

Reimagining Under-Resourced African Schools through AI: Pedagogical Transformation and Teacher Adaptability

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Abstract: The introduction of Artificial Intelligence (AI) in the education sector is changing the teaching and learning process, although the effects on schools with limited resources, especially those in Africa, are under-researched. The paper is a review of the literature regarding AI-driven tools, including adaptive learning systems, intelligent tutoring, and automated assessment tools, and how they can support teaching and learning practices in socio-economically disadvantaged educational contexts. The structural barriers, such as digital inequity, inadequate infrastructure, and inadequate training of teachers, are discussed. Research indicates that AI may be used to personalize education, decrease the workload on administration, and differentiate instruction, but the feasibility of implementation depends on the digital skills of the teacher and their professional growth, as well as the support of the institution. The strategic suggestions include context-specific AI implementation, teacher education investment, and inclusive digital infrastructure development. This paper demonstrates that the proper implementation of AI in under-resourced educational environments is necessary and should be equitable and sustainable.

Keywords: Artificial Intelligence in Education; Under-resourced Schools; Teacher Adaptability; Pedagogical Transformation; Digital Inequality; African Education; Educational Technology

1. INTRODUCTION

The education sector has transformed through complete assessment of student knowledge because Artificial Intelligence (AI) has developed into its current form. The technologies which include adaptive learning platforms and intelligent tutoring systems and automated assessment tools create a shift from traditional teaching methods to educational practices which focus on student needs (du Plooy Casteleijn Franzsen 2024). Olaoye et al. (2024) highlight that AI-driven adaptive learning systems significantly enhance student engagement by delivering personalized learning paths and real-time feedback, which includes gamified experiences that help students, who want to learn independently, to achieve better academic results. However, in African schools which lack basic resources the technology has not gained widespread acceptance, because digital gaps and inadequate teacher training exist (Mutiso, Hanney, & Mousa, 2026). The most essential conditions of the effective introduction of AI are flexibility of teachers, digital skills, and institutional readiness (Ng, Leung, Su, Ng, & Chu, 2023; Alomairi, Boshehri, Al-Abdaly, & AlHamad, 2026). The gap in the research that the present study will address is the paucity of studies about AI applications in the pedagogical change and teacher flexibility in socio-economically disadvantaged cultures. It is important to learn how AI can be successfully incorporated in such settings in order to facilitate equitable and sustainable educational development. The gap in existing research lies in the limited exploration of how Artificial Intelligence supports pedagogical transformation in under-resourced African schools and the challenges affecting its adoption in socio-economically disadvantaged contexts.



2. LITERATURE REVIEW

The educational system now uses artificial intelligence as a revolutionary tool which enables students to learn at their own pace while it improves their social interactions with other learners. Educational institutions can use intelligent tutoring systems and adaptive learning platforms which operate through AI technology to deliver customized learning experiences that match students' specific requirements. The research conducted by Holmes et al. (2021) demonstrates that AI educational systems have the potential to transform teaching and learning because they create personalized learning experiences which result in better educational outcomes through data analysis which improves academic performance and student participation however educational institutions must address ethical issues and equity concerns and infrastructure requirements before implementing AI systems. Zawacki-Richter et al. (2019) demonstrate that educational institutions can improve learning outcomes through their use of artificial intelligence because artificial intelligence enables schools to automate their assessment and feedback systems.

The implementation of AI in schools with a lack of resources has opportunities and challenges. Educational institutions can use artificial intelligence for better educational access but its effectiveness remains limited because of existing disparities in infrastructure and digital resources. The evolution of pedagogical methods depends on artificial intelligence because it enables educational institutions to shift from teacher-led instruction toward student-oriented learning environments. AI-based learning tools developed by Crompton and Burke (2023) bring active learning and student participation enhancement through their ability to adapt to dynamic learning environments while providing interactive educational content.

The flexible nature of teachers plays a decisive role in determining how successfully AI technology performs in educational settings. The educators need to develop new skills which will enable them to effectively implement AI tools within their teaching methods. Liu, Wang, and Lei (2025) discovered that pre-service teachers planned to use generative AI during their future teaching because they regarded the technology as useful and easy to use while their confidence in using the technology remained intact which created a need for teacher preparation programs to teach technical skills and teaching methods and ethical practices needed for AI-supported educational settings. Digital inequality creates a major obstacle which prevents students from achieving equal educational results because students with restricted technology and internet access face difficulties in studying and participating in classes and performing academically.

Miah (2024) explains that the digital divide creates two problems because it restricts educational resource access and it prevents students from achieving essential digital skills required for academic success. The research demonstrates that learning gaps become worse because of differences in available devices and internet access and digital literacy especially in higher education institutions and among low-income communities. Digital inequality must be resolved because it serves as an essential requirement which enables special education programs to succeed while ensuring that all students gain access to learning experiences that technology brings to the classroom.

