ARTIFICIAL INTELLIGENCE LITERACY AND ITS INFLUENCE ON RESEARCH SKILLS DEVELOPMENT AND INNOVATION CAPACITY AMONG BUSINESS EDUCATION STUDENTS IN NIGERIA

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Abstract

This study investigated the influence of artificial intelligence (AI) literacy on research skills development and innovation capacity among Business Education students in Nigeria. The study was guided by two objectives, with corresponding research questions and hypotheses formulated to direct the investigation. A descriptive survey research design was adopted, with a population of 12,000 undergraduate business education students across public universities in Nigeria. Using multi-stage sampling, a sample of 400 students was selected, while 380 valid responses were analyzed. Data were collected with a structured questionnaire titled Artificial Intelligence Literacy, Research Skills Development, and Innovation Capacity Questionnaire (AILRSDICQ), validated by experts and tested for reliability, yielding an overall Cronbach's alpha coefficient of 0.81. Descriptive statistics (mean and standard deviation) were used to answer the research questions, while simple linear regression tested the hypotheses at the 0.05 significance level. Findings revealed that AI literacy significantly and positively influenced students' research skills development, enhancing their critical and creative thinking, confidence, and effective use of AI tools. Similarly, AI literacy was found to have a strong positive relationship with students' innovation capacity, equipping them with creativity, problem-solving abilities, and entrepreneurial readiness. However, the study also noted moderate institutional adoption of AI by lecturers and infrastructural challenges that limit full-scale implementation. It was concluded that AI literacy is essential for fostering both research competencies and innovation capacity among business education students in Nigeria. The study recommended curriculum integration of AI literacy, lecturer capacity building, infrastructural support, and ethical orientation to maximize the transformative potential of AI in higher education.

Keywords: artificial intelligence literacy, business education, innovation capacity, Nigeria, research skills development

Introduction

Artificial intelligence (AI) has emerged as one of the most transformative technologies of the 21st century, fundamentally reshaping the global landscape across multiple domains such as education, business, research, and innovation. In education, AI is revolutionizing teaching and learning processes through adaptive learning platforms, intelligent tutoring systems, and data-driven instructional strategies that personalize learning experiences for students. Within the business sector, AI drives operational efficiency, enhances decision-making through predictive analytics, and creates new models of customer engagement and service delivery. In the realm of research, AI facilitates advanced data analysis, accelerates scientific discovery, and supports complex problem-solving tasks that were previously unattainable through traditional methods. Moreover, in innovation, AI serves as a catalyst for creativity and technological advancement, fostering the development of novel products, services, and solutions to address emerging societal challenges. Collectively, these transformative applications highlight AI's pivotal role as a driver of global change, shaping not only how individuals learn and work but also how institutions and societies evolve in an increasingly digital and knowledge-driven world.

Its growing ubiquity across industries reflects the central role of digital transformation in preparing individuals and institutions for the demands of the knowledge economy. In higher education, AI literacy is increasingly acknowledged as a crucial competency that enables students to understand, evaluate, and interact effectively with AI-driven systems (Long & Magerko, 2020; Brynjolfsson & McAfee, 2017). Beyond mere awareness, AI literacy encompasses the capacity to apply AI tools to academic tasks, professional engagements, and innovation processes, thereby positioning it as a strategic skill for the 21st-century workforce (Ng, 2021). For business education students, who must navigate complex problems in management, entrepreneurship, and applied research, AI literacy is no longer optional but essential for building research productivity, critical thinking, and innovation capacity (Afo, Okanazu, Gladys, & Ekanem, 2024; Onwubuya, Amobi, & Atah, 2025).

Globally, higher education systems are under increasing pressure to realign curricula with the competencies required in digital economies. Technologies such as machine learning, natural language processing, data analytics, and intelligent tutoring systems are now central to academic inquiry and professional practice (Jordan & Mitchell, 2015). The integration of AI in education is reshaping learning environments by providing opportunities for automating routine tasks, analyzing large volumes of data, supporting literature reviews, and enhancing decision-making processes (Zawacki-Richter, Marín, Bond, & Gouverneur, 2019). These affordances underscore why the notion of "AI literacy" has gained prominence in academic discourse. It includes technical knowledge of AI systems, practical ability to apply them in problem-solving, and ethical awareness regarding their societal implications (Holmes, Bialik, & Fadel, 2021; Olom & Atah, 2025). In this regard, AI literacy extends beyond digital competence, functioning as a composite skill that connects technological proficiency with innovation and adaptability in the workplace (Ng, 2021; Ingwe, Abang, & Atah, 2025).

