The role of Institutional Procedure on the Adoption of Artificial Intelligence in Teaching and Learning Process in Higher Learning Institutions in Tanzania: A Systematic Literature Review (2019 – 2025)

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Abstract
Artificial Intelligence (AI) has recently gained significant attention, specifically in the transformation of education in HLIs. Therefore, AI has the potential to reform the education process, including the transformation of the teaching and learning process within HLIs. This systematic literature review aims to provide a comprehensive understanding of the role of institutional procedures on the adoption of AI in teaching and learning processes in the context of HLIs in Tanzania. The systematic review approach includes a systematic identification, selection, and combination of literature from different sources and databases. The search strings and keywords tailored to the adoption of AI in higher education and teaching and learning processes were applied to ensure relevant studies are included in the in-depth analysis. Rigorous screening based on the predefined inclusion and exclusion criteria was conducted based on the PRISMA 2020 model, which extracted 28 papers. Three theme categories were thematically identified. Findings show that no HLIs in Tanzania have fully engaged AI in academic research nor in the teaching and learning process. Additionally, the key themes like institutional policy, environment readiness, and institutional strategies as factors within institutional procedure play an important role in AI adoption for the teaching and learning process within HLIs. The findings further highlight that ethical considerations and AI awareness also may enhance the adoption process. The study then proposed the AI adoption framework, which can be validated in future research. The study further recommends that HLIs need to develop an adaptive AI adoption policy and its strategies for the teaching and learning process. The study makes both practical and policy contributions.

Keywords: *Artificial Intelligence, Institutional Procedure, Teaching and Learning, Digital Learning, HLIs, AI adoption, AI policy.*

1.0 INTRODUCTION

The application of Artificial Intelligence (AI) is a fast-growing technology that globally transforms several innovations across various sectors. In the same case educational sector also, AI for improving outcomes, efficiency, as well as addressing resource constraints by supporting and promoting the teaching and learning methodology (Xu, 2024; Reiss, 2021). For instance, in academic institutions ChatGPT and plagiarism checker are AI tools that are being adopted in the remarkable pace and which empirically found to improve learning and teaching outcomes (Hamman and Iyamu, 2025; Schönberger, 2024). This is based on the fact that AI tools are suggested to provide an adaptive assessment as well as creating a virtual tutor and a tailor-made learner with a unique need while enhancing inclusivity and governance in the process of teaching and learning process (URT, 2025).

In developed world such as united states and China managed to integrate education systems with AI that support an adaptive learning environment, enhancing learning material accessibility, streamlined administrative processes, and improving students' engagement in the learning process (Xu, 2024). As described by Park and Choo, (2024) and Hamman and Iyamu (2025) that the integration has improved the ability to refine learning instructions, design, and communication in such a way that stimulates a generative AI that si contractually complied to quality responses. Empirically, the integration of AI in the process of the teaching and learning essentially reform the assessment, instructional design and delivery experiences (Schönberger, 2024; Nurjanah et al., 2024). This fact basically raises the need further research on educational governance including pedagogy and ethics in the era of AI for Higher Learning Institutions (HLIs) in developing countries.

HLIs in Tanzania also recognized AI based systems for education as a tool contributing to an intelligent teaching and learning systems as well as support an adaptive curriculum. The emphasis and application of AI in HLIs is stated in the Tanzania Education and Training Policy of 2014 with revised edition of 2023 detailing the use of new technologies for teaching and learning (URT, 2023). This means that the application of an integrative AI technology in the process of teaching and learning effectively extends personalized learning, decision support and assessment (Susilo and Aritonang, 2023; Crampton and Song, 2021). Prior research identified that the adoption of AI in teaching and learning in developing countries is highly uneven due to various factors such as complexity of governance structure, limited resources which includes weak infrastructures, digital skills, and ethics and privacy specifically on assessments procedures among learners (Motlaghet *et al.*, 2023; Ngoet *et al.*, 2024; Ohei *et al.*, 2023;

Jakkula, 2024; Garzón, Patiño, and Marulanda, 2025; Khoalenyane and Ajani, 2024; Chiu et al., 2023; Singh and Hiran, 2022; Williamson and Eynon, 2020; Singh, Singh, and Mishra, 2024). Despite growing interest in investment and adoption of AI in HLIs yet there are limited studies addressing on the role of institutional policies and procedures in adopting AI tools in teaching and learning process in Tanzanian HLIs. An understanding of the procedural levels in adopting AI in HLIs is inevitable for supporting administrators, policy makers, and academician harnessing the pedagogical benefits and hence enhancing the teaching and learning while abiding to ethical standards. This study therefore sought at investigating on the role of institutional policies in the adoption of AI in teaching and learning process within HLIs in Tanzania.

2.0 LITERATURE REVIEW

2.1 Artificial Intelligence

AI as described by Word Economic Forum (2023) is referred to as a field of study and type of technology characterised by the development and use of computerized machines with a capability of performing tasks that would have required human intelligence. In supporting this definition Baker, Smith and Anissa, (2019), described AI as "computers which perform cognitive tasks, usually associated with human minds, particularly learning and problem-solving".

Also, Siau (2018) further explained AI as "the ability and development of information technology-based computer systems or other machines to perform tasks that typically required human beings." In same understanding, AI generally is a term describing range of technologies and systems including machine learning, networks, data mining and processing. Therefore, AI technologies is continuously employed by various researchers worldwide as a tool in supporting and contributing in the development expertise in different field of studies as well as further the development of artificial intelligence (Mnguni, 2024; Chen, Chen, and Lin, 2020). Previous scholars such as Yufeia et al. (2020), Gligorea et al. (2023) and Khoalenyane and Ajani (2024) have conducted research on the application of AI in education and digital classroom for adaptive learning and have revealed that it supports personalized learning and adaptive pedagogical approach. This gives light that the adoption and application of AI tools in teaching and learning process in HLIs need more research in educational practices.

2.2 AI in Teaching and Learning process

AI is widely studied and that it supports the transformation of education and enhancing teaching methodology. This implies that AI in HLIs actuates the

pedagogical applications to continuously impart students' knowledge as well as content adjustment and assessment feedback. The impact of AI in teaching and learning is that it leverages learners' interaction with data to predict performance and also enable targeted teaching and learning interventions to provide stronger evidence on learning outcomes (Ngo et al., 2024; Doyle et al.,2025). This means that, there are several applications of AI that can be employed to facilitate the learning process (Reiss, 2021). In addition, scholars such as Lee (2020) and Almaiah *et al*., (2022) made an empirical investigation on the application of AI on shaping students' ideas and contents, emotions, and collaborative interactions respectively. They found that AI may lead into negative academic ethics. However, educators must discourage the misconception on AI application to maintain an HLIs education ethics (Sharifuddin and Hashim, 2024).

In the context of teaching and learning literature, scholars have identified some negative impact on the use of AI tools (such as ChatGPT) in teaching and learning process that it promotes academic dishonest, lower the learner's pace of critical thinking in the level of higher learning (Hamman and Iyamu, 2025; Sok and Heng, 2024; Victor, 2024). However, there is an increasing trend for HLIs in the country on emphasizing the educators and learners to use the AI-based plagiarism systems to ensure and academic integrity is maintained as per university standards (Hamman and Iyamu, 2025). Holmes et al., (2019) contextualized that AI enabled adaptive teaching and learning platforms tailor content to individual student's needs, learning speeds and preferences. Based in the prior study's findings show a substantive requirement for adopting AI in teaching and learning process in HLIs. It is from this background that this study focused on the role of institution procedures in the adoption of AI in the teaching and learning process within HLIs in Tanzania.

