Journal of
Engineering and Technology Systems

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Review

Artificial Intelligence in African Education: A Systematic Review of Benefits and Ethical Challenges

Akem Solange Ojong, Drexel University, School of Education, Philadelphia, PA, USA

[1] akemsolangeojong41@gmail.com
* Correspondence: akemsolangeojong41@gmail.com
https://orcid.org/0009-0003-9590-3391

Abstract

Artificial intelligence (AI) is shaping education across Africa through its application in teaching, learning, administration, research, and institutional management. However, evidence on its benefits and ethical challenges remains spread across different educational settings. This study used a systematic literature review to examine the benefits of AI adoption and the ethical challenges associated with its use in African education. Guided by the Diffusion of Innovations Theory (Rogers, 2003) and the Technology Acceptance Model (Davis, 1989), the review analyzed 41 studies. The findings identified five themes related to the benefits of AI in African education, including personalized teaching and learning, educational access and inclusion, administrative efficiency, student engagement and academic performance, and research productivity and professional development. Seven themes were identified under ethical challenges, including the digital divide, limited AI literacy, academic integrity concerns, data privacy and algorithmic bias, policy and governance gaps, uneven institutional readiness, and financial constraints and resistance to change. The review concludes that that AI has the potential to transform education and expand access across Africa. However, realizing these benefits requires investment in digital infrastructure, ethical governance, and inclusive policies that promote equitable and sustainable AI integration in education. The findings are limited to the African educational settings represented in the reviewed studies.

Keywords: Artificial Intelligence; African Education; Educational Transformation; Educational Access and Inclusion; Ethical Challenges; Digital Transformation

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1. Introduction

Artificial intelligence (AI) is changing the way education is delivered, experienced, and managed, creating new opportunities for teaching, learning, and institutional development. As an important technological advancement, AI involves the development of intelligent machines and computer programs that can perform tasks that normally

require human intelligence. These technologies are increasingly used in education to support learning, curriculum development, assessment, and administrative activities (Fathima Anjila, 2021). Abbass (2021) also describes AI as a social and cognitive phenomenon that allows machines to perform tasks involving human-like thinking and communicate with other systems and people. In education, the use of AI has expanded through computer-assisted learning, online educational resources, and intelligent systems designed to support teaching and learning (Hlongwane et al., 2024). These developments have increased interest in how AI can improve educational practices and support technological change in educational institutions (Ahmed et al., 2025).

In African education, AI offers opportunities to improve teaching, learning, and the management of educational institutions. However, its adoption is influenced by differences in access to technology, available resources, and institutional readiness. Many educational institutions face challenges in adopting new technologies, particularly where financial resources and technological skills are limited. Rangara-Omol et al. (2025) examined faculty awareness, personal investment, and views on emerging educational technologies in selected African universities. Their study identified the perceived usefulness of AI for teaching, learning, writing, and research, while also reporting challenges related to costs, institutional support, and technology policies. Similarly, Hlongwane et al. (2024) examined the opportunities and challenges of integrating AI into higher education in Zimbabwe, with attention to its potential contribution to education and development. These studies show the importance of considering the conditions under which AI is introduced into educational institutions.

Several studies have examined the benefits and challenges of AI in education. Opesemowo and Adekomaya (2024) conducted a qualitative study on the use of AI to support Sustainable Development Goals in South African higher education. Their findings indicated that AI could support student engagement, personalized learning, collaboration, and inclusive classroom activities. The authors also recommended national policy guidelines to support AI use in higher education. However, their study focused on lecturers in South African higher education institutions. Chembe et al. (2023) examined the opportunities and risks associated with AI in education. They discussed how AI can support personalized learning, automate educational tasks, and create new learning experiences. They also emphasized the need to consider ethical concerns and other risks before adopting AI on a wider scale. These studies provide useful evidence on AI in education, but their different areas of focus also show the importance of examining educational benefits and ethical concerns of AI in education.

Other researchers have examined AI adoption in relation to educational development and wider social needs. Kolog et al. (2022) explored challenges affecting AI implementation in African education, particularly during the COVID-19 pandemic, when many educational institutions moved from face-to-face teaching to online learning. The authors discussed possible solutions to these challenges and developed a conceptual framework to support AI implementation in education. Their work focused mainly on implementation challenges and possible solutions within the context of the pandemic. Mienye et al. (2024) reviewed the role of AI in supporting sustainable development in Africa. Their study examined AI applications in healthcare, agriculture, education, environmental protection, and infrastructure. They identified challenges affecting AI adoption and proposed a framework to support its use in sustainable development. Although the study included education, it examined AI across several sectors rather than focusing only on educational benefits and ethical challenges.

Ahmed et al. (2025) provided a more direct examination of AI in African education through a systematic review of 22 studies published between 2017 and 2022. Their review examined trends, opportunities, challenges, and future directions of AI in education. The findings highlighted developments in computer-adaptive testing, educational

technology, and approaches to improving graduate employability. The authors also identified challenges involving educational resources, teacher training, and ethical issues. This study is important because it shows that the opportunities and challenges of AI in African education have already been examined through a systematic review. However, existing studies have different areas of focus. While some emphasize the educational opportunities offered by AI, others give more attention to implementation challenges, ethical concerns, and the conditions affecting its adoption (Ahmed et al., 2025; Chembe et al., 2023; Kolog et al., 2022; Opesemowo & Adekomaya, 2024). These different perspectives suggest the need for further examination of both the benefits and ethical challenges of AI within African educational settings.

This review takes the view that AI has the potential to improve education in Africa, but introducing new technology does not always mean that teaching and learning will improve. An educational institution with reliable internet access, adequate resources, and trained teachers may benefit from AI differently from one that lacks these basic facilities. This is important because AI could create more learning opportunities for some students while leaving others behind. The value of AI should be considered not only in terms of what it can do, but also how it benefits teachers and students and whether it is used fairly and responsibly. African countries and educational institutions face different challenges, and what works in one setting may not work in another. For this reason, it is important to examine the available studies to understand both the benefits of AI and the ethical concerns that may affect its use in African education.

Although previous studies have examined different aspects of AI adoption in African education, there is still a need to bring together existing evidence to better understand its benefits and ethical challenges. This study aims to address this need by examining the benefits of adopting AI in African education and identifying the ethical challenges associated with its use. To achieve these objectives, the study conducted a systematic review of 41 studies, using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) guidelines to guide the reporting of the review process (Page et al., 2021). The review is guided by two theoretical frameworks: the Diffusion of Innovations Theory (Rogers, 2003) and the Technology Acceptance Model (Davis, 1989). The Diffusion of Innovations Theory helps explain how new technologies spread and are adopted within educational institutions, while the Technology Acceptance Model explains how perceived usefulness and ease of use influence people's acceptance of technology. Together, these theories provide a basis for understanding the factors that influence AI adoption in education. The review suggests that AI can improve teaching, learning, and institutional practices, but its benefits depend on access to resources, institutional readiness, and responsible use. Since the 41 studies do not cover every African country or educational setting, the findings are limited to the contexts represented in the review. The study contributes to existing knowledge by bringing together evidence on both the benefits and ethical challenges of AI adoption, with implications for educators, institutional leaders, policymakers, and researchers working to improve education in Africa.

Review Questions

This systematic review is guided by two research questions:

1. What are the benefits of artificial intelligence in African education?
2. What ethical challenges are associated with the use of artificial intelligence in African education?

2. Theoretical and Conceptual Framework

This systematic review is guided by the Diffusion of Innovations Theory (Rogers, 2003) and the Technology Acceptance Model (Davis, 1989). These theories explain

different aspects of technology adoption. The Diffusion of Innovations Theory explains how innovations spread within a social system over time, while the Technology Acceptance Model explains how individuals' beliefs influence their acceptance and use of technology. Both theories were selected because AI adoption in education involves institutional decisions and individual acceptance. They provide a basis for understanding the benefits of AI adoption and the conditions that may influence its use in the African educational contexts examined in this review.

