



EVALUATION OF THE APPLICATION OF ARTIFICIAL INTELLIGENCE IN DELIVERING BUSINESS EDUCATION CURRICULUM CONTENT IN NIGERIAN COLLEGES OF EDUCATION

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Abstract

The study assessed the application of artificial intelligence (AI) in delivering Business Education curriculum content in Nigerian Colleges of Education, with a specific focus on Intelligent Tutoring Systems (ITS) and Adaptive Learning Platforms (ALP). The research aimed to evaluate the extent to which these AI tools are integrated into the teaching process and their impact on the quality of business education. Two research questions and two null hypotheses guided the study. A descriptive survey research design was adopted to explore the current state of AI application in business education. The population for the study comprised 34 business educators from the Federal College of Education, Obudu, and the College of Education, Akamkpa, both in Cross River State, Nigeria. Given the manageable size of the population, no sampling technique was applied. The instrument titled "Evaluation of the Application of Artificial Intelligence in Delivering Business Education Curriculum Content Questionnaire (EAAIDBECCQ)" was used for data collection. The instrument was structured to capture the educators' perspectives on the use of AI tools in delivering business education curriculum content. To ensure the instrument's validity, the draft questionnaire was reviewed by three experts in the field, who validated it for face validity. The reliability of the instrument was confirmed through a pilot study conducted outside the study area, which yielded a Cronbach's alpha reliability coefficient of 0.89, indicating a high level of consistency. The researchers personally administered and retrieved all 34 copies of the questionnaire, ensuring a 100% response rate. The collected data were analyzed using descriptive statistics, specifically mean and standard deviation, to answer the research questions. Additionally, an independent t-test was employed to test the null hypotheses at a 0.05 level of significance. The findings revealed that the use of AI, specifically ITS and ALP, in delivering business education content in Nigerian Colleges of Education is currently at a very low level. This underutilization of AI tools suggests a significant gap in the integration of modern technology into the educational process, which may hinder the effectiveness of business education in preparing students for the demands of a rapidly evolving, technology-driven business environment. Based on the findings, the study recommended that educational authorities and stakeholders should organize regular seminars and workshops to train and retrain business educators on the effective use of AI in delivering curriculum content. Such initiatives would not only enhance the educators' technical skills but also improve the overall quality of business education in Nigerian Colleges of Education.

Keywords: application, artificial intelligence, delivering, business education, and curriculum content



Introduction

The integration of Artificial Intelligence (AI) into educational settings has emerged as one of the most transformative innovations of the 21st century, especially in the field of business education. As institutions strive to keep pace with rapid technological advancements, AI offers promising opportunities to reshape teaching methodologies, improve learning outcomes, and ensure that students are better prepared for the demands of a digital economy. Globally, AI has evolved into a strategic tool that not only supports but also enhances the effectiveness of education by enabling personalization, efficiency, and innovation in instructional delivery (Russell & Norvig, 2020; Chen et al., 2020). In Nigeria, and particularly in Cross River State, educators are increasingly acknowledging the urgency of adopting AI-driven pedagogical practices to modernize business education courses, thereby addressing student learning needs as well as the demands of a rapidly changing business environment (Akeke, Atah, Ushie, & Ingwe, 2024; Alabi & Atah, 2024).

AI encompasses a range of technologies designed to perform tasks that typically require human intelligence, such as learning, reasoning, problem-solving, and decision-making. In business education, AI applications have manifested through Intelligent Tutoring Systems (ITS), Adaptive Learning Platforms (ALP), virtual reality simulations, and automated administrative tasks that significantly reduce workload and improve resource management (VanLehn, 2011; Siemens, 2013; Atah & Alabi, 2025a). These tools provide personalized learning experiences, enhance student engagement, and allow instructors to track learning performance in real time. The relevance of AI to teaching business education courses in Cross River State is underscored by the urgent need for higher education institutions to align their curricula with global trends while addressing local challenges such as inadequate teaching resources, insufficient infrastructure, and high student-teacher ratios (Olom & Atah, 2025; Regina Agbogo, Uju, Atah, & Idike, 2024).

