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RESEARCH ARTICLE

The Integration of Artificial Intelligence (AI) Technologies in Advance Learning in Universities at Mwanza, Tanzania

^aBosco August L, ^aDemetria Mkulu, ^aClara Rupia^aDepartment of Education Foundations, St. Augustine University of Tanzania**Corresponding Author**Bosco August L, Email : augustlyamuya.bosco@gmail.com**Author's Contributions**

All authors contributed equally to this research.

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ABSTRACT

The rapid development of Artificial Intelligence (AI) technologies is significantly transforming higher education, altering how students and faculty search for information, analyze data, develop ideas, share knowledge, and conduct research. Universities are increasingly adopting tools such as generative AI, machine learning, natural language processing, intelligent tutoring systems, and AI-powered research instruments to improve learning and research results. This study systematically reviews empirical evidence on AI integration in advanced learning, emphasizing how AI supports academic research in universities. Guided by the PRISMA framework, the review involved systematic searches of peer-reviewed journal articles, books, policy reports, and scholarly works from major databases like Scopus, Web of Science, ERIC, Google Scholar, and institutional repositories. Selected studies were screened, assessed for eligibility, and thematically synthesized. The review discusses AI-assisted literature searches, information retrieval, data analysis, academic writing, research design, and productivity. Results suggest that AI boosts efficiency and accessibility across research stages, including language assistance and data processing. However, issues such as information accuracy, academic integrity, bias, privacy, over-dependence on AI, and limited AI literacy remain concerns. For Mwanza universities, the researcher recommends that successful AI integration needs institutional policies, strong digital infrastructure, ethical guidelines, and continuous human oversight. The study concludes that AI should be viewed as a tool to support, not replace, scholarly judgment.

Keywords: Artificial Intelligence, Learning, Technologies, Advance, Integration, academic research, universities, learning institutions

INTRODUCTION

Artificial Intelligence (AI) is rapidly reshaping how knowledge is created, processed, and shared, especially in higher education. At universities, AI is now an important tool for teaching, learning, administration, and research. Technologies such

as machine learning, natural language processing, expert systems, and intelligent automation support researchers at every stage of their work. These tools make it easier to find relevant literature, analyze large datasets, generate insights, manage references, and improve academic writing

(Zawack-Richter, 2019). UNESCO (2023) notes that AI, particularly large language model-based applications, is attracting more attention because it helps researchers with literature searches, idea generation, academic writing, language improvement, data analysis, coding, and summarizing. Integrating AI into higher education can support research from choosing topics and organizing literature to analyzing data and managing citations (Perkins & Roe, 2024).

Globally, studies conducted in the USA, Australia, and China have highlighted that universities are integrating AI tools such as intelligent tutoring systems, natural language processing applications, and generative AI platforms to support academic activities, including research tasks. These tools have demonstrated significant potential to enhance student engagement and improve research productivity. Furthermore, AI facilitates access to vast amounts of academic information, enabling researchers and students to conduct literature reviews, analyze complex datasets, and generate knowledge more efficiently (UNESCO, 2023).

In Africa, universities, research institutions, and governments are increasingly adopting AI technologies to address challenges in education and economic development. Artificial intelligence (AI) is transforming research across Africa by improving data analysis and simplifying information searches. However, the integration of AI in higher education institutions varies by technological maturity and by financial and institutional policies (UNESCO, 2021). Not all universities have adopted AI in the same way. Many face challenges with digital infrastructure, research ethics, academic integrity, bias, limited AI skills, and weak institutional policies (Umamageswari & Vijayakumar, 2025).

