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The Role of Artificial Intelligence in the Future of Language Teaching and Learning Practices in Higher Education

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Abstract

Integrating Artificial Intelligence (AI) into education is set to transform globally teaching and learning practices. Although the potential benefits of AI in education are vast, significant challenges and uncertainties persist regarding its implementation and impact on the teaching and learning practices. This descriptive study examines the role of AI in language teaching and learning at a university in Tanzania, focusing on its applications, potential impacts, challenges, and ethical considerations. Data were collected from 128 participants through surveys, interviews, observations, and group discussions, providing a detailed account of the current state of AI integration and use. The findings revealed the growing use of AI-powered educational technologies in Tanzanian university settings, offering innovative solutions to traditional challenges and optimizing learning outcomes. However, challenges such as data privacy, lack of proficiency in AI, lack of suitable equipment, plagiarism issues, and high dependency on AI need to be addressed. Moreover, questions have arisen about the evolving roles of teachers and the ethical implications of AI usage in education. Despite the challenges, the study highlights AI's potential to transform teaching, personalize learning, and enhance instruction through improved access to materials and data analysis. Furthermore, instructors mainly benefit from AI lesson content creation and virtual reality simulations. However, concerns regarding dependency and misuse raise issues regarding critical thinking and integrity. Therefore, this study advocates for ongoing dialogue among stakeholders to ensure responsible AI integration in education and to maximize its potential.

Keywords: Artificial Intelligence, language teaching, language learning, ethical implications, AI in education, Tanzania

Introduction

The impact of Artificial Intelligence (AI), driven by rapid advancements, has profoundly transformed every field integrated with technology from industry and medicine to education. Incorporating AI into educational settings is expected to revolutionize teaching and learning practices globally. AI technologies, including machine learning algorithms, natural language processing, and adaptive learning systems, offer unprecedented opportunities to personalize education, enhance instructional effectiveness, and optimize learning outcomes (Son et al., 2023). As AI continues to evolve, its potential to reshape the future of education is increasingly evident, with implications for educators, students, and educational policymakers.

Artificial Intelligence (AI) is often defined as a computing system capable of engaging in human-like processes such as learning, adapting, synthesizing, self-correcting, and using data for complex processing tasks (Popenici & Kerr, 2017). Another perspective defines AI as the creation of machines that can function appropriately and with foresight in their environment (Tuomi, 2018). These definitions underscore the broad capabilities of AI and its applicability across various domains including education.

Integrating AI into educational settings represents a significant paradigm shift in how teaching and learning are conceptualized and

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executed. AI technologies encompass a wide range of applications, from machine learning algorithms capable of analyzing vast amounts of educational data, to natural language processing systems that facilitate personalized interactions with learners (Son et al., 2023). These technologies hold immense promise for revolutionizing education by offering innovative solutions to age-old challenges and unlocking new opportunities to enhance teaching effectiveness and optimize learning outcomes.

One of the key drivers of the adoption of AI in education is the growing recognition of the need for personalized and adaptive learning experiences. Traditional one-size-fits-all approaches to education often fail to accommodate the diverse needs, interests, and learning styles of students. However, AI-powered adaptive learning platforms have the potential to customize educational content and activities for each student's unique abilities, preferences, and progress. By analyzing students' interactions with learning materials and providing real-time feedback and recommendations, AI systems can facilitate more personalized and effective learning experiences, thereby maximizing student engagement, motivation, and academic achievement.

Furthermore, AI is expected to transform teaching methodologies and practices. Teachers are increasingly using AI-powered tools and resources to streamline administrative tasks, create interactive and immersive learning environments, and deliver personalized instruction at scale. For example, AI-driven chatbots and virtual assistants can provide students with instant support and guidance outside of traditional classroom hours. At the same time, intelligent tutoring systems can deliver adaptive instructions customized to students' individual learning needs. By enhancing educators' capabilities and expanding the scope of what is possible in teaching and learning, AI has the potential to transform education and empower educators to meet the diverse needs of 21st-century learners.

However, the widespread adoption of AI in education is not without challenges and complexities. Ethical considerations regarding data privacy, algorithmic bias, and the equitable distribution of AI-enabled resources must be carefully addressed to ensure that AI technologies serve the best interests of all learners and teachers. Moreover, the rapid pace of technological change and the potential of AI to disrupt traditional education systems raise important questions about the future roles and responsibilities of educators, the nature of student-teacher interactions, and the overall direction of educational policy and practice in the AI era.

Despite the growing recognition of AI's transformative potential in education, a critical gap remains in understanding how AI technologies impact language teaching and learning in higher education institutions in Tanzania. This study addressed this gap by examining the integration of AI-powered educational technologies into language instruction and their effects on teaching methodologies and student learning experiences. Specifically, this study sought to answer the following research questions: (1) How are current trends in AI-powered educational technologies shaping language teaching and learning practices? (2) What are the roles and potential impact of AI on teaching methodologies and student learning experience? (3) What ethical and practical challenges arise from AI use in language education? By exploring these aspects, this study provides insights into the transformative potential of AI in education and offers recommendations for its responsible and equitable deployment in higher education institutions in Tanzania in particular and elsewhere.

