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EXPLORING THE CHALLENGES OF UTILIZING ARTIFICIAL INTELLIGENCE IN INDUSTRIAL TECHNOLOGY EDUCATION IN TERTIARY INSTITUTIONS IN SOUTH-EAST, NIGERIA

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Abstract
Artificial Intelligence (AI) has emerged as a global frontier, enabling computational systems to perform tasks traditionally associated with human intelligence. Within the education sector, particularly in industrial technology education at tertiary institutions in South-east Nigeria, utilization of AI has presented a lot of challenges amidst its benefits. This paper examines the nature of AI, its impacts, and challenges it poses to industrial technology education in the region. Data were sourced from secondary materials, including textbooks and online resources. While AI offers significant benefits, it also raises concerns such as data privacy, over-dependence on technology, and shifts in student behaviour. The study highlights educational challenges linked to AI, including irregular student attendance, vulnerability of disadvantaged learners, evolving instructional techniques, and the need for emergency preparedness to cope with technological disruptions. Importantly, the paper argues that AI may induce long-term negative behavioural changes that affect learning outcomes in industrial technology education. To address these issues, strategies such as aligning theory with practice, implementing effective policies, and investing in capacity building are emphasized. Consequently, the paper suggested that government should provide adequate and qualitative teaching and learning resources to sustain educational standards in utilizing AI era.

Keywords: , Artificial, Challenges, Education, Intelligence, Technology Education

Introduction

In Nigeria, particularly in the Southeast, the education system is increasingly confronted with the disruptive influence of Artificial Intelligence (AI). AI refers to computational systems capable of performing tasks traditionally associated with human intelligence, such as reasoning, problem-solving, and learning (Ukala & Ukala, 2024). While AI offers opportunities to modernize teaching and learning (Wogu, Okorafor, Okoye & Nwankwo, 2025), its rapid adoption also presents challenges that demand urgent attention. A balanced approach to integration is therefore necessary, ensuring that AI complements rather than replaces human interaction and the cultivation of critical thinking skills (Aniella & Gabriel, 2025).

The transformative potential of AI in education is evident in its ability to streamline administration, personalize learning, and enhance instructional delivery (Solyd Nigeria Foundation, 2026). However, these benefits are

accompanied by risks such as over-dependence on technology, data privacy concerns, and behavioural shifts among students. In the Southeast, where infrastructural and policy gaps persist, the question arises: how can the education system sustain its efficacy amidst AI's growing influence? More specifically, what emergency plans and precautionary measures should institutions adopt to mitigate unforeseen disruptions?

Emergency preparedness emerges as a critical strategy for coping with AI's challenges. This involves proactive planning, capacity building, and policy implementation to ensure resilience in the face of technological change (Onwusa, Okotubu, Okoye & Uyeri, 2025). Without such measures, the government may struggle to provide timely interventions, leaving institutions vulnerable to systemic shocks. Thus, the integration of AI into industrial technology education must be guided by deliberate strategies that marry theory with practice, safeguard vulnerable learners, and uphold educational standards. Ultimately, preparedness will determine whether AI strengthens or undermines the transformative capacity of Nigeria's education system.

Artificial Intelligence in Perspective

Artificial intelligence (AI) is a term coined by emeritus Stanford Professor, McCarthy in 1995. McCarthy defined AI as the science and engineering of making intelligent machines (Onyebuchi and Wogor, 2024). Similarly, Nkemdilim, Okenwa-Fadele et al, (2025) and Murphy (2019), also defined artificial intelligence as the application of software algorithms and techniques that allow computers and machines to simulate human perception and decision-making process to complete tasks. To the authors, AI operates using the instructions that are coded using the certain algorithms and provided desired output. It is therefore understood that in AI period, people continue getting interest at high rate despite it academic impacts. Unarguably, the spread of these impacts have become a world academic issue, thereby, causing a serious concern on how to navigate the challenges of AI to attain the expected objectives.