The significance of this discussion for Tanzania continues to grow. The Ministry of Education, Science and Technology in Tanzania has formulated national digital education guidelines and strategies for 2024/25-2029/30, which include specific directives for universities and the use of artificial intelligence in education. This policy shift underscores that digital technologies and AI are becoming central to Tanzania's broader educational transformation efforts. Universities are increasingly recognizing the value of integrating AI to enhance

research capacity, improve learning outcomes, and boost their competitiveness in the global knowledge economy (Dwivedi et al., 2023). Academic staff and students are increasingly using AI tools to search for scientific literature, improve academic writing, and manage references, despite insufficient institutional policies and concerns about academic integrity (Kasneci et al., 2023). Consequently, the use of AI for research activities varies considerably across higher education institutions. Universities in the Mwanza region are also seeing increased adoption of digital technologies to support academic and research activities. Researchers and students are beginning to use AI applications for literature reviews, language editing, and data analysis (Bende et al., 2021). Nevertheless, there is limited published evidence describing the extent to which AI technologies are integrated into research activities within these universities. Most available studies discuss AI adoption in Tanzanian higher education in general without providing evidence specific to universities in Mwanza. This lack of context-specific literature creates a knowledge gap regarding how AI technologies support research activities in Mwanza universities. Understanding the influence of AI in this context is important for informing institutional policies, strengthening researchers' digital competencies, and guiding investments in digital infrastructure. Therefore, this study reviewed existing literature to examine the influence of AI technologies in supporting research activities, with particular emphasis on Mwanza universities.

Statement of The Problem

Research constitutes a core function of universities, contributing substantially to knowledge creation, innovation, and socio-economic development. The quality and productivity of research activities depend on researchers' ability to access relevant literature, analyze data efficiently, manage research information, and disseminate findings effectively. However, research activities in many universities encounter challenges such as limited access to research resources, prolonged data analysis processes, insufficient research support systems, and increasing pressure to enhance research productivity. Artificial intelligence (AI) technologies present opportunities to address these challenges by automating key research tasks. Despite the

increasing availability of AI tools, empirical and contextual evidence regarding the influence of AI technologies on research activities among students and staff in these institutions remains limited. Most existing studies have concentrated on the application of AI in teaching and learning, with comparatively less attention to its role in supporting research functions. As a result, there is insufficient understanding of the benefits, challenges, and overall influence of AI technologies on research activities within Mwanza universities.

Objectives of The Study

1. General Objective

To examine the integration of artificial intelligence (AI) technologies in advanced learning at universities in Mwanza, Tanzania

2. Specific Objective

To determine the influence of Artificial Intelligence Technologies in supporting research activities.

Research Question

How do Artificial Intelligence technologies support research activities?

Significance of The Study

This study will be useful to a diverse array of stakeholders, including the Ministry of Education, Science and Technology, the Tanzania Commission for Universities (TCU), universities and colleges, students, staff, and professional organizations. The insights gleaned from this research will empower the Ministry of Education, Science and Technology to craft policies that effectively harness the potential of artificial intelligence (AI) in higher education. Additionally, the findings of this study will help TCU establish a strong foundation that enables higher learning institutions to use AI tools properly to improve the provision of quality education. The findings will also help students discover how AI can revolutionize their learning journey, providing tailored instruction and research support.

Conceptual Clarification

1. AI-Driven Learning Technologies

AI-driven learning technologies refers to digital systems that use AI techniques to support teaching, learning, information processing or research. In this paper, the term encompasses generative AI systems, intelligent search and recommendation

systems, natural-language processing applications and other AI tools that can assist users in finding, processing and synthesizing academic information. AI is particularly relevant to academic research because it can generate and transform text, summaries documents, explain concepts, translate material, assist with coding, and support the preparation of academic manuscripts. However, its outputs are probabilistic and require human verification. UNESCO (2023) emphasizes that AI should be implemented through a human-centered approach that protects agency, inclusion, equity, privacy and academic integrity. For this study, AI-driven learning technologies are therefore understood not as replacements for researchers but as augmentation technologies that can support selected academic and research tasks.

2. Advanced Learning

Advanced learning refers to higher-level learning associated with university. It involves critical thinking, independent inquiry, problem solving, knowledge construction, evaluation of evidence, and synthesis of ideas. In this study, advanced learning is understood not simply as obtaining more information but as developing the capacity to interrogate, compare, evaluate and generate knowledge.