2.3 Institutional Procedure on AI adoption

The HLIs and other public sectors are continually adopting AI tools for the purpose of reshaping governance including efficiency, transparency, and accountability (Anomah, 2025). This implies that AI integration in teaching and learning process in HLIs remain an essential aspect for maintaining academic relevance in a digital era. However, successful adoption of AI does not merely focus on a technological advancement but it requires institutional readiness including commitment, good infrastructure, enabling regulatory framework, and skilled personnel (Anomah, 2025; Chan, 2023). Furthermore, Chan (2023) makes an emphasis that institutional procedures is recommended to begin with a policy and governance framework. In the context of education, Chan delves on AI ecological education policy framework for HLIs covering pedagogical, governance, and operational. Therefore, institutional procedures can be

considered as a critical enabler for successful AI tools adoption in HLIs (Garzón, Patiño, Marulanda, 2025). Thus, for sustainable AI adoption HLIs is recommended to invest in procedural infrastructure to shape the pedagogical redesign and knowledge ethics.

In the context of higher education, institutional procedure is characterised by policy environment, institutional culture, and the broader flow of education framework (Pinho, Franco, and Mendes, 2021; Fleming and Kowalsky, 2021). This is to say that institutional procedure also guides educators and researchers' network which demonstrates the systems readiness towards the adoption of new technology in teaching and learning process. The study of Okai-Ugbaje, Ardzejewska, and Imran (2020) contends that understanding of institutional procedures supports in defining roles and responsibilities of the key stakeholders in the entire process of adopting AI for teaching and learning process. Despite this importance, researches on how institutional policies address the adoption of AI in HLIs in the perspective of teaching and learning process remain elusive. This has led into the question that how the institutional policies and procedures can influence the adoption of AI in teaching and learning process in HLIs?

2.4 Policy environment and AI adoption in HLIs

The adoption and application of AI in HLIs is prevalent like many other sectors such as finance, health care, economy sector, and transportation (Eggmann et al., 2023; Wu et al., 2022; Buckley et al., 2021). The implication is that institutional policy environment and clear regulatory framework also shape an institution to adopt AI effectively. This aspect also applies in teaching and learning process whereby the policy environment may institutionalize accountability, data governance, privacy as well as procurement policies (Morandín-Ahuerma, 2023). Similarly, the government of Tanzania in the 2024/25 – 2029/30 strategy ensures a harmonized adoption of AI that supports equitable access and sustainable socio-economic development in line with the National ICT policy 2016 (URT 2025). For instance, the 2025 UNESCO report established that HLIs in Tanzania is highly complemented by research bodies such as Afri AI Lab which has been implemented in a partnership between University of Dodoma (UDOM) and Institution of Science and Technology (NM-AIST) fostering responsible AI research and capacity development (UNESCO, 2025a).

This strategy also includes application of AI in teaching and learning process. More specifically the National education strategy recommends on the formulation of an institutional policies and guidelines that govern the ethical and the application of AI in teaching, learning, and administrative processes in HLIs. In the context of policy environment, the study of Adiguzel et al., 2023 contends

that the adoption of AI educational policy provides the students with necessary skills and knowledge that improves the learning process in terms of providing personalized, real-time feedback, and active participation in the learning process (Atlas, 2023; Chan and Hu, 2023). On the other hand, adoption of AI systems supports students with the capacity to prepare and be active participants in the development and implementation of the AI for teaching and learning process and ensuring that it benefits society as a whole. Moreover, despite various advantages of AI, this still some institutional support networks and clear policy frameworks within HLIs remain a problem to maximize the promise of AI adoption, especially in HLIs for teaching and learning process in Tanzania. This has raised the need for understanding on how institutional policy and the environment readiness could influence the adoption of AI in teaching and learning process within HLIs.

3.0 METHODOLOGY

This study employs a systematic review in which the PRISMA statement approach were followed (Garzón, Patiño, and Marulanda, 2025). More specifically the three steps (such as the preparation of the protocol for review (planning step), conducting review, and hence publication of the findings (reporting). Each step proposed is described as the process carried out.

3.1 Planning of the Review

The basic objective of planning of the review is to build the basic strategy for the process of reviewing identified literature. This includes the definition of the research questions, developing research objectives, and establishing the research protocol. The established protocol basically provides the key to open gates between the researcher and research objectives (Rout and Aldous, 2016; Cameli *et al*., 2018). This means it help the researcher to search the relevant studies in academic databases.

3.2 Search Strategies and Data Sources

The database search was conducted across the different databases including Taylor and Francis, Scopus, Eric, Google Scholar, Web of Science, IEEE Xplore, Elsevier, and emerald insights. These databases were selected based on the high quality with broad coverage, peer reviewed literature in higher learning education, educational technology and Artificial Intelligence in Education, interdisciplinary fields, and ensuring an inclusive retrieval of related studies and its citation tracking.

In the searching process in the databases researchers uses the following searching strings across all databases: (“AI” OR “Artificial Intelligence” OR “E-Learning”

OR "Adoption of AI") AND ("learning" OR "education" OR "training" OR "teaching") AND ("systematic review" Or "systematic literature review" OR "systematic analysis") AND ("Higher learning Institutions") OR "HLIs"). As suggested by Chiu et al. (2023) and Garzón, Patiño, Marulanda, (2025) this study restricted the search categories to specifically education research or teaching and learning process. Therefore, the review for this study included studies that were conducted from 2019 to 2025 for the purpose of focusing on the current state of AI adoption in teaching and learning HILs in both Tanzania and other part of the universe. The database search process stopped on September 2025 with a total of 608 titles and abstracts.

3.3 Inclusion and Exclusion Criteria

At the first stage of screening was carried out by a team of two coders in which the inclusion and exclusion criteria were discussed regularly to reach consensus. The inclusion and exclusion criteria are employed as the selection or sampling techniques used to select the published articles for this study as defined in Table 1.

Table 1: Inclusion and exclusion criteria

Criteria	Inclusion Criteria	Exclusion Criteria
Focus area	Adoption of AI in teaching and learning process/education process in HLIs	Do not address AI in education specifically on teaching and learning process in HLIs
Time frame	Literatures published from 2019 – 2025	Published before 2019
Peer reviewed	Peer – reviewed journal articles	Theses, dissertation, and or conference paper
Accessibility	Accessible and retrievable	Not accessible full text
Reports	Government reports and policy aligned with HLIs policies and educational process in AI application	Not focused on educational process with the application of A I in HLIs

The relevant systematic reviews were ensured by again reviewing the reference lists and conducting a backward citation searching (Chiu et al., 2023; Higgins et al., 2019; Garzón, Patiño, and Marulanda, 2025). This approach is suitable for systematic review methodology for the purpose of enhancing the process of identifying potential studies in the final systematic analysis (Higgins et al., 2019). This approach therefore, enable researchers to identify a total of 414 studies after removing 194 duplicate entries, in the same way the second authors screened and

identified the remained 132 studies. Together the 104 studies were excluded after thorough full text reviews and remained with 28 relevant included articles and other 2 reports which were guided by PRISMA model as illustrated in figure 1. Furthermore, the studies screening analysis and selection process was done based on their titles, abstracts and keywords to ensure we dwell in relevancy content and materials as illustrated in table 1, followed by a step that involve the screening of a full text article.