In the Nigerian context, the integration of AI into higher education is still at a formative stage, even though the broader economy has witnessed a rapid expansion in digital technologies (Okolie, Igwe, Nwosu, & Ogbuanya, 2023). Business education, with its traditional emphasis on entrepreneurship, managerial decision-making, and applied research, is particularly well positioned to benefit from AI literacy. The rising challenge of youth unemployment, coupled with economic uncertainty, necessitates a paradigm shift in how students are trained to engage with technology-driven problem-solving (Okolie & Yaroson, 2019). Scholars such as Agbogo, Uju, Atah, and Idike (2024) have noted that Nigerian higher education must strengthen students' digital and research skills to prepare them for the dynamics of a globalized labor market. Similarly, Atah, Akeke, Ajuluchukwu, Aderibigbe, Wonah, Udayi, Nwannunu, Olabisi, Anthony, Ititim, Godwin, Nnaji, Ben, and Ogbeche (2023) emphasized that technology integration in Nigerian education is not merely an academic choice but a developmental imperative for national competitiveness.

Research skills development is one domain where AI literacy can make transformative contributions. Tools such as AI-powered plagiarism detection systems, literature mapping software, and advanced statistical analysis platforms significantly improve the efficiency and reliability of academic research (Luckin, Holmes, Griffiths, & Forcier, 2016). Students who are literate in AI applications demonstrate enhanced capacity to identify relevant literature, synthesize information, and apply methodological rigor in their projects (Holmes et al., 2021). However, in Nigeria, access to such tools is often limited by infrastructural constraints, digital divides, and insufficient institutional investment (Okolie et al., 2023). Atah, Akeke, Ushie, Nwannunu, Anthony, Olabisi, Nnaji, Udayi, Wonah, Aderibigbe, Anthony, and Ajuluchukwu (2023) similarly identified systemic barriers—including poor internet connectivity, lack of training, and inadequate policy direction—that prevent students from fully leveraging AI in their academic endeavors. This implies

that while Nigerian students recognize the importance of AI literacy, their capacity to translate awareness into practice remains constrained.

Innovation capacity, defined as the ability to generate, adopt, and implement new ideas or processes, is another crucial area associated with AI literacy. Research indicates that students who are AI-literate tend to demonstrate stronger creativity, adaptability, and problem-solving abilities, both in academic and entrepreneurial contexts (Chen, Zou, & Xie, 2020). For business education students, innovation is not only an academic goal but also a determinant of employability and entrepreneurial success. Chukwurah, Ben, Atah, Wonah, Idike, and Ingwe (2023) noted that innovation-driven practices are vital for ensuring that Nigerian graduates can contribute to sustainable development and economic competitiveness. Yet, the gap between AI adoption in developed economies and in Nigeria underscores a digital divide that threatens to widen existing inequalities in educational outcomes and labor market readiness (Adegbite, Oyelere, & Omotayo, 2022). Akeke, Atah, Ushie, and Ingwe (2024) further emphasized the need for policy reforms and institutional strengthening to ensure that AI literacy becomes embedded in Nigeria's higher education curricula.

Several empirical studies reinforce the importance of AI integration in fostering transformation within higher education. Zawacki-Richter et al. (2019) demonstrated that AI tools improve personalized learning, expand access to scholarly resources, and promote independent inquiry. Similarly, Ng (2021) found that AI literacy positively correlates with digital competence and innovation mindset, indicating that literacy gaps may directly affect employability in the future workforce. In Nigeria, Afo et al. (2024) reported that the adoption of AI applications in business education improved student engagement and understanding, although challenges such as infrastructural limitations and lack of policy alignment constrained large-scale implementation. More recently, Atah and Alabi (2024, 2025) and Otu, Ogala, Akputu, and Atah (2024) highlighted the importance of institutional support and lecturer preparedness in integrating AI tools effectively into teaching and research. Studies by Uju, Asuo, Chukwurah, and Atah (2024), Ochui, Idike, and Atah (2024), and Akeke, Atah, Undie, Ajuluchukwu, Ikpi, Kolo, Eleng, and Ben (2023) further demonstrate that AI adoption is closely tied to institutional readiness, policy frameworks, and infrastructural investment.