Literature Review

This study used constructivist learning theory (CLT) as its guiding framework to explore the impact of AI on future language teaching and learning. The theory informs the design of AI

interventions, ensuring that they provide interactive, student-centered learning experiences that promote engagement and deeper understanding. CLT posits that learners construct their own understanding and knowledge of the world through experiences and reflect on those experiences. This theory is primarily associated with the work of Piaget (1969) and Vygotsky (1978). Piaget emphasized the importance of individual cognitive development, while Vygotsky highlighted the social context of learning, suggesting that social interactions play a critical role in the construction of knowledge. In this theory, learning is viewed as an active, contextualized process of constructing knowledge rather than acquiring it. Learners are encouraged to use active techniques (such as experiments and real-world problem-solving) to create more knowledge and then to reflect on and talk about what they are doing and how their understanding is changing. Teachers synchronize their teaching strategies to fit learners' needs and prior knowledge.

Artificial Intelligence (AI) integration in education has gained significant attention due to its potential to transform learning experiences. This review critically examined the impact of AI on future language teaching and learning practices. Studies by Allam et al. (2023), Arikunto (2013), Chen et al. (2019), Harry (2023), Kaledio et al. (2024), Ma and Siau (2018), Mureșan (2023), Owan et al. (2023), Popenici and Kerr (2017), Rahayu (2023), Riduwan (2015), Sangheethaa and Korath (2024), Slimi (2023), and Tuomi (2018) are critically reviewed to identify benefits, challenges, and gaps in knowledge.

AI's Transformative Potential in Education

Tuomi (2018) notes that advancements in AI, driven by affordable processing power and vast data availability, have led to significant breakthroughs in machine learning and neural networks. These technologies are now being applied in various fields, including real-time language processing and translation, which are crucial for language education. Tuomi suggests that AI's impact on education could be profound, potentially rendering some traditional educational functions obsolete while emphasizing new teaching and learning methods. This aligns with the broader consensus that AI can significantly enhance educational practices by providing innovative tools and methodologies.

Kaledio et al. (2024) on the other hand, emphasizes the role of AI technologies such as machine learning, natural language processing, and data analytics in creating personalized and adaptive learning experiences. AI-powered educational platforms can analyze large datasets to customize content and feedback according to individual students' needs and learning styles. This personalized approach can enhance student engagement and motivation by providing immediate and constructive feedback. For instance, AI can automate grading for timely feedback and support collaborative learning through intelligent tutoring systems and virtual assistants, thereby enhancing participation, critical thinking, and problem-solving skills.

Similarly, Allam et al. (2023) comprehensively reviewed AI in education. Their study highlights AI's proven and potential educational benefits, such as personalized learning, efficient assessment processes, and enhanced engagement. However, they also stressed the importance of addressing ethical and privacy concerns associated with AI. The study calls for balancing AI's advantages with its potential risks, emphasizing the need for global and local discussions on the ethical implications of AI in education. This balance is crucial to ensure that AI technologies are used responsibly and equitably, particularly in developing countries like Tanzania. Kimondo et al. (2023) indicated the impact and developments related to AI in the education sector. The findings further indicate that the advantages of integrating AI in the education sector have affected not only the teaching process, but also the acquisition of information by students through methods such as personalized learning. In addition, their study highlights the need for guidelines and policies to control advanced technologies in education, as the excessive use of AI can lead to student laziness and reduced creativity. These scholars

concluded that AI should enhance, not dominate, the learning process.

Personalized Learning

Sangheethaa and Korath (2024) focused on personalized learning, an instructional strategy that uses AI to customize educational experiences according to individual students' needs. AI can generate customized lesson plans and evaluations by analyzing student data, potentially improving student achievement and engagement. However, the study also highlights challenges in using AI in classrooms, such as ensuring teachers' readiness to integrate AI tools effectively. This aspect is particularly relevant for Tanzania, where teacher training and readiness may vary significantly across different regions. Traditional educational methods, especially assessment, often require significant time and resources, leading to feedback delays. Riduwan (2015) and Arikunto (2013) note that AI can quickly address these inefficiencies by providing accurate, valid, and reliable assessments. Owan et al. (2023) and Chen et al. (2019) corroborate this, showing that AI can reduce bias in human judgment and offer adaptive assessments synchronized to individual needs. These studies demonstrate AI's potential to improve assessment processes, providing timely feedback that enhances learning quality.

AI Benefits and Challenges

Rahayu (2023) explored AI's multiple benefits, such as objectivity, efficiency, consistency, analytical capabilities, and fraud mitigation. However, the study also discusses significant challenges, including ensuring AI's validity, addressing technological dependency, securing data, and managing high costs. These challenges are particularly pertinent in Tanzania, where resource constraints and technological infrastructure may pose significant hurdles for AI implementation.

Harry (2023) emphasized the significant advantages of AI in education, particularly in personalized learning. AI enables the customization of learning experiences to suit individual students' needs, allowing them to learn at their own pace and in ways that match their learning style. This personalized approach can lead to improved student outcomes. Mureșan (2023) also highlights the role of AI in creating personalized learning programs that cater to each student's strengths and interests, thereby fostering unique human skills. Similarly, Slimi (2023) underscores the effectiveness of AI in personalizing teaching methods, which can significantly enhance learning experience in higher education.

AI's ability to automate grading and assessment processes is another critical advantage highlighted by Harry (2023). Automated grading saves teachers time and provides more accurate and consistent feedback. This efficiency is echoed by Slimi (2023), who points out that AI can facilitate prompt feedback and automate administrative tasks, allowing educators to focus on curriculum development and quality instruction. The ability of AI to provide real-time detailed feedback is crucial for both students and teachers, as it helps identify and address learning gaps promptly.

