ISSN 1118-1364
International Journal of Science Education
Volume 19, Number 1, March 2026, https://nigerianjournalsonline.org/

ARTIFICIAL INTELLIGENCE AS A PREDICTOR OF SKILL DEVELOPMENT AND ECONOMIC EMPOWERMENT OF SSS II CHEMISTRY STUDENTS IN OYO WEST AND EAST LGA OF OYO STATE.

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Abstract

This study examined the role of artificial intelligence as predictor of skill development and economic empowerment in Oyo West and East LGA of Oyo State. One of the research questions in the study is what is the composite contribution of artificial intelligence, skill development and economic empowerment on SSS II chemistry students? Descriptive survey was used as the research design of this study. All secondary school chemistry students in Oyo West and East were used with a sample of 100 chemistry students selected from each local government using a random sampling technique of which it gives a total of 200 students. The instrument for the study was a survey questionnaire tagged "AI, Skill Development and Economic Empowerment Questionnaire" (AISDEEQ). The instrument's reliability was 0.76 using Person Product Moment Correlation. There is a moderate-to-strong positive contribution of AI use to skill development ($r= 0.526$, $n = 200$, $p < 0.05$) and there is a weak-to-moderate positive contribution of AI use to economic empowerment ($r= 0.346$, $n = 200$, $p < 0.05$). It was concluded that AI is a transformative force in education. When strategically implemented, it can bridge the gap between academic learning and real-world application thereby fostering both skill development and economic empowerment among students. It was recommended teachers should prioritize AI tools that directly align with curriculum goals (e.g., virtual labs, data analysis software) to enhance skill development in students.

Keywords: Artificial Intelligence, Skill Development, Economic Empowerment.

Introduction

The integration of AI into education holds immense promise, particularly in science education, where complex concepts and dynamic learning environments demand innovative solutions (Buckingham Shum & Deakin Crick, 2020). AI technologies provide educators unparalleled potential to optimize teaching approaches, tailor learning, and empower students to interact profoundly with scientific principles (Li & Li, 2021). AI is human intelligence or behaviour demonstrated by machines, an innovative technical framework that encompasses the creation of computer systems with the ability to execute activities that usually need human intellect (Aina et al., 2023).

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AI applications in education encompass adaptive learning platforms, intelligent tutoring systems, and virtual simulations. Through the use of artificial intelligence, educators have the ability to construct dynamic and interactive learning environments that accommodate the various learning styles and capabilities of students (Aina et al., 2023).

In Nigeria, the National Universities Commission (NUC) has emphasized the importance of aligning higher education with global technological trends. The country, which has a growing youth population, wants to promote itself as a technological hub. To attain this ambition, Nigerian institutions must change their curricula to provide students with the skills required by a constantly changing technology landscape (NUC, 2020).

The integration of artificial intelligence (AI) in science education is transforming teaching practices, skill development, and economic empowerment opportunities. AI technologies offer personalized learning experiences, enhance teacher effectiveness, and equip students with market-relevant skills. AI-driven tools such as virtual labs and simulations allow students to explore complex scientific concepts in an interactive manner. For instance, AI-powered platforms can simulate experiments, enabling learners to visualize chemical reactions or biological processes without physical resources (Singh & Sharma, 2023). Such tools not only enhance conceptual understanding but also make science education more accessible to under-resourced schools.

The integration of AI in education fosters economic empowerment by aligning academic curricula with industry needs. For instance, partnerships between educational institutions and technology companies enable students to gain certifications in AI-related fields, enhancing employability (Smith & Brown, 2020). Entrepreneurial opportunities also arise from AI-driven education. Students trained in AI tools can develop innovative solutions to local problems, creating startups and contributing to economic growth. For example, AI-powered agricultural technologies designed by young innovators have improved crop yields in rural communities (Ahmed et al., 2023).

Enhancing Teacher Competence Through AI Integration

Professional development opportunities are crucial for educators to stay updated on the latest field trends and continually enhance their teaching skills (Smith & Gillespie, 2023). Teachers can benefit from workshops, seminars, conferences, and online courses focusing on integrating AI into science teaching, which can offer innovative strategies to engage students and improve learning outcomes. By participating in these professional development activities, educators can expand their knowledge base, network with colleagues, and gain valuable insights that can positively impact their teaching practices (Appleman, 2022).