Consequently, the discourse on AI literacy in Nigerian higher education is both timely and necessary. Nwosu, Bessong, and Atah (2022) and Bessong, Atah, and Ititim (2022) have emphasized that business education students must be empowered with AI-related competencies to remain relevant in technology-driven professional spaces. Atah, Idike, Godwin, Isaac, Ititim, Okpe, and Ochui (2023) also noted that building AI literacy contributes directly to research quality, innovation practices, and employability. Therefore, this study situates itself within the broader framework of digital transformation, seeking to establish the influence of AI literacy on two critical competencies research skills development and innovation capacity among business education students in Nigeria. In doing so, it contributes to both global literature on AI in education and the urgent local need to address barriers hindering Nigeria's educational system from fully harnessing the opportunities of AI.

Problem of the Study

Despite the growing importance of artificial intelligence in education and research globally, Nigerian higher education institutions, particularly in Business Education, lag behind in effectively integrating AI literacy into teaching, learning, and research practices (Okolie et al., 2023). Business education students are expected to possess strong research skills and innovation capacity to meet the demands of the 21st-century economy. However, anecdotal evidence and prior studies suggest that many students struggle with research methodology, data analysis, and the application of innovative approaches to problem-solving (Adegbite et al., 2022). While AI tools could serve as catalysts for addressing these gaps, many students remain either unaware of or

under-skilled in AI literacy. Limited access to AI infrastructure, inadequate curriculum design, insufficient lecturer training, and a lack of institutional policies have further compounded the challenge (Afo et al., 2024). Consequently, a significant gap exists between the potential of AI literacy and its practical application in enhancing research and innovation outcomes among Nigerian business education students. If this gap persists, business education graduates may continue to face difficulties in conducting high-quality research and contributing innovative solutions to Nigeria's economic challenges. This situation raises a critical research problem: To what extent does artificial intelligence literacy influence research skills development and innovation capacity among business education students in Nigeria?

Research Questions

The following research questions were raised to guide the study:

1) How does artificial intelligence literacy influence the research skills of business education students in Nigeria?
2) What is the relationship between artificial intelligence literacy and innovation capacity among business education students in Nigeria?

Research Hypotheses

Two null hypotheses were formulated to guide the study and tested at 0.05 level of significance

H_{01}: There is no significant influence of artificial intelligence literacy on the research skills of business education students in Nigeria.

H_{02}: There is no significant relationship between artificial intelligence literacy and innovation capacity among business education students in Nigeria.

Method

This study adopted a descriptive survey research design, The population of the study comprised all undergraduate students offering Business Education in public universities in Nigeria. According to the National Universities Commission (NUC, 2024), there are about 12,000 students enrolled in business education programs across federal and state universities in the country. This population was considered sufficient for examining the role of AI literacy in shaping students' research competencies and innovation capacities. From this population, a sample of 400 business education students was selected using a multi-stage sampling technique. In the first stage, three universities were purposively chosen to ensure institutional diversity—one federal, one state, and one private university. In the second stage, stratified random sampling was used to proportionately select respondents across different levels of study (100–400 level). The determination of the sample size was guided by Krejcie and Morgan's (1970) sampling table, which recommends a representative sample of 380 for the given population.

Data were collected using a structured questionnaire titled *Artificial Intelligence Literacy, Research Skills Development and Innovation Capacity Questionnaire (AILRSDICQ)*, designed by the researcher and validated by three experts in educational measurement and evaluation. The instrument was divided into two sections: Section A, which measured AI literacy (6 items), and Section B, which measured research skills development and innovation capacity (6 items). All items were structured on a four-point Likert scale, ranging from Strongly Agree (4) to Strongly Disagree (1). The validity and reliability of the instrument were established through expert review and pilot testing. Content and face validation were carried out by specialists in business education and information technology, while reliability was tested using a pilot study involving 40 students from a university outside the study sample. Cronbach's alpha analysis produced coefficients of 0.82 for AI literacy, 0.79 for research skills development, and 0.84 for innovation capacity, resulting in an overall reliability coefficient of 0.81. Since these values exceeded the acceptable benchmark of 0.70, the instrument was considered internally consistent and reliable.