The potential of AI lies in its capacity to tailor course content to individual learning styles, thereby improving comprehension and retention rates. Intelligent Tutoring Systems, for example, replicate the functions of human tutors by offering personalized feedback and adaptive learning pathways, thus ensuring that each student progresses at an appropriate pace (VanLehn, 2011; Atah & Alabi, 2025b). Likewise, Adaptive Learning Platforms continuously analyze performance data, modifying instructional strategies to address knowledge gaps and learning preferences (Pane et al., 2014; Ingwe, Abang, & Atah, 2025). These innovations are particularly critical for business education, which requires students to develop not only theoretical knowledge but also practical competencies in financial analysis, entrepreneurship, digital marketing, and strategic management (Chukwurah, Ben, Atah, Wonah, Idike, & Ingwe, 2023).

In Nigeria, several studies have highlighted both the progress made and the persistent challenges facing AI integration in education. While early signs of AI adoption are visible in universities and colleges of education, barriers such as inadequate digital infrastructure, high implementation costs, lack of teacher training, and resistance to pedagogical innovation remain major obstacles (Kumar et al., 2019; Zhang et al., 2020; Ochui, Idike, & Atah, 2024). The situation in Cross River State reflects these national trends. Institutions struggle with limited funding, erratic electricity supply, and poor internet connectivity, which constrain the full deployment of AI-enabled platforms (Nwosu, Bessong, & Atah, 2022; Bessong, Atah, & Ititim, 2022). Additionally, concerns over data privacy, ethical usage, and equitable access to digital resources further complicate adoption efforts (Floridi, 2019; Onwubuya, Amobi, & Atah, 2025).

Despite these challenges, the benefits of integrating AI into business education in Cross River State are considerable. Personalized learning experiences and enhanced student engagement can improve learning outcomes and better prepare students for a technology-driven



economy (Atah & Alabi, 2024; Atah et al., 2023a). Furthermore, AI-powered systems can enhance instructional efficiency by automating routine administrative functions, freeing educators to focus more on teaching and mentorship. Beyond classroom efficiency, AI has the potential to bridge the gap between theoretical instruction and the practical skills required in today's dynamic business environment. For example, AI-powered simulations and virtual reality applications provide students with immersive experiences that mimic real-world business challenges, thereby strengthening entrepreneurial skills and decision-making abilities (Otu, Ogala, Akputu, & Atah, 2024; Atah & Alabi, 2025a).

Local scholarship has also emphasized the role of digital technologies and AI in strengthening curriculum delivery. Studies by Akeke et al. (2023), Atah, Idike, Godwin, Isaac, Ititim, Okpe, and Ochui (2023), and Uju, Asuo, Chukwurah, and Atah (2024) show that while digital adoption remains uneven, there is increasing recognition of AI's potential to address gaps in teaching and learning. These studies highlight the importance of investment in infrastructure, professional development for lecturers, and policy support to enable broader AI adoption. In particular, collaborative efforts involving government agencies, private sector actors, and academic institutions are critical to creating an enabling environment for sustainable integration (Atah, Akeke, Ajuluchukwu, Aderibigbe, Wonah, Udayi, Nwannunu, Olabisi, Anthony, Ititim, Godwin, Nnaji, Ben, & Ogbecbe, 2023).

Therefore, while the current level of AI adoption in Cross River State's Colleges of Education may be limited, the opportunities for transformative change remain substantial. This study responds to both the global trend of AI-driven education and the local need for curriculum modernization. By evaluating the use of Intelligent Tutoring Systems and Adaptive Learning Platforms, identifying the challenges faced, and exploring potential strategies for wider adoption, this research aims to provide empirical insights into how AI can enhance the delivery of business education curriculum content in Nigerian Colleges of Education. Such insights are timely and critical, as they align with national aspirations for digital transformation, global competitiveness, and sustainable educational development (Atah & Alabi, 2025b; Atah et al., 2023b).

