



ADOPTION OF ARTIFICIAL INTELLIGENCE (AI) TECHNOLOGIES AND INSTRUCTIONAL QUALITY AMONG BUSINESS EDUCATION LECTURERS IN COLLEGES OF EDUCATION IN ANAMBRA STATE, NIGERIA

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ABSTRACT

This study examined the adoption of artificial intelligence (AI) technologies and instructional quality among business education lecturers in Colleges of Education in Anambra State, Nigeria. The study determined the extent of AI adoption and examined the relationship between AI adoption and instructional quality. A descriptive survey research design was adopted. The population comprised business education lecturers from two public Colleges of Education in Anambra State, and the entire population was studied. Data were collected using a structured, validated questionnaire. Reliability was established using the Cronbach Alpha method. Mean and standard deviation were used to answer the research questions, while Pearson Product Moment Correlation was used to test the hypotheses at the 0.05 level of significance. The findings indicated a moderate level of AI adoption among lecturers and a positive influence of AI use on instructional practices. The results also revealed a significant positive relationship between AI adoption and instructional quality, suggesting that increased integration of AI technologies improves teaching effectiveness. The study concluded that although lecturers demonstrate awareness of AI technologies, their integration into instructional practice remains limited due to infrastructural, technical, and institutional constraints. It recommended increased investment in AI infrastructure, continuous professional development, and clear institutional policies to support effective and ethical integration of AI in teaching.

Keywords: Artificial intelligence, Artificial intelligence technologies, instructional quality, Business Education, adoption.

Introduction

Artificial Intelligence (AI) has emerged as a dominant force in the transformation of contemporary educational systems (Dwivedi et al., 2023; Russell & Norvig, 2021). It encompasses a range of computational techniques that enable systems to perform cognitive functions such as learning, reasoning, pattern recognition, and adaptive decision-making. Within educational contexts, AI facilitates personalized learning environments, automated and scalable assessment systems, intelligent content generation, and data-driven instructional feedback. These capabilities position AI as a critical instrument for enhancing pedagogical effectiveness and optimizing learning outcomes.

Since 2020, the integration of AI into education has expanded significantly across multiple instructional domains. Technologies such as intelligent tutoring systems, learning analytics



platforms, and generative AI models are increasingly embedded in teaching and learning processes. These tools support lecturers in structuring instructional content, monitoring learner progression, and delivering timely and targeted feedback. Empirical evidence suggests that AI integration contributes to improved instructional efficiency, increased student engagement, and enhanced learning performance when effectively aligned with pedagogical objectives and institutional capacity.

The COVID-19 pandemic served as a major catalyst for the accelerated adoption of digital technologies in education. Institutions rapidly transitioned to online and blended learning modalities to sustain academic continuity. While this shift underscored the strategic importance of technology in educational delivery, it also exposed structural deficiencies, including inadequate infrastructure, limited digital competence among lecturers, and weak institutional preparedness. These systemic challenges continue to shape the adoption and effective utilization of advanced technologies such as AI, particularly within developing educational contexts.

In Nigeria, Colleges of Education serve as foundational institutions for the preparation of professional teachers, including business education lecturers. These lecturers are responsible for imparting both theoretical knowledge and practical competencies in areas such as accounting, office technology, entrepreneurship, and business management. The integration of AI into instructional practices presents significant opportunities for improving lesson planning, enhancing assessment accuracy, and facilitating timely and individualized feedback. Existing studies indicate that the use of digital technologies contributes to improved teaching effectiveness and increased student engagement within Nigerian tertiary institutions.

Despite these prospects, the adoption of AI technologies within Colleges of Education remains relatively low. Empirical evidence indicates limited usage among lecturers and minimal integration into core instructional activities. This situation is attributed to a range of interrelated constraints, including inadequate ICT infrastructure, restricted access to AI-enabled tools, insufficient professional training, and the absence of coherent institutional policy frameworks. These limitations significantly constrain lecturers' capacity to effectively integrate AI into teaching and learning processes.

Instructional quality represents a central determinant of educational effectiveness and refers to the extent to which teaching practices facilitate meaningful learning outcomes. It encompasses clarity of instructional objectives, coherence in content delivery, active learner engagement, alignment of assessment strategies, and the provision of timely feedback. The integration of technology into instructional processes enhances these dimensions by promoting interactivity, improving clarity, and supporting deeper cognitive engagement. AI further strengthens instructional quality through the automation of routine tasks, the development of adaptive learning systems, and the facilitation of data-informed pedagogical decision-making.

Within the domain of business education, AI assumes particular relevance due to the applied nature of the discipline. AI-driven tools enable the use of simulations, real-time feedback mechanisms, and digital learning environments that reflect contemporary business practices. These applications enhance experiential learning and support the development of competencies required in modern workplaces, thereby improving students' practical readiness and employability.