Also, Mureșan (2023) discusses the role of AI in enhancing communication and collaboration between students and teachers. AI-powered tools can facilitate better interactions, enabling students to engage more effectively with their peers and instructors. This aspect is particularly important in language learning, where communication skills are essential. AI can support the development of these skills through interactive platforms and virtual assistants, which promote active learning and collaboration. Further, Mureșan (2023) indicates that AI technologies can stimulate creativity and critical thinking by providing students with innovative resources and tools. For example, designed software and virtual assistants help students develop imaginative solutions and critical thinking skills, fostering essential skills in a rapidly digitizing world. Therefore, AI plays a crucial role in advancing educational communication, collaboration, and the development of critical and creative skills.

Ethical Considerations and Future Careers

Despite its numerous benefits, the integration of AI into education also raises ethical concerns. Harry (2023) notes privacy, security, potential bias, and the need for transparency and fairness in AI-based education systems. Slimi (2023) similarly emphasizes the importance of considering ethical implications, particularly in higher education. Addressing these concerns is crucial to ensuring that AI technologies are used responsibly and equitably.

Also, the potential of AI to influence future careers is another area of interest. According to Ma and Siau (2018), a significant proportion of US and European jobs are at risk owing to advancements in AI. However, they argue that AI may not be as effective in developing soft skills, such as empathy, communication, and leadership. Therefore, higher education institutions should focus on providing both hard and soft skills to prepare students for the future workforce. This view is supported by Slimi (2023), who highlights the need for higher education programs to integrate AI more extensively to equip graduates with the necessary career skills.

Furthermore, Popenici and Kerr (2017) discussed the limitations of current AI technologies, asserting that while AI can enhance teaching, it cannot replace teachers. They describe the concept of a "teacherbot," which can assist with certain teaching tasks but cannot fully replicate the role of a human teacher. For example, Žáček and Pavel (2019) demonstrated how AI such as Ozobot can enhance educational experiences by developing students' computational and analytical skills through programmable robots.

While existing research highlights the potential benefits of AI in education, there is a notable gap in studies that focus specifically on the impact of AI in education. Most current studies provide a general overview of AI's benefits and challenges in education but do not address the unique linguistic and cultural context of Tanzanian education. This study considers this knowledge gap by considering factors such as language diversity, resource availability, and local educational practices in Tanzania. Therefore, AI holds significant promise for transforming language teaching and learning practices in many developing countries like Tanzania. In a developing country like Tanzania, it is unclear what the teacher's role and potential impact of AI are when AI is integrated into language teaching and learning.

Methods

Study Design and Sampling

This study employed a descriptive research design to systematically document and analyze the role of Artificial Intelligence (AI) in teaching and learning practices. A descriptive design was chosen because it aligns with the objective of the study of providing a detailed account of current AI applications, challenges, and ethical considerations within the educational setting. The study was conducted at the Sokoine University of Agriculture (SUA) in Morogoro, Tanzania. This university has a diverse student population and a growing integration of digital learning technologies, making it an ideal environment for examining the role of AI in higher education. The participants included students, lecturers, and educational administrators actively involved in teaching, learning, and administration at the university.

A purposive sampling strategy was employed to ensure that participants had relevant experience with AI-powered technologies or were involved in the teaching and learning processes. The sample consisted of 120 students, 5 lecturers, and 3 educational administrators. The inclusion criterion required participants to have at least one semester of experience using or engaging with AI-powered learning tools or resources in their educational activities. Participants were excluded if they had no direct interaction with AI technology in their roles. This selection allowed for diverse perspectives, focusing on those with meaningful exposure to AI in education. The students, representing various programs, were selected because they

were enrolled in an intensive grammar course to improve their English proficiency, a key area in which AI tools were used to support learning.

Data Collection, Analysis, and Ethics

Data collection methods included structured questionnaire, classroom observations, Focus Group Discussions (FGDs), and interviews, enabling the researcher to capture a broad and accurate description of AI's role in education within the university context. The questionnaire focused on students' experiences with AI-powered learning technologies, while the interviews and FGDs provided insights into the perceived challenges and opportunities in integrating AI into pedagogical practices.

For data analysis, a combination of statistical analysis and thematic analysis was employed. Quantitative data from the questionnaire were analyzed using the Statistical Package for the Social Sciences (SPSS), allowing for descriptive and inferential statistical analysis. Qualitative data from interviews and FGDs were analyzed thematically, identifying key patterns and themes related to AI's influence on teaching and learning practices. The integration of these methods enabled triangulation, enhancing the validity of the findings.

Several strategies were employed to ensure the reliability and trustworthiness of the study. In terms of quantitative data, the questionnaire was pretested for clarity and consistency, and Cronbach's alpha was used to assess the internal reliability of the scales. For qualitative data, trustworthiness was enhanced through member checking, in which participants were asked to review and confirm the accuracy of the data. Triangulation across data sources (students, lecturers, and administrators) and data collection methods (questionnaires, interviews, and FGDs) further enhanced the credibility and validity of the findings.

