

Design and Implementation of AI-Driven Personalized Learning Tools for Tanzanian Secondary Schools

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ABSTRACT

This study investigates the effectiveness of AI-powered personalised learning tools in Tanzanian secondary schools. The research explores the potential of these tools to address the unique challenges these schools face, including large class sizes, limited resources, and significant language diversity. Through a comparative analysis of various AI tools, the study examines their adaptability to Tanzania's educational context, considering language diversity, cultural relevance, and infrastructure constraints. The research employs qualitative design, incorporating comparative case study elements to evaluate the functionalities and adaptability of selected AI-driven personalised learning tools. Data collection involves a systematic review of available tools, semi-structured interviews with educators and AI experts, and a survey to gather information specific to the Tanzanian educational context. Key findings indicate that AI-driven personalised learning tools offer significant potential for enhancing education in Tanzanian secondary schools. These tools can adapt to individual student needs, providing personalized learning experiences that traditional methods cannot achieve. However, the study also identifies challenges, including limited language support, the need for culturally relevant content, and infrastructural constraints. Addressing these challenges is crucial for maximizing the effectiveness of these tools in the Tanzanian context. The study concludes that AI tools can significantly contribute to personalized learning in Tanzania, but their successful implementation requires careful consideration of local needs and challenges. Recommendations include prioritizing AI tools with high adaptability, robust multilingual support, and mobile-first designs to cater to Tanzania's diverse linguistic landscape and technological infrastructure. Future research should focus on empirical testing within Tanzanian classrooms and refining AI tools to align better with local educational needs.

Keywords: AI-driven, Adaptability, Artificial intelligence, Secondary schools.

I. INTRODUCTION

The government of Tanzania acknowledges that secondary school learners form a core part of its economic backbone and has made considerable efforts to safeguard them so that they become a productive workforce and participate in socio-economic development [1], [2]. A skilled and adaptable workforce is essential as Tanzania strives to achieve its development goals. Personalized learning, AI integration, and competence-based learning can equip students with 21st-century skills, enhancing their employment ability and contributing to the country's economic growth. The fast advancement of Artificial Intelligence (AI) technologies is reshaping numerous sectors globally, with education among the most promising. AI's potential to personalize learning experiences for individual students—adapting to their unique needs, preferences, and learning speeds—has attracted substantial interest from researchers and educators alike [3], [4]. Personalized learning, driven by AI, offers opportunities to transform traditional education by tailoring instructional content and strategies, thus fostering a more engaging and effective learning environment. Studies in various regions have demonstrated the effectiveness of AI-powered tools in enhancing learning outcomes, particularly in improving student engagement and addressing specific academic challenges [5]. However, while these studies primarily focus on educational systems in developed countries, research on AI applications in the setting of developing countries, particularly in Africa, remains limited [6], [7].

Tanzanian secondary schools illustrate an urgent need for innovative solutions like AI-driven personalisation. With large class sizes, limited resources, and significant language diversity, Tanzanian schools encounter numerous barriers that hinder effective learning. The country's unique linguistic landscape compounds these challenges; students in Tanzanian secondary schools speak various local languages, yet English often serves as the primary language of instruction, creating an added layer of complexity for both students and educators. The conventional, one-size-fits-all approach commonly applied in classrooms cannot effectively address such diverse needs, resulting in disengagement, disparate learning outcomes, and limited academic growth for many students. [8] noted that the current Tanzanian educational system struggles to meet students' individual learning needs, underscoring the potential benefits of adopting AI-powered tools to create a more inclusive and personalized academic experience.

Previous research by scholars like [9] and [10], has highlighted the transformative potential of AI in education, with an emphasis on creating adaptive, student-centred learning environments. Their studies reveal that AI-driven educational tools, such as smart tutoring systems and adaptive learning platforms, can identify and address students' learning gaps in real time, thus enhancing engagement and comprehension[11] further expanded this understanding by demonstrating that AI-powered systems could be effectively integrated into classroom settings to support various academic needs, from foundational skills to advanced topics. This research indicates a strong foundation for incorporating AI in educational settings. It suggests that AI tools could address specific challenges in Tanzania's education system, particularly by enabling language support, adapting content to different learning paces, and providing real-time feedback.

Building on these significant contributions, this study addresses a critical question: *What AI-powered personalized learning tools can effectively address Tanzanian secondary schools' unique educational needs?* To answer this, the research will explore and evaluate AI-driven learning tools that have proven successful in other contexts, focusing on their adaptability to Tanzania's unique educational landscape. This involves examining each tool's compatibility with Tanzania's language diversity, cultural alignment, and infrastructure constraints. By identifying suitable AI tools, this research could pave the way for more reasonable and inclusive educational opportunities in Tanzania, ultimately enhancing the learning experience for students across diverse backgrounds.

2. LITERATURE REVIEW

Artificial Intelligence (AI) integration in education has gained significant attention over the past decade, with AI-powered tools showing promise in enhancing personalized learning experiences across diverse educational contexts. Recently, personalized learning through AI has been proposed to cater to individual learning needs, foster engagement, and address academic challenges, particularly in developing regions with limited resources [12], [13]. This review examines the theoretical foundations of AI in personalized learning and critical findings from prior studies. It also identifies gaps in the research that this study aims to address.

2.1 Theoretical Review

AI in education is grounded in several theoretical frameworks, primarily related to adaptive learning and constructivist theories, emphasizing personalized, student-centred learning experiences. Constructivist Learning Theory, proposed by scholars such as Jean Piaget and Lev Vygotsky, posits that students actively construct their knowledge through experiences and interactions [14]. AI-driven personalized learning tools, which adapt to each student's needs, align with this theory by providing tailored learning experiences that engage students individually.