Theoretical Framework

1. The Diffusion of Innovations Theory

The Diffusion of Innovations theory, devised by Everett Rogers in 1962, guides this study. It is widely applied in fields such as technology adoption. The theory describes how new ideas, technologies, or innovations are introduced, embraced, and disseminated among individuals and organizations over time. Rogers highlights five key attributes that influence innovation adoption: relative advantage, compatibility, complexity, trialability, and observability. This framework is particularly relevant because AI technologies are still a new innovation in many universities' academic research, including those in Mwanza. It helps explain how researchers, staff, and students become aware of AI tools, assess their usefulness, and decide whether to adopt them in their research work. Overall, the theory offers a comprehensive understanding of the factors affecting AI adoption, considering institutional, technological, and personal influences on

researchers' acceptance and spread of these technologies in Mwanza's universities

LITERATURE REVIEW

Artificial Intelligence Technologies in Supporting Research Activities.

The widespread adoption of AI applications such as ChatGPT, Grammarly, and Research Rabbit demonstrates a strong AI pattern in academic research worldwide. These tools consistently automate repetitive tasks, generate insights from large datasets, and support complex decision-making, forming a distinct pattern of AI integration into research workflows. Despite this, there is still limited understanding of how these technologies influence research activities, particularly in universities in Mwanza, Tanzania. Examining the impact of AI is essential, as it reveals how these systems increase researcher productivity, improve data analysis, and foster knowledge creation (Enayathulla & Krishna, 2024). The findings can help universities, policymakers, and researchers recognize both the opportunities and challenges associated with Artificial Intelligence adoption.

Influence of AI Technologies on Literature Search and Knowledge Discovery

AI technologies can support researchers in identifying and organizing scholarly information. AI-powered search and recommendation systems can help researchers generate keywords, identify related concepts, locate potentially relevant publications, and organize large bodies of literature. There is substantial agreement in the literature that AI can improve the efficiency of information processing. Kasneci et al. (2023) argue that AI can assist learners and researchers with information-related tasks, while Dwived et al. (2023) similarly identify information processing as an area where AI may increase productivity. However, there is also disagreement about the reliability of AI-generated information. Some scholars emphasize the productivity benefits of AI, whereas others warn that large language models can produce inaccurate information and fabricated references. Therefore, the literature agrees that AI can support literature reviews, but it does not establish that AI can replace the researcher's responsibility to identify, read, evaluate, and cite sources. AI-powered search engines and recommendation systems significantly

improve researchers' ability to identify relevant scholarly materials. Integrating AI technologies into research activities reduces the time required to locate relevant literature (Ouyang et al., 2022). Similarly, Anyaso and Stanley (2025) conducted a groundbreaking study in the U.S. that employed a systematic literature review, underscoring the transformative power of AI capabilities in natural language processing for research initiatives. These advanced AI algorithms can efficiently analyze vast amounts of academic literature, distilling essential insights and pinpointing promising areas for future exploration. The potential of this technology is vast and impactful, spanning critical fields such as language education, engineering education, mathematics education, and medical education. These advancements have significantly improved the efficiency and quality of research outputs. Researchers have observed that AI-assisted search platforms improve the comprehensiveness of literature reviews by identifying connections between publications that may not be immediately apparent through traditional search methods.

Influence of AI Technologies on Academic Writing

Academic writing is another area where AI has attracted significant attention. AI can assist researchers in improving grammar, sentence structure, organization of ideas, paraphrasing, translation, and preparing preliminary drafts. Generative AI tools such as ChatGPT have introduced new opportunities for academic writing support. AI-powered writing assistants have become valuable tools for researchers. These systems support grammar checking, language improvement, citation generation, paraphrasing, and content organization. Studies show that AI tools enhance writing quality and reduce the time required to prepare research manuscripts. AI applications also assist non-native English speakers in improving academic writing (Kasnecia et al., 2023). A study conducted by Anane (2021) similarly suggests that AI-powered tools have not only expedited research processes but have also markedly improved their quality. Addressing the critical issue of insufficient training for researchers in advanced technologies is paramount, as this deficiency can severely impede the effective utilization of these powerful tools in Ghanaian