Ethical considerations were followed to uphold the high standards of research ethics. Following a clear explanation of the study's objectives, procedures, and participants' rights, informed consent was secured from all individuals involved. Participants were assured of confidentiality, and any identifying information was anonymized in the results. Approval for the study was granted by the relevant authorities, ensuring adherence to institutional and national research regulations and guidelines.

Findings

The integration of AI tools in Tanzanian higher education was examined, focusing on how these technologies support interactive and personalized learning. Additionally, the study addressed the challenges and ethical considerations of AI integration, underscoring the need for targeted training to empower both students and instructors. The results emphasize the transformative potential of AI in creating engaging, personalized, and reflective learning environments and advancing educational practices in Tanzania in accordance with CLT.

Current Trends and Developments in AI-powered Educational Technologies

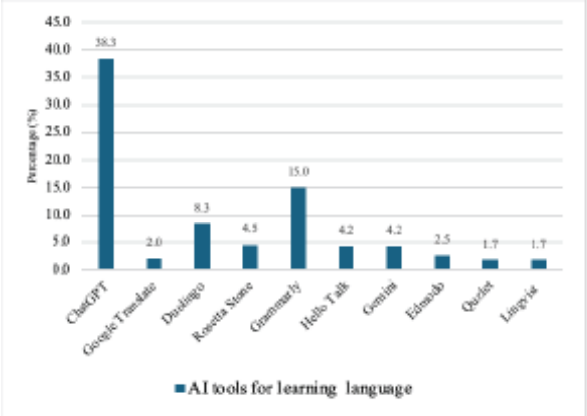
The literature review indicates a growing adoption of AI-powered educational technologies globally, including machine learning algorithms, natural language processing systems, and adaptive learning platforms. These technologies personalize learning experiences, optimize instructional effectiveness, and enhance learning outcomes. Examples of AI applications in education include intelligent tutoring systems, chatbots, virtual assistants and adaptive learning platforms. Global trends in AI-powered educational technologies are reflected in the specific tools used by students in Tanzanian higher education, particularly in language learning.

The data on AI tools used in language learning in Tanzania's higher education (see Figure 1) align well with the global trends in AI-powered educational technologies. The data indicate that AI tools, such as ChatGPT (38.3%), are highly preferred because they offer interactive and personalized learning experiences, reflecting constructivist principles in which students actively engage with language tasks and receive

immediate, context-specific feedback. Google Translate (20.0%) and Grammarly (15.0%) are also popular, showing the importance of tools that optimize instructional effectiveness and provide real-time feedback. Duolingo (8.3%) and Rosetta Stone (4.2%) represent adaptive learning platforms that customize educational content to individual student needs, ensuring effective learning progression. Although in smaller percentages, the presence of various other tools highlights a diverse approach to language learning, incorporating different functionalities like instant support, structured courses, and skill enhancement. This usage pattern indicates a growing reliance on AI technologies to enhance learning outcomes by providing personalized, accessible, and engaging educational experiences. Generally, using AI applications such as ChatGPT, Google Translate, and Grammarly, students actively construct knowledge, engage with content, receive real-time feedback, and align with constructivist principles.

Figure 1

Frequently Used AI in Education in Tanzania



Additionally, Table 1 shows that most male and female respondents hold positive views. A smaller portion of participants express neutral or negative perceptions, with males slightly more likely than females to have a negative outlook. The results indicate a largely positive perception of AI, with only a small minority of respondents expressing reservations.

Table 1

Gender and Perceptions of AI Use

Perception		Male	Female	Total
Perception of the use of AI in language learning	Positive	68	23	91
	Neutral	8	3	11
	Negative	14	4	18
Total		90	30	120

Role of AI in Language Teaching and Learning

Table 2 highlights the pivotal role of AI in enhancing language teaching in Tanzania by providing support to students. The widespread use of AI to generate images and drawings based on the provided data (100%) indicates its effectiveness in making language learning visually stimulating and engaging for all students. This visual support helps break down complex concepts and makes them more accessible. Moreover, the high frequency of AI offering personalized feedback and corrections (75%) underscores its ability to cater to individual learning needs, thus fostering a more effective and customized educational experience. This personalized feedback helps students promptly identify and correct mistakes, enhancing their learning process.

Table 2

AI Role in Language Teaching

Roles	**Frequency** (out of 120 students)	**Percentage** (%)
Generating images or drawings based on provided data	120	100
Providing personalized feedback and corrections	90	75
Offering interactive language practice sessions	80	66.67
Facilitating language translation and editing	70	58.33
Creating language learning games and quizzes	60	50
Assisting in pronunciation practices	50	41.67
Analyzing language usage patterns and progress	40	33.33
Customizing learning paths based on student performance	30	25

Additionally, AI's role in offering interactive language practice sessions (66.67%) and facilitating language translation (58.33%) demonstrates its potential to bridge language barriers and improve language accuracy. These interactive sessions and translation tools make learning more dynamic and inclusive, accommodating students with diverse linguistic backgrounds. The creation of language learning games and quizzes (50%) by AI makes learning more engaging and fun, encouraging students to participate actively. AI also assists in pronunciation practice (41.67%), helping students improve their spoken language skills through consistent and accurate feedback.