Statement of the Problem

The integration of artificial intelligence (AI) into delivery business education curriculum in Nigerian Colleges of Education presents a promising yet challenging frontier in the pursuit of educational excellence and relevance. Despite the potential benefits of AI, such as personalized learning experiences, enhanced engagement, and streamlined administrative processes, there is a notable lack of comprehensive analysis regarding its effective implementation in these institutions. The problem arises from several interconnected issues: **Insufficient Infrastructure and Resources:** Many colleges in Cross River State face significant limitations in technological infrastructure and resources, which are crucial for the successful deployment of AI tools. This includes inadequate access to advanced hardware, software, and reliable internet connectivity necessary for AI applications (Kumar et al., 2019). **Limited Expertise and Training:** There is a shortage of trained personnel with expertise in AI and its applications in education. Educators and administrative staff often lack the necessary skills and knowledge to effectively integrate and utilize AI technologies within the curriculum, which hampers the potential benefits of these tools (Chen et al., 2020). **Financial Constraints:** The financial burden associated with acquiring, implementing, and maintaining AI technologies poses a significant barrier. Many colleges operate with constrained budgets, which affects their ability to invest in the necessary AI infrastructure and training programs (Zhang et al., 2020). **Resistance to Technological Change:** There is often resistance to adopting new technologies among educators and administrators. This reluctance can stem from a preference for traditional teaching methods, skepticism about the efficacy of AI tools, and concerns



over the implications for existing teaching practices and job roles (Floridi, 2019). Ethical and Privacy Concerns: The use of AI in education raises concerns about data privacy, security, and the ethical implications of automated decision-making. Ensuring the protection of student data and addressing ethical issues are critical to gaining trust and facilitating the effective use of AI in educational settings (Russell & Norvig, 2020). In light of these issues, there is a pressing need to conduct a thorough analysis of how AI is currently being used in teaching business education courses at colleges in Cross River State. This analysis should explore the opportunities AI presents, identify the challenges faced by institutions, and propose strategies to overcome these obstacles to optimize the integration of AI in business education.

Research Questions

The following research questions guided the study.

1. To what extent are Intelligent Tutoring Systems (ITS) used in delivering business education curriculum content in Nigerian education colleges?
2. To what extent are adaptive learning platforms (ALP) used in delivering business education curriculum content in Nigerian colleges of education?

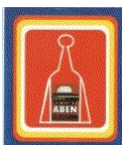
Research Hypotheses

The following null hypotheses are stated for this study:

1. There is no significant difference in the mean ratings of male and female business educators on the extent to which Intelligent Tutoring Systems (ITS) are used in delivering business education curriculum content in Nigerian colleges of education.
2. There is no significant difference in the mean ratings of business educators on the extent to which adaptive learning platforms (ALP) are used in delivering business education curriculum content in Nigerian colleges of education based on experience.

Methods

This study adopted the descriptive survey research design. Survey research design possesses great relevance for adoption when a researcher intends to describe conditions that already exist and intends to induce reasons for their prevalence. The population of the study comprised thirty-four business educators in Federal Colleges of Education Obudu and College of Education Akamkpa in Cross River State. Since the population was sizeable, there was no sampling. A researcher-developed questionnaire titled "Evaluation of the Application of Artificial Intelligence in Delivering Business Education Curriculum Content Questionnaire (EAAIDBECCQ)" was used to collect data. The structured questionnaire was used in the study with a four-point response scale with the following options: Very High Extent (VHE); High Extent (HE); Low Extent (LE); and Very Low Extent (VLE). To ascertain the validity of the instrument, the draft of the instrument was given to three experts, two from the Department of Business Education at the University of Calabar. A test-retest method was used to establish the reliability of the instrument. The reliability of the instrument was achieved through a pilot study, and the data from the pilot study yielded coefficient values of 0.89, suggesting a high reliability. The researcher administered and retrieved 34 copies of the instrument, which were used for analysis. The data collected for this study were analyzed using mean and standard deviation to answer the research questions, while an independent t-test was used to test the null hypothesis at the 0.05 level of significance. Using the mean, a benchmark of 2.5 was used as a limiting score for acceptance, while any score below 2.5 was rejected. On the other hand, a null hypothesis was accepted if the t-calculated value is less than the t-critical value. Where the reverse is the case, the null hypothesis was rejected.



