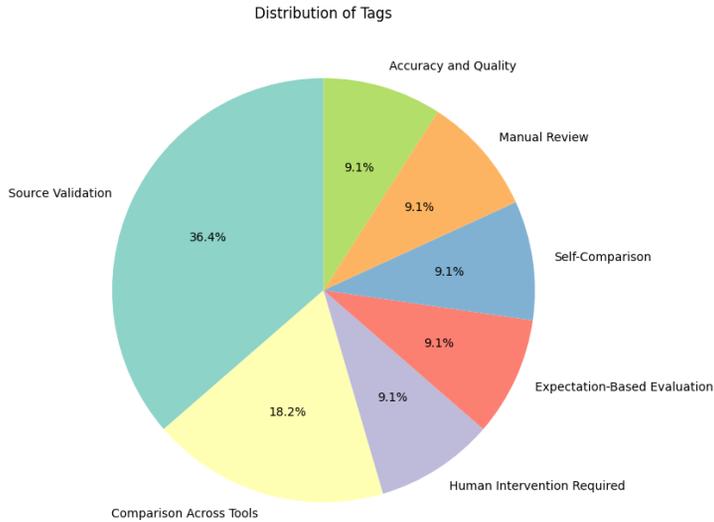


Figure 2: Evaluation of AI driven tools

Participants were also asked to evaluate the perceived potential of AI-driven tools to enhance learning outcomes, particularly for students facing resource constraints, a salient issue within African educational contexts. Analysis of these qualitative data, triangulated with findings from the quantitative analysis, enabled the identification of key themes and the development of robust, evidence-based conclusions regarding the role of AI in promoting equitable access to quality education Jian (2023); Dey (2025).

- Offline Access : 45.5% of participants find that with AI driven tools should be offline to support student with limited resources to access learning material offline.
- Personalized learning: 31.8% of the participants suggest that personalized learning feature would support alot student, given that people have different learning capabilities.
- Real time translation : 13 % percent of the participants finds that real time translation can support alot. mostly because of the language barriers. Some materials are better understood in the local languages.

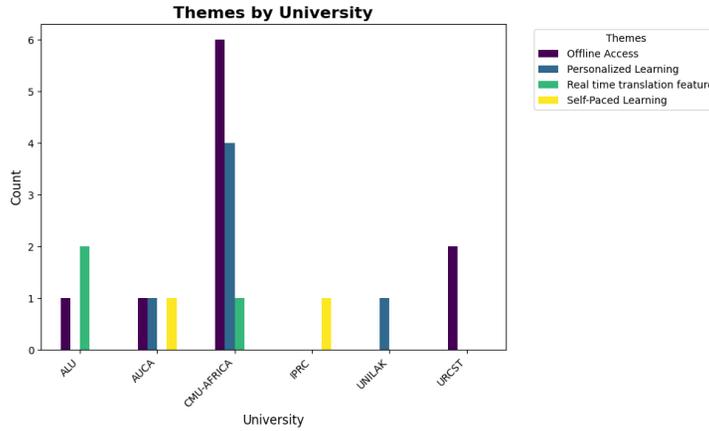


Figure 3: Themes of Area of Improvements

Finally, participants were surveyed regarding their interest in receiving further instruction on effectively leveraging AI-driven tools for learning. A significant majority expressed a desire to participate in training programs designed to enhance their proficiency in utilizing these tools and critically evaluating the validity of AI-generated outputs Mollick and Mollick (2023). This suggests a recognized need for pedagogical interventions aimed at fostering AI literacy and promoting responsible engagement with these technologies among students, particularly within resource-constrained educational settings.

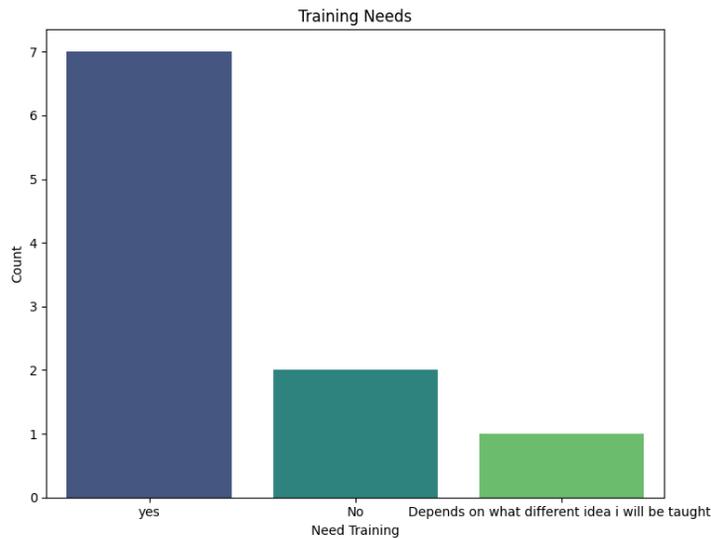


Figure 4: Need of Training

4. Policy Recommendations

1. Collaborative Development of Contextually Relevant AIED Solutions

Recommendation: Governments should forge partnerships with AI-driven education tool developers to co-create solutions that are specifically tailored to the linguistic and cultural contexts of diverse African communities Tourni et al. (2023). This collaboration should extend to incorporating local content and addressing the unique pedagogical needs of African learners.