In Anambra State, available evidence suggests that while business education lecturers demonstrate a degree of awareness of AI technologies, their level of practical adoption remains



low. This limited utilization is linked to deficiencies in digital competence, inadequate institutional support, and the absence of structured professional development opportunities. Consequently, the potential of AI to enhance instructional quality within this context remains underexploited.

A persistent challenge in instructional delivery lies in addressing the diverse learning needs of students. Conventional teaching approaches often adopt uniform strategies that do not adequately accommodate variations in learners' abilities, preferences, and learning pace. AI technologies provide mechanisms for personalized learning through continuous monitoring of student performance and adaptive instructional adjustments. However, while students increasingly engage with AI tools independently, lecturers' instructional practices have not evolved correspondingly, resulting in a disconnect between teaching approaches and emerging learning behaviors.

This disconnect underscores the need for a systematic examination of the relationship between AI adoption and instructional quality. A comprehensive understanding of how lecturers engage with AI technologies is essential for informing policy development, institutional planning, and professional training initiatives aimed at improving teaching effectiveness. Consequently, this study examines the adoption of AI technologies and their relationship with instructional quality among business education lecturers in Colleges of Education in Anambra State.

Statement of the Problem

Artificial intelligence has become a major driver of change in education, with strong capacity to improve instructional quality through enhanced lesson planning, automated assessment, and timely feedback. However, the integration of AI technologies into instructional practices among business education lecturers in Colleges of Education in Anambra State remains limited and inconsistent. Although lecturers demonstrate some level of awareness of AI technologies, this awareness has not translated into effective and sustained use in teaching, assessment, and feedback. In many cases, knowledge of AI remains theoretical and does not extend to practical classroom application. This gap is linked to several constraints, including inadequate infrastructure, limited professional competence, restricted access to AI tools, and lack of clear institutional policies. Low adoption of AI has direct implications for instructional quality. It limits the use of interactive and adaptive teaching strategies, reduces responsiveness to diverse learner needs, and contributes to delays in feedback and inefficiencies in instructional delivery. As a result, the potential of AI to enhance teaching effectiveness remains largely underutilized. At the same time, students increasingly use AI tools for independent learning, creating a mismatch between traditional teaching approaches and modern learning practices. This disparity affects the relevance and effectiveness of instruction. Despite existing studies on AI awareness and usage, there is limited empirical evidence on how AI adoption influences instructional quality among business education lecturers in Colleges of Education in Anambra State. This gap restricts informed decision-making on policy development, institutional planning, and professional training. Therefore, the problem of this study is the limited and inconsistent adoption of AI technologies among business education lecturers and the lack of clear empirical evidence on how such adoption affects instructional quality in Colleges of Education in Anambra State.



Research Questions

The following research questions guided the study:

1. To what extent do business education lecturers adopt artificial intelligence technologies in teaching in Colleges of Education in Anambra State?
2. What is the relationship between artificial intelligence adoption and instructional quality among business education lecturers in Colleges of Education in Anambra State?

Hypotheses

The following null hypothesis were tested at 0.05 level of significance:

1. There is no significant relationship between artificial intelligence adoption and instructional quality among business education lecturers in Colleges of Education in Anambra State.
2. Artificial intelligence adoption has no significant influence on instructional quality among business education lecturers in Colleges of Education in Anambra State.

Method

This study employed a descriptive survey research design to investigate the adoption of artificial intelligence (AI) technologies and instructional quality among business education lecturers in Colleges of Education in Anambra State, Nigeria. The population of the study comprised 81 business education lecturers drawn from two public Colleges of Education in Anambra State, namely Federal College of Education (Technical), Umuze and Nwafor Orizu College of Education, Nsugbe. Given the relatively small and manageable size of the population, a census approach was adopted. Data were collected using a structured questionnaire developed by the researcher based on the objectives of the study and insights from the reviewed literature. The instrument consisted of two sections. Section A elicited demographic information from respondents, while Section B comprised items organized into clusters corresponding to the core variables of the study, including awareness of AI technologies, extent of AI adoption, perceived impact, barriers to adoption, and instructional quality. The items were structured on a five-point Likert scale ranging from Strongly Agree to Strongly Disagree. The instrument underwent both face and content validation by experts in Business Education to ensure clarity, relevance, and adequacy of item coverage. The reliability of the instrument was established using the Cronbach Alpha technique, which confirmed a satisfactory level of internal consistency among the items. Data collection was conducted through direct administration of the questionnaire by the researcher. The researcher visited the selected institutions, distributed copies of the instrument to respondents, and retrieved the completed questionnaires on the same day. This approach ensured a high response rate and minimized data loss. Data analysis was carried out using both descriptive and inferential statistical methods. Mean and standard deviation were used to answer the research questions by summarizing respondents' ratings and assessing the degree of dispersion. Decision rules based on the real limits of the Likert scale were applied to interpret the mean scores. For hypothesis testing, Pearson Product Moment Correlation and Regression Analysis were employed for the hypothesis one and two respectively at the 0.05 level of significance.



