AKSU International Journal of Research in Education (AKSUIJRE) (2025) Vol. 1, No. 1

Navigating the Future of Education: The Impact of AI on Teacher Roles and Student Learning in Economically Challenged and Insecure Environments

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Abstract

The integration of Artificial Intelligence (AI) in education poses challenges for teachers and students in economically disadvantaged and insecure environments, exacerbating existing inequalities. This study investigates the impact of AI on teacher roles and student learning in economically challenged and insecure environments. Research revealed that AI can enhance student learning outcomes, but its implementation in resource-constrained settings can widen the gap between privileged and disadvantaged students. Teachers in these environments face significant challenges in adapting to AI-powered education. It concludes that the successful integration of AI in education requires careful consideration of the unique challenges faced by teachers and students in economically disadvantaged and insecure environments. Contextualized solutions, teacher training, and inclusive design are crucial to mitigating the negative impacts of AI on educational equity. It recommends developing context-specific AI solutions for education, provision of comprehensive teacher training and support, ensuring inclusive design, accessibility of AI-powered learning tools, addressing infrastructure gaps and digital divides by teachers and continuous monitoring and evaluation of the impact of AI on education in these environments by teachers, stakeholders and other professional bodies.

Keywords: Artificial Intelligence, Teachers, Students, Economically challenged, and insecurity

Introduction

AI is a broad term that encompasses various analytical methods. According to Aggarwal (2018), these methods can be categorized as machine learning, neural networks, and deep learning. AI does not refer to a singular technology, but rather to computers that can perform cognitive tasks akin to human minds, particularly learning and problem-solving. It is a machine that can perform the task that humans carry out through their thinking (Dörfler, 2022). Accordingly, Nathan, Abasi and Isuaiko (2025) refers to Artificial Intelligence (AI) as the study of how the human brain makes decisions, learns new things, and thinks through difficulties. In recent years, artificial intelligence (AI) has emerged as a powerful tool in education, offering innovative solutions to challenges such as access, personalized learning, and efficiency in the learning process. AI-powered tools and platforms can enhance access to education by providing remote and personalized learning experiences. (Qadir, 2022). Through AI-driven adaptive learning systems, students can receive tailored instruction that meets their individual learning needs, regardless of teacher availability or resource constraints. Moreover, AI can assist in automating administrative tasks, reducing the workload on overburdened teachers, and allowing them to focus more on student engagement and instruction. This transformation is occurring in a global context marked by increasing economic instability, political insecurity, and in some cases, ineffective governance, or kakistocracy.

Against this backdrop, AI offers promising solutions, particularly in regions experiencing insecurity and economic hardships. Thus, the incorporation of AI in education has the potential to address systemic issues exacerbated by poverty, conflict, and instability while also reshaping the traditional roles of educators and students in the learning process. This paper seek to discuss the impact of AI on teacher roles, explore the impact of AI on student learning, analyse the economic challenges and insecure environments in Education and offers implications for the study.

Insecurity in Nigeria

A plethora of Nigerian scholars and practitioners have articulated that the repercussions of insecurity on the educational framework within Nigeria are not only intricate but also deeply interconnected, creating a complex web of challenges that require comprehensive understanding and analysis. To begin with, the Boko Haram insurgency that has plagued North-eastern Nigeria has not only resulted in the physical destruction of educational institutions but has also contributed to the alarming displacement of both students and educators, thereby

significantly disrupting the overall educational system (Abdullahi, 2019). Consequently, this rampant violence and instability have culminated in a substantial lack of access to quality educational opportunities for millions of children, particularly in those regions that have been most adversely affected by such turmoil and unrest. Moreover, the alarming rise in incidents of kidnapping and banditry across various regions of the nation has engendered a pervasive climate of fear and unpredictability, which has in turn severely hampered the ability of students to attend school with a sense of safety and security (Oluwatosin, 2020). This precarious situation has directly resulted in a marked decline in both school enrollment and regular attendance, particularly in those locales where the threats posed by insecurity are most evidently pronounced and pervasive.

Furthermore, the continued strife arising from farmer-herder conflicts and the associated ethnic tensions has further exacerbated the impact on the educational sector, as educational institutions frequently find themselves ensnared in the crossfire of these enduring conflicts (Oluwatosin, 2020). The ramifications of such violence have led to the closure of numerous schools, the displacement of both students and educators, and a significant disruption of the educational ecosystem that is critical for the development of the nation. Lastly, the economic consequences stemming from insecurity in relation to education in Nigeria cannot be underestimated or overlooked. The financial burden imposed by insecurity on the educational sector is estimated to amount to billions of naira, reflecting the substantial loss of vital infrastructure, necessary resources, and invaluable human capital that are integral to fostering a robust educational environment (Abdullahi, 2019). The overarching issue of insecurity in Nigeria has thus had a profoundly detrimental effect on the education sector, resulting in grave and far-reaching implications for the future of the country as a whole. It is of utmost importance that the government, alongside various stakeholders, takes decisive and immediate action to confront and mitigate the root causes of insecurity, thereby ensuring the safety, security, and overall well-being of students, teachers, and educational institutions throughout the nation.