Results

Research Question 1

To what extent are Intelligent Tutoring Systems (ITS) used in delivering business education curriculum content in Nigerian education colleges?

Table 1: Mean and Standard Deviation Scores of Responses on the extent to which Intelligent Tutoring Systems (ITS) are used in delivering business education curriculum content in Nigerian education colleges. (n= 34)

S/N	The following Intelligent Tutoring Systems (ITS) are used in delivering business education curriculum content.	\bar{x}	SD	Decision
1.	Knowledge-Based ITS	1.43	0.52	Very Low Extent
2.	Peer Tutoring Systems	1.51	0.65	Very Low Extent
3.	Simulated Tutor Systems	1.42	0.82	Very Low Extent
4.	Competency-Based ITS	1.39	0.64	Very Low Extent
5.	Feedback-Based ITS	1.48	0.79	Very Low Extent
	Grand Mean	1.45	0.68	Very Low Extent

The results in Table 1 show that the mean scores vary from 1.39 to 1.51. This demonstrates that the respondents gave very poor ratings to all of the statements in items 1–5. Data in Table 1 also demonstrate that the grand mean for the entire item is 1.45, which falls within the response option of very low extent. The grand mean score of 1.45 indicates that respondents ranked the items to a very low level. This demonstrates that Intelligent Tutoring Systems (ITS) are being used to a restricted extent in Nigerian education colleges to offer business education curriculum content. The standard deviation value of 0.65 suggests that the replies were consistent.

Research Question 2:

To what extent are adaptive learning platforms (ALP) used in delivering business education curriculum content in Nigerian colleges of education?

Table 2: Mean and Standard Deviation Scores of Responses on the extent to which Adaptive Learning Platforms (ALP) are Used in Delivering Business Education Curriculum Content in Nigerian Colleges of Education (N =34)

S/N	The following adaptive learning platforms (ALP) are used in delivering business education curriculum content.	\bar{x}	SD	Decision
6.	Personalized Learning Platforms	0.56	0.61	Very Low Extent
7.	Interactive Content Platforms	1.79	0.45	Very Low Extent
8.	Adaptive Assessment Platforms	0.57	0.55	Very Low Extent
9.	Skill Development Platforms	1.91	0.71	Very Low Extent
10.	Collaborative Learning Platforms	0.77	0.66	Very Low Extent
	Grand Mean	1.12	0.60	Very Low Extent

Table 2 shows that the average scores vary from 0.56 to 1.91. This demonstrates that respondents gave very poor ratings to all of the propositions in items 6–10. Data in Table 2 also



demonstrate that the grand mean for the entire item is 1.12, which falls within the answer option of very low extent. The grand mean score of 1.12 indicates that respondents gave poor ratings on the items. Adaptive learning platforms (ALP) are rarely used to deliver business education curriculum at Nigerian institutes of education. The standard deviation value of 0.57 suggests that the responses were consistent.

Hypotheses

Ho₁: There is no significant difference in the mean ratings of male and female business educators on the extent to which Intelligent Tutoring Systems (ITS) are used in delivering business education curriculum content in Nigerian colleges of education.

Table 3: Analysis of t-test on the Mean and Standard Deviation Responses of Business Educators on the extent to which Intelligent Tutoring Systems (ITS) are used in delivering business education curriculum content in Nigerian colleges of education Based on Gender.