Furthermore, AI analyzes language usage patterns and progress (33.33%), providing insights into students' learning trajectories and helping instructors customize their teaching strategies accordingly. Customizing learning paths based on student performance (25%) allows for a more personalized learning experience, addressing each student's specific needs and pace. Therefore, AI's role in generating images and providing personalized feedback aligns with constructivist principles by making language learning more interactive and tailored to individual needs. Students actively create visual content and reflect on personalized feedback, enhancing their understanding and retention of language concepts. Thus, the data underscores the transformative potential of AI in language teaching, advocating for its integration to enhance engagement, provide personalized support, and foster inclusive learning environments.

Challenges and Ethical Considerations Associated with AI Integration in Education

The widespread adoption of AI in education in many countries, including Tanzania, raises concerns about data privacy, algorithmic bias, and the equitable distribution of AI-enabled resources. Ethical considerations must be addressed to ensure AI technologies serve all learners and instructors fairly. Questions arise about the future roles and responsibilities of educators, the nature of student-teacher interactions, and the direction of educational policy in the AI era. The survey results in Table 3 indicate that among the 120 students, many reported multiple challenges, reflecting a more realistic distribution of responses. The data indicate that the most significant challenge for university students in Tanzania using AI in education is limited internet access and infrastructure, affecting most respondents. This is followed by limited access to technology, which was also noted by most respondents, highlighting the gap in the availability of necessary devices.

Table 3

Challenges of AI Use in Education Based on Students' Perspectives

Students Responses on Challenges of AI	**Frequency** (out of 120 Students)	**Percentage** (%)
Limited Internet Access and Infrastructure	90	75
Limited Access to Technology	85	70.83
Lack of Skills to Integrate AI in Teaching and Learning	80	66.67
High Dependency on AI even for Basic Issues	60	50
Sometimes AI Provides Wrong Answers	50	41.67
Some Teachers Feel Threatened by AI, Perceiving it as a Replacement	45	37.5
Privacy and Security	35	29.17
Language Barrier	25	20.83

Also, many students reported a lack of skills to integrate AI into teaching and learning, pointing to a need for better training for both students and instructors. Half of the participants' concerns about high dependency on AI suggest a fear of over-reliance on technology, while 29.17% are worried about privacy and security. The reliability of AI is questioned by 41.67% of students who noted that AI, like ChatGPT, sometimes provides incorrect answers. Additionally, 37.5% observed that some teachers feel threatened by AI, perceiving it as a potential job replacement.

Finally, a small percentage cited language barriers, indicating that AI tools may not fully support local languages. Furthermore, Table 4 presents interview data collected from university lecturers and administrators. The data indicate that in the Tanzanian university learning context, the main challenges of using AI tools like ChatGPT, Google Translate, and Gemini are numerous.

The challenges identified underscore critical barriers to the effective integration of AI in education. Firstly, inadequate infrastructure, including the lack of necessary equipment and internet connectivity, severely limits the use of AI tools in educational settings. Secondly, instructors and students have a significant knowledge and skills gap regarding AI technologies, hindering their effective implementation. Ethical concerns such as data privacy, algorithmic bias, and equitable resource distribution further complicate AI adoption, necessitating strong policies and practices to safeguard privacy and ensure fair access. Also, issues like plagiarism stemming from students misusing AI for assignments underscore the need for new pedagogical strategies and assessment methods. Dependency on AI for basic tasks also poses risks to students' critical thinking skills, highlighting the importance of balancing AI use with fostering independent learning abilities.

Table 4

Challenges of Using AI in Education: Perspectives of Lecturers and Administrators

Challenge/Ethical Issues	Concern/Themes
I think here in Tanzania we are facing a significant challenge with infrastructure, as many schools and universities lack the necessary equipment and internet connectivity to fully utilize AI tools (Instr.I)	Lack of Suitable Equipment & Infrastructure
A major issue is the lack of necessary equipment. Many institutions don't have the technology required to support AI in education. (Instr.I)	
I also think that there is a lack of training and familiarity with AI technologies among both students and instructors, which hampers effective use. (Instr.I)	Knowledge and Skills Acquisition
Proper training is essential for effective AI use. Teachers and students need to be proficient in using AI tools, especially for tasks like data analysis. (Instr.I)	
Data privacy and security are also big concerns, as we need to ensure that the large amounts of data collected by AI systems are protected and used ethically. (Instr.I)	Data Privacy, Equitable Resource Distribution
We need to ensure that the data collected by AI systems is protected and used ethically. Privacy is a big concern. (Ad.I)	
Plagiarism is a big problem. Students sometimes misuse AI to complete their assignments, which undermines academic integrity. (Instr. I)	Plagiarism Issues
Plagiarism is an issue, as some students use AI to complete assignments. This is against university's learning policies. (Ad.I)	
Well, I think there's the risk of over-reliance on AI. Students might use AI for even simple questions, which can hinder the development of their critical thinking and problem-solving skills. (Instr. I)	High Dependency on AI
Integrating AI into the existing curriculum is another complex issue. It requires careful planning and adjustments to ensure it aligns with our educational goals. (Ad.I)	Curricula integration Complexity
Okay, we are struggling with clear policies and regulations to govern the use of AI in education. Currently, we don't have clear policies essential to address ethical, legal, and practical issues. (Ad.I)	Ethical Considerations
Resistance to change is a challenge. Some staff and teachers are reluctant to adopt AI due to fears of change or job security concerns. (Ad.I)	Fear for Replacement &
There are many questions about how teachers' roles will evolve with AI. I think this is a big challenge which we, instructors need to be prepared for these changes. (Instr.I)	Change of Future Role of Teachers
Actually, AI has been my enemy; I don't get any more money from editing or translating doc. It has grabbed my clients because people now use AI to edit or translate their doc. (Instr.I)	
AI has limitations in providing contextually relevant information unless it's properly trained and updated. (Instr. I)	Limited AI Contextual Understanding