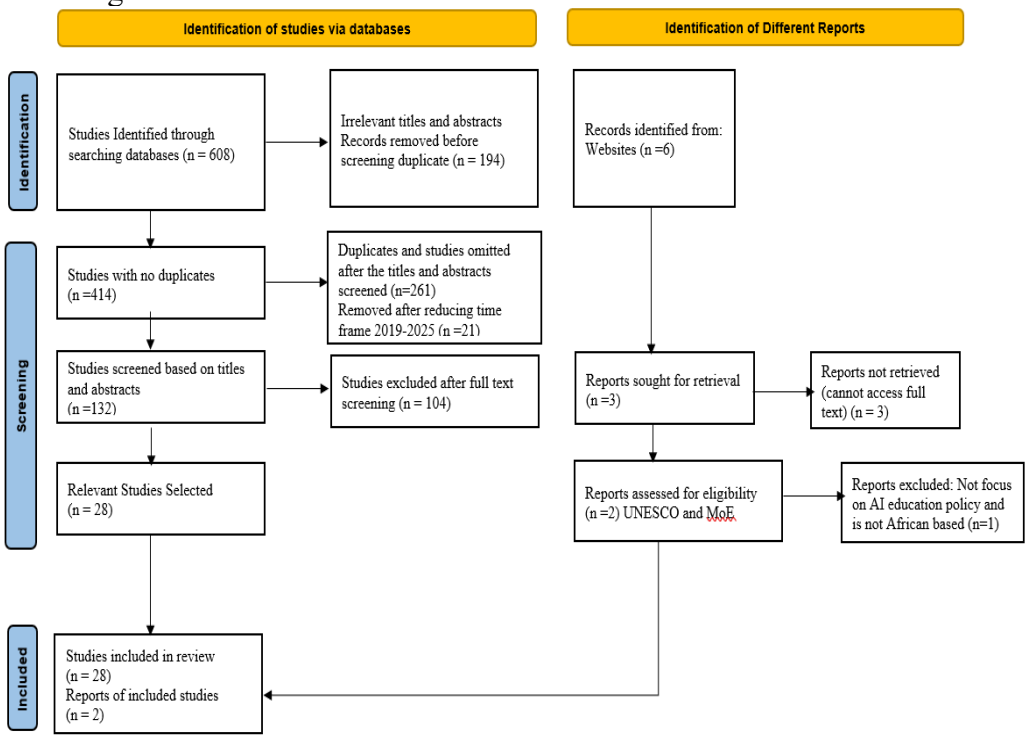

Figure 1: A PRISMA model for new systematic reviews which included searches of databases and other sources

This study aimed at conducting a thorough examination of the relevant literatures on the role of the institutional procedures on the adoption of AI in HLIs. In the analysis of the involved literatures, thematic analysis technique was used as framework for examination. This technique involves the analysis of the current status of the adoption of AI in different HLIs across the developing countries and world in general and hence identifying the key themes and patterns across the literature as shown in table 2. The systematic analysis of the literatures, provided a comprehensive overview of the AI adoption strategies and approaches, and further analysis of the influence of the institutional procedures in adopting AI in education. This contributes to the existing body of knowledge of the application

of AI in the teaching and learning process by answering the following research questions

i) How the AI could support the teaching and learning process in higher education?
ii) How could institutional policies and environmental readiness enable the adoption of AI in HLIs?

Based on the questions above, table 2 analyzed and presents different findings of selected articles that was further discussed in the discussion section.

4.0 RESULTS

The systematic review on the institutional procedure and adoption of AI in teaching and learning process in HLIs in Tanzania have shown a great insight of the current demand of adopting AI in the higher education. Moreover, the results indicate a diverse range of factors influencing the AI adoption process including institutional strategies, policies, and the student outcomes in teaching and learning process as illustrated in table 2. From these factors then three main themes categories were thematically developed from the collected studies such as Support of AI in teaching and learning process in HLIs, Institutional policy, readiness and environment in AI adoption, and Institutional strategies for AI adoption in Teaching and learning process in HLIs (themes in table 2).

Table 2: Summary of included articles findings on the adoption of AI in teaching and learning process

Themes	Journal/Article	Country and Research focus	Method	Findings and Implication
Support of AI in teaching and learning process in HLIs	Cronjé, J. C. (2023). Exploring the Role of ChatGPT as a Peer Coach for Developing Research Proposals: Feedback Quality, Prompts, and Student Reflection. *The Electronic Journal of E-Learning*, 22(2), 1–15.	Analysing the student feedback quality and reflection upon using ChatGPT in South Africa	Qualitative	the user (such as institutions) should oversee the process and evaluate the feedback in e-learning process
	Bower et al. (2024). How should we change teaching and assessment in response to increasingly powerful generative Artificial Intelligence? Outcomes of the ChatGPT teacher survey. *Education and Information Technologies*, 29, 15403–15439.	Examining the views of educators (n = 318) from a diverse range of discipline areas about the impact of AI on teaching and assessment in Australia	mixed methods	As the results of generative AI the changes in specific curriculum, pedagogy, and assessment ethical values are demanded
	Sarakikya, G. M. and Kitula, P. R. (2024). Application of artificial intelligence platforms and its influence on education of students in higher learning institutions in Arusha City, Tanzania. *Journal of Research Innovation and implications in Education*, 8(4), xxx – xxx. https://doi.org/10.59765/nvthtd5.	The study investigates attitudes towards AI from both students and lecturers and assess strategies to mitigate AI-assisted plagiarism in Tanzania	Mixed method	Indicates the high level of AI integration in educational practices, positive attitudes towards AI from both students and lecturers. A need for clear policies and guidelines for the ethical use of AI is inevitable
	Adiguzel, T., Kaya, M. H., and Cansu, F. K. (2023). Revolutionizing education with AI: Exploring the transformative potential of	comprehensive overview of AI technologies, their potential applications in education, and	Qualitative	how AI may be successfully incorporated into the educational setting to benefit