Respondents	N	\bar{x}	S ²	df	t.cal	t.crit	a	Remark
Male	24	1.36	0.44	32	-3.067	2.021	.05	Retain Ho
Female	09	1.01	0.61					

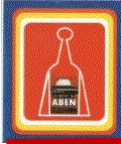
The t-test table 3 shows that t-cal (-3.067) is less than t-crit (2.021), hence Ho should be retained. The null hypothesis is maintained, which states that there is no significant difference in the mean ratings of male and female business educators on the extent to which Intelligent Tutoring Systems (ITS) are used in delivering business education curriculum content in Nigerian colleges of education.

Ho₂: There is no significant difference in the mean ratings of business educators on the extent to which adaptive learning platforms (ALP) are used in delivering business education curriculum content in Nigerian colleges of education based on experience.

Table 4: Analysis of t-test on the Mean and Standard Deviation Responses of Business Educators on the Extent to Which Adaptive Learning Platforms (ALP) is used in Teaching Business Education Courses Based on Experience.

Location	N	\bar{x}	S ²	df	t.cal	t.crit	a	Remark
Below 10 years of experience	18	1.73	0.62	36	-0.082	2.017	.05	Retain Ho
Above 10 years of Experience	16	1.74	0.64					

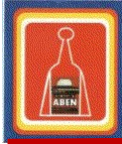
The t-test table 4 shows that t-cal (-0.082) is less than t-crit (2.017), hence Ho should be retained. The null hypothesis is kept, implying that there is no significant difference in the mean ratings of business educators on the extent to which adaptive learning platforms (ALP) are employed to provide business education curriculum content in Nigerian colleges of education based on experience.



Discussion

The findings of the study revealed that the use of artificial intelligence (AI), specifically intelligent tutoring systems (ITS), in delivering business education curriculum content in Nigerian colleges of education is currently at a very low level. This limited integration of ITS into the teaching process has significant implications for the quality of education provided to business education students. The integration of Intelligent Tutoring Systems (ITS) into the business education curriculum in Nigerian colleges of education offers numerous advantages. From personalized learning and real-time feedback to improved student engagement and efficiency for educators, ITS has the potential to revolutionize the way business education is delivered. While there are challenges in terms of infrastructure and teacher training, the long-term benefits of ITS can lead to a more effective and accessible education system that prepares students for success in the competitive business landscape. The absence of ITS integration is consistent with Chen et al.'s (2020) findings that AI adoption in education, particularly in poor countries such as Nigeria, is still in its early stages. One of the most important components of ITS, virtual teachers, are not being used to deliver real-time, accurate responses to student requests. This is a critical gap, as real-time input is required for optimal learning. Immediate, accurate comments enable students to clarify questions, fix errors, and improve their comprehension of the content. Without this, students in business education classes miss out on opportunities to expand their knowledge through timely corrections and direct feedback. Zhang et al.'s (2020) study found that one of the most important benefits of ITS is its ability to customize instruction to individual learners. Each student in a business education program has unique learning needs, strengths, and weaknesses. ITS can analyze student performance and provide tailored lessons, ensuring that learners focus on areas where they need the most improvement. This personalized learning approach enhances student comprehension of complex business concepts, which are often difficult to grasp through traditional, one-size-fits-all teaching methods. Kumar et al. (2019) revealed that ITS systems create interactive learning environments that keep students engaged. Business education can be highly practical, requiring case studies, problem-solving, and real-world simulations. ITS can simulate these experiences, allowing students to engage with content in a hands-on way, which leads to a better understanding of how business principles are applied in real scenarios. Increased engagement through ITS can result in higher motivation, retention rates, and overall satisfaction among students. The integration of Intelligent Tutoring Systems (ITS) in delivering business education curriculum content in Nigerian colleges of education holds significant potential to transform the teaching and learning experience. ITS leverages artificial intelligence (AI) to provide personalized, adaptive instruction and real-time feedback, which are essential for modern education. The importance of ITS in business education is multifaceted and can lead to both improved student outcomes and enhanced instructional efficiency.