Key: Ad. I = Administrator Interview; Instr. I = Instructor Interview

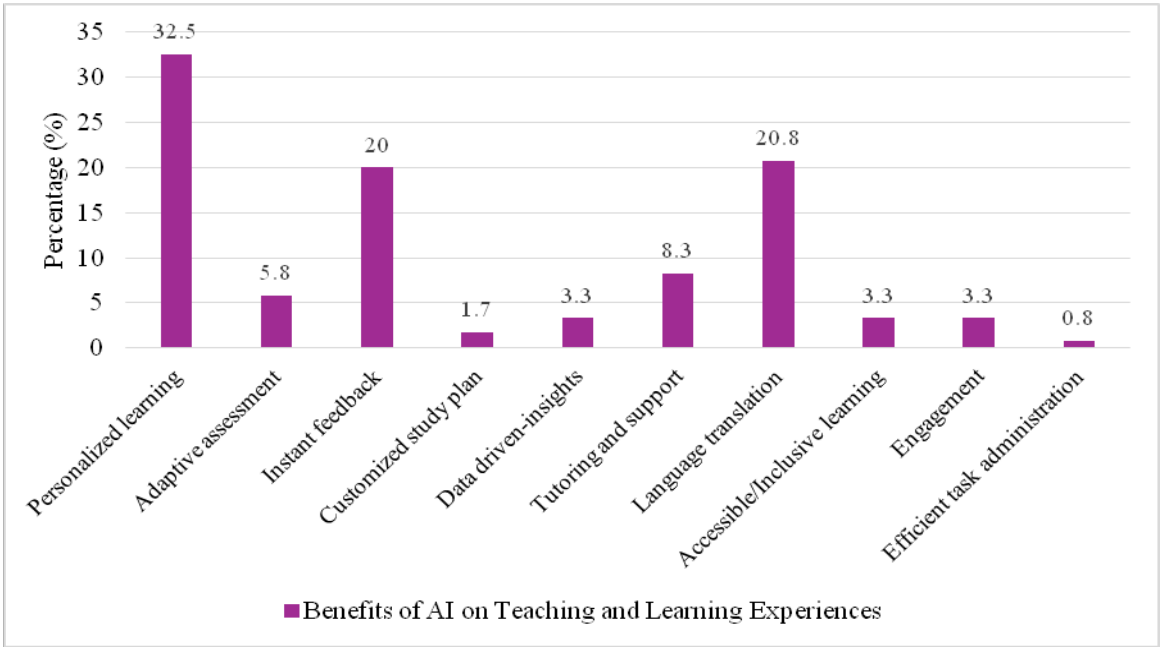
Addressing resistance to change among instructors and uncertainties about AI integration require proactive professional development and clear communication. A comprehensive approach is needed, combining technological readiness, ethical considerations, pedagogical innovation, and supportive policies. Substantial investment in internet infrastructure, affordable technology, and training programs is essential. Policies must promote balanced AI use, data privacy, and security. Enhancing AI accuracy and supporting local languages will improve trust and relevance. Supportive measures for teachers, emphasizing AI as a complementary tool, can mitigate fears and foster collaboration, paving the way for more effective and inclusive educational practices in Tanzania.

Potential Benefits of AI on Teaching and Learning Experiences

Figure 2 shows that 32.5% of respondents identify personalized learning as the main benefit of AI in education, offering tailored educational experiences to suit individual student needs. Following this, 20.8% highlight language translation, showcasing AI's effectiveness in making educational materials accessible for a diverse, multilingual student population. Instant feedback, valued by 20.0% of participants, aids learning by allowing students to quickly address mistakes and enhance their comprehension. Furthermore, 8.3% recognize the value of tutoring and support, affirming AI's ability to provide additional help beyond conventional classrooms. Adaptive assessment received appreciation from 5.8% for its capacity to tailor to student performance levels. Enhanced engagement, accessible learning, and data-driven insights each received 3.3%, indicating a moderate appreciation of AI's contribution to creating interactive learning experiences, meeting diverse needs, and offering valuable educational analytics. Furthermore, efficient task administration (0.8%) and customized study plans (1.7%) are mentioned less frequently.

Figure 2

Benefits of Using AI in Education



Furthermore, the results in Table 5 specifically indicate that each of the 120 students identified multiple or more than one impact of AI on education. The most significant potential impact of AI in education, as perceived by most students, 90 (75%), is personalized learning, where AI customizes educational content to individual needs. Efficient administrative tasks and enhanced student engagement are also highly valued, as indicated by the majority of the students, suggesting that AI can significantly reduce the administrative burden on educators and create more interactive learning environments.

Immediate feedback and access to diverse resources were identified by more than half and half of the participants, respectively, highlighting AI's role in providing real-time support and a wealth of learning materials. Improved learning outcomes (41.67%), innovative teaching methods (33.33%), and adaptive learning technologies (25%) reflect AI's capability to enhance educational practices and cater to diverse learning

styles. Instant support and guidance (20.83%) and intelligent tutoring systems (16.67%) show the perceived benefits of AI-driven assistance and customized instruction.