Additionally, Adaptive Learning Theory forms the basis of many AI-powered educational tools. Adaptive learning systems use algorithms to assess a student's learning pace, strengths, and weaknesses, providing real-time adjustments in content delivery [15]. These AI-driven tools create a continuous feedback loop that enhances personalized learning outcomes by analyzing student performance and adapting instructional material to match individual learning needs. Bloom's Mastery Learning Theory also supports AI in education, which suggests that all students can achieve mastery if given the right instructional conditions, time, and feedback[16] . AI Tools in education apply this theory by adapting to students' learning needs, pacing lessons accordingly, and providing personalized support that promotes mastery.

2.2 AI-Driven Personalized Learning in Developing Countries

Studies focusing on AI in developing countries, particularly in Africa, are relatively limited. However, the importance of AI in addressing educational challenges in these regions has been recognized in the application of AI tools in Tanzania, identifying key challenges such as inadequate infrastructure, teacher digital literacy, and financial constraints [17], [18], [19]. Their study emphasizes the need for AI tools that are adaptable to local contexts, culturally relevant, and capable of functioning in low-resource settings. Furthermore, [20], discuss how language diversity in Tanzania adds another complexity to adopting AI-driven personalized learning. While platforms like Duolingo for Schools offer language-learning tools, their limited support for local languages reduces their effectiveness in multilingual environments, highlighting a need for more inclusive solutions.

2.3 Educational Impact of AI Tools on Student Performance

Several studies demonstrate that AI-powered educational tools significantly impact student engagement and performance. [21],evaluated tools significantly enhance student performance by targeting individual learning needs, improving attitudes toward learning, boosting motivation, integrating AI in classrooms, and observing improvements in learning outcomes and student motivation. The study highlights that AI tools provide personalized feedback, creating a learning experience that encourages students to engage actively with the content. Moreover, a survey by [22], showed that AI tools can enhance student performance through automated assessment, personalized feedback, and educational data analysis. They support adaptive learning and 21st-century skills, promoting educational equity and accessibility while addressing ethical considerations for responsible implementation in academic settings. Also, [23]evaluated AI-driven tools significantly enhance student performance by offering personalized learning experiences, improving engagement through adaptive learning platforms, and streamlining assessments with automated tools. These innovations reshape traditional educational practices, fostering better academic outcomes and effectively addressing diverse learning needs. The evidence suggests that students who engage with AI tools, such as smart tutoring systems and adaptive learning platforms, experience improved understanding and retention of material due to these systems' continuous feedback and adaptive nature.

2.4 Personalized Learning Tools and Platforms

Personalized learning platforms leverage AI to create individualized learning experiences with tools adaptable to a student's progress and areas of need. Several types of AI-driven tools are currently significantly impacting Tanzanian secondary schools. Here is a summary of the commonly used tools and the challenges each tool faces.

Table 1: AI- driven tools used in Tanzania

AI-Driven Tool	Description	Challenges	Citation
M-Shule	A mobile-based learning platform offering personalized quizzes and lessons, adapting to each student's level. The software is founded in Kenya.	Limited smartphone access among students; inconsistent internet connectivity; content mainly in English.	[24]

Kio Kit	Digital learning platform with preloaded educational content on tablets, designed for resource-limited schools.	High initial setup cost; maintenance and battery issues; limited language customization for multilingual classrooms.	[25]
Ubongo Kids	An educational platform using AI to deliver math and science lessons through videos and interactive tools.	Primarily video-based, requiring internet access; content adaptation challenges for higher secondary levels.	[26]
Eneza Education	AI-driven SMS-based learning service offering quizzes and tutoring support for students in remote areas.	Text-based limitations make complex topics harder to explain, such as SMS costs for low-income families and language limits.	[27]
SmartClass	AI-powered platform providing customized tutoring and learning paths for individual students in STEM subjects.	High data consumption; lack of integration with local curriculum; requires teacher training on AI tools.	[28]

Challenges of AI in Education in Developing Regions

Implementing AI-driven educational technologies in developing regions such as Africa poses unique challenges due to infrastructural and cultural barriers. [21]notes that many African countries, including Tanzania, face limited access to digital infrastructure, insufficient digital literacy, and resource constraints that can inhibit adopting and incorporating AI technologies in education. Access to a stable internet, adequate devices, and reliable electricity are often inconsistent, particularly in rural areas, which limits the reach and effectiveness of AI-driven tools. Moreover, limited financial resources can make it difficult for schools to acquire and maintain these technologies, further exacerbating the digital divide within and across educational institutions.

Language and cultural differences also present significant barriers to implementing AI tools designed outside the African context. AI-powered tools often lack features that account for African nations' linguistic diversity and cultural particularities. For example, the standard language of instruction in Tanzanian secondary schools is English, which may not be the first language for many students. AI tools that lack multilingual capabilities or culturally relevant content may fail to engage students effectively or address their unique learning[17], [18], [19], [29]. This highlights the importance of designing or adapting AI tools specifically for the African context to ensure they are accessible, relevant, and effective for students in this region.

2.5 Research Gap

While there is growing evidence of AI's positive impact on education, a significant gap exists in research focusing on applying AI-driven personalized learning tools in the African context, specifically in Tanzanian secondary schools. Previous studies have concentrated on developed countries with minimal infrastructural and resource constraints. In Tanzania, however, the educational landscape presents unique challenges requiring contextually relevant AI solutions.