2.1. Diffusion of Innovations Theory

The Diffusion of Innovations Theory was developed by Rogers (2003). The theory describes how new ideas, practices, and technologies spread among individuals and organizations over time. Rogers (2003) identified four main elements of diffusion: innovation, communication channels, time, and the social system. He also identified five characteristics that influence the rate of adoption: relative advantage, compatibility, complexity, trialability, and observability. These characteristics concern whether an innovation is seen as better than existing practices, suitable for users' needs, easy to understand, available for testing, and able to produce visible results. The theory also explains that individuals and organizations adopt innovations at different times, leading to five adopter categories: innovators, early adopters, early majority, late majority, and laggards (Rogers, 2003). In this review, the theory provides a way to understand why AI adoption may differ among educational institutions. Its concepts help explain how the perceived advantages of AI, its compatibility with educational practices, its complexity, and the conditions within institutions may influence adoption. The theory is particularly relevant to understanding differences in institutional readiness, available resources, and support for AI integration. It was used to interpret the conditions affecting adoption rather than to measure adoption rates or classify institutions into Rogers' adopter categories.

2.2. Technology Acceptance Model

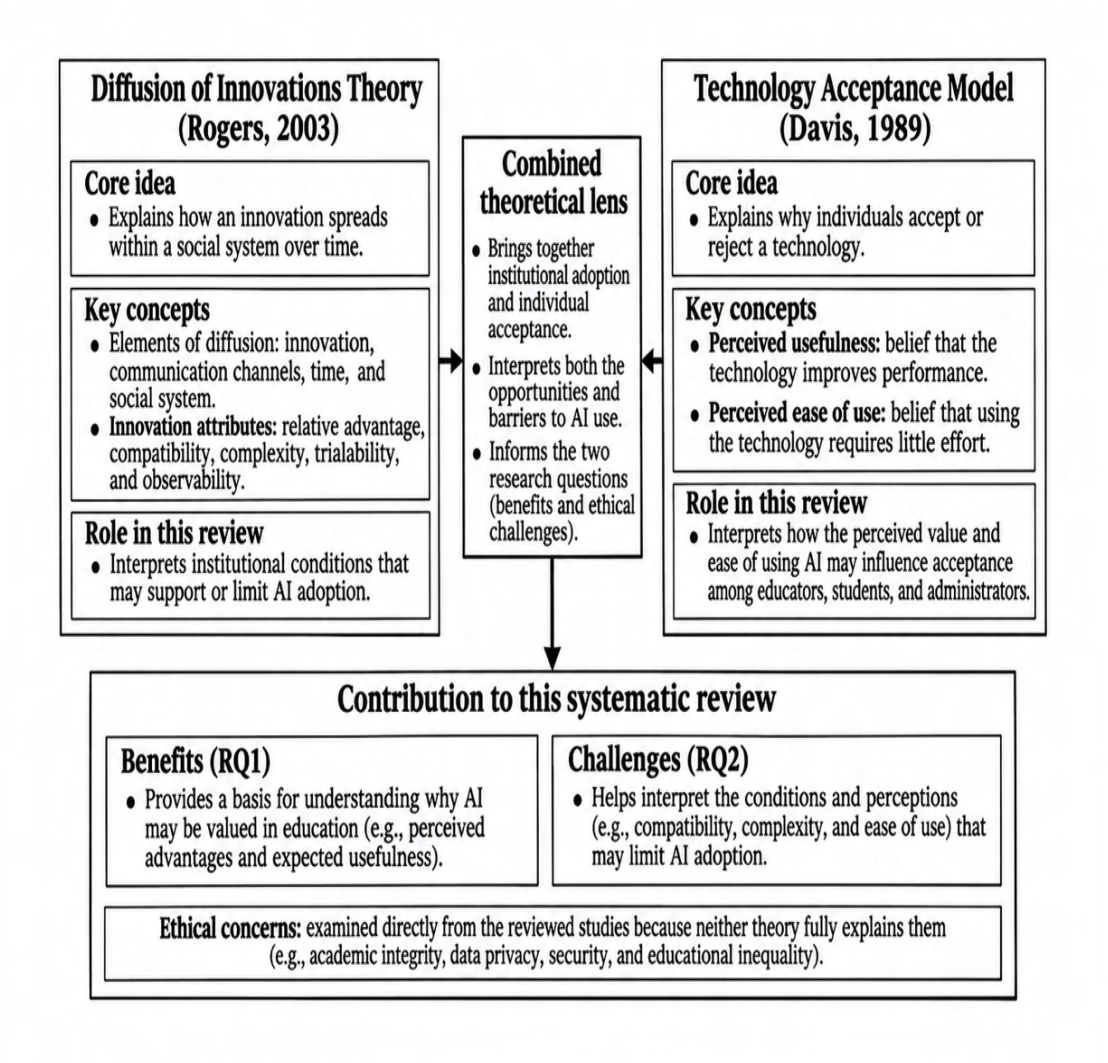
The Technology Acceptance Model (TAM) was developed by Davis (1989). The model explains technology acceptance through two main beliefs: perceived usefulness and perceived ease of use. Perceived usefulness refers to the extent to which individuals believe that using a technology will improve their performance, while perceived ease of use refers to the extent to which they believe that using it will require little effort (Davis, 1989). The author also examined how these beliefs relate to attitudes, intentions, and actual technology use. Bagozzi et al. (1992) further explain that beliefs, attitudes, and intentions are important factors in the adoption of computer technologies and the act of using computers, the role of *learning to use* the computer needs to be better understood within the overall adoption process. TAM is relevant to this review because the perceived benefits and difficulties of using AI may influence its acceptance among teachers, students, and administrators. Perceived usefulness provides a way to understand why individuals may consider AI valuable for educational activities, while perceived ease of use helps explain why they may hesitate to adopt technologies they find difficult to operate. The model was used to interpret how the reported benefits of AI and challenges related to skills, training, and technical support may influence acceptance. However, the review did not directly measure TAM variables or test relationships among them.

The two theories provided different but related perspectives for interpreting the findings of the included studies. The Diffusion of Innovations Theory helped explain the institutional conditions that may support or limit AI adoption, while TAM helped explain how individuals' perceptions of usefulness and ease of use may influence acceptance. Together, they provided a basis for understanding why AI may offer educational benefits while its adoption remains difficult in some settings. For the first research question, which examines the benefits of AI adoption, relative advantage and perceived usefulness helped

interpret why AI may be valued in education. For the second research question, which examines ethical challenges, the theories helped consider how adoption conditions and perceptions of technology may influence its use. However, ethical concerns such as academic integrity, data privacy, security, and educational inequality are not fully explained by either theory. These issues were therefore examined directly through the evidence reported in the reviewed studies. The contribution of combining the theories is that AI adoption can be understood from both institutional and individual perspectives. This approach recognizes that the benefits of AI depend not only on what the technology can offer but also on the conditions under which it is introduced and used. Figure 1 presents the original conceptual framework developed for this review, showing how the two theories informed the interpretation of AI adoption, its benefits, and its challenges in the educational contexts covered by the included studies.

Figure 1

Conceptual framework for interpreting the benefits and challenges of artificial intelligence adoption in African education.



Note. Developed by the author based on the Diffusion of Innovations Theory (2003) and the Techn ology Acceptance Model (Davis, 1989).

3. Research Methods

3.1. Review Design

This study used a systematic literature review to examine the benefits of artificial intelligence (AI) adoption and the ethical challenges associated with its use in African education. The review was reported with reference to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) guidelines (Page et al., 2021). These guidelines support clear reporting of how studies are identified, screened, selected, and analyzed. The findings of the included studies were examined using thematic analysis to address the two research questions.

3.2. Search Strategy and Sources of Literature

A structured literature search was conducted using Google Scholar as the main search platform. The main search phrases were "AI in African higher education," "the benefits of AI in African higher education," and "the ethical challenges of AI in African education." Google Scholar results were sorted by relevance, and the "Related articles" feature was used to identify additional studies. Other sources included ResearchGate, Google Search, African Journals Online (AJOL), Springer Nature publishing platforms, Emerald Insight, and the reference lists of relevant publications. The search focused on studies published between 2021 and 2026, with the final updated search conducted on November 6, 2026. Only English-language publications were considered, and patents were excluded. Titles were examined first, followed by the abstracts of potentially relevant publications. Full texts were then retrieved for studies that appeared to meet the inclusion criteria.