Table 5

Students Perspectives on the Impact of AI in Education

Potential Impact of AI on Education	Frequency (out of 120 Students)	Percentage (%)
Personalized Learning	90	75
Efficient Administrative Tasks	80	66.67
Enhanced Student Engagement	70	58.33
Immediate Feedback	65	54.17
Access to Diverse Resources	60	50
Improved Learning Outcomes	50	41.67
Innovative Teaching Methods	40	33.33
Adaptive Learning Technologies	30	25
Instant Support and Guidance	25	20.83
Intelligent Tutoring Systems	20	16.67

The data suggest that AI's greatest impact lies in personalizing education, breaking language barriers, and providing immediate feedback, significantly improving learning outcomes and student engagement. However, the lower emphasis on administrative efficiency and customized study plans indicates that while these areas benefit from AI, they are not yet seen as critical by most students, highlighting the need for continued focus on developing AI applications that directly enhance learning. Thus, implementing AI in education requires substantial investment in digital infrastructure and training investment. Personalized learning and adaptive technologies can improve student outcomes while automating administrative tasks, which allows teachers to focus more on instruction. Interactive AI tools enhance engagement and provide real-time feedback, creating a more responsive learning environment.

Discussion

The integration of AI into educational settings represents a significant advancement with the potential to transform teaching and learning practices. The results of this study underscore the transformative impact of AI-powered educational technologies on various aspects of education, including teaching methodologies, instructional practices, and student learning experiences. By adopting AI-powered educational technologies, Tanzania mirrors global trends and aligns with constructivist learning theory, emphasizing active, contextualized, and student-centered learning experiences. AI tools like ChatGPT, Google Translate, and Grammarly are widely used, reflecting the global shift towards personalized and interactive learning experiences. These tools support students in actively constructing knowledge by engaging with the content and receiving real-time feedback, as Harry (2023) and Cardona et al. (2023) highlighted. Educators are exploring AI tools to improve lesson planning and adapt materials, addressing unmet priorities

in teaching and learning, and further supporting constructivist principles.

Furthermore, AI's role in personalized learning, with 75% of respondents using it for this purpose, is supported by the work of Rana et al. (2022) and Samad et al. (2022), who emphasize that personalized learning customizes educational experiences to individual student needs, leading to better outcomes. AI's ability to automate administrative tasks, enhance engagement, and provide immediate feedback is crucial for optimizing instructional practices (Kimondo et al., 2023). Popenici and Kerr (2017) add that AI complements, rather than replacing teachers, since it enhances educational interactions and enables new pedagogical approaches.

Also, AI tools provide instant access to learning resources and support, making education more flexible and accessible. This is particularly beneficial for language learning, where continuous practice and feedback are crucial. Furthermore, these tools teach languages and improve specific skills such as writing and speaking, offering a comprehensive approach to language proficiency. The interactive nature of AI tools keeps students motivated and reduces dropout rates. By adopting these technologies, teachers in Tanzania can provide more effective and personalized instruction, ultimately leading to better educational outcomes and preparing students for academic and professional success.

Similarly, AI's influence in Tanzanian education extends beyond personalized learning, including administrative support and enhanced engagement. The use of AI to create interactive learning environments and provide virtual teaching support, especially in contexts with large class sizes, is particularly impactful. AI's role in generating visual aids, monitoring attendance, and offering real-time feedback demonstrates its versatility in supporting both students and educators. AI has significantly influenced the teaching and learning process in Tanzania, as reported by students and instructors during FGD and interviews, respectively. Firstly, AI acts as a virtual teacher in contexts where there is a shortage of human instructors capable of handling large class sizes, which often exceed 300 students per lecturer in our context. In this regard, students rely on AI to clarify concepts beyond what their teachers provide, thereby saving time and aiding in rapid comprehension of complex topics.

AI also facilitates quick access to learning materials and simplifies tasks like data analysis and synthesizing papers. One student noted during FGD that, *'previously I used to spend much time and struggle much with data analysis and synthesizing findings from research papers. Now, AI assists me a lot, and in that way, it saves my time*.' However, there are concerns about high dependency, with some students admitting that some rely on AI for even basic tasks. As a result, this can be dangerous since it can reduce their critical thinking and engagement in learning processes.

Moreover, results indicate that AI in Tanzania serves as a teaching aid by creating interactive learning environments. During FGDs with students, the students pointed out that sometimes lecturers use AI to generate images and virtual reality simulations, such as creating virtual tours of places where tourist have interests to visit in the country. One student noted, '*learning grammar and vocabulary has been quite interesting because our teachers have been generating virtual reality simulations of tourist sites like Mount Kilimanjaro, Mikumi National Park and Kalenga Museums.'* Thus, this simulation enriches language learning with practical applications of grammar concepts.

Despite the benefits of AI, main challenges such as limited internet access, lack of technology, high dependency on AI, students misusing it, and insufficient skills remain significant barriers. Harry (2023) and Cardona et al. (2023) highlight concerns about privacy, security, and potential bias in AI systems. Mureșan (2023) also points out the broader societal impact, indicating that the risk of job automation underscores the need for education systems to adapt to the digital age.