Language diversity, limited technological infrastructure, and a scarcity of localized AI-powered educational tools hinder the effective implementation of personalized learning solutions in Tanzanian schools [5], [30].

Additionally, while studies indicate that AI-driven tools can improve engagement and academic performance, limited research exists on how these tools can be adapted to cater to Tanzania's unique linguistic and cultural needs. The impact of AI in multilingual and resource-limited settings, particularly in rural Tanzanian schools, remains underexplored. There is also a lack of empirical data on the acceptance and usability of AI tools among Tanzanian educators and students, which is crucial for successful implementation. The study addresses these research gaps by investigating AI-powered personalized learning tools and assessing their adaptability in Tanzanian secondary schools. Focusing on Tanzania's linguistic, cultural, and infrastructural challenges, this research aims to provide insights into selecting and implementing AI tools that support personalized learning and inclusivity. Ultimately, this study seeks to contribute to the limited research on AI in education in developing regions, providing actionable recommendations for policymakers and educational practitioners in Tanzania. This study adopted a comparative analysis approach to evaluate the suitability of various AI-driven personalized learning tools for Tanzanian secondary schools[31]. The methodology involves a systematic review of available tools, interviews with educational professionals, and a contextual survey, emphasizing understanding each tool's cultural adaptability, infrastructure requirements, and academic impact.

3. METHODOLOGY

This study employed a comparative analysis approach to assess the effectiveness of different AI-powered personalized learning tools for secondary schools in Tanzania. The methodology encompasses research design, data collection, sample size, data analysis, and the study's limitations. It emphasized the importance of adapting these tools to accommodate local languages, the national curriculum, and technological constraints.

3.1 Research Design

The study utilized a qualitative research design, incorporating comparative case study elements to evaluate the functionalities and adaptability of selected AI-driven personalized learning tools. This comparative analysis enabled a comprehensive understanding of the powers and limitations of these AI tools by examining their impact in various educational settings [32], [33]. This design was particularly appropriate given Tanzania's unique educational challenges, including language diversity, limited technological infrastructure, and varying academic needs.

3.2 Data Collection Methods

The data collection process used three primary methods to understand the subject matter comprehensively. First, a thorough review of relevant tools and platforms was conducted to assess their effectiveness and applicability within the educational landscape. Second, semi-structured interviews were held with diverse educators and experts in the field, allowing for in-depth discussions and insights into their experiences and perspectives. Finally, a survey was administered to gather information specific to the Tanzanian educational context, targeting various stakeholders to obtain a wide range of data that reflects the current state of education in the region.

The study employed three methods to get full insight into the data collected during data collection. This method systematically evaluates available AI-driven personalized learning tools, focusing on their functionalities, target age groups, and adaptability features. This approach helps identify tools that have been successful in similar contexts and assess their suitability for the Tanzanian educational landscape [14], [34]. Educators and Experts are interviewed semi-structured with Tanzanian secondary school teachers and AI education experts to gain insights into the adaptability and usability of each tool within local schools. Topics explored include challenges in implementation, language and cultural relevance, and the need for teacher training[35]. A survey of the Tanzanian Educational Context was also administered to collect information on Tanzanian secondary school environments, focusing on language diversity, infrastructure availability, and pedagogical needs. This survey provides a comprehensive perspective on the challenges and requirements for effectively integrating AI-powered personalized learning tools in Tanzania.

3.3 Sample Size

The research employed purposeful sampling to ensure a diverse and representative mix of perspectives among participants. This approach was designed to portray a wide range of insights, encompassing both the practical applications and strategic considerations related to the adaptability of AI tools. By carefully selecting individuals with varied experiences and viewpoints, the study aimed to comprehensively understand how these tools can be effectively integrated and utilized across different contexts. The sample includes A total of 100 secondary school teachers who have been selected to ensure a diverse representation from both rural and urban areas. This group comprises 25 professionals with expertise in artificial intelligence and its applications in education, particularly those with experience adapting tools for developing countries. Twenty-five individuals play a role in decision-making and policymaking regarding adopting educational technology in Tanzania.

3.4 Data Analysis

Data analysis involves two key approaches: thematic analysis and descriptive statistics. Thematic analysis is applied to qualitative responses, allowing researchers to detect and analyze patterns or themes within the data. This qualitative method helps understand the underlying meanings and insights expressed by participants. On the other hand, descriptive statistics are used to summarise and describe the characteristics of quantitative survey data. This includes measures such as percentages and means, which provide a clear overview of the numerical data and help make informed conclusions based on the surveyed population. Together, these methods provide a comprehensive understanding of the data collected.

Thematic analysis was directed to qualitative data from interviews and open-ended survey questions. The thematic analysis identifies recurring themes related to adaptability challenges, cultural relevance, and infrastructure requirements[36] . Themes are coded using NVivo software to ensure systematic categorization and facilitate comparisons between different tools. Descriptive Statistics were used to ensure survey responses were analyzed using SPSS software to derive descriptive statistics. These statistics provide insights into participants' prevalence of identified challenges and general attitudes towards AI tools. Descriptive statistics are handy for understanding the distribution of responses on adaptability, usability, and perceived impact of AI tools in Tanzanian schools. [14], [21]

3.5 Limitations of the Study

Variations influence the study's findings in infrastructure across different schools, particularly in urban and rural areas. While the sample size of 150 is adequate for obtaining qualitative insights, it may not fully represent the diversity of secondary schools in Tanzania across all regions. The study is also constrained by time, funding, and access limitations, affecting the depth and extent of data collection. Additionally, personal biases from teachers, administrators, and experts especially those with pre-existing opinions on the use of technology in education—may impact the results. The study does not utilize a controlled experimental design but relies on comparative analysis and qualitative insights.