	ChatGPT. *Contemporary Educational Technology, 15*(3), ep429. https://doi.org/10.30935/cedtech/13152	the difficulties involved in Turkiye		teachers and students in which can promote ethical AI use
	Mena-Guacas, A. F., Rodríguez, J. A. U., Trujillo, D. M. S., Gómez-Galán, J., and López-Meneses, E. (2023). Collaborative learning and skill development for educational growth of artificial intelligence: A systematic review. *Contemporary Educational Technology*, 15(3), ep428.	analyses the relationship between AI, competency development, and collaborative learning (CL)	systematic review	Discusses AI's role in fostering collaboration and competency development, identifying key objects of study and gaps in AI's application to collaboration in learning. However, it should be approached with caution
	Luhwera, M. G. (2024). The Use of Artificial Intelligence in Tanzania's Higher Education: Instructors' Perceptions and Experiences at TPSC *Journal of Public Sector Management*, Vol. No. 8, pp 73 – 86.	investigated instructors' perceptions and experiences regarding using artificial intelligence tools in higher education	Mixed Method	insufficient awareness and training, inadequate infrastructure to support AI tools, and a lack of knowledge and relevant skills among instructors. Thus, for effective education processing, the effective strategies such as face-to-face presentations and plagiarism detection of software could highly influence the use of AI in HLIs
Institutional policy, readiness and environment in AI adoption	Matto, G., and Ponera, J. M. (2025). Artificial intelligence in higher education institutions in Tanzania: Analysis of policy perspectives. *Interdisciplinary Journal of Education Research*, 7(1), a13.	examine the policy perspectives regarding the use of AI in higher education institutions (HEIs) in Tanzania.	Qualitative study	Lack of clear focus on which specific AI elements the policy should govern, hence HLIs is missing AI policy for education process

https://doi.org/10.38140/ ijer-2025.vol7.1.13			
Kurup, S., and Gupta, V. (2022). Factors Influencing the AI Adoption in Organizations. *Metamorphosis: A Journal of Management Research*, *21*(2), 129-139. https://doi.org/10.1177/ 09726225221124035.	Focused at developing a model for identifying the factors influencing AI adoption in organizations	Quantitative	change capability of an organization and leadership, AI readiness by the organizations positively impacts AI adoption
Utonga, D., Gwanyemba, J. K., and Kilamlya, J. J. (2025). Factors Shaping the Adoption of Artificial Intelligence Tools by Higher Education Students in Tanzania. Advanced Research in Economics and Business Strategy Journal, 6(1), 118-133. https://doi.org/10.52919/ arebus.v6i01.79	examining the factors that influence the adoption of AI tools for academic purposes, specifically learning and research, by higher education students in Tanzania.	Quantitative	The study identifies some factors that may influence the AI adoption including access to technology and its user-friendliness (usefulness and ease of use)
Anomah, S. (2025). Assessing the institutional readiness and capacity for AI adoption in public audit institutions in developing countries: evidence from Ghana. *Telematics and Informatics Reports*, *20*, 100260.	Empirically examines the influence of technological capacity, organizational capability, and environmental context on AI adoption in developing countries. A case of Ghana	Quantitative (A cross sectional survey design)	Found significant link between institutional readiness and behavioural intention to adopt AI. This provides actionable policy and institutional recommendations to guide AI integration in public sector audits, emphasizing infrastructure, human capital, and regulatory alignment
Mugisha Kamala and Albert Moshi. (2025). Readiness of Higher	The study assessed Artificial Intelligence adoption readiness	Mixed method	The study established a significant contribution of

Learning Institutions in Adopting AI for Hearing-Impaired Students: A Case Study of the Tanzania Institute of Accountancy. *Asian Journal of Education and Social Studies*, *51*(2), 321–332. https://doi.org/10.9734/ajess/2025/v51i21788	for hearing-impaired students in higher learning institutions, grounded in Technology-Organization-Environment (TOE) theory in Tanzania		institutional readiness and environment readiness in the adoption of AI in learning process. However, HLIs e-learning systems lack integration with AI applications such as speech-to-text applications
Baynit, M., Mnyanyi, C. B., and Msoroka, M. S. (2025). Digital Learning in the Age of Artificial Intelligence: Insights from Selected Higher Learning Institutions in Tanzania. *African Quarterly Social Science Review*, *2*(2), 96-112. https://doi.org/10.51867/AQSSR.2.2.9	Explores the integration of AI in digital learning within the selected HLIs in Tanzania	Systematic review	Findings reveals that the AI tools have significantly impact in teaching and learning by providing personalized feedback, improving learning resources accessibility. Furthermore, Identified the need of AI investment for effective educational outcomes (such as infrastructure and policy development)
Adel Al-Maaitah, T., Alduneibat, K., Alshdaifat, S. M., Alsarayreh, R., Ahmad, A. Y., Ahmad,.B., Hijazin, A. F. (2025). AI adoption, technological readiness, and AI usability in sustainability accounting education: The moderating role of academic integrity. *Heritage and Sustainable Development,* 7(1), pp.611-628. https://doi.org/10.37868/hsd.v7i1.1176	investigates the influence of AI adoption tools, user readiness, and ease of use on sustainability accounting education in Jordanian public universities,	Quantitative	The findings indicates that Usability greatly facilitates the adoption of AI, with increased student engagement by providing higher levels of involvement. institutions need to invest in adaptive policy infrastructures and digital literacy

	Mollel, G. (2025). Determinants of AI utilization among Tanzania higher learning students: examining trends, predictors, and academic applications. *East African Journal of Information Technology*, *8*(1), 57-69.	examines the extent, frequency, and determinants of AI tool utilization among undergraduate students at the Tanzania Institute of Accountancy (TIA)	Quantitative (Cross sectional survey design)	The study identifies predictors of AI adoption including formal AI training as well as the need for tailored institutional policies.
	Machemba, S. J. (2025). The perspective and impact of technology among students and teachers: An insight into artificial intelligence in Africa and Tanzania. *Journal of Research Innovation and Implications in Education*, 9(3), 140 – 150. https://doi.org/10.59765/jriie.9.3.	impacts of artificial intelligence (AI) integration among students and teachers within African educational institutions. A case of Tanzanian HLIs	Quantitative method	The study underscores the need for context-specific strategies to ensure equitable and sustainable AI integration across diverse educational environments
Institutional strategies for AI adoption in Teaching and learning process in HLIs	Mwogosi, A. and Simba, R., (2025). Integration of AI into teaching methodologies in health training institutions in Tanzania. *Journal of Research in Innovative Teaching and Learning*; https://doi.org/10.1108/JRIT-03-2025-0069	investigates the integration of AI into teaching methodologies within HLIs in Tanzania. Specifically, explore expert perspectives on AI's potential benefits, and strategies for successful adoption.	Qualitative (an interpretivist research philosophy) using case study design	The study reveals that most AI applications driven by individual initiatives rather than institutional strategies and thus emphasis on a clear AI adoption policy
	Chatterjee, S., Bhattacharjee, K.K. (2020). Adoption of artificial intelligence in higher education: a quantitative analysis using structural equation modelling. *Educ Inf Technol* **25**, 3443–3463. https://doi.org/10.1007/s10639-020-10159-7	The focus was to explore how the stakeholders would be able to adopt AI for learning purposes	Quantitative	The AI adoption in HLIs is an important strategy to reduce the multiplied workload due to massification of higher education.