3.3. Inclusion and Exclusion Criteria

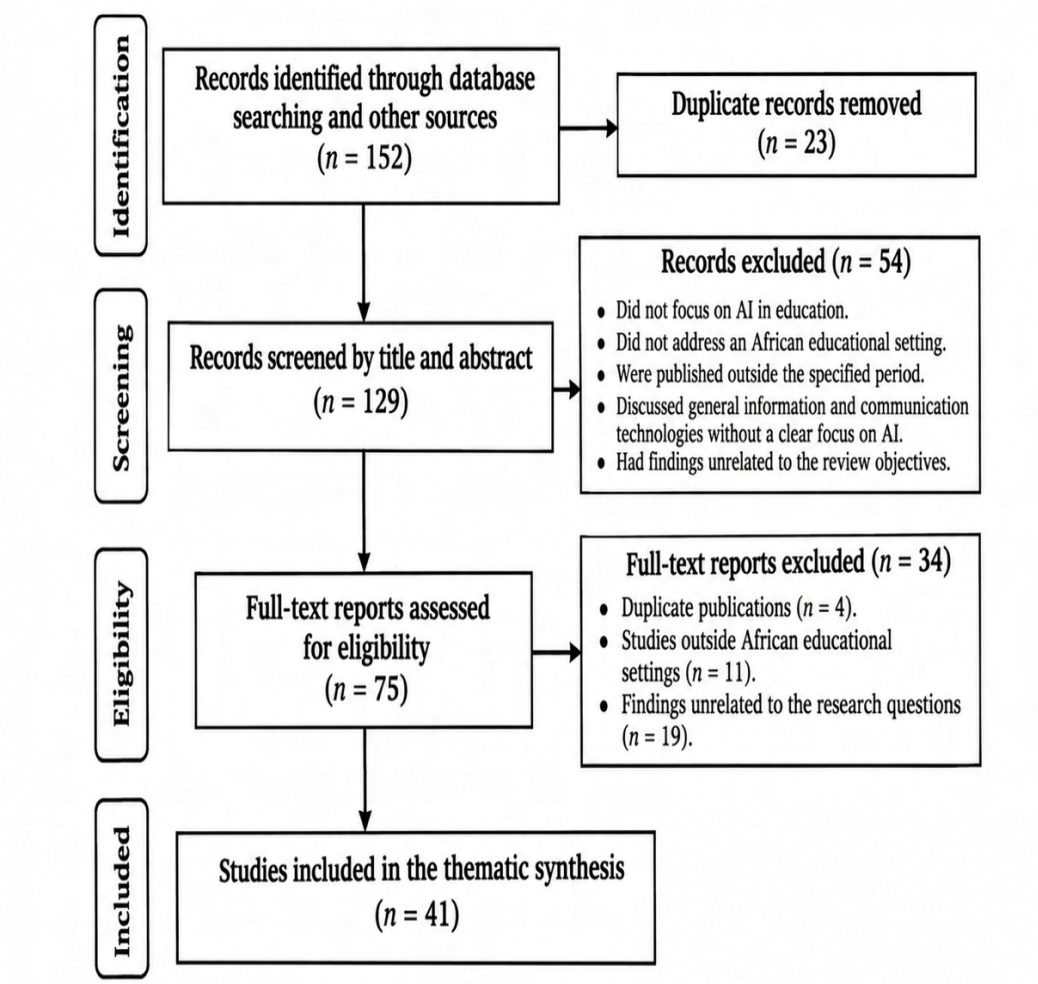
Studies were included if they examined AI adoption, implementation, benefits, or ethical challenges in African educational settings. Relevant studies on digitalization and ICT were also considered where their findings provided useful evidence about the infrastructure, skills, financing, and institutional conditions related to AI adoption. These studies were clearly distinguished from studies examining AI directly. Eligible publications included peer-reviewed journal articles, conference papers, academic book chapters, scholarly reports, and relevant academic preprints published in English between 2021 and November 6, 2026. Studies were required to provide information relevant to at least one research question and to be available in full text. Publications were excluded if they did not address an African educational setting, were outside the publication period, lacked sufficient scholarly evidence or methodological information, or did not contribute relevant findings to the review.

3.4. Screening and Study Selection

The screening and selection process was conducted by the author and reported following the PRISMA 2020 guidelines (Page et al., 2021). Records identified through the literature searches were organized using Mendeley Reference Manager and checked for duplicates. A total of 152 records were identified across all searches. After removing 23 duplicate records, 129 records remained for title and abstract screening. Of these, 54 were excluded because they did not meet the inclusion criteria. The remaining 75 reports were retrieved and assessed in full text. Following this assessment, 34 reports were excluded, including four duplicate publications, 11 studies outside African educational settings, and 19 studies whose findings did not address the research questions. The remaining 41 studies met the eligibility criteria and were included in the thematic synthesis. Figure 2 presents the study selection process.

Figure 2

PRISMA 2020 Flow Diagram of the Study Selection Process



Note. The diagram presents the identification, screening, eligibility assessment, and inclusion of studies. The flow diagram was prepared using the study selection records and informed by PRISMA 2020 (Page et al., 2021)

3.5. Data Extraction and Organization

Data were extracted manually from the included studies using a Microsoft Word template. The information recorded included the authors, publication year, country or educational setting, research focus, study design, findings on AI benefits, ethical challenges, and recommendations. The extracted information was reviewed and organized to identify similarities and differences across the studies.

3.6. Quality Assessment

The author assessed the quality of the studies using a five-item checklist. The checklist examined the clarity of the research objectives, appropriateness of the research design, explanation of the methods, clarity of the findings, and relevance to the review questions. Each criterion was rated as *Yes*, *No*, or *Unclear*. Studies meeting at least three of the five criteria were considered suitable for inclusion. Publications with insufficient methodological information or relevant findings were excluded during full-text assessment. The checklist was developed for this review and was not a validated risk-of-bias assessment tool.

3.7. Data Analysis

The included studies were analyzed manually using thematic analysis. First, the full texts were read repeatedly to understand their findings. Second, relevant findings were highlighted and coded using Microsoft Word. Third, similar codes were compared and grouped into broader categories. Finally, the categories were reviewed and developed into themes that addressed the two research questions. The analysis identified five themes related to the benefits of AI adoption and seven themes related to the ethical and associated challenges of AI use. Rogers' Diffusion of Innovations Theory (2003) and Davis' Technology Acceptance Model (1989) were used to support the interpretation of the findings. The theories were used to explain patterns in AI adoption and acceptance rather than to test statistical relationships.

3.8. Ethical Considerations

This systematic review did not involve human participants, animals, or the collection of primary data. Ethical approval was therefore not required. All information was obtained from published scholarly sources. The sources were properly cited and acknowledged throughout the paper.

4. Results

This section presents the findings from the 41 studies included in this systematic literature review. The findings are organized into themes based on the two research questions. The first part examines the benefits of AI adoption in African education, while the second part presents the ethical challenges associated with its use. Five themes were identified under the benefits of AI adoption, and seven themes were identified under ethical challenges. These themes reflect the main findings reported across the selected studies.

RQ1: Benefits of Artificial Intelligence in African Education

Theme 1: AI-Enhanced Teaching and Personalized Learning

The reviewed studies identified enhanced teaching and personalized learning as important benefits of AI adoption in African education (Maluleke, 2025; Oguntona & Emere, 2025; Tarisayi, 2024). In Cameroon, Richard (2024) highlighted the potential of AI to improve language teaching by providing personalized and adaptive learning experiences. The study explained that adaptive learning platforms use AI algorithms to adjust educational content to individual students' needs, while AI-powered tutoring systems provide personalized guidance and support. AI-driven language assessment tools also help improve the assessment process. Similarly, Angwah (2025) identified the benefits of AI in Cameroon English Language Teaching, particularly in supporting self-directed learning, assessment, and language acquisition. These findings highlight how AI can support different approaches to language teaching and provide learning experiences that respond to students' individual needs.