4. RESULTS AND DISCUSSION OF THE STUDY

This section displays the outcomes attained after the interview and evaluation study.

4.1 Demographic data

The data was collected in two regions, i.e. Dar es Salaam and Dodoma, where there were 28 females and 42 males in Dodoma. In Dar es Salaam, 41 females and 39 males of different ages and educational backgrounds were interviewed. Only participants (91%) owned smartphones and, 89% owned tablets, 41% owned laptops provided to them by the Government of Tanzania for easier accessibility of teaching and learning platforms. The remaining (9%) owned dumb or feature phones. The study observed that most teachers have obtained a master's level, and few have a certificate, as shown in the figure below.

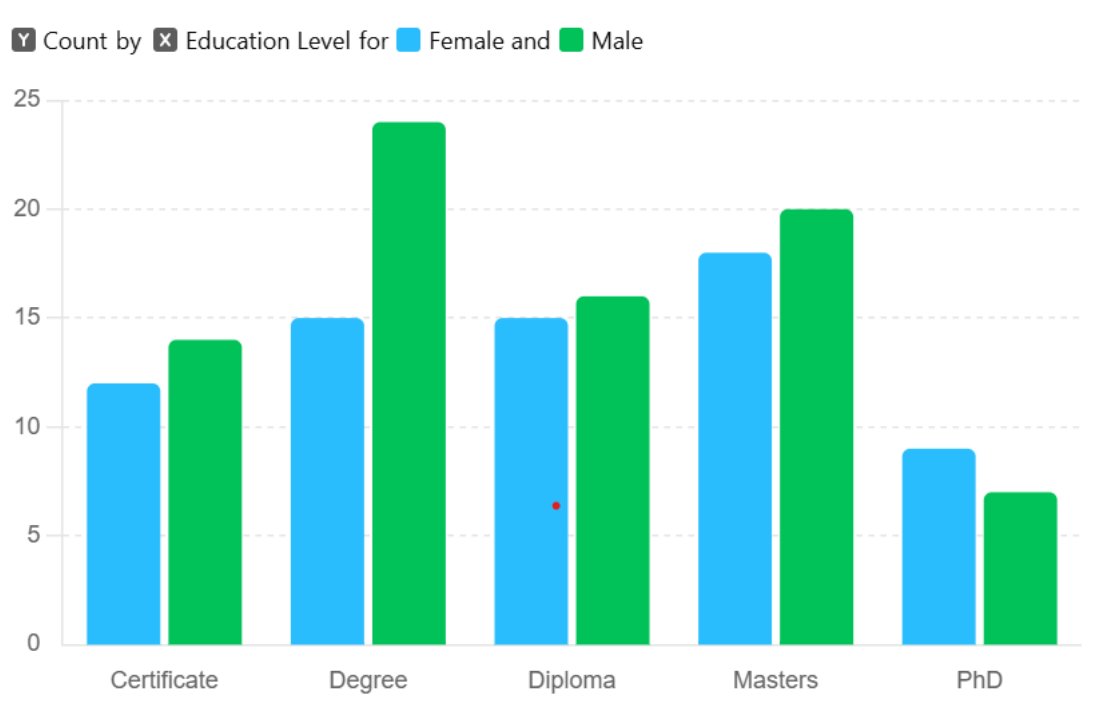


Figure 1 demographic data

4.2 Comparison of AI Tools used in Tanzania for learning

Summary of findings from the tool review, focusing on adaptability to diverse student needs and success in achieving educational goals. The evaluation was based on responses to questions about the effectiveness, challenges, and support for AI-driven tools in schools, each rated on a Likert scale from 1 to 5. Key areas covered are technological infrastructure, compelling language-related challenges, and the importance of mobile-first approaches addressing classroom needs. The user-friendliness of the AI tool for students in the Tanzanian context indicates that 56.6% of the IA-driven tolls have been accepted by learners, indicating a generally positive perception of the tool's usability, though not at the highest level. Also, it has a substantial share (22%), suggesting that some respondents see room for improvement in user-friendliness, whereas only 9.3%, highlighting that few respondents rated it as fully user-friendly. The study indicates that while the tool is somewhat user-friendly, a noticeable percentage of respondents find it less intuitive. A survey of respondents evaluated the adaptability of educational content to accommodate different learning paces.

The findings revealed that 54.3% of participants believe the content is moderately adapted. This moderate adaptability is often influenced by the specific local contexts in which the learning takes place and the tools utilized for instruction. In contrast, 30.7% of respondents expressed that the tools' adaptability is relatively high, suggesting that these tools effectively support learners in maintaining an appropriate learning pace. The data indicates that certain educational tools and methods have the potential to enhance learning experiences by catering to diverse needs. However, 14.7% of respondents felt the current tools are not well adapted to learners' needs. This sentiment raises concerns about the inclusivity and effectiveness of these tools in addressing all students' unique learning requirements. Overall, the data indicates a moderate level of adaptability in educational content and tools, but it also underscores the fact that some students' learning needs may not be fully met. In a survey regarding the cultural relevance of the content provided by the tool, 49.4% of respondents indicated that it was of slight significance. Meanwhile, 23.3% considered it moderately relevant, and 27.4% felt the tool was highly culturally relevant for learners. This distribution suggests that the tool could enhance its alignment with Tanzanian cultural contexts.