Chan, C.K.Y. A., (2023) comprehensive AI policy education framework for university teaching and learning. *Int J Educ Technol High Educ* **20**, 38. https://doi.org/10.1186/s41239-023-00408-3	examining the perceptions and implications of text generative AI technologies and hence developed an AI education policy for higher education. A case of Hong Kong Universities.	Mixed method	The study delves an AI Ecological Education Policy Framework (focusing changes on Pedagogical, Governance, and Operational) to address the multifaceted implications of AI integration in university teaching and learning
Fleming, R.S., and Kowalsky, M. (2021). Understanding Institutional Policies and Procedures. In: Survival Skills for Thesis and Dissertation Candidates. *Springer Texts in Education. Springer, Cham*. https://doi.org/10.1007/978-3-030-80939-3_6	Institutional policies and procedures bring an awareness of the many rules which govern progress throughout your project		Effective project and time management need an understanding of human's behaviour in any way, including their characteristics, their perceptions, behaviours, communications as well as policies and procedures Implication is that AI must reflect social behaviour to trigger its adoption
Kikutadze, V., and Lekishvili, T. (2025). AI and the Evolution of Higher Education: A Strategic Approach. In: Geibel, R.C., Machavariani, S. (eds) Digital Management and Artificial Intelligence. ISPC 2024. *Springer Proceedings in Business and Economics*. Springer, Cham. https://doi.org/10.1007/ 978-3-031-88052-0_14	explores the strategic approaches necessary for aligning educational program learning outcomes with the evolving demands imposed by AI technologies.	Qualitative	The study advocates for a comprehensive framework that encompasses curriculum redesign, faculty development, and the integration of AI literacy across higher education

Lashayo, D. (2023). Evaluating the Extent of Adoption and Integration of Artificial Intelligence Content into Computing Curricula in High Education Institutions in Tanzania: A Focus on the Design and Delivery of Academic Programmes. *Business Education Journal (BEJ),* 9(1): 1 – 21	The study delves on the extent of incorporation of AI content during the designing and delivering educational programmes in HEIs in Tanzania	Qualitative .	The results indicated that the incorporation of AI content into computing (ICT-related) programmes is low. Therefore, study identifies the need of incorporating of AI content during the designing and delivering educational programmes in HEIs in Tanzania
Mushi, R. M. (2025). Trust and AI Adoption for Mobile Learning in Higher Education: Evidence from Tanzanian Universities. *Advances in Mo bile Learning Educational Research,* 5(2), 1597-1610. https://doi.org/10.25082/AMLER.2025.02.014	examines whether trust influences AI acceptance in higher learning institutions (HLIs) in Tanzania	Quantitative	Findings shows that perceived trust was not a significant predictor of behavioural intention to use AI. However, it was identified that trust provides a strong policy insights for AI adoption in higher education.
Mbilinyi, A. P., Mwalukasa, N., and Mahenge, M. (2025). Determinants of artificial intelligence use in research at higher learning institutions of Tanzania. African Quarterly Social Science Review, 2(3), 307–321. https://doi.org/10.51867/AQSSR.2.3.27	the study examined the extent of AI usage in research and the factors influencing its adoption	Mixed method	The study shows performance expectancy, teaching experience, and workload have significant influence on AI adoption. This implies that policies and procedure could trigger the expected performance and behaviour intentions towards AI

4.1 Findings and Discussion

The findings from reviewed literatures shows the evidence that the investment in technological infrastructure in teaching and learning process in higher learning education have encouraged the adoption of AI education. Literature reveals AI adoption is currently considered as learning tools for both lecturers and students in different HLIs in Tanzania. For instance, use of plagiarism checker AIs to ensure quality of research work. Therefore, the purpose of enhancing the process of teaching and learning among limited resources in HLIs the adoption of AI is highly recommended. However, the adoption process depends on the strong collaboration among researchers, educators, and policy makers to ensure meaningful definition of the AI policy in higher education as explained by the Tanzanian Ministry of Education (URT, 2025). In the same line the review identified diverse range of studies which showed different aspect of AI adoption in HLIs. These aspects were contextually grouped into three themes namely the application of AI in teaching and learning process, Institutional policy and environment readiness in AI adoption, and Institutional strategies for AI adoption in Teaching and learning process in HLIs. Based on the selected 28 literatures on the adoption of AI published from 2019 to 2025, the findings of this systematic review are discussed based on the specified research objective and two research questions.

4.2 Support of AI in teaching and learning process in HLIs

It has been critically shown in the results that adoption and application of AI in teaching and learning found to enhance personalized experience and student engagements during the teaching and learning process. In the same way, the adoption of AI in learning process found to empower teachers by reduction in administrative work and providing tools for professional development (Srivastava, Srivastava, and Rao, 2025; Bower *et al.*, 2024). This means the application of AI in teaching and learning process exposes a wide range of information from different sources especially in HLIs environments. However, it is important to support the application of AI to ensure the trustworthiness and information completeness when using AI in educational setting.

The findings from the literature review shows a potential of using AI for educational purposes. Several researchers have focused on the analyzing the benefit of AI such as ChatGPT in educational processes (Elbanna and Armstrong, 2024; Adiguzel et al., 2023; Al-Mughairi, and Bhaskar, 2024; Lo, Hew and Jong, 2024). More than that, the findings further reveals that AI is an innovative tool that could transform the process of teaching and learning. This implies that educators have demonstrated a remarkable interest in innovative educational technologies which eventually trigger into the adoption and use of AI for teaching

and learning process. The finding is supported by the study of Mwakyusa and Ng`webeya (2022) that the response of educators and learners in using technology was very high specifically in the teaching and learning process as well as assessment evaluation during COVID pandemic.

The findings provide evidence that AI can provide unique features of customization and personalization of teaching and learning process. This means these features are recognized as enabling factors that motivates educators towards adoption AI for teaching and learning process within HLIs. For instance, the use of ChatGPT could easily personalize and customize some teaching materials and learning experiences which made the process of teaching and learning process more engaging and effective (Adiguzel et al., 2023; Al-Mughairi, and Bhaskar, 2024; Opara et al., 2023; Saidakhror, 2024; Sun et al., 2024). The study of Fuchs and Aguilos (2023) noted that the use of AI in learning process motivates the support for autonomous learning, digital and artificial tutoring, and academic misconduct and ethical considerations. These factors tend to stimulates educators and learners to focus more personalized learning as well as creating an efficient learning environment. The personalized learning and customizations are found to enable educators and students to adapt to new pedagogical approaches and hence meet the evolving strategies for adopting AI for teaching and learning process within HLIs.

4.3 Readiness of Institutional Policies and Environment to Enable the Adoption of AI in HLIs

The findings signify that institutional policies and readiness as the key enablers for technological advancement, diverse learning resources, flexibil ity and accessibility, and cost-management. AI are among the learning resources that has the potential to personalize teaching and learning process, enhance learning outcomes, and optimize institutional management. Thus, the growing interest in AI technologies in learning process within HLIs education context requires some institutional readiness and well-defined policy frameworks. This means the HLIs have to maintain standard by ensuring a clear ethical, infrastructure, and pedagogical methodology preparedness to connect AI sustainably and responsibly.

In the context of environment readiness, the finding indicates that technological readiness is an important factor that can shape the process of adopting AI in teaching and learning process. This means that the intention of adopting AI for education is identified as a mediator between readiness factors and future AI use, supporting investments in AI infrastructure and awareness programs in HLIs (Ayyash and Salah, 2025). This is in line with Anomah (2025) that institutional

readiness for AI adoption requires human capital development and cultural transformation with the academic institutions. This implies that human capital development could mediate the technological readiness and successful AI adoption within HLIs as well as sustainable use of AI in teaching and learning process. Furthermore, the results reveals that environment readiness and institutional readiness increases the ethical awareness among educators and learners. The readiness therefore affects the adoption of AI in HLIs in the way that it fosters a holistic approach that addresses ethical education practices and technical preparedness.