universities. Similarly, a study conducted by Makombe (2020) employed a qualitative research approach to assess the integration of AI in higher education in Tanzania. The findings highlight that incorporating AI into research dramatically empowers researchers to analyze extensive datasets with exceptional speed and unparalleled accuracy. This advancement not only accelerates the research process but also enhances the quality of insights derived, underscoring the transformative potential of AI in research writing. There is therefore agreement that AI can provide useful language and writing assistance. This may be particularly valuable for researchers who work in multilingual academic environments. Nevertheless, the literature contains disagreement about the extent to which AI-generated text should be permitted in academic writing. Supporters emphasize efficiency and language assistance, while critics raise concerns about originality, plagiarism, and the possibility that researchers may submit AI-generated content without adequate intellectual contribution.

Plagiarism Detection and Research Integrity

Academic integrity is one of the most debated topics in the literature. Scholars recognize that AI can provide useful research assistance, but they also identify risks, including plagiarism, fabrication, false citations, undisclosed AI use, and inappropriate authorship. Alkaissi and McFarlane (2023) demonstrate that AI systems can generate fabricated scientific information and references. UNESCO (2023) similarly identifies concerns related to misinformation, privacy, equity, and ethical use. Cotton et al. (2023) argue that universities increasingly use AI-powered plagiarism detection systems to maintain academic standards and research quality. These systems compare submitted documents against extensive databases to identify similarities and potential cases of academic misconduct. According to a UNESCO (2023) report, AI-based plagiarism detection tools contribute to ethical research practices by encouraging originality and reducing instances of academic dishonesty. There is therefore substantial agreement among scholars that unrestricted AI use may threaten research integrity. The differences lie in the proposed response. Some scholars emphasize stronger institutional regulation and

disclosure requirements, while others emphasize researcher education and responsible use.

Influence of AI Technologies on Data Analysis and Interpretation

The literature also demonstrates that AI can support the analysis of research data. Perkins and Roe (2024) report that AI can assist with quantitative coding, thematic analysis, transcription, statistical coding, and interpretation of analytical outputs. AI technologies play a critical role in data analysis by processing large datasets and identifying complex patterns that may not be easily detected through traditional analytical methods. Machine learning and AI-based analytical tools facilitate rapid processing of large datasets. Researchers can use AI technologies to identify patterns, generate predictive models, and perform complex statistical analyses that would otherwise require extensive time and expertise (Russell & Norvig, 2021). Similarly, Chen et al. (2020) suggest that AI-based analytical tools significantly improve the speed and accuracy of research data analysis. Santo and Serpa (2023) conducted qualitative research in Portugal, demonstrating how AI empowers researchers to analyze extensive datasets and uncover patterns and trends that may elude human detection. Enayathulla and Krishna (2024) employed a qualitative approach to explore the impact of AI-driven data analysis in India, asserting that it significantly elevates academic research by providing sophisticated data, advanced pattern recognition, and powerful modeling tools. The studies illustrate that artificial intelligence (AI) fundamentally transforms the management of extensive datasets by automating workflows and improving data organization. This technological advancement not only enhances the depth and precision of data analysis but also enables sophisticated predictive models that can uncover trends and insights previously hidden. Furthermore, Kariuki and Kamau (2021) employed a qualitative research approach that emphasizes the pivotal role of AI in bolstering research capabilities across Kenyan higher education institutions. Their findings reveal that AI-powered tools have significantly advanced data analysis and fostered more effective research collaboration. These enhancements contribute directly to elevated research quality and productivity. The findings compellingly highlight that

AI serves as a transformative catalyst in advancing interdisciplinary research, which is essential for tackling the multifaceted challenges of contemporary academia. The evidence from the studies suggests that AI-driven analytics improve research accuracy and contribute to evidence-based decision-making. These findings are consistent with the argument that AI can reduce the amount of time researchers spend on repetitive analytical activities. In this respect, scholars agree that AI can improve research efficiency.