Types of Artificial Intelligence Impacts

AI has impacted education in various ways. Some notable impacts of AI according to Blogs (2025) include:

Data Privacy Concerns

One of the primary disadvantages of AI in education is the issue of data privacy. AI systems often require vast amounts of personal data to function effectively. These includes: students' academic records, behavioural data and biometric information. This extensive data collection raises significant concerns about how information is stored, used and protected, as improper or inadequate safeguards can lead to data breaches, exposing sensitive student information to unauthorized parties which may potentially result in identity theft or other forms of misuse. Hence, embracing robust data privacy measures and compliance with regulations could be key to protecting students' information and classified documents of the institution.

Dependence on Technology

Another major concern is the growing dependence on technology that AI in education fosters. As educational institutions increasingly rely on AI-driven

tools for teaching, assessment and administrative tasks, there is a risk of becoming overly dependent on these technologies. This dependence can lead to significant disruptions in the event of technical failures or cyber-attacks. Furthermore, it may also diminish the development of critical thinking and problem-solving skills among students, as they may become accustomed to AI systems providing answers and solutions (Adinoyi, 2023).

Lack of Human Touch/Dehumanized Learning Experience

The lack of human touch is a critical disadvantage of AI in education, leading to a dehumanized learning experience. Traditional education relies heavily on human interaction, with teachers providing not only academic instruction but also emotional support and mentorship. AI systems, while efficient, cannot replicate the empathy, understanding and personal connection that human educators offer. This absence of human elements can affect students' social and emotional development, as well as their overall engagement and motivation in the learning process (Atik, 2024). It becomes imperative to underscore that the widely acceptance and utilization of AI cannot supplant human interface as technology alone is incapacitated in the absence of human component.

Risk of Cheating

AI in education also raises the risk of cheating. Advanced AI tools can be exploited by students to find ways to bypass academic integrity measures. For instance, AI-powered plagiarism detection systems may themselves be outsmarted by sophisticated AI-generated content that mimics genuine student work. Additionally, AI-based tutoring systems and automated assessments might be manipulated to provide undue assistance, undermining the fairness and integrity of academic evaluations. Schools and institutions must continuously adapt and update their AI tools to mitigate these risks.

Teacher Job Displacement

Lastly, the rise of AI in education brings the concern of teacher job displacement. As AI systems take on more roles traditionally filled by educators, there is a fear that teachers may become obsolete. Automated grading, AI-driven tutoring, and administrative tasks handled by AI could reduce the need for human teachers, leading to job losses and a devaluation of the teaching profession. While AI can certainly support and enhance educational practices, it is essential to balance its implementation to ensure that teachers remain integral to the educational process, providing the human touch that technology cannot replace (Bell, 2021; Okoye & Erem-Kalu, 2025).

Further perspectives on challenges of utilization of Artificial Intelligence in Nigeria

It could be deduced from the foregoing literature that the challenges in utilization of artificial intelligence in industrial technology education, apparently influence the advance of learning among students in developing countries of which Nigeria is one. This could be generally attributed to the slow rate of education technology. Nevertheless, some of the challenges that could be faced by the Nigerian education

system in AI era could be viewed to include the following:

Students' attendance: under students' absence, how do one measure attendance to determine the number of students as supposed to classroom attendance. This problem becomes severe if a student relies on AI education.

The vulnerable: this includes students with disabilities, those living in poverty and some in the remote areas. They may not be easily catered for due to their individual needs and peculiarities. This group of students remain the most valuable in receiving balanced educational opportunity and this will constitute the main issue of challenge in AI.

Access to electricity: In Nigeria, some rural areas are still not connected to national grid. Even those connected suffer problem of unsteady and epileptic supply of electricity light.

Instructional technique: The teaching methods, skills, approaches and styles, as contrary to classroom instruction need to be rightly adjusted, for effective and efficient service delivery that will suit the situation at hand.