Beyond language education, other studies reported the benefits of AI for personalized teaching and learning. Apata et al. (2025) identified opportunities for personalized and multilingual learning through generative AI in African higher education. Similarly, Tarisayi (2024) explained that AI can support personalized teaching, provide formative feedback, and help identify students at risk of poor academic performance. In South Africa, Phokoye et al. (2025) highlighted the potential of AI technologies to enhance teaching and learning through adaptive learning platforms, intelligent tutoring systems, and automated grading. Similarly, Opesemowo and Adekomaya (2024) found that AI supported student engagement, collaborative learning,

and personalized learning experiences in South African higher education. Their findings indicated that AI helped create more interactive and inclusive classrooms by responding to students' different learning styles and abilities. Participants also reported that AI encouraged students to become more engaged, motivated, and supported in their learning. Odoh et al. (2024) further explained that AI supports personalized learning by adjusting educational content, activities, and teaching methods to students' individual needs and learning progress. Through machine learning, AI systems can analyze students' performance, engagement, and learning behaviors to identify areas where additional support is needed. Adaptive learning systems can also adjust lesson difficulty, provide suitable learning materials, and offer immediate feedback based on students' progress. This allows educators to monitor learning and provide guidance that responds to individual students' needs. Similarly, Guadu et al. (2025) highlighted the potential of intelligent tutoring systems and other AI applications to enhance teaching and learning in African higher education.

Taken together, these findings suggest that a major benefit of AI in African education is its ability to support teaching that responds to students' different learning needs and progress. Rather than relying only on the same learning materials and teaching methods for every student, AI provides opportunities to adjust content, learning activities, and feedback according to individual performance. The findings also show that AI can support educators by helping them identify students who need additional assistance and provide more targeted learning support. These benefits can be understood through the Diffusion of Innovations Theory (Rogers, 2003), particularly the concept of relative advantage, which explains how the perceived benefits of an innovation may influence its adoption. They also relate to perceived usefulness in the Technology Acceptance Model (Davis, 1989), which concerns the belief that a technology can improve performance. In this review, personalized instruction, adaptive learning, and timely feedback represent educational benefits that may make AI valuable to teachers and students. The findings therefore suggest that AI's contribution to teaching and learning lies in its ability to support educators while providing learning experiences that respond more closely to individual students' needs.

Theme 2: AI-Supported Educational Access, Inclusion, and Equity

Beyond improving teaching and personalized learning, AI also offers opportunities to make education more accessible and inclusive in African educational settings. Findings from the reviewed studies show how AI technologies can expand access to learning resources, support students with different learning needs and abilities, and create more opportunities for learners from disadvantaged and underserved communities to participate in education. Angwaomaodoko (2025) found that AI has the potential to promote educational equity in African higher education by expanding learning opportunities through virtual classes, open-access learning materials, automated teaching, and adaptive learning technologies. These applications can support social inclusion and provide students with more equal opportunities to access educational resources. In Nigeria, Ayo (2025) identified adaptive learning systems, virtual classrooms, and data-driven educational support as opportunities for improving learning outcomes among marginalized students, particularly those in rural and underserved communities. Funda and Mbangeleli (2024) also highlighted the role of AI in improving access to educational resources and providing personalized learning experiences. Their study emphasized that AI-driven tools offer opportunities for historically disadvantaged students to access quality learning materials, receive real-time support, and benefit from adaptive learning. In South Africa, Phokoye et al. (2025) highlighted the potential of AI technologies to bridge educational gaps by improving teaching, learning, and student

engagement. Maluleke (2025) likewise identified expanded educational access and inclusion as important benefits of AI adoption in African education.

Beyond expanding access to educational resources, other studies examined how AI can support students with different learning needs and abilities. Anselimus (2026) found that generative AI has the potential to promote inclusive learning opportunities for university students with disabilities. Mbambo and Du Plessis (2025) conducted a quantitative study examining the role of emerging AI technologies in creating inclusive learning environments for students, including those with learning difficulties. Their findings indicated that AI integration offers opportunities to address students' diverse learning needs and strengthen inclusive educational practices. Similarly, Oyelere and Aruleba (2025) conducted a quantitative study involving students in Kenya, Nigeria, and South Africa. Their study examined students' motivation for programming, attitudes toward AI-supported educational tools, and perceptions of the role of these technologies in promoting equity, diversity, and inclusion in programming education. These findings further highlight the potential of AI to support learning environments that recognize students' different needs and provide opportunities for greater participation in educational activities.

Overall, these findings suggest that AI can contribute to educational access, inclusion, and equity by making learning resources and educational support more accessible to students with different needs and backgrounds. An important contribution identified across the studies is the opportunity to support learners who may face difficulties accessing educational resources, including students with disabilities, those from disadvantaged backgrounds, and learners in underserved communities. The findings also suggest that improving educational access involves more than making learning materials available. It includes providing learning opportunities that respond to students' individual needs and abilities. These benefits can be understood through the Diffusion of Innovations Theory (Rogers, 2003), particularly the concept of relative advantage, which explains how the perceived benefits of an innovation may influence its adoption. They also relate to perceived usefulness in the Technology Acceptance Model (Davis, 1989), as students and educators may value AI technologies that improve access to learning resources and provide additional educational support. Overall, the findings highlight the importance of AI in making educational opportunities available to a wider range of learners, particularly those who face barriers to accessing quality education. By supporting different learning needs and improving access to educational resources, AI offers opportunities to create more inclusive learning environments and encourage greater participation among students from different backgrounds.

Theme 3: AI-Supported Administrative Efficiency and Institutional Effectiveness

The use of AI in educational administration has created opportunities for improving institutional operations, resource management, and decision-making. In Cameroon, Etonge Ndeley Samuel and Bashi Meshack Spirit (2025) found that AI, particularly predictive analytics, holds promise for improving administrative operations, student outcomes, and strategic decision-making in higher education. The authors also noted the country's National AI Strategy as an important step toward AI adoption. Maluleke (2025) similarly identified improved administrative efficiency as a benefit of AI adoption in African education. Evidence from Nigeria further supports these contributions, as Jamaica and Tagbo (2025) reported that AI technologies, including machine learning, natural language processing, and automated scheduling systems, contributed significantly to administrative effectiveness, decision-making, and resource management in Rivers State universities. The studies draw attention to the growing role of AI in supporting institutional management and improving the delivery of administrative services.

The application of AI to university ICT operations provides another perspective on administrative efficiency. In South Africa, Funda and Francke (2024) surveyed 28 participants in a university ICT department and identified opportunities for AI-powered decision support systems to improve incident management, reduce response times, and support more informed decisions. Their study also highlighted the potential of AI to strengthen network monitoring, resource allocation, and operational scalability. AI-powered chatbots were identified as useful tools for handling user requests, reducing manual workloads, and improving service delivery and user satisfaction. In line with these applications, Tarisayi (2024) discussed how AI-powered chatbots can streamline administrative activities and support better resource utilization in higher education. Further evidence comes from Ghana, where Opoku et al. (2026) surveyed 136 administrative staff at Ghana Communication Technology University. The researchers found that AI was mainly used for communication and basic records management, with limited use of advanced analytics and workflow automation. Their statistical analysis established a significant positive association between AI adoption and administrative efficiency, accuracy, and service delivery ($\beta = 0.68$, $p < 0.001$).