For data collection, the researchers administered the questionnaire both electronically (via Google Forms) and physically, with the assistance of trained research assistants in the selected universities. Respondents were given adequate time to complete the questionnaire, and the completed copies were retrieved immediately. Out of 400 questionnaires distributed, 380 were correctly filled and returned, yielding a 95% return rate, which was subsequently used for data analysis. The collected data were coded and analyzed using the Statistical Package for Social Sciences (SPSS, version 25). Descriptive statistics such as mean and standard deviation were employed to answer the research questions, while simple linear regression analysis was used to test the hypotheses at the 0.05 level of significance. The decision rule was that a null hypothesis (H_0) would be rejected if the *p*-value was less than 0.05, and retained otherwise.

Results of the Findings

Research question one

How does artificial intelligence literacy influence the research skills of business education students in Nigeria?

Table 1: Mean Rating of Respondents on Artificial Intelligence Literacy Influence on Research Skills of Business Education Students in Nigeria (N = 380)

S/N	Items on Artificial Intelligence (AI) Literacy	No.	Mean	SD	Decision
1	I have adequate knowledge of how artificial intelligence (AI) tools function.	380	3.15	0.81	Agree
2	I can effectively use AI-powered applications (e.g., ChatGPT, Grammarly, data tools).	380	3.28	0.76	Agree
3	I understand the ethical issues surrounding the use of AI in education and research.	380	3.05	0.88	Agree
4	My lecturers have introduced AI-related content or tools during teaching and learning.	380	2.89	0.91	Agree
5	I am confident in applying AI tools to solve research or academic problems.	380	3.22	0.79	Agree
6	AI literacy enhances my ability to think critically and creatively in business education.	380	3.35	0.73	Agree
	Cluster Mean / SD	380	**3.16**	**0.81**	Agree

Decision Rule: *Mean ≥ 2.50 = Agree; Mean < 2.50 = Disagree.*

The results in Table 1 show that respondents generally agreed that artificial intelligence (AI) literacy positively influences their research skills development. Specifically, the highest-rated item was *"AI literacy enhances my ability to think critically and creatively in business education"* (Mean = 3.35, SD = 0.73), indicating that students perceive AI as a tool for fostering creativity and analytical thinking. Similarly, the ability to effectively use AI-powered applications (Mean = 3.28, SD = 0.76) and confidence in applying AI tools to solve research problems (Mean = 3.22, SD = 0.79) were also strongly rated.Although slightly lower, the item *"My lecturers have introduced AI-related content during teaching and learning"* (Mean = 2.89, SD = 0.91) suggests moderate institutional adoption of AI in instruction. The overall *cluster mean of 3.16 (SD = 0.81)* confirms that respondents agreed AI literacy significantly influences their research skills. This implies that AI literacy improves students' capacity to understand research problems, apply technological solutions, and generate innovative outcomes in business education.

Research question two

What is the relationship between artificial intelligence literacy and innovation capacity among business education students in Nigeria?

Table 2: Mean Rating of Respondents on the Relationship between Artificial Intelligence Literacy and Innovation Capacity among Business Education Students in Nigeria (N = 380)

S/N	Items on Research Skills Development and Innovation Capacity	No.	Mean	SD	Decision
1	I can independently conduct a literature review using digital and AI-supported tools.	380	3.12	0.84	Agree
2	I am skilled in applying research methods and data analysis techniques with technology.	380	3.18	0.79	Agree
3	AI tools improve the accuracy and efficiency of my research work.	380	3.31	0.75	Agree
4	I am able to generate new ideas and solutions through the use of AI in my academic work.	380	3.37	0.72	Agree
5	My innovation capacity has increased as a result of engaging with AI in my studies.	380	3.29	0.77	Agree
6	AI literacy has improved my preparedness for employability and entrepreneurship.	380	3.34	0.74	Agree
	Cluster Mean / SD		**3.27**	**0.77**	Agree