AI tools for lesson planning and delivery offer significant benefits to teachers in primary education (Smith & Gillespie, 2023). These tools can analyse student data to personalise lesson plans, identify areas of difficulty, and suggest appropriate interventions. By incorporating AI tools into their teaching practices, educators can ensure that each student receives individualised support based on their unique learning needs and preferences (Luckin et al., 2022). Additionally, AI tools can help teachers track student progress more effectively and make real-time adjustments to lesson plans as needed. Integrating AI in lesson planning and delivery can enhance teaching effectiveness and student learning outcomes in primary education settings (Felix & Webb, 2024).

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International Journal of Science Education
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Data-driven insights for Instructional Improvement play a crucial role in enhancing teaching practices and student learning outcomes (Schildkamp, 2019). Teachers can identify areas of weakness, assess development over time, and customize educational tactics to fit the unique needs of their pupils by analyzing student performance data. Furthermore, data-driven insights can provide valuable feedback on the efficacy of teaching approaches (Ahmad et al., 2020), allowing educators to make more informed decisions about curriculum design and delivery. Overall, using data analytics in education can result in more personalized and successful student learning experiences (Betul Aktas, 2024).

Collaboration and knowledge-sharing platforms have become essential tools in modern education (Fischer et al., 2020), allowing teachers to connect and share resources with colleagues globally. These platforms allow educators to collaborate on lesson plans, share strategies for incorporating technology into the classroom, and discuss best practices for teaching science. These platforms can help enhance student outcomes by boosting professional development and improving the quality of education by creating a feeling of community among teachers. Platforms for collaboration and information exchange can also help integrate AI into science instruction by giving teachers access to materials and tools that can improve student learning. (Castaneda & Cuellar, 2020).

AI and Skill development

AI-driven tools enhance the teaching of STEM (science, technology, engineering, and mathematics) subjects by incorporating real-world applications into lessons. Simulations and AI-based virtual labs provide hands-on experience, equipping students with critical skills like problem-solving, computational thinking, and data analysis (Karsenti & Collins, 2022). These skills are essential for fostering innovation in industries that contribute to economic transformation, such as renewable energy, biotechnology, and transportation.

AI provides tools like virtual labs, simulations, and intelligent tutoring systems, which are critical for skill development in science education. These platforms enable students to experiment with complex scientific concepts in a controlled, risk-free environment (Dawson, 2024)

AI in Economic Transformation

AI education empowers students with the knowledge and skills needed to drive economic growth. For instance, teaching students how to use AI for optimizing supply chains or improving agricultural productivity can address critical economic challenges. A study by Amara et al. (2021) emphasizes that training in AI applications prepares students to innovate in sectors that are key to economic transformation, such as manufacturing, healthcare, and transportation.

Science education enhanced by AI fosters innovation and entrepreneurship, crucial for economic growth. By equipping learners with AI-driven problem-solving skills, nations can build a workforce capable of driving technological advancements (Garcia, 2024)

AI Tools for Teaching Skill Development in Science Education

Artificial intelligence (AI) tools are transforming science education by enabling innovative approaches to teaching and learning. These tools foster the development of essential skills such as

ISSN 1118-1364
International Journal of Science Education
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critical thinking, problem-solving, and practical application of scientific concepts. Below are key AI tools and their impact on skill development in science education (Thomas et al., 2024).

1. **Intelligent Tutoring Systems**

   Intelligent Tutoring Systems (ITS) use AI to provide personalized learning experiences for students by adapting to their individual needs. These systems analyze learners' progress and tailor content delivery accordingly. For instance, platforms like Carnegie Learning's MATHia have shown significant improvements in problem-solving skills (Smith et al., 2022).

2. **Virtual and Augmented Reality**
   AI-powered virtual and augmented reality (VR/AR) tools provide immersive learning experiences. Virtual labs, such as Labster, enable students to conduct experiments in a simulated environment, promoting hands-on learning without the need for physical resources (Nguyen et al., 2023).
3. **Adaptive Learning Platforms**
   Adaptive learning platforms, such as Knewton and DreamBox, leverage AI to analyze student interactions and adjust learning content in real-time. These tools ensure that students progress at their own pace, mastering foundational skills before moving on to advanced concepts (Brown et al., 2022).