4.4 Institutional strategies for AI adoption in Teaching and learning process in HLIs

The findings show HLIs specifically in developing countries are proactively addressing the adoption of AI in teaching and learning practices particularly in academic integrity (use of plagiarism checker systems) for enhancing quality of academic work. In this aspect the key policy measures include the development of plagiarism guidelines for ethical use, as well as development of authentic assessments to trigger the academician and HLIs in general to be encouraged in the adoption AI for teaching and learning process. This includes the change in pedagogy, assessments and evaluation approach, technological infrastructure which basically found to influence AI adoption within HLIs (Bower, Torrington, and Lai, 2024). This is online with the study of Cronjé (2024) which described that the quality of education HLIs through the use of AI that "learning tasks to be developed in such a way that learners should use the AI as an intelligent assistant". In similar approach, Jin *et al.* (2025) contends that "using Generative AI tools in a manner that maintains academic integrity and aligns with the principles of originality and honesty"

Institutional strategies for AI adoption found to create the pattern for managing institutional structures and policies within HLIs for completion of different resources for teaching and learning process. For instance, it has been revealed that there are several aspects that affect the adoption of AI in HLIs specifically in developing countries. This includes policy development and regional collaboration which basically accelerate the process of adopting AI in HLIs (Al-Zahrani and Alasmari, 2025). In the same line, also Alenez (2023) identified some four strategies for adopting AI for teaching and learning process within HLIs which are the facilitating conditions, performance expectance, effort expectance, and social influence. This emphasizes on the importance of instructional strategies based on the teaching and learning theories such as sociocultural theories that enable institutional AI adoption (Olawale, Omodan, and Saddiq,

2025). This implies that there is strong correlation between AI adoption, improvement of student support and institutional teaching and learning plan.

5.0 A PROPOSED AI ADOPTION FRAMEWORK FOR TEACHING AND LEARNING PROCESS IN HIGHER LEARNING INSTITUTIONS

This research is guided by the analysis of institutional procedures on the adoption of AI for teaching and learning process. According the findings extracted from the systematic literature review, generally we identified factors that influence the adoption of AI within HLIs. These are AI readiness which require environment readiness which include technological readiness that could trigger the use of AI, supporting investments in AI infrastructure and awareness programs in HLIs. Secondly, a clearly defined AI policy for HLIs which reflects the instate vision and change management. These policy vision could highlight the necessity of HLIs to align a policy with a relevant adoption of AI for teaching and learning process. This is online with the study by Matto and Ponela (2025) which makes an emphasis that "the elements that affect AI adoption are consistent with those that impact policy adoption". This implies that the management or leaders from different HLIs need to take an active role through the institute vison and adoption strategies. Thirdly, institutional adoption strategies and knowledge this considers the aspects that includes the government or national level policies and regulation to enhance education integrity within HLIs. Additionally, institutional strategies tend to outlines the AI adoption features to be governed by HLIs educational tools which will facilitates the successful implementation of AI policies designed by the government through ministry of education. The general view of this AI adoption framework in figure 2 can be guided and validated through the technology, organizational, and environment theoretical framework.

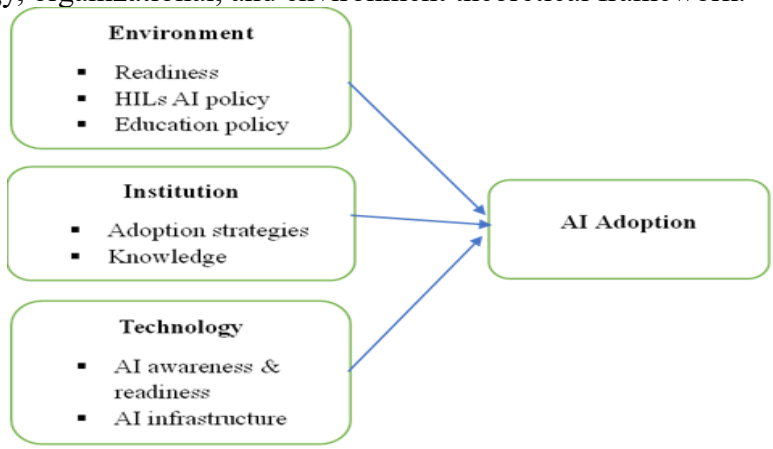

Figure 2: **A proposed framework of AI adoption in HLIs in Tanzania (extracted from literature review findings)**

6.0 CONCLUSION AND RECOMMENDATION

The adoption of AI technology in education process in HLIs is increasing day by day. The research on the role of institutional procedures on the adoption of AI for teaching and learning process in HLIs have demonstrated that academician have remarkable understanding on its application. The application of AI in teaching and learning process enhance learning outcomes, personalize teaching and learning process as well as optimize institutional learning management. The study further indicates that Institutional policy, readiness and environment are critical factors influencing in AI adoption within HLIs. Furthermore, a well-defined institutional strategy for AI adoption in Teaching and learning process was also identified as an important factor affecting the adoption process within HLIs. Based on these findings, the adoption of AI in teaching and learning process improves the pedagogical approach. More specifically, the institutional procedures are mostly governed by the established policy and its readiness which basically enable the AI adoption within HLIs.

In the light of the findings, the study recommends that HLIs should set some AI standards and prioritize investments on AI infrastructure and AI literacy which will promote digital knowledge to create AI based learning environment. As pointed out by UNESCO 2025b there is a need national and institutional policy interventions to promote ethical and responsible use of AI during learning process. We further recommend collaboration among HLIs, policy makers, and educators to improve AI readiness, formation of policy strategic reforms which is important aspect for adopting of AI for teaching and learning process. This collaboration trigger into the interdisciplinary research which includes educational experts, psychology, computer science experts, and other relevant fields to explore an innovative socio-technical determinant to be covered by AI for enhancing the quality of teaching and learning process. Furthermore, the study established the framework to enhance the process of AI adoption which will further be measured and verified in the future research.

6.1 Implication of the Study

This study contributes to research, practice, theory and policy particularly in the context of HLIs in Tanzania. The study addresses an identified research gap on the role of institutional procedures on the adoption of AI in teaching and learning process in HLIs. Considering the facts from the findings of the study, it provides evidence that in the presence of a well-articulated national AI policy for education processes stimulates the establishment of readiness and awareness that could influence the ethical AI adoption in HLIs. Therefore, this study highlights on the immediate need for policymakers to construct actionable frameworks that address an adaptive AI adoption policy including ethics of AI in teaching and

learning process and strategies within HLIs that will act as guide for AI adoption. Practically, findings from this study can be useful in the preparation of the best practice to support learners and educators in teaching and learning process or enhanced pedagogical approach to enhance the learning outcome.

Theoretically, as proposed in AI adoption framework in figure 2 the findings support technology, organization and environment theoretical framework in the field of information system. According to the framework in figure 2 AI adoption is influenced by three main constructs such as environment (including readiness and well-defined institution AI policies), Institutional adoption strategies and AI knowledge, and technological aspects (including AI awareness and readiness and AI infrastructure). With respect to institutional adoption strategy the study pointed out that strong prioritization of a clear AI policy adoption by HLIs leaders in respect to MoE AI adoption policy significantly influences the adoption of AI for teaching and learning process within HLIs.