Researchers have found that AI applications in education are primarily used for three purposes which include adaptive learning and assessment and administrative tasks (Zawacki-Richter et al 2019). The review confirms previous research about reach and scalability because it shows how AI technology improves learning results through automated work and allows educational institutions to teach more students from different backgrounds.

Crompton and Burke (2023) demonstrate that AI technologies enable more student-centred learning environments through their ability to support interactive and adaptive teaching methods. The researchers emphasize that AI enables students to learn through active learning because it provides them with the ability to study at their own pace which leads to their ability to learn better.

The authors present their case that generative artificial intelligence (AI) in education has the potential to improve educational outcomes through its power to generate content, deliver customized instruction, and provide instant feedback. The implementation of the system creates challenges for academic integrity and ethical usage of AI technologies while requiring teachers to acquire AI classroom management skills.

The researchers from Mutiso, Hanney, and Mousa (2026) demonstrate that African countries face challenges with AI technology adoption because of their insufficient electricity supply and internet connectivity and their outdated data management systems. The researchers from Mutiso, Hanney, and Mousa (2026) demonstrate that African countries face challenges with AI technology adoption because of their insufficient electricity supply and internet connectivity and their outdated data management systems.

UNESCO (2021) identifies AI as a technology which provides educational institutions worldwide with both beneficial resources and difficult obstacles. The publication provides guidance for policy-makers on how to effectively leverage AI to enhance teaching, learning, and administrative processes, while also addressing potential risks such as equity gaps, data privacy concerns, and ethical considerations. The researchers from Miao, Holmes, Huang, and Zhang (2021) indicate that educational institutions require the development of unified policies and strategies to achieve responsible AI integration which benefits all learners through inclusive educational practices.

The study demonstrates that educational success depends on students and teachers achieving their educational goals. The authors demonstrate through their study that educational systems need more than technological resources to achieve successful results because educational needs proper management through well-designed teaching systems which require active student participation and teacher commitment.

The OECD (2026) report shows that educational institutions use generative AI technology to create customized learning experiences while developing students' digital competencies and implementing new teaching methods. The report identifies existing issues related to fairness and online access and responsible technology usage which educational systems must address.

3. Research Gap

Even though the current literature identifies the possibilities of AI to revolutionize the field of education, there are still several gaps. To start with, there is a scarcity of research based on under-resourced African schools, in which the contextual issues vary greatly in comparison with developed areas. Second, despite numerous studies concerning the adoption of AI, the few that investigate its effect on pedagogical change in low-resource conditions do exist. Third, limited research explores the practical challenges which hinder educational institutions from adopting AI technologies in environments that face socio-economic disadvantages. The research paper will complete these research deficiencies through its detailed examination of AI technology's impact on educational practices and teacher adaptability in low-resource educational settings.

4. Research Objectives

1. To examine the role of Artificial Intelligence in supporting teaching and learning practices in under-resourced African schools.
2. To analyze the key challenges affecting the adoption of Artificial Intelligence in socio-economically disadvantaged educational contexts.

5. Research Questions

1. RQ1: What role does Artificial Intelligence play in supporting teaching and learning practices in under-resourced African schools?
2. RQ2: What are the major challenges influencing the adoption of Artificial Intelligence in socio-economically disadvantaged educational contexts?

6. METHODOLOGY

This paper will take the systematic literature review method to examine the recent studies on AI in education. The review will concentrate on peer-reviewed journal articles.

Data Collection

The academic databases, i.e., Scopus, Web of Science, and Google Scholar, were utilised to spot relevant studies. Such keywords as AI in education, teacher adaptability, under-resourced schools, and pedagogical transformation are used.

Inclusion Criteria

The inclusion criteria used in conducting this study were well spelled out to make sure that only high-quality and relevant literature was obtained. To begin with, the articles that were selected were only peer-reviewed journal articles since they are evaluated academically and present credible and reliable results that can be used in scholarly research. This way, the evidence employed in the study is of the required academic standards. Second, the chosen articles were to possess a definite focus on the educational application of Artificial Intelligence. It encompasses the studies that analyze the use of AI technologies, i.e., adaptive learning systems, intelligent tutoring systems, learning analytics, and generative AI in the field of teaching and learning. This focus will make the study reliable since all the literature used in it will be related to the research on the role of AI in education. Lastly, the studies were to show that they were relevant to teacher practices or pedagogy.

Analysis Method

The thematic analysis was also performed to determine the common patterns and themes of the use of AI, pedagogical change, and teacher flexibility.