In Tanzania's multilingual environment, 57.3% of respondents indicated that the language options are somewhat limited. Many find that the language support does not adequately meet Tanzania's needs, as most tools are primarily in English, which can be challenging for Swahili learners. Additionally, 14.7% of respondents suggested moderate language support, while 30% felt that some tools offer comprehensive multilingual options. Overall, this feedback reveals that many respondents consider the language support insufficient for Tanzania's diverse linguistic landscape.

So, regarding the overall suitability of the tool for secondary school students, 35.3% of the respondents suggested that it is somehow suitable. In comparison, 64.7% of the respondents showed that these tools are ideal for learners. The data is supported by the figure below.

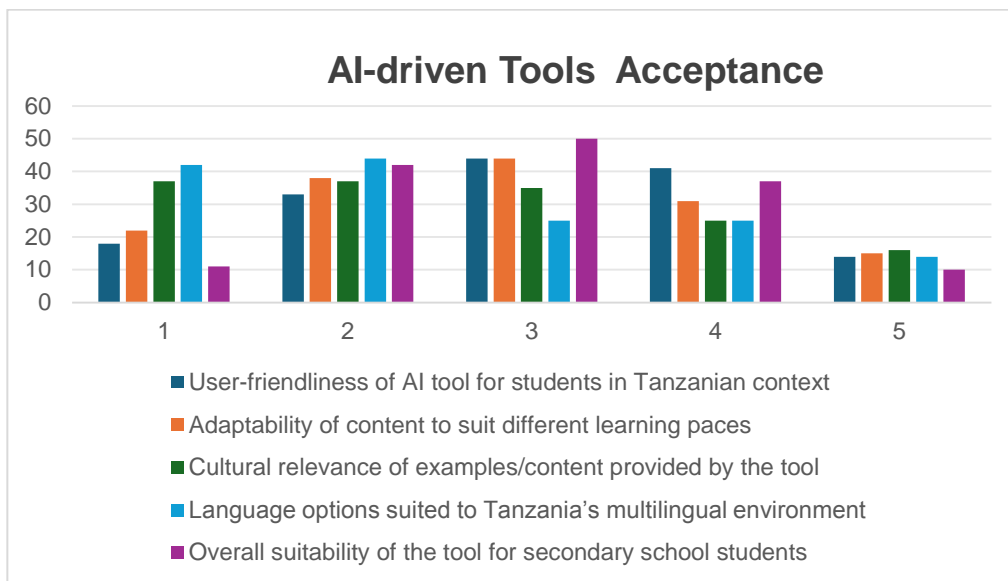


Figure 2: acceptability of AI-drive Tools

4.3 Technological Infrastructure in School Settings

Participants were only knowledgeable about tools available for learning that they had used for teaching their pupils. Most respondents (89%) initially reported challenges with the existing technological infrastructure, including unreliable internet access, outdated devices, or inadequate technical support. The weaknesses in technological infrastructure hinder the consistent use of AI tools, particularly in schools with limited or unstable internet and device access. The effectiveness ratings of the tools are relatively balanced; 20.6% of respondents rated them as ineffective, while 21.2% rated them as highly effective. Additionally, 22.7% rated the effectiveness as a 2, and 19.7% rated it as a 3. This indicates that many find the infrastructure less than ideal yet functional, as illustrated in the figure below. The variation in responses highlights disparities in the availability and quality of technological resources across different schools. Some infrastructures are inadequate, while others are relatively effective, reflecting overall quality variability.

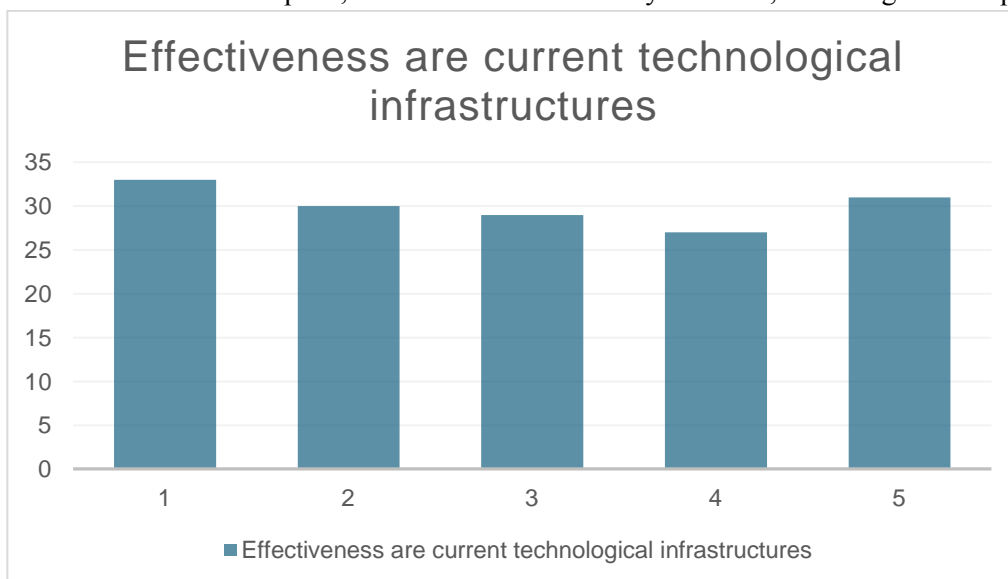


Figure 3: current Technology effectiveness

The average scores for each question reflect a generally moderate level of satisfaction and effectiveness across all evaluated aspects. The scores range from 2.95 to 3.11, indicating that respondents view the technological

infrastructure, language support, mobile-first compatibility, classroom suitability, and administrative support for AI tools as somewhat adequate but not exceptionally high. The slight variation in scores suggests a consistent perception of moderate effectiveness, highlighting areas where improvements could enhance the experience and utility of AI tools in schools.