Research Collaboration and Knowledge Sharing

AI technologies are increasingly influencing how researchers collaborate, communicate, and share knowledge. AI-supported platforms can facilitate collaboration by helping researchers identify potential collaborators, organize research information, translate academic materials, summarize lengthy documents, and communicate research findings across disciplinary and geographical boundaries. Scholars generally agree that AI can facilitate research collaboration and knowledge sharing by reducing barriers associated with information processing, language, and geographical distance. Dwivedi et al. (2023) state that AI technologies facilitate collaboration among researchers through digital platforms, automated communication tools, and knowledge management systems. These technologies enable researchers from different institutions and countries to share information and work together effectively. Similarly, Holmes et al. (2019) indicate that AI-supported collaboration tools enhance interdisciplinary research and increase opportunities for innovation in higher education. The literature reveals several areas of agreement. Scholars agree that AI can increase the speed and efficiency of knowledge sharing; however, disagreement arises concerning the extent to which AI should participate in collaborative research. One perspective views AI primarily as a research assistant that supports human researchers, while another emerging perspective considers AI a more active participant in knowledge production processes. Therefore, the literature suggests that AI should not be regarded as a replacement for human research collaboration; rather, its greatest value may be in augmenting collaboration by helping researchers locate

information, communicate ideas, and synthesize knowledge.

Influence of AI Technologies on Research Productivity

AI has increasingly been recognized as a potential tool for improving research productivity in higher education. Research productivity can be understood in terms of the efficiency and effectiveness with which researchers generate scholarly outputs, including journal articles, conference papers, reports, theses, and books. AI technologies can contribute to research productivity by reducing the time required for routine research activities, supporting information processing, improving academic writing, and facilitating collaboration. Several scholars agree that AI has the potential to increase research productivity. This finding is supported by a study by Ngwane and Mahlangu (2020), which used a qualitative research approach and demonstrated that integrating AI in South African universities has significantly enhanced research quality by promoting data-driven decision-making and encouraging interdisciplinary collaboration. This research demonstrates the profound and transformative impact of artificial intelligence on research collaborations and resource management within higher education institutions. By leveraging advanced AI technologies, these institutions are not only streamlining operations and optimizing resource allocation but also fostering innovative partnerships that enhance academic research capabilities. Similarly, Luhanga and Mwalogo (2019) emphasize that AI tools, like Turnitin, play a crucial role in upholding academic integrity by effectively detecting plagiarism in student theses and research papers. These findings suggest that AI can contribute to greater research efficiency. However, researchers reveal an important disagreement among scholars about whether increased AI-assisted efficiency necessarily results in higher-quality research productivity.

Challenges Facing Integrating AI Technologies in Supporting Research Activities

Although artificial intelligence technologies have transformed academic research by improving literature searches, data analysis, academic writing, and research dissemination, integrating

these technologies into research activities remains constrained by several challenges. The reviewed literature identified ethical, technological, institutional, financial, and human-capacity barriers that limit effective adoption in universities.

Ethical Issues and Academic Integrity

One of the most frequently discussed challenges is the ethical use of AI in research. AI tools such as ChatGPT can produce coherent academic text, summarize literature, and assist with manuscript preparation. However, scholars argue that excessive reliance on AI may encourage plagiarism, fabrication of information, inaccurate citations, and reduced critical thinking among researchers. Kasneci et al. (2023) argue that AI has enormous potential to improve research productivity but should always operate under human supervision because AI systems can generate misleading or fabricated information. Similarly, UNESCO (2023) emphasizes that universities should establish ethical guidelines governing the responsible use of AI in research and education. The literature demonstrates substantial agreement that AI technologies improve research efficiency, productivity, and access to scientific knowledge. However, scholars differ regarding the severity of these challenges. Scholars view AI risks, particularly bias and ethical concerns, as manageable through governance, regulation, and human oversight.