Records management and information processing also received attention in the reviewed literature. In South Africa, Modiba (2025) examined the potential of AI and robotic technologies to improve records management at the Gauteng Department of Education. The study identified opportunities to automate record classification, sorting, storage, and retrieval. AI-supported cloud storage was also presented as a possible solution for reducing record loss, addressing storage limitations, and improving access to information. The author further explained that these technologies could reduce manual workloads and support institutional productivity and decision-making. Related evidence on digital transformation was provided by Tangmo et al. (2021), who found a significant positive relationship between the digitalization of administrative and curriculum processes and the effectiveness of state universities in Cameroon. Administrators reported improvements in document sharing, information retrieval, file processing, record management, and operational efficiency, alongside reductions in processing time and paper-related costs. They also identified benefits for access to learning materials, distance education, research, institutional visibility, and competitiveness.

A common point across these studies is the importance of improving how educational institutions handle information, deliver services, and manage their resources. AI applications such as automated scheduling, predictive analytics, decision support systems, and chatbots offer different ways of making administrative work more efficient. While some studies reported positive relationships between AI adoption and administrative performance, others examined the improvements that could be achieved through AI integration. This distinction is important because the evidence includes both reported outcomes and expected benefits. The overall contribution of AI to institutional effectiveness can therefore be understood through its capacity to reduce repetitive administrative work, improve access to information, support timely decisions, and strengthen the management of educational institutions.

Theme 4: AI-Enhanced Student Engagement and Academic Performance

AI is increasingly being used to support student engagement and academic performance in African educational settings. Olaifa et al. (2026) found that AI tools offer practical opportunities to improve student engagement and learning outcomes in under-resourced schools. In South Africa, Funda and Mbangeleli (2024) highlighted the potential of automated assessment tools, intelligent tutoring systems, and adaptive learning platforms to improve student engagement and academic performance. Phokoye et al. (2025) also identified opportunities for AI-driven technologies to increase student engagement through adaptive learning platforms, automated grading, and intelligent

tutoring applications. Their study emphasized how these technologies can make educational activities more efficient and accessible. Evidence from Tanzania provides further insight into these benefits. Kamaghe (2026) examined the use of generative AI tools, including ChatGPT and Grok, among 120 secondary school teachers in Dar es Salaam and Dodoma. The study reported significant improvements in student engagement and academic performance through AI-supported lesson preparation, assessments, and personalized learning materials, alongside reduced teacher workload.

Research examining students' academic outcomes provides additional evidence of AI's contribution to learning. In South Africa, Wilson-Trollip (2025) reported a high level of student engagement (95%) through AI-supported peer learning, personalized learning pathways, and continuous feedback. Although students' grades improved by approximately 3–5%, the improvement was not statistically significant ($p > 0.05$). The study also highlighted the potential of predictive AI systems to identify students experiencing academic difficulties and recommended making AI-supported peer learning available to all students rather than limiting it to those considered at risk. In Ghana, Essel et al. (2022) found that students who interacted with an AI chatbot performed better academically than those who received support from the course instructor without the chatbot. Focus group findings also showed that students in the experimental group expressed confidence in the integration of the chatbot into their learning activities.

Further evidence comes from Nigeria, where De Simone et al. (2025) evaluated an AI-supported tutoring intervention and reported a significant improvement of 0.31 standard deviations in overall assessment performance. The assessment covered English topics aligned with the Nigerian curriculum, AI knowledge, and digital skills. The improvement in English performance was 0.23 standard deviations. The researchers also estimated that the learning gains were equivalent to approximately 1.5 to 2 years of regular schooling, indicating the intervention's cost-effectiveness. Although students across different initial ability levels benefited from the intervention, the largest effects were reported among female students and those with higher initial academic performance. These results highlight the potential of structured AI-supported tutoring to improve learning outcomes in resource-constrained educational settings.

The evidence presented in these studies points to two related contributions of AI: encouraging greater student participation in learning activities and supporting academic achievement. Personalized learning materials, intelligent tutoring systems, chatbots, and continuous feedback were identified as ways of making learning more interactive and responsive to students' needs. However, the results also show an important distinction between increased engagement and measurable academic improvement. While Essel et al. (2022) and De Simone et al. (2025) reported improvements in academic performance, Wilson-Trollip (2025) found that higher engagement was accompanied by grade improvements that were not statistically significant. The studies provide evidence that AI can support student engagement and learning, while also showing that the strength of its contribution to academic performance varies across the educational settings and interventions examined.

Theme 5: AI-Supported Research Productivity, Professional Development, and Digital Transformation

The contribution of AI to African education also includes supporting academic research, strengthening educators' professional competencies, and improving institutional processes. Apata et al. (2025) identified generative AI as a useful technology for improving research productivity in African higher education. This contribution was also examined by Adewale (2025), who investigated the experiences of female academics and researchers in South Africa. The study found that participants had mixed perceptions of ChatGPT's usefulness, although many used it to support research and other scholarly

activities. Despite these differing views, the findings indicated that ChatGPT contributed to their research productivity.

Professional development emerged as another area in which AI could benefit educators. In Ghana, Anim Mante et al. (2026) examined the relationship between self-directed learning, generative AI, and teachers' professional competencies. Their findings showed that self-directed learning significantly improved professional knowledge, professional practice, professional values and attitudes. Generative AI was also positively associated with professional knowledge and practice but negatively affected professional values and attitudes. Furthermore, the researchers found that higher generative AI use weakened the positive relationships between self-directed learning and all three dimensions of professional competence. Evidence from Nigeria offers another perspective, as Bassey et al. (2024) reported a strong and statistically significant relationship between AI-related technology use and lecturers' professional development at the University of Uyo. In particular, the use of data analytics, search engines, and machine learning showed strong relationships with professional development. These findings demonstrate the relevance of digital technologies to educators' professional growth, while also revealing that greater AI use does not necessarily strengthen every aspect of professional competence.

Institutional digital transformation was also addressed in the literature. Agadagba and Ekwevugbe (2025) found that AI adoption in Nigerian educational institutions was progressing gradually, with growing recognition of its value in improving administrative operations. Although the use of AI in academic functions such as grading, advising, and scheduling remained limited, the study identified its emerging contribution to streamlining institutional processes. In Cameroon, Tangmo et al. (2021) reported that the digitalization of administrative and curriculum processes improved institutional efficiency and curriculum delivery in state universities. Their study provides related evidence on the benefits of digital transformation, although it examined digitalization more broadly rather than the specific effects of AI.

Across these areas, the reviewed evidence shows how AI can contribute to academic and institutional development in different ways. Its use in research offers opportunities to support scholarly work, while its application in professional learning is associated with aspects of educators' knowledge and practice. The findings also relate to perceived usefulness in Davis' Technology Acceptance Model, as researchers and educators identified practical ways in which AI could support their academic and professional activities. However, Adewale (2025) reported mixed perceptions of ChatGPT, while Anim Mante et al. (2026) identified less favourable relationships involving professional values and self-directed learning. At the institutional level, AI is gradually contributing to digital operations, although its application remains uneven across administrative and academic activities. These differences indicate that the benefits of AI extend to researchers, educators, and institutions, but vary according to the activities and outcomes examined in each study.

RQ2: Ethical Challenges of Artificial Intelligence in African Education

Theme 1: Digital Divide and Infrastructure Barriers

The digital divide and unequal access to digital infrastructure remain the major challenges to AI adoption in African education. Maluleke (2025) identified the digital divide, policy and capacity gaps, and infrastructural inequality as barriers to AI integration. In South Africa, Phokoye et al. (2025) found that the benefits of AI adoption remain uneven because of infrastructural and systemic challenges, including limited internet access and the persistent digital divide. This concern was also reflected in Soko (2026), who examined AI engagement among faculty members and students in Sub-

Saharan African higher education and identified unreliable internet connectivity, high data costs, and unequal access to digital devices as barriers to AI integration. Mbambo and Du Plessis (2025) also found that although AI has the potential to improve educational inclusion, its integration is hindered by the digital divide. Similar concerns were reported in Nigeria, where Ayo (2025) identified gaps in digital infrastructure as a major barrier to AI integration. Opoku et al. (2026) also identified inadequate infrastructure as a challenge.