4.4 Educational Impact Assessment on the AI-driven tools

Overall, the tool demonstrates moderate effectiveness across various educational impact areas, indicating potential value and highlighting areas for refinement to suit the needs of Tanzanian students better. Specifically, student engagement scored 57.87%, suggesting that while the tool aids in engaging students, there is room to make it more captivating in the context of secondary education. The tool's contribution to improving understanding and retention is somewhat higher at 63.47%, demonstrating a reasonable positive impact on students' grasp of subjects, which is valuable for core curriculum comprehension in secondary schools.

Regarding real-time feedback, the score of 59.87% suggests that while the tool offers some capacity for immediate assessment, further development could enhance its responsiveness, potentially supporting teachers in large classroom settings typical in Tanzanian schools. The ability to address individual learning needs is rated at 59.07%, showing that while the tool provides moderate support for personalized learning, it may require more advanced customization features to meet the diverse needs of students within Tanzanian classrooms. Lastly, the overall educational impact score of 64.93% indicates that the tool can enhance student outcomes but may need tailoring to reach its full potential in a Tanzanian secondary educational context.

4.5 Language suitability and cultural relevance on AI-driven tools

It was observed that the applicability of an AI-powered personalized learning tool for Tanzanian secondary schools reveals nuanced insights into its adaptability and effectiveness. Key findings indicate that while the tool shows promise in enhancing students' understanding of subject matter—evident from a relatively high agreement rate (35.33%)—there are areas requiring further development to fully align with Tanzanian educational needs. Language suitability is notably a challenge, with over half of the respondents (53.34%) expressing concerns, underscoring the importance of integrating language options that resonate more closely with Tanzanian students. Similarly, only 30.67% of participants agree that the tool includes culturally relevant examples, suggesting incorporating local references could improve engagement and relatability. Moreover, with 46% of responses questioning the tool's alignment with the Tanzanian curriculum, there is a clear need for the tool to mirror local educational standards and learning levels better. Addressing these areas could significantly enhance the tool's effectiveness, making it more adaptable to Tanzanian students' linguistic, cultural, and academic contexts, thus better supporting personalized learning within the country's secondary education system.

4.6 Discussion of the findings

The findings from this study underscore the significant potential of AI-powered personalized learning tools in enhancing education in Tanzanian secondary schools, especially by addressing specific barriers such as large class sizes, limited resources, and language diversity. Results reveal a moderate level of acceptance and perceived adaptability among users. For example, while 56.6% of the respondents find AI-driven tools generally user-friendly, some areas still require improvement, particularly in user interface design, to make the tools more accessible for all students. Additionally, approximately 54.3% of participants noted moderate adaptability in educational content, with 30.7% expressing that these tools are highly adaptable. Language options were another critical area, as 57.3% of respondents cited limited support, pointing to the need for multilingual features to serve Tanzania's diverse linguistic landscape better. Overall, the tools show moderate effectiveness across various educational impact areas, including engagement and real-time feedback, which indicates their potential but also highlights areas for refinement.

4.7 Implications for Tanzanian Education

Given Tanzanian secondary schools' distinct challenges—such as large class sizes, limited resources, and diverse language backgrounds—AI tools emerge as a promising solution for enhancing individualized learning. These tools can be designed to adapt to each student's unique pace and needs, ensuring a more personalized educational experience[8], [21]. The survey revealed that approximately 54.3% of users believe these AI tools demonstrate a moderate level of adaptability, particularly in how the content is tailored to local contexts. This adaptability is crucial,

enabling students to connect their learning to relevant cultural and linguistic situations, making the educational process more engaging and effective. AI can thus help bridge educational gaps, providing each student with the targeted support they require and offering real-time feedback that can guide their learning journeys. Furthermore, these insights correlate with findings from comparable studies conducted in developing regions, which indicate that personalized learning tools can significantly elevate student engagement levels and improve academic performance. By meeting students where they are and addressing their specific challenges, AI technology holds great promise for transforming the educational landscape in Tanzania . [11], [37]

For policymakers, the study suggests prioritizing AI tools with high adaptability and minimal technological requirements to maximize their impact across diverse school settings in Tanzania. Since 57.3% of respondents indicated language limitations, policymakers should focus on AI tools that offer robust multilingual support to accommodate Tanzania's linguistic diversity. Furthermore, the selection of tools should emphasize mobile-first designs, as smartphone access is relatively high among teachers (91%), making mobile-compatible tools a viable choice for reaching students even in resource-limited areas. [20] (These insights can guide investments in educational technology, ensuring that selected AI tools are accessible and impactful for Tanzanian students.