The findings the second research question reveal that adaptive learning platforms (ALP) are currently being used to a very low extent in delivering business education curriculum content in Nigerian Colleges of Education. Adaptive learning platforms (ALP) leverage artificial intelligence and advanced data analytics to personalize learning experiences based on individual student performance, learning styles, and needs. However, the limited adoption of this technology highlights key challenges and missed opportunities in enhancing the quality of business education in Nigeria. Despite the proven benefits of adaptive learning platforms in educational settings, their use in Nigerian Colleges of Education remains underdeveloped. This limited adoption could be attributed to several factors, including inadequate infrastructure, lack of technical expertise, financial constraints, and a general reluctance to embrace technological innovations in education. As noted by Olanukanmi (2020), Nigeria's education system has not yet fully capitalized on the



potential of artificial intelligence-driven educational tools due to a lack of localized expertise and resources. This suggests that the use of ALP in business education is similarly constrained, as institutions are often under-resourced and unable to implement advanced technological systems effectively. The limited use of ALP in delivering business education content means that students are missing out on personalized, adaptive learning experiences that could significantly improve their academic performance. According to Pane et al. (2014), adaptive learning platforms provide students with customized learning paths based on their progress and learning style, which helps them focus on areas where they need more practice. In business education, where topics such as finance, economics, and management require in-depth understanding and continuous practice, the absence of adaptive learning systems diminishes the potential for students to receive personalized instruction tailored to their specific needs. By not fully utilizing ALP, Nigerian business education students are denied the opportunity to engage in a more flexible and interactive learning process. ALPs offer dynamic content adjustments based on real-time data, helping learners master concepts at their own pace (Kumar et al., 2019). This adaptive process allows students to build confidence in their abilities, leading to better retention and understanding of complex business topics.

The limited use of ALP, therefore, restricts students' opportunities to excel in business education, especially in areas requiring mastery through continuous practice and reinforcement. Adaptive learning platforms not only benefit students but also enhance the effectiveness of educators by providing data-driven insights into student performance. Educators can use the data generated by ALP to identify learning gaps and trends, allowing them to adjust their teaching strategies accordingly (Siemens, 2013). However, in the absence of such platforms, educators may continue relying on traditional instructional methods, which are often less effective in meeting the diverse needs of students. ALP can also help alleviate the administrative burden on teachers by automating routine tasks, such as grading and progress tracking, allowing educators to spend more time on personalized teaching interventions. The underutilization of ALP in Nigerian Colleges of Education means that these efficiencies are not being realized, resulting in a teaching approach that may not fully accommodate the growing number of students or the increasing complexity of business education content. The low level of ALP integration in Nigerian Colleges of Education aligns with findings by Zhang et al. (2020), which indicate that the adoption of AI-driven technologies in education is often hindered by financial and infrastructural barriers. In many cases, the implementation of such technologies requires significant investment in hardware, software, and teacher training. Without sufficient government support or institutional investment, many colleges struggle to adopt ALP or other AI-driven educational tools. Additionally, there may be a lack of awareness and understanding among educators about the potential benefits of ALP. Training and professional development in the use of adaptive learning technologies are crucial to their successful implementation (Floridi, 2019). Educators must be equipped not only with the tools but also with the knowledge to effectively integrate ALP into their teaching practices. The absence of such training programs further limits the extent to which ALP is used in business education.

Conclusion

The findings of this study highlight the underutilization of intelligent tutoring systems (ITS) and adaptive learning platforms in delivering business education curriculum content in Nigerian Colleges of Education. While these platforms have the potential to transform teaching and learning by offering personalized, data-driven instruction, their limited use suggests that there are significant infrastructural, financial, and educational barriers to their full adoption. Addressing these challenges will be critical to unlocking the potential of ALP in improving business education outcomes in Nigeria.



Recommendations

Based on the findings of the study, the following recommendations were made:

1. The federal government and its relevant agencies should guarantee that there is enough and ongoing understanding of the relevance of using intelligent tutoring systems (ITS) for delivering business education curriculum content.
2. Colleges and universities should regularly set aside rooms for seminars and workshops where business educators can be effectively trained and retrained on the use of adaptable learning platforms (ALP) in delivering business education course content.

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