The differences in access to AI technologies are particularly clear in the findings of Mbozo'o (2025), who reported a significant digital divide, with rural schools facing limited infrastructure. Naphiyo et al. (2026) found that although students were becoming more aware of AI, their use was largely limited to basic applications such as chatbots and generative AI. More advanced applications, including predictive analytics and automation, remained restricted by inadequate infrastructure. Thembane and Tshibangu (2026) similarly found that the digital divide and infrastructure limitations constrain the potential of AI to transform education. Guadu et al. (2025) raised further concerns about unequal access to digital infrastructure and the dependence on AI tools developed in the Global North. The authors identified digital sovereignty, fairness, and cultural relevance as important issues, warning that these conditions could worsen existing educational inequalities.

These results show that the availability of AI technologies does not mean that all educational institutions and learners can benefit from them equally. Limited infrastructure and internet access affect the extent to which AI can be used, while differences in institutional capacity may leave some schools and universities with fewer opportunities to adopt these technologies. This concern relates to Rogers' Diffusion of Innovations Theory, which recognizes the importance of communication channels and the social system in the spread of an innovation. The findings indicate that inadequate infrastructure and unequal institutional conditions can restrict the spread of AI, even when its educational benefits are recognized. They also relate to Davis' Technology Acceptance Model, as perceived usefulness and ease of use alone cannot address the lack of infrastructure needed to use AI. In the review's conceptual framework, the digital divide is therefore both a barrier to AI adoption and an issue of educational fairness, because unequal access can prevent some learners and institutions from benefiting from the same technological opportunities.

Theme 2: Limited AI Literacy and Lack of Training

Limited digital skills and insufficient training were identified as important challenges to the use of AI in African education. Thembane and Tshibangu (2026) reported inadequate training among lecturers, while Mbozo'o (2025) found low digital competence among teachers and minimal use of ICT in classroom instruction. Mbambo and Du Plessis (2025) also identified limited digital skills among instructors as a challenge to AI integration. This concern was reinforced by Phokoye et al. (2025), who reported a shortage of educators trained in AI, particularly in rural areas. These studies identify gaps in teachers' and lecturers' preparation, including both general digital skills and training specifically related to AI. Other researchers identified weaknesses in the technical knowledge needed to use AI effectively. Ayo (2025) highlighted low digital literacy as a barrier to AI integration, while Opoku et al. (2026) reported limited technical expertise and insufficient training. Soko (2026) further found that formal AI training remained limited, with most respondents reporting that they had received no structured training. Instead, self-learning and peer support were the main ways through which they developed their AI skills. Naphiyo et al. (2026) identified weak data literacy and limited analytical skills. The authors also found that ethical preparedness was insufficient because of limited curriculum coverage and weak institutional governance. Their findings draw

attention to the need for knowledge and skills related not only to AI applications but also to their responsible use.

The main concern reflected in these studies is the gap between the availability of AI technologies and the skills needed to use them. Limited training, low digital competence, and weak analytical skills can restrict the ability of educators and institutions to make effective use of AI. Soko's (2026) findings also show that users often depend on their own efforts and support from others to learn about AI when formal training is unavailable. This relates to Rogers' Diffusion of Innovations Theory, particularly the concept of complexity, which concerns how difficult an innovation is perceived to be to understand and use. Limited skills and training may make AI adoption more difficult, while inadequate institutional preparation may affect how it spreads. Davis' Technology Acceptance Model also provides a useful explanation through perceived ease of use, as people may find AI difficult to use when they lack the necessary skills. Although the reviewed studies did not directly test these theories, their findings help explain why training and digital competence matter for AI adoption. Improving access to AI alone may therefore be insufficient without preparing educators and other users to apply the technology effectively and responsibly.

Theme 3: Academic Integrity, Overreliance, and Critical Thinking Risks

The growing use of AI in African education has raised concerns about academic honesty and the reliability of students' work. Soko (2026) identified concerns about inaccurate AI-generated information, hallucinations, plagiarism, and assessment integrity among faculty members and students in Sub-Saharan African higher education. Concerns about academic integrity were also reported by Apata et al. (2025), Mbambo and Du Plessis (2025), and Guadu et al. (2025), who identified academic dishonesty as an ethical issue associated with AI adoption in African higher education. Maluleke (2025) similarly highlighted the misuse of generative AI as a risk to academic integrity. These studies identify concerns about the originality of academic work and the accuracy of information produced through AI tools.

The risks associated with AI-generated academic work were examined more closely by Nzembayie and Tubuo (2026) in Cameroon. The researchers identified three patterns that could affect examination integrity in the bilingual General Certificate of Education (GCE): automated translation producing nearly perfect answers that did not match candidates' general language performance, AI-generated essays producing well-organized responses with limited evidence of deeper understanding, and examination questions based on general knowledge being particularly vulnerable to machine-generated answers. Their analysis of 224 examination scripts identified cases where translation scores exceeded 90%, while essay scores in the same paper were below 10%. These differences raised concerns about possible AI involvement but did not establish that students had used AI. The authors also found that existing examination regulations did not explicitly address AI-assisted authorship and that invigilation systems had limited capacity to detect hidden digital tools. Their findings show how AI-generated responses can make it difficult to judge whether examination work reflects students' own knowledge and abilities.

Another concern is the relationship between AI use and students' independent thinking. Moluayonge (2025) found that increased AI use positively predicted cognitive offloading, which negatively affected critical thinking. The Sobel test further confirmed that cognitive offloading partially mediated the relationship between AI use and critical thinking. This means that part of the relationship between AI use and critical thinking was explained by the tendency to rely on AI for cognitive tasks. The author recommended that teachers balance AI use with activities that encourage deep thinking, active learning, and

cognitive engagement. Training educators to use AI appropriately was also recommended to help reduce the negative effects of cognitive offloading.

The main concern across these studies is that AI use can affect both the trustworthiness of academic work and the development of independent thinking. The findings raise questions about whether AI-generated responses reflect students' own understanding and how reliance on AI may affect their critical thinking. In Rogers' Diffusion of Innovations Theory, these concerns relate to compatibility, which considers how well an innovation fits existing values and practices. The risks to academic integrity show why the use of AI needs to be considered alongside the expectations of honest academic work. Davis' Technology Acceptance Model also offers a useful connection. Although students and educators may consider AI useful and easy to use, these perceptions do not establish that its use will support academic honesty or independent thinking. Within the review's conceptual framework, the findings indicate that the acceptance of AI and its responsible use are different issues. AI can support academic activities, but its use also raises concerns about the authenticity of students' work and their ability to think independently.

Theme 4: Data Privacy and Algorithmic Bias

Data privacy and algorithmic bias were identified as important ethical concerns in the use of AI in African education. Because AI systems may process student and institutional information, questions arise about how this information is protected and used. Maluleke (2025) identified data privacy as a major ethical challenge affecting AI adoption in African higher education. Ayo (2025) raised similar concerns about data privacy in Nigeria, while Angwaomaodoko (2025) reported that data security and privacy concerns could hinder the responsible adoption of AI in African higher education institutions. Mbambo and Du Plessis (2025) also highlighted concerns about data privacy. These studies draw attention to the importance of protecting personal and institutional information when adopting AI technologies.

The fairness of AI systems was another concern raised in the literature. Algorithmic bias occurs when an AI system produces unfair or unequal results because of the data used to develop it or the way it is designed. In South Africa, Phokoye et al. (2025) identified data privacy and algorithmic bias as significant ethical challenges affecting AI adoption in education. Guadu et al. (2025) similarly reported that algorithmic bias and data privacy could worsen existing educational inequalities. Soko (2025) found strong concerns about data privacy violations and algorithmic bias, yet fewer than one-third of respondents reported having clear institutional AI policies. This difference between reported concerns and existing institutional policies raises questions about how educational institutions are addressing these ethical issues.