While the study offers valuable insights, it also has limitations, primarily regarding selecting tools based on available data, which may not represent the full range of AI tools suitable for Tanzanian education. The AI tools reviewed in this study were limited to those with pre-existing data, possibly omitting other effective technologies that could better address local needs. Further empirical testing within Tanzanian classrooms is recommended to validate these findings and explore additional AI tools that could offer even greater alignment with Tanzania's unique educational landscape. [1], [23] Additionally, participant biases may have influenced feedback, as responses were based on educators' and experts' personal experiences and perceptions, which could affect the generalizability of results across other Tanzanian schools. Future research should include a larger sample in various educational contexts to overcome this restriction and obtain a more thorough grasp of AI's possible effects.[33]

5. CONCLUSION AND RECOMMENDATIONS

This study evaluated several AI-powered personalized learning tools, examining their suitability for Tanzanian secondary schools, which face unique challenges such as large class sizes, limited resources, and language diversity. Key tools reviewed include M-Shule, Kio Kit, Ubongo Kids, Eneza Education, and SmartClass. Each tool offers unique functionalities to support individualized learning, potentially enhancing student engagement, providing real-time feedback, and addressing individual learning paces. However, limitations in technological infrastructure, language options, and cultural relevance restrict their effectiveness. Findings indicate moderate levels of usability and adaptability, suggesting that while these tools have potential, they require enhancements to be fully effective in Tanzanian classrooms. This study adds to the growing knowledge of AI in education, particularly in resource-limited contexts. Focusing on Tanzania's educational landscape provides insights into how AI tools can be adapted to meet local needs. The research emphasizes the importance of adaptability in AI technologies, especially regarding linguistic and cultural relevance, and sheds light on the infrastructural constraints of Tanzanian schools. These insights are crucial for stakeholders looking to implement AI-powered learning solutions in similar educational contexts, demonstrating how such technologies can be strategically tailored to promote equitable access to quality education in developing regions.

Future studies should aim to empirically test AI-powered learning tools in Tanzanian classrooms to gather robust data on their effectiveness and impact on student learning outcomes. Pilot testing, especially in various school settings across urban and rural areas, would provide critical insights into how these tools perform in real-world conditions. Additionally, further research could focus on refining AI tools to better align with Tanzania's linguistic diversity and educational needs, including multilingual support and curriculum integration. This research will be instrumental in building a more comprehensive understanding of AI's potential in Tanzanian education, paving the way for evidence-based policy recommendations and sustainable AI-driven educational solutions.

REFERENCE LIST

- [1] N. N. Mtawa and G. Wangenge-Ouma, "Questioning private good driven university-community engagement: A Tanzanian case study," *High Educ (Dordr)*, vol. 83, no. 3, pp. 597–611, 2022.
- [2] D. SALAAM, "MAPPING SKILLS GAP AND SKILLS NEEDS FOR TECHNICIAN GRADUATES IN THE SELECTED ECONOMIC SECTORS FOR INDUSTRIAL GROWTH IN TANZANIA," 2020.
- [3] S. S. Matazu, "Impact of AI-Blended Learning and AI-Personalized Learning on Undergraduate Biology Students' Attitude and Performance in Climate Change Education," *Anchor University Journal of Science and Technology*, vol. 5, no. 1, pp. 83–95, 2024.
- [4] M. Quirke, P. McCarthy, and C. Mc Guckin, "'I can see what you mean': Encouraging higher education educators to seek support from 'outside agencies' to aid their work with visually impaired learners.," *AISHE-J: The All Ireland Journal of Teaching and Learning in Higher Education*, vol. 10, no. 1, 2018.
- [5] K. Lin and G. Wang, "Self-supervised Deep Multiple Choice Learning Network for Blind Image Quality Assessment".
- [6] S. O. Ayelaagbe, "Utilization and perception of intelligent tutoring systems among undergraduates in Ondo State, Nigeria," *Faculty of Natural and Applied Sciences Journal of Mathematics, and Science Education*, vol. 5, no. 4, pp. 85–91, 2024.
- [7] P. Charland, A. Létourneau, M. D. Martineau, J. Boasen, and P.-M. Léger, "Navigating the Future of Learning: A Systematic Review of AI-Driven Intelligent Tutoring Systems (ITS) in K-12 Education," 2024.
- [8] A. Ziraba, G. C. Akwene, and S. C. Lwanga, "The adoption and use of Moodle learning management system in higher institutions of learning: A systematic literature review," *American Journal of Online and Distance Learning*, vol. 2, no. 1, pp. 1–21, 2020.
- [9] R. Ndungi and M. U. Siregar, "The effects of artificial intelligence on the Kenyan society," *Indonesian Journal of Electrical Engineering and Computer Science*, vol. 32, no. 2, pp. 1199–1205, 2023.
- [10] D. Plaut, "How Can Implementers Apply Digital Personalised Learning in Schools?," EdTech Hub, 2024.
- [11] C. Mambile and A. Mwogosi, "Transforming higher education in Tanzania: unleashing the true potential of AI as a transformative learning tool," *Technological Sustainability*, 2024.
- [12] S. Riedel and W. Wünschmann, "Evaluation of a Web Based Information System for Blind and Visually Impaired Students: A Descriptive Study," pp. 611–619, 2010, doi: 10.1007/978-3-540-30120-2_77.
- [13] M. H. Lin, H. C. Chen, and K. S. Liu, "A study of the effects of digital learning on learning motivation and learning outcome," *Eurasia Journal of Mathematics, Science and Technology Education*, vol. 13, no. 7, pp. 3553–3564, 2017, doi: 10.12973/eurasia.2017.00744a.
- [14] S. J. Mgaiwa, "Fostering Graduate Employability: Rethinking Tanzania's University Practices," *Sage Open*, vol. 11, no. 2, Apr. 2021, doi: 10.1177/21582440211006709.
- [15] S. Ennouamani and Z. Mahani, "An overview of adaptive e-learning systems," in *2017 eighth international conference on intelligent computing and information systems (ICICIS)*, IEEE, 2017, pp. 342–347.
- [16] D. Obidiegwu, J. Uche, and J. O. Ajibare, "Blooms Mastery Learning Theory: implications on adult education," *Recuperada de*, 2014.
- [17] L. I. Kumbo, V. S. Nkwera, and R. F. Mero, "Evaluating the Ethical Practices in Developing AI and ML Systems in Tanzania," *ABUAD Journal of Engineering Research and Development (AJERD)*, vol. 7, no. 2, pp. 340–351, 2024.