AI Tools for Teaching Economic Development in Science Education

The integration of artificial intelligence (AI) in education has opened new pathways for teaching economic development within the context of science education. AI tools enable students to connect scientific concepts to real-world applications, particularly in areas that drive economic growth, such as renewable energy, biotechnology, and technological innovation. Below are some of the AI tools and their applications in teaching economic development through science education:

1. **Data Analytics Platforms for Economic Trends**
   AI-driven data analytics tools, such as Tableau and IBM Watson, are valuable in teaching students about the intersection of science and economic development. These platforms analyze large datasets to provide insights into trends such as energy consumption, climate change impacts, and resource allocation. Students can use these tools to understand how scientific innovations contribute to economic growth (Ali & Brown, 2023).
2. **Simulation Tools for Resource Management**
   AI-powered simulation platforms, like Simul8 and Stella, allow students to model economic scenarios related to scientific fields. These tools enable learners to experiment with variables such as resource management, investment in research, and the impact of technology on economic systems (Sharma et al., 2021).
3. **AI-Powered Collaborative Platforms**
   Collaborative platforms like Microsoft Teams and Google Workspace, enhanced with AI features, support group-based projects on economic development topics. AI tools in these platforms can recommend resources, provide real-time feedback, and facilitate virtual teamwork, fostering communication and collaboration skills essential for addressing economic challenges (Kumar & Patel, 2022).

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International Journal of Science Education
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Statement of the Problem

In the rapidly evolving global economy, the integration of artificial intelligence (AI) in science education presents significant opportunities for skill development and economic empowerment. Traditional science education often focuses on theoretical knowledge, with limited emphasis on practical, technology-driven skills that align with the demands of the modern workforce. This gap leaves many students, particularly in developing regions, underprepared for careers in STEM (science, technology, engineering, and mathematics) fields and limits their potential for economic advancement. Despite the transformative potential of AI, its application in science education remains underutilized due to factors such as inadequate infrastructure, lack of teacher training, and resistance to technological change. Many educational institutions struggle to incorporate AI-driven tools such as virtual laboratories, intelligent tutoring systems, and data analytics for personalized learning. As a result, students miss out on hands-on experiences that could enhance their problem-solving abilities, critical thinking, and innovation skills essential competencies for the 21st-century workforce. Therefore, this study examined the role of artificial intelligence as predictor of skill development and economic empowerment in Oyo West and East LGA of Oyo State.

Research Questions

- What is the composite contribution of artificial intelligence to skill development of SSS II chemistry students?
- What is the composite contribution of artificial intelligence to economic empowerment of SSS II chemistry students?
- What is the composite contribution of artificial intelligence, skill development and economic empowerment on SSS II chemistry students?

Methodology

A descriptive survey design was employed for this investigation. The study was carried out in Oyo State. The population of the study comprised all secondary school students in Oyo West and Oyo East local government in Oyo State. The random sampling technique was used where 100 students were selected from each of the local government, making it a total of 200 students. The instrument for the study was a survey questionnaire tagged "AI, Skill Development and Economic Empowerment Questionnaire" (AISDEEQ). The instrument was partitioned into four sections (A, B, C and D). Section A was structured to collect demographic data of the respondents. Sections B, C and D were structured in the pattern of Likert 5 - point rating scale of agreement on artificial intelligence, skill development and economic empowerment. The independent variable in the study is Artificial intelligence measured by students' responses to items under the concept of AI; dependent variables: skill development measured using responses to items on AI predicting skill development, economic empowerment measured using responses to items on AI predicting economic empowerment. The instrument was face validated by two experts in the Department of Science Education in University of Ibadan, Ibadan. Copies of the instrument were administered and retrieved by the researchers at the spot. The instrument's reliability was 0.76 when the researchers administered it to students outside the study population but with the same

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International Journal of Science Education
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characteristics. The research adopted inferential statistics for the analysis. Regression analysis is used to measure the contribution of independent variable to dependent variables.

Data Analysis and Discussion of Results

What is the composite contribution of artificial intelligence to skill development of SSS II chemistry students?

Table 1: Composite contribution of artificial intelligence to skill development of SSS II chemistry students in Oyo East and Oyo West Local Government, Oyo State.