AI's Impact on Teacher Roles

The integration of AI into education fundamentally alters the traditional role of teachers (Salas-Pilco et al., 2022). In economically challenged and insecure environments, teachers often face overwhelming challenges, including large class sizes, insufficient resources, and limited professional development opportunities. In Nigeria, where the education sector faces several challenges, teachers, who play a crucial role in shaping student learning, are particularly affected by these crises. These include inadequate professional development, lack of qualified teachers, poor and inadequate infrastructure, fewer resources, large student-teacher ratios, and limited access to digital resources, psychological factors such as anxiety, attitudes and low self-esteem (Ajayi & Ogbeba, 2017; Okwuduba, 2018; Eden & Mbuk, 2019; Emelogu *et al.*, 2022). AI can alleviate some of these pressures by automating administrative tasks such as grading, attendance, and scheduling, allowing teachers to focus more on instruction and student engagement (Nataraj, 2022). AI offers promising solutions, particularly in regions experiencing insecurity and economic hardships. For instance AI can help reduce teachers' workload (Nataraj, 2022), who can spend less time planning and more time working with individual students. Nathan, Abasi and Isuaiko (2025) also opines that the involvement of artificial intelligence as a digital resource in research activities marks a transformative era for data collection. By exploring strategic steps to enhance data acquisition processes, students/researchers can leverage AI's potential to unlock new possibilities, address existing limitations, and contribute to the advancement of knowledge across various disciplines. AI can also grade assessments, freeing teachers' time for other tasks (Mandernach, 2018). Moreover, AI-powered learning platforms can provide remote and personalized tutoring (Hasiloglum et al., 2020), adapt to the needs of individual students, and offer real-time feedback on student performance (Salas-Pilco et al., 2022). This can help teachers manage classrooms with diverse learning levels and needs, particularly in regions where teacher-to-student ratios are high and individualized attention is difficult to provide. While these technologies can enhance teaching efficiency (Sindermann et al., 2021), they also raise concerns about the diminishing need for traditional teaching roles (Cukurova, Miao & Brooker, 2023). As AI takes over more routine instructional tasks, there may be a shift toward teachers serving more as facilitators, guiding students through personalized learning journeys rather than delivering one-size-fits-all lectures.

However, this shift could have mixed effects in insecure environments. On the one hand, it can empower teachers by freeing them from administrative burdens and enabling more student-centered instruction (Akturk & Ozturk, 2019). On the other hand, it may devalue the professional expertise of teachers (Fast & Horvitz, 2017;

Gado et al., 2021), especially in under-resourced areas where teacher training and capacity building are already limited. In such environments, the effective use of AI will depend heavily on how well educators are trained to integrate these tools into their teaching practices.

AI's Impact on Student Learning

AI's most significant promise lies in its potential to revolutionize student learning, especially in resource-constrained settings. AI-driven systems can deliver tailored educational content to students, enabling them to learn at their own pace and according to their own learning styles. For example, an AI system can analyse data on how a student interacts with an online learning system to infer their learning style and recommend instructional strategies that cater to that style (Jamal, 2023). AI-powered tools and platforms can also enhance access to education by providing remote and personalized learning experiences (Hasiloglum et al., 2020). Through AI-driven adaptive learning systems, students can receive tailored instruction that meets their individual learning needs, regardless of teacher availability or resource constraints (Sindermann et al., 2021). This personalized approach can be particularly beneficial in economically disadvantaged regions where educational resources are limited, and students often struggle to keep up with standardized curricula. AI can provide access to high-quality learning materials through mobile devices and online platforms, extending educational opportunities to remote areas affected by conflict or economic hardship. For instance, AI can support distance learning in regions where schools are frequently closed due to insecurity. During the COVID-19 pandemic, AI-powered platforms like chatbots, adaptive learning systems, and virtual teaching assistants were employed to continue education in regions that lacked access to formal schooling (Radwan, Shaladan, Marbán, Alattar, Radwan, Radwan & Alajez, 2022). These systems offer hope for mitigating learning losses in unstable environments where traditional education is inaccessible.