REFERENCES

Adiguzel, T., Kaya, M. H., and Cansu, F. K. (2023). Revolutionizing education with AI: Exploring the transformative potential of ChatGPT. *Contemporary Educational Technology, 15*(3), ep429. https://doi.org/10.30935/cedtech/13152

Alenezi, F. Y. (2023). Artificial Intelligence Versus Arab Universities: An Enquiry into the Saudi Context. *Scientific Journal of King Faisal University, Humanities and Management Sciences*, *24*(1).

Almaiah, M. A., Alfaisal, R., Salloum, S. A., Hajjej, F., Shishakly, R., Lutfi, A., ... and Al-Maroof, R. S. (2022). Measuring institutions' adoption of artificial intelligence applications in online learning environments: integrating the innovation diffusion theory with technology adoption rate. *Electronics*, *11*(20), 3291.

Al-Mughairi, H., and Bhaskar, P. (2024). Exploring the factors affecting the adoption AI techniques in higher education: insights from teachers' perspectives on ChatGPT. *Journal of Research in Innovative Teaching and Learning*.

Al-Zahrani, A.M., and Alasmari, T.M. (2025). A comprehensive analysis of AI adoption, implementation strategies, and challenges in higher education across the Middle East and North Africa (MENA) region. *Educ Inf Technol* **30**, 11339–11389. https://doi.org/10.1007/s10639-024-13300-y

Anomah, S. (2025). Assessing the institutional readiness and capacity for AI adoption in public audit institutions in developing countries: evidence from Ghana. *Telematics and Informatics Reports*, *20*, 100260.

Atlas, S. (2023). ChatGPT for higher education and professional development: A guide to conversational AI. https://digitalcommons.uri.edu/cba_facpubs/548

Ayyash, M. M., and Salah, O. H. (2025). AI adoption in higher education: Advancing sustainable energy management in palestinian universities. *Journal of Open Innovation: Technology, Market, and Complexity*, *11*(2), 100534.

Baker, T., Smith, L., and Anissa, N. (2019). Educ-AI-tion rebooted? Exploring the future of artificial intelligence in schools and colleges.

Bower, M., Torrington, J., and Lai, J.W.M. *et al.* (2024). How should we change teaching and assessment in response to increasingly powerful generative Artificial Intelligence? Outcomes of the ChatGPT teacher survey. *Educ Inf Technol* **29**, 15403–15439. https://doi.org/10.1007/s10639-023-12405-0

Buckley, R. P., Zetzsche, D. A., Arner, D. W., and Tang, B. W. (2021). Regulating artificial intelligence in finance: Putting the human in the loop. *Sydney Law Review, The*, *43*(1), 43-81.

Chan, C. K. Y. (2023). A comprehensive AI policy education framework for university teaching and learning. *International journal of educational technology in higher education*, *20*(1), 38.

Chan, C. K. Y., and Hu, W. (2023). Students' voices on generative AI: Perceptions, benefits, and challenges in higher education. https://doi.org/10.48550/arXiv.2305.00290

Chen, L., Chen, P., and Lin, Z. (2020). Artificial intelligence in education: A review. *IEEE access*, *8*, 75264-75278.

Chiu, T. K., Xia, Q., Zhou, X., Chai, C. S., and Cheng, M. (2023). Systematic literature review on opportunities, challenges, and future research recommendations of artificial intelligence in education. *Computers and Education: Artificial Intelligence*, *4*, 100118.

Crompton, H. and Song, D. (2021). The potential of artificial intelligence in higher education. Revista Virtual Universidad Católica Del Norte, (62), 1-4. https://doi.org/10.35575/rvucn.n62a1

Cronjé, J. C. (2024). A Constructionist Approach to Learning with AI: An "Old" Solution to a "New" Problem? In K. Arai (Ed.), Advances in Information and Communication, 920, 13–22. Springer Nature.

Dai, Y., Liu, A., and Lim, C. P. (2023). Reconceptualizing ChatGPT and generative AI as a student-driven innovation in higher education. In A. Liu and S Kara (Eds.), Proceedings of the 33rd CIRP Design Conference, Procedia CIRP, 119, 84–90. DOI: https://doi.org/10.1016/j.procir.2023.05.002.

Doyle, A., Sridhar, P., Agarwal, A., Savelka, J., and Sakr, M. (2025). A comparative study of AI -generated and human-crafted learning objectives

in computing education. Journal of Computer Assisted Learning, 41(1), 1-16.

Eggmann, F., Weiger, R., Zitzmann, N. U., and Blatz, M. B. (2023). Implications of large language models such as ChatGPT for dental medicine. *Journal of Esthetic and Restorative Dentistry*. https://doi.org/10.1111/jerd.13046

Elbanna, S., and Armstrong, L. (2024). Exploring the integration of ChatGPT in education: adapting for the future. *Management and Sustainability: An Arab Review*, *3*(1), 16-29.

Fleming, R.S., Kowalsky, M. (2021). Understanding Institutional Policies and Procedures. In: Survival Skills for Thesis and Dissertation Candidates. Springer Texts in Education. Springer, Cham. https://doi.org/10.1007/978-3-030-80939-3_6

Fuchs, K., and Aguilos, V. (2023). Integrating artificial intelligence in higher education: Empirical insights from students about using ChatGPT. *International Journal of Information and Education Technology*, *13*(9), 1365-1371.

Garzón, J.; Patiño, E.; Marulanda, C. (2025). Systematic Review of Artificial Intelligence in Education: Trends, Benefits, and Challenges. Multimodal Technol. *Interact.* 9(84). https://doi.org/10.3390/mti9080084

Hamman, M and Iyamu, T. (2025). Conceptualising using prompt engineering with ChatGPT in engaging with higher education students. *Issues in Information Systems* 26(4) pp. 369-381.

Jakkula, A. R. (2024). Developing User-Friendly Artificial Intelligence Technical Tools. Journal of Artificial Intelligence and Cloud Computing, 3(2), 1–2.

Jin, Y., Yan, L., Echeverria, V., Gašević, D., and Martinez-Maldonado, R. (2025). Generative AI in higher education: A global perspective of institutional adoption policies and guidelines. *Computers and Education: Artificial Intelligence*, *8*, 100348.

Khoalenyane, N. B., and Ajani, O. A. (2024). A Systematic Review of Artificial Intelligence in Higher Education-South Africa. *Social Sciences and Education Research Review,* 11(1), 17–26.

Kurup, S., and Gupta, V. (2022). Factors Influencing the AI Adoption in Organizations. *Metamorphosis: A Journal of Management Research*, *21*(2), 129-139. https://doi.org/10.1177/09726225221124035 (Original work published 2022)

Lee, L., Dabirian, A., McCarthy, I., and Kietzmann, J. (2020). Making sense of text: artificial intelligence-enabled content analysis. *European Journal of Marketing*, 54, 615-644. https://doi.org/10.1108/ejm-02-2019-0219.

Lo, C.K., Hew, K.F. and Jong, M.S. (2024). The Influence of ChatGPT on Student Engagement: A Systematic Review and Future Research Agenda. *Comput. Educ*. 219, 105100.

Matto, G., and Ponera, J. M. (2025). Artificial intelligence in higher education institutions in Tanzania: Analysis of policy perspectives. *Interdisciplinary Journal of Education Research*, 7(1), a13. https://doi.org/10.38140/ijer-2025.vol7.1.13

Mena-Guacas, A. F., Rodríguez, J. A. U., Trujillo, D. M. S., Gómez-Galán, J., and López-Meneses, E. (2023). Collaborative learning and skill development for educational growth of artificial intelligence: A systematic review. *Contemporary Educational Technology*, 15(3), ep428.