Inadequate Digital Infrastructure

Successful AI integration depends on reliable digital infrastructure, including high-speed internet, cloud computing, and powerful computing resources. Many higher education institutions, particularly in low- and middle-income countries, lack these essential resources. UNESCO (2024) reported that many universities, particularly in developing countries like Tanzania, face shortages of reliable internet connectivity, cloud computing facilities, high-performance computers, and digital libraries. These infrastructural limitations reduce researchers' ability to utilize AI-powered research tools effectively. Similarly, a study conducted by Crompton & Burke (2023) found that inadequate ICT infrastructure remains one of the primary barriers to Artificial Intelligence in African universities. There is broad agreement among

scholars that infrastructure is a prerequisite for successful AI implementation in higher education institutions.

Data Privacy and Security Concerns

AI systems frequently require researchers to upload research documents, datasets, or unpublished manuscripts to cloud-based platforms. This raises concerns about confidentiality, intellectual property, cybersecurity, and compliance with data protection regulations. UNESCO (2023) cautions that institutions should carefully evaluate AI platforms before researchers upload sensitive information. Likewise, Dwivedi et al. (2023) recommend stronger institutional policies governing data management and AI use. Although scholars consistently recognize data privacy as an important issue, they disagree on the extent of the risk. Therefore, scholars argue that secure institutional AI platforms can substantially reduce privacy concerns.

Limited AI knowledge and skills

Effective integration of AI requires researchers, lecturers, and students to possess adequate digital competence. Zawack-Richter et al. (2019) observed that insufficient digital skills remain a major obstacle to academics effectively using AI technologies. UNESCO (2023) similarly argues that universities should invest in continuous professional development to improve AI literacy among researchers. Dwivedi et al. (2023) contend that researchers adapt more rapidly to AI technologies because of their greater familiarity with digital tools. This suggests that the challenge may differ across generations and disciplinary contexts. The successful application of AI depends on users possessing sufficient digital and AI literacy. However, many academic staff and students have limited knowledge of AI tools and their appropriate use in research activities (Kasneci et al., 2023). Therefore, universities should invest in continuous professional development to improve AI competencies among researchers and educators

Research Gap

The reviewed literature demonstrates that Artificial Intelligence (AI) technologies have significantly enhanced research activities in higher education by improving literature searches, academic writing, data analysis, and reference management. Most

existing studies have been conducted in developed countries, where universities have relatively advanced digital infrastructure, well-established AI policies, and greater access to AI technologies. Although several studies have examined AI adoption in higher education in Africa and Tanzania, the majority focus on teaching and learning rather than the specific role of AI in supporting research activities. Furthermore, these studies often examine higher education at the national level without providing context-specific evidence from individual regions. Specifically, there is limited published literature examining how AI technologies influence research activities in Mwanza universities. Existing studies provide insufficient evidence on the extent to which researchers in Mwanza universities use AI technologies, the benefits they obtain, and the challenges they encounter. As a result, there is a lack of localized evidence to guide university management and policymakers in developing effective strategies for the responsible adoption of AI in research. Therefore, this review addresses this knowledge gap by synthesizing the literature on the influence of AI technologies in supporting research activities in Mwanza universities

METHODOLOGY

This study was based exclusively on published literature obtained from reputable online academic sources. The reviewed materials included peer-reviewed journal articles, conference papers, books, review articles, and reports from recognized international organizations. The literature was retrieved from academic databases and search platforms such as Scopus, Web of Science, and Google Scholar. Additional reports from organizations such as UNESCO and the World Bank were included. The literature search focused on publications related to Artificial Intelligence, higher education, advanced learning, research activities, research productivity, and AI-supported research. Keywords used during the search included Artificial Intelligence, AI in higher education, AI and research productivity, generative AI, AI-supported research and research activities in universities. Preference was given to studies published between 2015 and 2026 to ensure that the review reflected recent developments in AI technologies, while a limited number of earlier

foundational studies were included where necessary to explain key concepts and theories. The identified publications were screened for relevance to the study objective. Only literature that addressed the influence of AI technologies on research activities in universities was included in the review. The selected studies were critically analyzed and synthesized by comparing their findings, identifying areas of agreement and disagreement among scholars, and highlighting knowledge gaps related to the integration of AI technologies in supporting research activities, particularly within the context of universities in Mwanza, Tanzania.