Despite these potential benefits, challenges remain. Access to AI technologies often depends on stable internet connectivity, adequate digital infrastructure, and basic technological literacy—all of which are frequently lacking in economically challenged and insecure regions, Students often experience interruptions in their education, lack of access to quality instruction, and unequal opportunities for academic growth (Nja, 2023). Additionally, there are concerns about the equity of AI-driven education, as students from lower-income families or conflict zones may not have equal access to the devices and infrastructure necessary to benefit from AI-enhanced learning (Mather & Yau, 2019). There are also concerns that AI might alter the role of teachers in ways that could undermine the human aspects of education. The potential over-reliance on AI could reduce the direct interaction between students and teachers (Gado et al., 2021; Ragot, Martin & Cojean, 2020), which is essential for social-emotional development. Furthermore, in insecure and economically deprived regions, there are issues of digital divide (Cukurova *et al.,* 2023), with many students and teachers lacking access to the technology and infrastructure required to implement AI-powered educational systems effectively. The question of training educators to integrate AI into their teaching practices is also critical. Liao, Huang, Sun and Li (2021); Akgun and Greenhow (2022) observed that many teachers and students in these regions may not have the resources or support to adopt these technologies, training and professional development opportunities.

Economic Challenges and Insecure Environments in Education

Economic challenges and insecurity often severely disrupt education systems, especially in low- and middle-income countries like Nigeria. Factors such as insufficient funding, teacher shortages, political instability, and conflicts can lead to the closure of schools, reduced access to quality education, and diminished learning outcomes (Ragot, Martin and Cojean, 2020). According to a report by UNESCO (2020), over 258 million children worldwide were out of school prior to the COVID-19 pandemic, with the majority residing in regions plagued by economic hardship and political instability. According to Radwan, Shaladan, Marbán, Alattar, Radwan, Radwan & Alajez (2022) during the COVID-19 pandemic, all educational institutions were closed, therefore educators were instructed to transfer from face-to-face education to distance education. The teachers taught the theoretical concepts of their curriculum online through technological devices and digital tools. On the other hand, they found it difficult to teach practical lessons and perform the laboratory experiments found in the syllabus. During the COVID-19 pandemic only privileged students and those of elite families learnt online (El Kharki, Berrada, & Burgos, 2021; Kapilan, Vidhya & Gao, 2020, Méndez Ruiz & Valverde Armas, 2022). These vulnerabilities create significant barriers to education, such as limited infrastructure, lack of qualified teachers, and insufficient learning

materials, further widening the gap between students in unstable environments and their peers in more developed settings.

In such contexts, AI presents a unique opportunity to enhance learning and teaching by addressing these systemic issues. AI-driven technologies can automate administrative tasks, provide personalized learning experiences, and deliver content remotely (Hwang et al., 2020), helping to mitigate the impact of economic and security-related disruptions on education systems. However, these benefits come with complex implications for the roles of teachers and the dynamics of student learning. Furthermore, the rise of AI in education must be viewed within the broader socio-political and economic context. In regions suffering from poor governance or kakistocracy, there may be a lack of political will to invest in educational technology, exacerbating inequality in access to AI-driven learning tools. Economic downturns also limit funding for technological advancements in schools, leaving underprivileged students and teachers behind in the AI revolution.

Implications for the Study

To mitigate the potential negative impacts of AI on teacher roles and student learning in economically challenged and insecure environments, there must be;

1. Contextualized AI integration: Develop and implement AI solutions that are tailored to the specific needs and constraints of economically challenged and insecure environments.
2. Teacher training and support: Provide teachers with comprehensive training and ongoing support to effectively integrate AI into their teaching practices and address the unique challenges of their students.
3. Inclusive design: Ensure that AI-powered learning tools and resources are accessible, user-friendly, and culturally responsive to promote equitable learning opportunities.
4. Addressing infrastructure gaps: Invest in digital infrastructure and connectivity to bridge the technology divide and ensure that all students have access to quality AI-powered education.
5. Continuous monitoring and evaluation: Regularly assess the impact of AI on teacher roles and student learning in these contexts to identify areas for improvement and inform data-driven decision-making.
6. Community engagement: Foster collaboration between educators, policymakers, and local communities to develop and implement AI-powered education solutions that address the unique needs and aspirations of students in economically challenged and insecure environments.
7. Ethical considerations: Prioritize transparency, accountability, and ethical considerations in the development and deployment of AI in education to ensure that the benefits are equitably distributed and the risks are mitigated. The ethical considerations around data privacy, bias in AI algorithms, and the potential for surveillance in insecure environments must also be addressed, as they could further marginalize vulnerable populations.

Conclusion

In conclusion, AI presents both transformative potential and significant challenges for education in economically challenged and insecure environments. Its impact on teacher roles and student learning will depend on the ability of governments, educators, and communities to navigate the complex interaction between technology and socio-economic conditions. While AI has the potential to enhance education in these regions, careful consideration of its implementation and the support needed for teachers and students is crucial to ensuring equitable and sustainable educational outcomes.

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