Mnguni, L. (2024). The Curriculum Ideologies Underlying the AfriMEDS Curriculum Framework for Undergraduate Medical and Dental Education in South Africa. *International Medical Education*, 3(1), 44-61.

Morandín-Ahuerma, F. (2023). Ten UNESCO recommendations on the ethics of artificial intelligence. https://doi.org/10.31219/osf.io/csyux

Motlagh, N. Y., Khajavi, M., Sharifi, A., and Ahmadi, M. (2023). The Impact of Artificial Intelligence on the Evolution of Digital Education: A Comparative Study of OpenAI Text Generation Tools including ChatGPT, Bing Chat, Bard, and Ernie, 1-35. DOI: https://doi.org/10.48550/ARXIV.2309.02029

Mwakyusa, W. P., and Ngwebeya, L. M. (2022). The response of Tanzania higher learning institutions to e-learning during COVID-19 pandemic. *East African Journal of Education and Social Sciences*, *3*(1), 19-28.

Ngo, T. T. A., Tran, T. T., An, G. K., and Nguyen, P. T. (2024). ChatGPT for Educational Purposes: Investigating the Impact of Knowledge Management Factors on Student Satisfaction and Continuous Usage. IEEE Transactions on Learning Technologies, 17, 1341–1352.

Nurjanah, A., Salsabila, I., Azzahra, A., Rahayu, R., and Marlina, N. (2024). Artificial intelligence (ai) usage in today's teaching and learning process: a review. Syntax Idea, 6(3), 1517-1523. https://doi.org/10.46799/syntax-idea.v6i3.3126

Ohei, K., Mantzaris, E., Ntshangase, B. A., and Olutade, E. O. (2023). Incorporating new technologies into teaching in south africa. International Journal of Research in Business and Social Science, 12(6), 286–295.

Okai-Ugbaje, S., Ardzejewska, K., and Imran, A. (2020). Readiness, roles, and responsibilities of stakeholders for sustainable mobile learning adoption in higher education. *Education Sciences*, *10*(3), 49.

Olawale, B. E., Omodan, B. I., and Saddiq, K. (2025). X-raying the enablers and barriers of e-learning in higher education institutions: a systematic review. In *Frontiers in Education* (Vol. 10, p. 1526076). Frontiers Media SA. doi: 10.3389/feduc.2025.1526076.

Opara, E., Mfon-Ette Theresa, A., and Aduke, T. C. (2023). ChatGPT for teaching, learning and research: Prospects and challenges. *Opara*

Emmanuel Chinonso, Adalikwu Mfon-Ette Theresa, Tolorunleke Caroline Aduke (2023). ChatGPT for Teaching, Learning and Research: Prospects and Challenges. Glob Acad J Humanit Soc Sci, *5*.

Park, J., and Choo, S. (2024). Generative AI Prompt Engineering for Educators: Practical Strategies. Journal of Special Education Technology, 0(0), 1–7.

Pinho, C., Franco, M., and Mendes, L. (2021). Application of innovation diffusion theory to the E-learning process: higher education context. *Education and Information Technologies*, *26*(1), 421-440.

Reiss, M. (2021). The use of AI in education: Practicalities and ethical considerations. London Review of Education. https://doi.org/10.14324/LRE.19.1.05.

Saidakhror, G. (2024). The impact of artificial intelligence on higher education and the economics of information technology. *International Journal of Law and Policy*, *2*(3), 1-6.

Schönberger, M. (2024). Integrating artificial intelligence in higher education: enhancing interactive learning experiences and student engagement through ChatGPT. In *The Evolution of Artificial Intelligence in Higher Education: Challenges, Risks, and Ethical Considerations* (pp. 11-34). Emerald Publishing Limited.

Sharifuddin, N. S., and Hashim, H. (2024). Benefits and challenges in implementing artificial intelligence in education (AIED) in ESL classroom: A systematic review (2019-2022). *International Journal of Academic Research in Business and Social Sciences*, *14*(1), 146-164.

Siau K. (2018) Education in the Age of Artificial Intelligence: How will Technology Shape Learning? The Global Analyst, 7 (3), 22-24.

Singh, R., Singh, S. K., and Mishra, N. (2024). Influence of e-learning on the students' of higher education in the digital era: A systematic literature review. *Education and Information Technologies*, *29*(15), 20201-20221. https://doi.org/10.1007/s10639-024-12604-3.

Singh, S. V., and Hiran, K. K. (2022). The impact of AI on teaching and learning in higher education technology. *Journal of Higher Education Theory and Practice*, 22(13). https://doi.org/10.33423/jhetp.v22i13.5514

Sok, S., and Heng, K. (2024). Opportunities, challenges, and strategies for using ChatGPT in higher education: A literature review. Journal of Digital Educational Technology, 4(1), 1–11.

Srivastava, N., Srivastava, A., and Rao, P. (2025). Leveraging AI in Higher Education Teaching and Learning: Opportunities and Challenges Ahead. *Emerald Publishing Limited. https://doi.org/10.1108/978-1-83662-066-2*.

Sun Jiali, Dayo, F., Gui Jun, Liu Shuangyao, and Najam, S. (2024). The Impact of Artificial Intelligence on Personalized Learning in Education: A

Systematic Review. *Pakistan Journal of Life and Social Sciences*, *22*(2), 7412–7428. https://doi.org/10.57239/PJLSS-2024-22.2.00560.

Susilo, T. and Aritonang, S. (2023). Optimizing the potential of artificial intelligence in education management for era 5.0. Al-Fikrah Jurnal Manajemen Pendidikan, 11(2), 219. https://doi.org/10.31958/jaf.v11i2.10371

UNESCO (2025a). Artificial Intelligence Readiness Assessment Report. Published by the United Nations Educational, Scientific and Cultural Organization 7, place de Fontenoy, 75352 Paris 07 SP, France

UNESCO. (2025b). Artificial intelligence in education: UNESCO advances key competencies for teachers and learners. https://www.unesco.org/en/articles/artificial-intelligence-education unesco-advances-key-competencies-teachers-and-learners

URT, (2025). National guidelines for artificial intelligence in education. *Ministry of Education, Science and Technology.* Dodoma, Tanzania

URT. (2023). Education and training policy of 2016 (2023 edition). Dodoma: Ministry of Education, Science and Technology.

Victor, D. (2024). Factors and Impacts of ChatGPT Adoption for Academic Purposes in Higher Learning Institutions: Students' Perspectives. *Global Scientific Journals*, 12(8), 327–351.

Williamson, B., and Eynon, R. (2020). Historical threads, missing links, and future directions in AI in education. *Learning, Media and Technology*, 45(3).

Wu, J., Wang, X., Dang, Y., and Lv, Z. (2022). Digital twins and artificial intelligence in transportation infrastructure: Classification, application, and future research directions. *Computers and Electrical Engineering, 101*, 107983. https://doi.org/10.1016/j.compeleceng.2022.107983

Xu, Z. (2024). AI in education: Enhancing learning experiences and student outcomes. *Applied and Computational Engineering, 51*(1), 104-111.