The findings identify two concerns that require attention when AI is adopted in education: the protection of personal information and the fairness of AI-generated outcomes. Concerns about data privacy show the importance of how student and institutional information is handled, while algorithmic bias raises questions about unequal treatment through AI systems. Rogers' Diffusion of Innovations Theory provides a connection through compatibility, particularly whether AI adoption aligns with institutional values and practices. The limited availability of institutional AI policies reported by Soko (2025) also relates to the role of the social system in guiding the use of an innovation. Davis' Technology Acceptance Model helps explain how perceived usefulness and ease of use may influence AI acceptance, but these perceptions do not establish whether personal information is protected or AI systems are fair. Within the study's conceptual framework, data privacy and algorithmic bias are ethical challenges associated with AI adoption. Although Rogers' Diffusion of Innovations Theory (DOI) and Davis' Technology Acceptance Model (TAM) help explain the adoption and

acceptance of AI, they do not fully explain concerns about personal data protection and fairness in AI systems.

Theme 5: Gaps in AI Policy, Governance, and Institutional Preparedness

The absence of clear AI policies and weak institutional governance were identified as challenges to AI adoption in African education. In Ghana, Boison (2025) found that unclear policy frameworks limited AI adoption in public universities. A similar concern was raised by Thembane and Tshibangu (2026), who identified ethical and policy gaps in African STEM education. Haji and Pascale (2026) also reported weak governance and coordination mechanisms in Cameroonian higher education. Alongside these findings, Oguntona and Emere (2025) identified growing academic interest in AI integration in African universities but noted substantial research gaps concerning ethical and policy frameworks. These studies draw attention to the limited policy guidance and institutional structures available to support AI integration in the educational settings examined.

Institutional preparedness was another issue raised in the literature. Naphiyo et al. (2026) found that ethical preparedness was insufficient because of limited curriculum coverage and weak institutional governance. The authors also reported that AI readiness in Sub-Saharan African higher education was marked by growing awareness but limited capacity for transformative entrepreneurial innovation. This difference between awareness and preparedness was also reflected in Soko (2025), who found that fewer than one-third of respondents reported having clear institutional AI policies. The author's study identified five policy priorities, showing a gap between awareness of ethical concerns and the institutional arrangements needed to address them.

A central issue in these studies is that growing awareness of AI does not necessarily mean educational institutions are prepared to manage its use. The reported policy gaps, weak governance, and limited coordination show that institutional readiness involves more than recognizing the potential of AI. This relates to Rogers' Diffusion of Innovations Theory, particularly the role of the social system in shaping how an innovation is adopted and used. The findings indicate that institutional conditions, including policy guidance and governance structures, are important when considering the spread of AI in education. Davis' Technology Acceptance Model offers a different perspective through perceived usefulness and perceived ease of use. However, these factors do not explain whether institutions have the policies and governance arrangements needed to guide AI adoption. Within the review's conceptual framework, policy gaps and weak institutional preparedness are therefore important challenges associated with AI adoption, even where awareness of the technology is increasing.

Theme 6: Uneven AI Readiness Across Countries and Institutions

This review has identified uneven AI readiness as an important challenge facing African higher education, despite the growing adoption of the technology. While some educational institutions are expanding their use of digital technologies, others have made less progress. Haji and Pascale (2026) found that although higher education institutions had expanded digital learning and administrative systems following the COVID-19 disruption, progress remained uneven. Apata et al. (2025) also reported that generative AI adoption in African higher education was increasing but remained concentrated in countries with more advanced digital systems. Their findings indicate that progress in adopting AI differs across the educational settings examined.

Institutional preparedness presents another concern. Naphiyo et al. (2026) found that AI readiness in Sub-Saharan African higher education was characterized by growing awareness but limited capacity for transformative entrepreneurial innovation. The researchers also identified insufficient ethical preparedness due to limited curriculum coverage and weak institutional governance. Considered alongside the findings of Haji

and Pascale (2026) and Apata et al. (2025), these results show that progress in digital development, AI adoption, and institutional preparedness is not occurring equally across higher education settings.

An important point from these studies is that expanding digital systems and increasing awareness of AI do not necessarily mean that institutions are equally prepared to adopt the technology. Differences in digital development, institutional capacity, and ethical preparedness may affect the opportunities available to universities to benefit from AI. These results can be interpreted through Rogers' Diffusion of Innovations Theory, particularly the role of the social system in influencing how new technologies spread. They also show the limits of Davis' Technology Acceptance Model, since perceived usefulness and ease of use do not fully explain differences in institutional readiness. Within the review's conceptual framework, uneven AI readiness is a challenge because institutions with different levels of preparedness may not have equal opportunities to benefit from AI. This raises the possibility that continued differences in AI adoption could contribute to existing educational inequalities.

Theme 7: Financial Constraints and Resistance to Change

Financial constraints and resistance to change were identified as challenges to AI adoption in African education. In Ghana, Opoku et al. (2026) surveyed 136 administrative staff at Ghana Communication Technology University and found that although AI adoption had a significant positive relationship with administrative efficiency, accuracy, and service delivery, financial constraints and resistance to change remained significant barriers to its integration. This finding shows that recognizing the benefits of AI does not necessarily mean that institutions have the resources or willingness to adopt it.

Financial difficulties were also reported in studies examining digital transformation in Cameroonian higher education. Maguatcher and Ru (2023) identified insufficient university budgets as a major challenge to digital transformation. Haji and Pascale (2026) reported limited and unpredictable financing as another constraint affecting the development of digital learning and administrative systems. Although these studies examined digital transformation more broadly, their findings provide related evidence of the financial difficulties facing technology adoption in higher education.

The results point to two issues that can affect the adoption of AI: the financial resources available to institutions and resistance to changing existing practices. While Opoku et al. (2026) identified both challenges in relation to AI, the studies from Cameroon show how limited funding can affect wider digital development in universities. These findings relate to Rogers' Diffusion of Innovations Theory, particularly compatibility and the role of the social system in shaping the adoption of new technologies. Resistance to change can be understood in relation to compatibility, while financial constraints reflect the institutional conditions under which adoption takes place. Davis' Technology Acceptance Model also helps explain why users may recognize AI as useful, but perceived usefulness and ease of use alone do not remove financial barriers or resistance to change. Within the review's conceptual framework, these challenges show that the adoption of AI depends not only on its perceived benefits but also on the resources and institutional conditions needed to support its use.

5. Discussion and Implications of the Review

The findings of this review show that AI offers opportunities to improve teaching, learning, educational access, administrative efficiency, research, and professional development in the African educational settings examined. These benefits are connected because they show how AI can support students' learning needs while also assisting educators and institutions in their activities. However, the findings reveal an important difference between the potential benefits of AI and the improvements demonstrated in

the studies. For example, Essel et al. (2022) and De Simone et al. (2025) reported improvements in students' academic performance, while Wilson-Trollip (2025) found that improvements in students' grades were not statistically significant, despite high levels of engagement. This difference indicates that increased student engagement does not necessarily lead to measurable improvements in academic performance. Similar differences were found in professional development. Anim Mante et al. (2026) reported positive relationships between generative AI and teachers' professional knowledge and practice, but a negative relationship with professional values and attitudes. The study also found that higher generative AI use weakened the positive relationship between self-directed learning and professional competence. These results suggest that the benefits of AI differ depending on the educational activities and outcomes being examined. Rogers' Diffusion of Innovations Theory (DOI) helps interpret these findings through relative advantage, as the benefits offered by AI may encourage its adoption. Similarly, perceived usefulness in Davis' Technology Acceptance Model (TAM) helps explain why students, educators, and institutions may value AI when they believe it can improve their work. However, the findings indicate that recognizing AI as useful does not necessarily mean that its use will produce better educational outcomes. Within the review's conceptual framework, AI adoption is associated with several educational benefits, but the evidence supporting these benefits differs across the studies.

The ethical challenges identified in this review help explain why the benefits of AI may not be experienced equally across the educational settings examined. Although AI offers opportunities to improve educational access and inclusion, the digital divide, inadequate infrastructure, limited training, financial constraints, and uneven institutional readiness may restrict its adoption and use. These challenges are closely related because they affect the ability of institutions, educators, and students to access and benefit from AI technologies. An important issue emerging from the findings is that a technology with the potential to improve educational inclusion may also contribute to existing inequalities when access and institutional resources are unequal. The findings also show that having access to AI does not necessarily mean it is being used responsibly.