Justification: This approach ensures that AIED tools are culturally sensitive, relevant, and effective in promoting learning outcomes within specific African contexts, moving away from the one-size-fits-all approach often seen with imported technologies Sinde et al. (2023).

2. Promotion of AI Literacy and Responsible Use

Recommendation: Governments, educational institutions, and AI developers should collaboratively implement comprehensive training programs to equip AIED tool users with the skills necessary to effectively leverage the capabilities of these tools and critically evaluate their outputs Howell et al. (2023).

Justification: Fostering AI literacy empowers students and educators to become discerning users of AIED, enabling them to identify potential biases, inaccuracies, and limitations, and promoting responsible engagement with these technologies Okolo et al. (2023).

3. Strategic Investment in Infrastructure and Connectivity

Recommendation: Governments should prioritize allocating resources to expand internet penetration in rural and underserved areas. Furthermore, the establishment of community-based connectivity centers equipped with necessary hardware and software should be prioritized to provide students with reliable access to the internet and digital resources Boateng (2024).

Justification: Addressing the digital divide is crucial for ensuring equitable access to AIED opportunities. Increased internet penetration and the establishment of connectivity centers can bridge the gap and enable students in resource-constrained environments to benefit from AI-powered learning tools Bura and Myakala (2024).

4. International Knowledge Sharing and Expertise Exchange

Recommendation: Governments of nations with advanced AI capabilities should establish collaborative agreements with developing countries to facilitate the sharing of expertise and best practices in AIED integration Isagah and Musabila (2020). This exchange should encompass technical knowledge, pedagogical strategies, and ethical considerations.

Justification: Sharing expertise and resources can accelerate the responsible and effective adoption of AIED in developing countries, enabling them to learn from the experiences of others and avoid potential pitfalls.

5. Prioritizing Underserved Communities in AIED Development

Recommendation: AI developers and governments should collaborate to develop AIED tools that explicitly prioritize the needs of underserved communities. These tools should be designed with offline capabilities and low bandwidth requirements to ensure accessibility in resource-constrained environments.

Justification: Addressing the specific needs of underserved communities is crucial for promoting equitable access to quality education. AIED tools with offline functionality can overcome connectivity challenges and ensure that all students, regardless of their location or socioeconomic status, can benefit from these technologies.

6. Advocating for Inclusive and Equitable AIED Development

Recommendation: AI policy pioneers should actively advocate for the inclusive development of AI-driven education tools, with a particular focus on addressing the needs of under-represented communities in developing countries. This advocacy should encompass promoting diversity in AI development teams and ensuring that AIED tools are designed to be culturally responsive and accessible to all learners Schiff (2020).

Justification: Ensuring inclusivity and equity in AIED development is essential for preventing the perpetuation of existing biases and inequalities. By prioritizing the needs of under-represented communities, we can ensure that AIED tools contribute to a more just and equitable education system.

Conclusion

As the digital age reshapes educational paradigms, Sub Saharan Africa stands at a pivotal stage where AI driven tools can transform inequalities in access to quality learning. This study demonstrates that while the integration of AI in education presents substantial opportunities for personalization, inclusivity, and support for under-resourced learners, it also reveals critical disparities in accessibility, digital literacy, and infrastructural readiness. Through comprehensive survey data and policy analysis, we identified high costs, privacy concerns, and lack of cultural adaptability as persistent barriers to equitable AI adoption.

To move beyond aspiration and into implementation, governments, educators, and developers must co-create contextually grounded AI solutions, invest in connectivity, and champion inclusive design. Prioritizing offline access, real-time translation, and localized personalization can catalyze meaningful change, particularly for marginalized communities. Furthermore, the widespread enthusiasm among students for training highlights a pressing need to embed AI literacy within institutional frameworks.

By aligning policy, pedagogy, and technological innovation, Sub-Saharan nations can ensure that AI does not deepen existing divides but instead becomes a powerful equalizer bridging educational gaps and unlocking the region's full intellectual potential.

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