RESULTS AND DISCUSSIONS

Results

The literature review demonstrates that Artificial Intelligence (AI) technologies have significantly transformed research activities in higher education institutions. Across the reviewed studies, AI applications have been shown to improve research efficiency and enhance the quality of scholarly outputs. The findings indicate that universities are increasingly integrating AI tools into different stages of the research process, including literature search, academic writing, data analysis, and research collaboration. AI technologies improve the efficiency of literature reviews. AI-powered academic search engines and generative AI tools assist researchers in identifying relevant publications, summarizing research articles, and organizing references. These capabilities reduce the time required to conduct literature reviews and enable researchers to access a broader range of scholarly evidence. Despite these benefits, the review identifies several barriers limiting the effective integration of AI technologies in university research. The most common challenges include inadequate digital infrastructure, unreliable internet connectivity, limited AI knowledge among academic staff and students, and ethical concerns and data privacy risks.

Discussions

The literature shows a broad consensus that artificial intelligence (AI) technologies have greatly transformed research activities in higher education institutions. Most scholars agree that AI boosts research efficiency by automating tasks like literature searches, data analysis, language editing,

citation management, and academic writing. For instance, Dwivedi et al. (2023) state that AI has revolutionized research by increasing productivity and aiding knowledge creation. Similarly, Zawack-Richter et al. (2019) claim that AI enhances research performance through smarter information retrieval. Kasneci et al. (2023) add that AI tools such as ChatGPT support researchers in generating ideas, summarizing literature, and improving manuscript preparation. While these views are widely shared, scholars differ on how much AI should be integrated into academic research. Some argue that AI should be broadly adopted because it improves efficiency and accelerates discovery, with Dwivedi et al. (2023) and Kasneci et al. (2023) noting that AI complements rather than replaces researchers' intellectual abilities. Others are concerned about over-reliance on AI. Bender et al. (2021) warn that AI can produce inaccurate, fabricated, or biased information, which could compromise research quality if accepted uncritically. They emphasize verifying AI-generated content with credible sources. Overall, the literature indicates greater agreement than disagreement on AI's positive contributions to research, especially in enhancing efficiency, productivity, and writing quality. Disagreements mainly relate to ethical issues, content reliability, and academic integrity. This can be understood through Rogers' (2003) Diffusion of Innovation Theory (DOI). Adoption of AI in Mwanza is expected to grow as awareness of benefits increases, and as institutions invest in infrastructure, training, and policies. Nonetheless, challenges like limited technological infrastructure, AI skills, and ethical concerns must be addressed to ensure successful and sustainable adoption. In conclusion, the literature suggests AI technologies positively impact research and learning, but their successful integration depends on factors that facilitate innovation diffusion within academic settings.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

The study concludes that AI is best viewed as a tool to support research by assisting with data analysis, literature reviews, and hypothesis generation. However, it is not intended to substitute for the critical thinking, creativity, and ethical considerations that are fundamental to scholarly

judgment. Instead, AI should be integrated as a complementary resource that enhances researchers' capabilities while preserving the essential role of human expertise and decision-making.

Recommendations

Based on the reviewed literature, the following recommendations are proposed to enhance the integration of Artificial Intelligence (AI) technologies to support research activities in universities in Mwanza.

1. Universities should invest in AI infrastructure and digital resources to facilitate access to AI-powered research tools, databases, and software that support literature review, data analysis, and academic writing.
2. Universities should develop clear policies and guidelines for the use of AI in academic research to ensure academic integrity, transparency, data privacy, and responsible use of AI-generated content.
3. Researchers should be encouraged to use AI tools as complementary instruments that enhance research efficiency and productivity while maintaining critical thinking and human judgment throughout the research process

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