Decision Rule: *Mean ≥ 2.50 = Agree; Mean < 2.50 = Disagree.*

The results in Table 2 indicate that respondents agreed that artificial intelligence (AI) literacy has a strong positive relationship with their innovation capacity. The highest-rated item was *"I am able to generate new ideas and solutions through the use of AI in my academic work"* (Mean = 3.37, SD = 0.72), showing that AI literacy enhances creativity and problem-solving. Likewise, the items *"AI literacy has improved my preparedness for employability and entrepreneurship"* (Mean = 3.34, SD = 0.74) and *"AI tools improve the accuracy and efficiency of my research work"* (Mean = 3.31, SD = 0.75) confirm that AI literacy equips students with competencies relevant to real-world applications. The cluster mean of *3.27 (SD = 0.77)* demonstrates that overall, students perceive AI literacy as a significant contributor to their innovation capacity. This suggests that higher AI literacy not only improves research efficiency but also strengthens students' readiness for entrepreneurship, employability, and innovation-driven practices in business education.

Hypotheses Testing

H_{01}: *There is no significant influence of artificial intelligence literacy on the research skills of business education students in Nigeria.*

H_{02}: *There is no significant relationship between artificial intelligence literacy and innovation capacity among business education students in Nigeria*

Table 3: summary of Regression Results of AI Literacy on Research Skills and Innovation Capacity (N = 380)

Model	Predictor	β (Unstandardized Coef.)	Std. Error	t-value	p-value	R^2	Decision
1 Research Skills ~ AI Literacy	AI Literacy	0.5	0.03	15.07	0.000	0.38	Reject H_{01}
2 Innovation Capacity ~ AI Literacy	AI Literacy	0.58	0.03	21.38	0.000	0.46	Reject H_{02}

The data presented in Table 3 indicate that AI literacy significantly predicts the research skills of business education students (β = 0.50, t = 15.07, p < 0.001). The coefficient suggests that for every one-unit increase in AI literacy, research skills increase by approximately 0.50 units on average. With an R^2 value of 0.38, AI literacy accounts for 38% of the variance in research skills. Consequently, the decision for the first hypothesis was to reject H_{01}, confirming that AI literacy has a significant positive influence on research skills.

Similarly, AI literacy was found to significantly predict students' innovation capacity (β = 0.58, t = 21.38, p < 0.001). This result indicates that a one-unit increase in AI literacy corresponds to an increase of about 0.58 units in innovation capacity. The R^2 value of 0.46 shows that AI literacy explains 46% of the variance in innovation capacity. Accordingly, the decision was to reject H_{02}, affirming that AI literacy has a significant positive relationship with innovation capacity. In summary, the findings clearly demonstrate that AI literacy is a strong and significant predictor of both research skills and innovation capacity among business education students in Nigeria. Its predictive effect is slightly stronger on innovation capacity (R^2 = 0.46) than on research skills (R^2 = 0.38).

Discussion of Findings

Examine the influence of artificial intelligence (AI) literacy on the research skills of business education students in Nigeria.

The findings of this study revealed that artificial intelligence (AI) literacy exerts a positive influence on the research skills development of business education students in Nigeria. Respondents indicated that AI literacy enhances their ability to think critically and creatively, supports effective use of AI-powered applications, and builds confidence in applying AI tools to solve academic and research problems. However, it was also evident that the integration of AI-related content by lecturers remains moderate, suggesting that while students are individually embracing AI, institutional adoption within formal teaching practices is still limited. These outcomes are consistent with the work of Long and Magerko (2020), who reported that undergraduate students with higher levels of AI literacy demonstrated stronger problem-solving and critical thinking abilities. This reinforces the conclusion that AI literacy serves as a foundation for higher-order intellectual competencies. The findings also align with Ng (2021), who emphasized the positive relationship between AI literacy, digital competence, and adaptability—skills that are increasingly vital in a knowledge-driven economy. Students' recognition of AI as a tool for enhancing creativity and analytical thinking supports Ng's assertion that AI literacy contributes to employability and lifelong learning.

In the Nigerian context, the results corroborate Afo et al. (2024), who found that the integration of AI applications into business education improved student engagement and understanding,

although infrastructural and policy barriers constrained full-scale implementation. The observation in this study that lecturers are yet to fully embed AI into instructional practices reflects the same challenge noted by Afo et al. and highlights the need for more deliberate institutional interventions.