Ensuring equitable access to AI resources and addressing ethical considerations, such as data privacy and algorithmic fairness, are essential for maximizing AI's potential benefits. Addressing these challenges is crucial for Tanzania's educational settings to harness the full potential of AI. By investing in infrastructure, providing comprehensive training, and establishing clear ethical guidelines, educational institutions in Tanzania, and elsewhere, can foster an environment conducive to responsible AI use. Therefore, implementing strategies to mitigate plagiarism and promoting critical thinking will ensure that AI complements rather than substituting traditional learning methods. As such, Tanzania can position herself to use AI as a transformative tool in education, preparing students to thrive in a technologically advanced global society.

Also, some instructors who engaged in translation and editing activities as freelancers expressed significant concerns. One instructor said, '*frankly speaking, since the emergence of AI tools such as ChatGPT, Grammarly, and Google Translator, I have noticed a substantial decline in the number of tasks for editing and translating that I used to receive. This is a big challenge because my income has gone down*.' This shift indicates that AI has effectively captured a large portion of their customer base, slowly replacing the need for human translators and editors. This issue is quite serious and warrants a thorough discussion among all stakeholders involved. While AI tools can perform editing and translation tasks efficiently, it is essential to recognize that they often lack the human touch that skilled professionals provide. AI-generated or edited documents can sometimes be identified as machine-produced due to their lack of natural flow and subtleties that a human writer or translator would typically incorporate. Therefore, it is essential to recognize the value of human expertise in ensuring the quality and authenticity of written content. AI should be used without completely sidelining the invaluable contributions of human professionals in the field.

Furthermore, the rapid pace of technological change and the potential for AI to disrupt traditional education systems raise important questions about teachers' future roles and responsibilities, the nature of student-teacher interactions, and the overall direction of educational policy and practice in the AI era. The findings of this study align with Son et al. (2023) who highlight the transformative potential of AI in education. Similar to other studies, this research underscores the benefits of AI in personalizing learning experiences, optimizing instructional effectiveness, and enhancing learning outcomes. However, this study also sheds light on the challenges and ethical considerations associated with AI integration in education. Contrary to some optimistic views on AI's potential to completely replace traditional teaching methods, this study suggests that AI technologies play a crucial role in supporting instructors in teaching practices rather than replacing them entirely.

In conclusion, the integration of AI into educational settings has the potential to transform teaching and learning practices in Tanzania, mirroring global trends. AI tools like ChatGPT, Google Translate, and Grammarly enhance personalized and interactive learning, optimizing instructional practices and improving student outcomes. However, this study also has identified significant challenges, including limited internet access, high dependency on AI, ethical concerns, and the potential displacement of human professionals in editing and translation roles. Addressing these issues requires comprehensive strategies, including investment in infrastructure, training educators, and the establishment of ethical guidelines to ensure responsible AI use. Despite AI's capabilities, the human touch in education remains irreplaceable, emphasizing the need for a balanced approach that uses AI's strengths while preserving the critical role of teachers. By overcoming these challenges, Tanzania in particular, and other developing countries like Tanzania, can effectively harness AI's transformative potential, preparing students to thrive in a technologically advanced global society.

Conclusion and Implication

The integration of AI in education in Tanzania reflects a significant shift towards more personalized, accessible, and engaging learning experiences. The growing use of AI tools like ChatGPT, Google Translate, and Grammarly demonstrates a strong preference for technologies that offer real-time feedback, personalized instruction, and interactive learning environments. The positive perception of AI among students, regardless of gender, underscores the broad acceptance and potential of these technologies to transform education.

However, this study highlights several critical challenges that must be addressed to fully realize the benefits of AI in education. Limited internet access and infrastructure, inadequate access to necessary technology, high dependency on AI, and a lack of skills to integrate AI into teaching and learning are significant barriers. Additionally, ethical concerns such as data privacy, algorithmic bias, and the equitable distribution of AI resources must be addressed to ensure that AI technologies serve all learners fairly. Therefore, by addressing these key areas, Tanzania can effectively integrate AI into its education system, enhancing student learning experiences and outcomes. Embracing AI responsibly will prepare students to thrive in a technologically advanced global society while maintaining the integrity and values of traditional education. Based on the findings of the study, the key takeaway messages from this study are as follows:

1. AI can revolutionize Tanzanian education through personalized learning, instant feedback, and abundant resources, enhancing educational outcomes and student engagement as a virtual teacher and teaching aid.
2. The realization of a strong positive perception of AI among students indicates a readiness to embrace these technologies, providing a solid foundation for further integration into educational practices.
3. Ensuring that all students and teachers have access to the necessary technology and skills by investing in digital infrastructure and training is essential for maximizing the benefits of AI.
4. Developing clear guidelines and policies to safeguard data privacy and prevent algorithmic bias is necessary for building trust and addressing ethical concerns to ensure that AI technologies are used responsibly and equitably.
5. It is important to strike a balance between the use of AI for its strengths and maintaining traditional teaching methods to foster critical thinking and independent learning.
6. Emphasizing AI as a complementary tool can mitigate fears of job displacement among professionals and promote collaborative teaching approaches. AI should complement, not replace, human educators.
7. There is a need for ongoing dialogue among stakeholders to ensure responsible AI integration in education to ensure that it does not replace educators, editors translators, and statistical data analysts.
8. Encourage active participation from all educational stakeholders, including parents, families, students, policymakers, and system leaders, in discussions about AI in education to foster human judgment and prioritize guidance in AI integration in educational settings.

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