Variables	N	Mean	SD	r	Sig
Artificial Intelligence	200	3.82	0.88	0.526	0.000
Skill Development	200	4.15	0.72		

Dependent variable: Skill Development $\alpha = 0.05$

Independent variable: Artificial Intelligence

Source: SPSS version 23, 2024

From the above table 1, it was shown that students rated the impact of AI on their skill development very highly (mean > 4.0), implying strong agreement that AI enhances competencies (e.g., problem-solving, technical skills). There is a moderate-to-strong positive contribution of AI use to skill development ($r= 0.526$, $n = 200$, $p < 0.05$). The statistical significance ($p = 0.000$) confirms this link is robust and unlikely due to chance. This implies that Artificial Intelligence is moderately linked to skill development of SSS II chemistry students in Oyo East and Oyo West Local Government, Oyo State.

What is the composite contribution of artificial intelligence to economic empowerment of SSS II chemistry students?

Table 2: Composite contribution of artificial intelligence to economic empowerment of SSS II chemistry students in Oyo East and Oyo West Local Government, Oyo State.

Variables	N	Mean	SD	r	Sig
Artificial Intelligence	200	3.65	0.91	0.346	0.000
Economic Empowerment	200	3.92	0.83		

Dependent variable: Economic Empowerment $\alpha = 0.05$

Independent variable: Artificial Intelligence

Source: SPSS version 23, 2024

From the above table 2, it was shown that Students generally perceive a positive link between AI and economic empowerment (mean approaching 4.0). The lower SD (0.83 vs. 0.91 for AI) implies relatively stronger consensus about economic benefits compared to AI's direct role. There is a weak-to-moderate positive contribution of AI use to economic empowerment ($r= 0.346$, $n = 200$, $p < 0.05$).

The statistical significance ($p = 0.000$) confirms this link is not random, but the weaker correlation suggests AI alone is not sufficient for economic empowerment; other factors (e.g., job access,

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International Journal of Science Education
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mentorship) likely play critical roles. This implies that Artificial Intelligence contributed moderately to economic empowerment of SSS II chemistry students in Oyo East and Oyo West Local Government, Oyo State.

What is the composite contribution of artificial intelligence, skill development and economic empowerment in science education?

Table 3:- Composite contribution of artificial intelligence, skill development and economic empowerment in science education

Model Summary

Model	R	R2	Adjusted R2	Std. Error of the Estimate	Sig
1	0.556	0.309	0.306	0.654	0.000

Dependent variable: Skill Development and Economic Empowerment

Independent variable: Artificial Intelligence

Source: SPSS version 23, 2024

The above table shows composite contribution of independent variable (artificial intelligence) on dependent variables (Skill Development and Economic Empowerment), it indicates a moderate positive contribution (0.556) between the independent variable and the dependent variables. According to the result, artificial intelligence accounts for 30.6% of contribution on skill development and economic empowerment of SSS II chemistry students in Oyo East and Oyo West Local Government, Oyo State. The p-value for the overall model is statistically significant ($p < 0.05$), meaning the independent variable has a significant contribution on the dependent variables.

Discussion of findings

This study examined the relationship between artificial intelligence (AI), skill development, and economic empowerment among SSS II Chemistry students in Oyo State, Nigeria. The findings reveal that students perceived AI as a highly effective tool for skill acquisition (Mean = 4.15, SD = 0.72), with a moderate-to-strong correlation (r = 0.526). This suggests AI significantly improves competencies such as problem-solving, digital literacy, and technical proficiency. While AI showed a positive association with economic empowerment (Mean = 3.92, r = 0.346), the weaker correlation implies that AI alone is not sufficient for financial advancement. Instead, economic benefits likely depend on additional factors, such as job opportunities, entrepreneurship training, or access to markets. The stronger impact of AI on skill development (Table 1) compared to economic outcomes (Table 2) suggests that skills are a necessary foundation, but translating them into income requires complementary interventions (e.g., mentorship, internships, or policy support.

Recommendations

i. Teachers should prioritize AI tools that directly align with curriculum goals (e.g., virtual labs, data analysis software) to enhance skill development in students

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ii. Educational stakeholders should pair AI education with entrepreneurship programs to strengthen economic empowerment..

iii. Government should fund AI and Entrepreneurship initiatives to bridge the gap between skills and income generation.

Conclusion

In conclusion, the study affirms that AI is a transformative force in education. When strategically implemented, it can bridge the gap between academic learning and real-world application thereby fostering both skill development and economic empowerment among students. However, for its full potential to be realized, it must be complemented by inclusive policies, teacher training, infrastructure development, and entrepreneurship support.

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