Development of standard: Introduction of standards that will match the content provision and make it equal to that as contained in the programmes and scheme of work is another challenging factor. This factor can be mitigated by embracing and strictly adhering to established standard and quality control measures guiding the implementation of the prevailing curriculum. In a nutshell, no standard can stand the taste of time unless its rules of engagement are religiously followed. Other challenges include ability of parents to meditate their roles at home, new system of measuring learning, monitoring and evaluation among others.

Coping with the challenges of Industrial Technology Education, education have the responsibility of preparing the youth for the future. Importance of technology education can be easily seen in our daily living. It is one of the major forces that shape the world. It is also that aspect of education designed to provide specialized skills, knowledge, attitude and habits necessary for securing gainful employment in an occupation or in a cluster of occupations and to ensure self-employment and self-reliance. Therefore, the sole task of vocational technical teacher education is to produce teachers as facilitators who will be competent enough to assist the students to acquire the vocational technical knowledge or skillsets that will guarantee a positive behavioural change to navigate the fast-changing technological world.

The origin of the problems/challenges of vocational technical education in Nigeria started with the introduction of the Western education (Oranu, 2016). Some problem areas, according to Igboamauchey (2023) include non-implementation of National Policy on education, poor society attitude to vocational technical education, inadequate funding, imbalance between theory and practical, shortage of personnel, poor research efforts/textbooks and low student enrollment among others. Conversely, Igboamauchey further recommended the following as remedies to the aforementioned imbalance: quick and full implementation of policy, revolutionizing secondary school programme, provision of employment opportunities and incentives, adequate funding, balancing theory and practical,

increasing the staff strength of vocational/technical educators in tertiary institutions. However, these issues should be prioritized in order for artificial intelligence to transform the education landscape, and ultimately yield the expected outcomes.

Artificial Intelligence Emergency Preparedness

Emergency as a sudden and dangerous situation that needs immediate action that cannot be toiled with. It has been established that AI has both positive and negative impacts. Therefore, it calls for emergency preparedness. The purpose is to ensure that adequate measures, as well as coordinated plans are on ground, to stop students from relying solely on AI tools. The emergency preparedness policy according to Helen (2024) includes: making a profile of anticipated strategy for AI students, collaboration, holding consultative meetings with relevant bodies, capacity building, development of emergency response worksheet, research investigations on new trends, contingency fund and programme coordinator. Suffice it to say that, building appropriate capacity would not only reposition the educational landscape but also bolster learners' enthusiasm and curiosity to optimally embrace AI.

Conclusion

Reliance on Artificial Intelligence (AI) induces long-term behavioural changes such as dependent on technology, data privacy concern, risk of dehumanized learning experiences, cheating among others; which significantly affect the operations of education system. A notable structural shift has occurred, with classroom instruction increasingly giving way to online teaching and learning as institutions attempt to adjust to these challenges. This would ensure that AI tools are embraced with commensurate measures and ethical conducts that could balance traditional learning approaches with emerging technologies.

Suggestions

To address the challenges of utilizing AI in industrial technology education institutions, the following suggestions were made:

1. There should be comprehensive policy implementation to promote ethical practices in utilizing of artificial intelligence by both learners and educators.
2. School administrators should balance theoretical knowledge with practical application in instructional delivery to enhance mastery and proficiency of industrial technology education concepts and principles.
3. Government intervention is essential so as to adequately and qualitatively provide the teaching and learning resources required to ensure continuity and uphold educational standards in utilizing AI. This includes infrastructure, digital tools, and training programmes that strengthen resilience against technological disruptions.
4. Industrial technology education must actively implement established remedies for innovation. By embedding adaptive strategies into curricula and practice, institutions can better align with global trends while safeguarding the human dimensions of learning.
5. The government should be deliberate in planning, resource provision, and committed to creative innovations. If

these measures are pursued, industrial technology education in Southeast Nigeria can transform potential risks into opportunities, ensuring that AI serves as a complement to human intelligence rather than a substitute.

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