Concerns about academic integrity, overreliance, critical thinking, data privacy, and algorithmic bias raise questions about how AI may affect educational practices. For example, Moluayonge (2025) found that cognitive offloading partly explained the negative relationship between AI use and critical thinking, while Soko (2025) reported concerns about data privacy and algorithmic bias despite the limited availability of clear institutional AI policies. These findings indicate that the challenges of AI adoption involve both access to the technology and the conditions needed for its responsible use. DOI helps explain these challenges through complexity, compatibility, and the role of the social system, which relate to users' skills, existing educational practices, and institutional conditions. TAM also provides a useful explanation through perceived usefulness and perceived ease of use. However, these factors alone do not fully explain financial constraints, weak governance, academic integrity concerns, data privacy, or algorithmic bias. Within the review's conceptual framework, the benefits and ethical challenges of AI adoption are therefore closely connected. The findings suggest that the educational value of AI depends not only on what the technology can offer but also on the conditions under which it is adopted and used.

These findings have broader implications for educational practice, institutional management, and the understanding of AI adoption in African education. For teaching and learning, the differences in reported outcomes show the importance of examining whether AI use is improving students' learning rather than assuming that increased engagement or technology use will always produce better results. For educational institutions, the relationship between the benefits and challenges of AI indicates that access to technology, training, financial resources, and institutional preparedness are

important when considering its adoption. The concerns about academic integrity, critical thinking, data privacy, and algorithmic bias also highlight the importance of clear institutional policies and responsible AI practices. This means that expanding AI adoption without addressing these challenges may limit its educational benefits and leave some learners and institutions at a disadvantage. The findings also have implications for the theoretical framework of this review. DOI and TAM provide useful explanations for why AI may be adopted or accepted, but they do not fully account for the institutional and ethical challenges identified in the studies. Although the reviewed studies did not directly test these theories, their findings show the value of considering technology adoption alongside educational outcomes and responsible use. Future research could examine whether improvements in student engagement lead to lasting improvements in academic performance and how differences in institutional resources affect the use of AI across educational settings. Further studies could also investigate how educational institutions address academic integrity, data privacy, and algorithmic bias as AI adoption increases. Overall, this review shows that understanding AI adoption in African education requires attention to its potential benefits, the outcomes reported in the studies, and the challenges that may affect its effective and responsible use.

6. Limitations of the Review

This systematic literature review has several limitations. Google Scholar was the main source used to identify relevant studies, although additional studies were identified through related searches and reference lists. Therefore, some studies available in other academic databases may not have been included. The screening and thematic analysis were conducted by one reviewer, which may have influenced study selection and the interpretation of findings. In addition, the included studies used different research methods and examined different educational settings. Some reported measured outcomes, while others focused on perceptions and potential benefits or challenges. The findings for this review cannot be generalized to all African countries, students, or educational institutions because they reflect only the countries, participants, and educational settings represented in the reviewed studies. Despite these limitations, the review provides useful insights into the benefits and ethical challenges of AI adoption in the selected African educational settings.

7. Recommendations of the Review

Based on the findings of this review, educational institutions and policymakers should give greater attention to the digital divide and infrastructure barriers affecting AI adoption in African education. Improving internet connectivity, access to digital devices, and the availability of digital resources is important, particularly in rural and underserved educational settings where access remains limited. These recommendations are supported by Phokoye et al. (2025), Mbambo and Du Plessis (2025), and Soko (2026), who identified unequal access and infrastructure limitations as barriers to AI integration. The findings on financial constraints also highlight the need for institutions to consider the costs of adopting and maintaining AI technologies. Opoku et al. (2026) identified financial limitations as a significant challenge to AI adoption, while Haji and Pascale (2026) reported limited and unpredictable funding for wider digital transformation in Cameroonian higher education. Educational institutions and policymakers should therefore consider sustained financial support for digital infrastructure, AI tools, and the resources needed for their use. Such efforts should take account of differences in institutional readiness so that institutions with fewer resources are not further disadvantaged.

Educational institutions should also strengthen AI literacy and provide regular training for teachers, lecturers, students, and administrative staff. The findings show that

limited digital skills, inadequate technical knowledge, and insufficient formal training affect the ability of educational users to adopt AI effectively. Soko (2026) found that most respondents had not received structured AI training and relied mainly on self-learning and peer support. Similarly, Naphiyo et al. (2026) identified weak data literacy, limited analytical skills, and insufficient ethical preparedness. These findings support the need for training that goes beyond basic awareness of AI tools. Training should help users understand how AI works, how to apply it in their educational activities, and how to recognize its limitations. AI literacy should also be included in relevant educational programmes and professional development activities so that students and educators can develop the skills needed to use the technology effectively and responsibly.

Another important recommendation concerns academic integrity, critical thinking, data privacy, and algorithmic bias. Educational institutions should establish clear guidance on acceptable AI use in teaching, learning, assessment, and research. Such guidance should explain when AI assistance is permitted and how students and educators should acknowledge its use. This is important because the findings identified concerns about plagiarism, inaccurate AI-generated information, and the originality of academic work. Moluayonge (2025) also found that cognitive offloading partly explained the negative relationship between AI use and critical thinking. Educators should therefore continue to use learning and assessment activities that require students to demonstrate their own understanding, reasoning, and independent thinking. In addition, institutions should strengthen measures for protecting student and institutional information and consider the fairness of AI-generated outcomes. Soko (2025) reported concerns about data privacy and algorithmic bias, while Guadu et al. (2025) highlighted the risk that algorithmic bias could worsen educational inequalities. These findings support the need for clear procedures for handling personal information and for examining whether AI tools are appropriate and fair in the educational settings where they are used.

Finally, the findings highlight the need to strengthen AI governance, institutional preparedness, and support for change. Educational institutions should develop clear AI policies that address responsible use, institutional responsibilities, and ethical concerns. This recommendation is supported by Boison (2025), who identified unclear policy frameworks as a barrier to AI adoption, and Soko (2025), who found that fewer than one-third of respondents reported having clear institutional AI policies. Institutions should also assess their infrastructure, staff skills, financial resources, and governance arrangements before expanding AI adoption. This is particularly important because the review found that AI readiness differs across countries and institutions, and growing awareness does not necessarily mean that institutions are prepared to use the technology. A gradual approach to AI integration may therefore be more appropriate for institutions with limited resources and technical capacity. The resistance to change identified by Opoku et al. (2026) also suggests the importance of involving educators, administrators, and other relevant institutional members in decisions about AI adoption. Providing training, clear guidance, and opportunities for participation may help institutions address concerns about changes to existing practices. Overall, these recommendations emphasize that improving AI adoption in African education requires attention not only to the availability of technology but also to the resources, skills, institutional policies, and ethical safeguards needed for its effective and responsible use.

7.1 Conclusion

This systematic literature review examined the benefits of AI adoption and the ethical challenges associated with its use in African education. Based on the included studies, the findings show that AI offers opportunities to improve teaching and personalized learning, educational access and inclusion, administrative efficiency, student engagement and academic performance, research productivity, and professional development. However,

the review also identified several challenges, including the digital divide, inadequate infrastructure, limited AI literacy and training, academic integrity concerns, overreliance on AI, data privacy, algorithmic bias, weak institutional policies, uneven AI readiness, financial constraints, and resistance to change. The findings show that although AI has the potential to support educational activities, its benefits are not equally demonstrated or accessible across the settings examined. They also highlight that the adoption of AI does not necessarily mean that institutions and users are prepared to use it responsibly. The review therefore concludes that the potential benefits of AI in African education are closely connected to the resources, skills, institutional preparedness, and ethical considerations that influence its adoption and use.

Funding: This research received no external funding.

Acknowledgments: During the preparation of this manuscript, the author used OpenAI's ChatGPT (GPT-6) to assist with language editing, and improving the clarity of the manuscript. The author reviewed and edited the output and takes full responsibility for the content of this publication.

Conflicts of Interest: The author declares no conflicts of interest.

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