- [18] J. M. Ponera and S. S. Madila, "Harnessing the Use of Artificial Intelligence among Higher Education Institutions in Tanzania: Challenges and Prospects," 2024.
- [19] J. O. Sarfo, "Artificial Intelligence Use, Technostress, and Academic Productivity among Students in Sub-Saharan Africa," *Journal of Advocacy, Research and Education*, vol. 11, no. 1, pp. 4–6, 2024.
- [20] M. Hakimi and A. K. Shahidzay, "Transforming Education with Artificial Intelligence: Potential and Obstacles in Developing Countries," 2024.
- [21] L. L. D. Mallillin, "Artificial Intelligence (AI) Towards Students' Academic Performance," *Innovare Journal of Education*, pp. 16–21, Jul. 2024, doi: 10.22159/ijoe.2024v12i4.51665.
- [22] N. K. Arkabaev and Z. Zh. Murzakmatova, "THE APPLICATION OF ARTIFICIAL INTELLIGENCE FOR MEASURING STUDENT PERFORMANCE," *Bulletin of Issyk-Kul University*, Jul. 2024, doi: 10.69722/1694-8211-2024-56-98-108.
- [23] S. Ou, "Transforming Education: The Evolving Role of Artificial Intelligence in The Students Academic Performance," *International Journal of Education and Humanities*, vol. 13, no. 2, pp. 163–173, Apr. 2024, doi: 10.54097/cc1x7r95.
- [24] Grace Nyagah, Reuben Nguyo Wachiuri, and Rosemary Imonje, "Relative Advantage of Assistive Technology in the Teaching and Learning of Integrated English Among the Visually Impaired Learners in Special Secondary Schools in Kenya," *US-China Education Review A*, vol. 7, no. 1, pp. 39–48, 2017, doi: 10.17265/2161-623x/2017.01.003.
- [25] F. K. Ahmad, "Use of assistive technology in inclusive education: Making room for diverse learning needs," *Transcience*, vol. 6, no. 2, pp. 62–77, 2015.
- [26] J. Watson, S. Hennessy, and A. Vignoles, "The relationship between educational television and mathematics capability in Tanzania," *British Journal of Educational Technology*, vol. 52, no. 2, pp. 638–658, 2021.
- [27] O. O. Stephen and I. O. OLURINOLA, "Mobile Learning in Africa Strategy for educating the poor," *2ndCU-ICADI held on May*, pp. 11–13, 2015.
- [28] A. Alelaiwi, A. Alghamdi, M. Shorfuzzaman, M. Rawashdeh, M. S. Hossain, and G. Muhammad, "Enhanced engineering education using smart class environment," *Comput Human Behav*, vol. 51, pp. 852–856, 2015.
- [29] T. J. Maginga, S. J. Kutuku, H. F. Hamza, G. G. Mulokozi, and J. Nsenga, "MKULIMAGPT: EQUITABLE AI USE VIA A SWAHILI CHATBOT FOR MAIZE FARMING SYSTEM IN TANZANIA," 2024.
- [30] N. R. Mramba, "The potentials of artificial intelligence in improving Africa informal cross border trade. What works, What doesn't, and What's next to Africans?," *African Journal of Land Policy and Geospatial Sciences*, vol. 7, no. 1, pp. 92–112, 2024.
- [31] E. K. Maritim and H. M. K. Mushi, "Mobile Technologies for Enhancing Distance Learning in Tanzania: An Exploratory Study Ezra," *Huria Journal of the Open University of Tanzania*, vol. 13, no. Special Issue, pp. 123–138, 2012, [Online]. Available: <https://www.out.ac.tz/page.php?m=179>
- [32] H. Huang, "Blind users' expectations of touch interfaces : factors affecting interface accessibility of touchscreen-based smartphones for people with moderate visual impairment," *Univers Access Inf Soc*, 2017, doi: 10.1007/s10209-017-0550-z.
- [33] S. Hu, "The effect of artificial intelligence-assisted personalized learning on student learning outcomes: A meta-analysis based on 31 empirical research papers," *Science Insights Education Frontiers*, vol. 24, no. 1, pp. 3873–3894, 2024.

- [34] A. M. Sayegh and D. I. Al-Badawi, "AI Based Innovative CC for Interactive Education System Build," in *2024 4th International Conference on Advance Computing and Innovative Technologies in Engineering (ICACITE)*, IEEE, May 2024, pp. 1562–1567. doi: 10.1109/ICACITE60783.2024.10617405.
- [35] R. I. Ahmada, A. A. Abdulla, S. A. S. Yunus, and M. J. Ismail, "Teachers' Perception on Using Kio-Kit to Enhance Teaching and Learning STEM Subjects in Zanzibar," in *International Conference on Sustainable ICT, Education, and Learning*, Springer, 2019, pp. 135–144.
- [36] B. Quality and R. A. Page, "14 . Quality and Metrics in Requirements Analysis 14 . 1 Introduction to Quality in Requirements Analysis," pp. 1–20, 2016.
- [37] H. Wang *et al.*, "Examining the applications of intelligent tutoring systems in real educational contexts: A systematic literature review from the social experiment perspective," *Educ Inf Technol (Dordr)*, vol. 28, no. 7, pp. 9113–9148, 2023.