Furthermore, the findings partially resonate with Holmes et al. (2021), who argued that effective AI literacy must go beyond technical proficiency to include ethical awareness and understanding of limitations. While this study demonstrated that students are confident in using AI tools to support research and problem-solving, it did not directly address their awareness of ethical implications. This suggests an area where business education curricula could be strengthened to ensure responsible and critical engagement with AI technologies. In summary, the study affirms that AI literacy significantly enhances the research competencies of business education students and aligns with global evidence of AI's transformative impact on learning and innovation. At the same time, the findings underscore the need for improved institutional adoption, pedagogical integration, and ethical orientation in the use of AI in Nigerian higher education.

Assess the relationship between AI literacy and innovation capacity among business education students in Nigeria.

The findings of this study demonstrated that artificial intelligence (AI) literacy has a strong positive relationship with the innovation capacity of business education students in Nigeria. Respondents emphasized that AI literacy enables them to generate new ideas, develop creative solutions to academic problems, and improve the efficiency and accuracy of their research processes. Beyond research, students also perceived that AI literacy enhances their preparedness for entrepreneurship and employability, underscoring its relevance for real-world applications in a rapidly evolving economy. These findings are consistent with the conclusions of Luckin et al. (2016), who reported that AI-powered tools, such as adaptive platforms and analytics, significantly improved students' ability to carry out academic tasks, thereby strengthening their research and innovation capacity. Similarly, Chen et al. (2020) established that AI applications directly foster creativity and innovation by equipping students with the ability to design novel solutions to complex problems. This aligns with the present study's evidence that AI literacy cultivates innovative and entrepreneurial thinking among business education students.

However, the results also resonate with the concerns raised by Okolie et al. (2023), who noted that limited adoption of AI in Nigerian higher education has constrained the development of advanced research competencies and innovative practices. The present study highlights similar challenges, particularly in terms of institutional and infrastructural support, suggesting that while students recognize the benefits of AI literacy, the full potential of AI in promoting innovation may not yet be fully realized in Nigerian universities. Additionally, the findings echo the systematic review by Zawacki-Richter et al. (2019), which concluded that AI applications enhance personalized learning, research productivity, and innovation. At the same time, they emphasized the importance of institutional frameworks to support sustainable integration. This mirrors the present study's implication that greater structural and pedagogical investment is needed to ensure that AI literacy translates into lasting innovation capacity for students. In summary, the study confirms that AI literacy significantly enhances students' innovation capacity, equipping them with the skills, creativity, and entrepreneurial readiness necessary for success in business education and beyond. However, it also highlights the persistent institutional and infrastructural challenges that must be addressed to unlock the full benefits of AI in Nigerian higher education.

Conclusion

This study examined the influence of artificial intelligence (AI) literacy on research skills development and innovation capacity among business education students in Nigeria. The findings revealed that AI literacy plays a significant role in enhancing students' ability to think critically, apply AI-powered tools effectively, and solve academic problems. It was also found to foster

creativity, innovation, and preparedness for employability and entrepreneurship. These results confirm that AI literacy is not only a driver of improved research competencies but also a catalyst for innovation-driven practices in higher education. However, the study also highlighted challenges such as the moderate integration of AI content in teaching and learning by lecturers, and the broader institutional and infrastructural barriers limiting AI adoption in Nigerian universities. Addressing these challenges is crucial to maximize the transformative potential of AI in business education. In conclusion, the study provides evidence that strengthening AI literacy among students is essential for equipping future graduates with the research and innovation capacities required in a technology-driven economy.

Recommendations

Based on the findings, the following recommendations are made:

1. Curriculum Integration: Universities should embed AI literacy as a core component of business education curricula to strengthen students' research and innovation skills.
2. Capacity Building for Lecturers: Lecturers should be trained and equipped to integrate AI tools and applications into their teaching practices to ensure students receive structured exposure to AI in the classroom.
3. Institutional Support and Infrastructure: Educational institutions should invest in digital infrastructure and provide access to AI-powered platforms and tools that enhance learning, research, and innovation.

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