7. ANALYSIS AND DISCUSSION

According to the findings, AI can drastically change education in under-resourced settings by offering new solutions to the issues faced by the pedagogy and the system as a whole. The ability of AI to provide personalised learning experiences has been listed among the major advantages that can be attained since it allows the educator to address the needs, learning pace, and abilities of different students. Adaptive learning platforms and AI-based analytics enable educators to track the progress of students in real-time and detect learning gaps and customize instructional material to meet the needs of individual learning paths (Holmes, Bialik, & Fadel, 2021; Zawacki-Richter et al., 2019). These types of individualised strategies are especially useful in schools that are under-resourced, but the number of students in these schools can have vastly different educational backgrounds, and there is little to no support available. Besides aiding instructional design, AI tools can greatly ease the burden on administration, such as grading, attendance keeping, and lesson planning. The teachers can use these routine tasks to spend more time on instructional activities, classroom intervention, and direct interventions with individual students by automating them (Crompton and Burke, 2023). This transfer of teacher effort can lead to better teaching as well as student performance, particularly in situations where the teacher's workload is high and available resources are limited. Despite these advantages, there are a few obstacles that prevent effective use of AI in educational institutions that do not have sufficient resources. The problem of infrastructure, such as poor internet connectivity, the unavailability of digital devices, and the unhelpful technical support, is still a major obstacle to implementation (Mutiso, Hanney, & Mousa, 2026; Miao, Holmes, Huang, & Zhang, 2021). Teachers are not always trained and have the digital skills required to implement AI tools effectively in their professional activities, even in cases when such technologies are accessible. This highlights the importance of special professional development and continuous assistance in the creation of teacher confidence and competence in the use of AI-based educational technologies (Liu, Wang, & Lei, 2025).

Ng, Leung, Su, Ng, and Chu (2023) argue that the COVID19 pandemic accelerated the adoption of AI technologies in education, highlighting a critical need for teachers to develop robust AI digital competencies—encompassing not only basic technological skills but also pedagogical, ethical, and twentyfirstcentury capabilities—to effectively integrate AI into teaching, learning, and assessment in the postpandemic world. The research also outlines the issue of teacher adaptability as one of the keys to successful implementation of AI. Teachers who are open to innovation, well-developed digital skills, and ready to change the conventional pedagogical strategies have high chances of successfully applying the AI technology (Luckin et al., 2016; Ng, Leung, Su, Ng, & Chu, 2023). The support of the institutions, such as the policy of promoting experimentation, providing access to programs of professional development, and mentoring systems, is also important in promoting teacher adaptability and maintaining the introduction of AI in the classroom. The results demonstrate that organizations need to develop specific responses which address their particular AI implementation needs. Schools with limited resources must develop their educational strategies according to the specific local factors which include their existing social and economic and cultural and technological capacity elements. The policies and interventions that are not based on these contextual challenges are likely to increase the existing inequalities instead of reducing them (Miah, 2024; OECD, 2026). Educational progress requires equal access to AI tools and teachers to implement flexible teaching methods which help students learn better through technological developments.

8. Implications

The results of the research study present significant effects which impact policy development institutional planning work and classroom teaching methods. The government functions as the central authority which guarantees that educational innovations based on artificial intelligence remain both accessible and effective. Digital infrastructure investments require schools to establish internet access points and provide sufficient computing devices and technical assistance for their students to reach academic success (Miao, Holmes, Huang, & Zhang, 2021; OECD, 2026). The development of AI technology access frameworks and guidelines should enable all people to use AI technology while giving priority access to underprivileged areas which helps reduce existing educational disparities. Educational organizations need to establish teacher training programs which help teachers develop their digital skills and technology knowledge and ability to teach through adaptive methods. Teachers who participate in ongoing capacity building programs acquire the necessary skills to use AI technologies for their teaching which improves their classroom performance and supports student-centered learning (Liu, Wang, & Lei, 2025; Luckin et al., 2016). Schools

should develop local AI adoption plans which use technology to meet their particular community needs and their present capabilities and their cultural background. Schools which match their AI systems to the requirements of their resource-limited settings can use technology to improve educational results instead of creating obstacles.

9. CONCLUSION

The research demonstrates how artificial intelligence has the power to change educational systems in African schools that lack necessary resources. The implementation of artificial intelligence solutions enables schools to improve teaching methods while delivering customized educational pathways and assisting educators with their AI-based teaching methods. The application of artificial intelligence in education enables teachers to deliver more effective lessons which boost student participation while meeting various educational requirements in schools that lack resources (Holmes, Bialik, & Fadel, 2021; Crompton & Burke, 2023). The successful deployment of artificial intelligence technology requires multiple interconnected components to function properly. Internet access and digital device deficits present two infrastructural obstacles which must be resolved to enable technological advancements to reach all student populations. The effective integration of artificial intelligence into classrooms requires two vital components which include developing teacher skills through professional training programs and establishing an environment that supports learning through technological advancements. Schools must adopt context-specific methods which combine their existing resources with educational technologies to achieve fair and substantial academic results according to research conducted by Mutiso, Hanney, and Mousa in 2026. Educational institutions must recognize artificial intelligence technology as a fundamental element which drives development towards human-centered educational reform. The educational community can develop learning environments which meet diverse needs by combining artificial intelligence with existing educational objectives through evidence-based decision-making from policymakers and educators and educational institutions. The approach to artificial intelligence development ensures that artificial intelligence will boost teaching effectiveness and student performance while strengthening the educational framework of schools that operate with limited resources.

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