Presentation of Results

Research Question 1: To what extent do business education lecturers adopt artificial intelligence technologies in teaching in Colleges of Education in Anambra State?

Table 1: Respondents mean ratings on the extent lecturers adopt AI technologies in business education teaching N= 81

S/No	Item Statement	Mean	SD	Decision
1.	Frequent use of AI in lesson planning	3.42	0.88	Moderate
2.	Integration of AI-powered multimedia in teaching	3.25	0.90	Moderate
3.	Use of AI for personalized instruction	3.15	0.95	Moderate
4.	AI-driven grading and assessment	3.05	0.85	Moderate
5.	Use of AI chatbots for student queries	2.48	0.92	Low
6.	Incorporation of AI simulations	3.10	0.87	Moderate
7.	Regular tracking of student progress via AI	3.22	0.80	Moderate
8.	AI as part of routine teaching practices	3.12	0.84	Moderate
Cluster Mean		3.10	0.87	Moderate

The findings in Table 1 indicated a moderate extent of AI adoption, with an overall mean of 3.10 and standard deviation of 0.87. Lecturers reported moderate usage in lesson planning, multimedia integration, personalized instruction, and routine tracking of student progress. Low adoption was noted for chatbots and AI-driven simulations, reflecting incomplete integration of AI into daily instructional practices.

Research Question 2: What is the relationship between artificial intelligence adoption and instructional quality among business education lecturers in Colleges of Education in Anambra State?

Table 2: Relationship between AI adoption and instructional quality

Analysis	Statistic	Value	p-value	Interpretation
Pearson Correlation	R	.68	< .001	Strong positive
Coefficient of Determination	R ²	.462	—	46.2% variance explained
Regression Coefficient	B	.68	< .001	Positive effect

The Pearson correlation analysis in Table 2 showed a strong positive relationship ($r = 0.68$, $p = 0.001$) between AI adoption and instructional quality, and regression analysis revealed that 46% of instructional quality can be predicted by AI adoption ($\beta = 0.68$). This indicates that lecturers who adopt AI tools more extensively demonstrate higher-quality lesson planning, delivery, assessment and engagement.

Hypothesis 1: There is no significant relationship between artificial intelligence adoption and instructional quality among business education lecturers in Colleges of Education in Anambra State.

Table 3: Pearson Correlation Analysis of AI Adoption and Instructional Quality

Variables	N	r	df	p-value	Decision
AI Adoption & Instructional Quality	81	.68	79	< .001	Reject H01



The result in Table 1 shows a strong positive relationship between artificial intelligence adoption and instructional quality, $r(79) = .68$, $p < .001$. Since the p-value is less than 0.05, the null hypothesis is rejected. This indicates that AI adoption is significantly associated with instructional quality among business education lecturers in Colleges of Education in Anambra State.

Hypothesis 2: There is no significant influence of Artificial intelligence adoption on instructional quality among business education lecturers in Colleges of Education in Anambra State.

Table 4: Summary of Regression Analysis of AI Adoption on Instructional Quality

Predictor	B	SE	B	t	p	Decision
AI Adoption	0.68	0.08	0.68	8.25	< .001	Reject H02

Model Summary

R	R ²	Adjusted R ²	F	df	p
.68	.462	.455	67.96	(1,79)	< .001

The regression analysis in Table 4 shows that artificial intelligence adoption significantly predicts instructional quality, $F(1,79) = 67.96$, $p < .001$. The model explains 46.2% of the variance in instructional quality ($R^2 = .462$). The standardized coefficient ($\beta = .68$, $t = 8.25$, $p < .001$) indicates a strong positive influence of AI adoption on instructional quality. Therefore, the null hypothesis is rejected. This implies that increased adoption of AI technologies leads to significant improvement in instructional quality among business education lecturers.

Discussion

The findings on research question one indicated that the level of artificial intelligence adoption among business education lecturers is moderate. Lecturers reported engagement with AI applications in core instructional domains such as lesson planning, content delivery, personalized instruction, and student performance monitoring. However, the utilization of more advanced AI-driven tools, including chatbots and simulation systems, remained comparatively low. This pattern suggests that while AI integration has commenced, it has not attained a level of systematic or institutionalized pedagogical application.

This outcome is consistent with extant empirical evidence within the Nigerian higher education context, which consistently reports a divergence between technological awareness and practical utilization. Edeh et al. (2025) observed that although lecturers possess conceptual awareness of AI technologies, their application within instructional processes remains constrained. In a similar vein, Unegbu et al. (2024) reported that AI adoption among business education lecturers in Colleges of Education in Anambra State is largely moderate and limited to foundational instructional activities.

This pattern reflects an intermediate phase within Rogers' Diffusion of Innovation framework, wherein adopters transition beyond awareness but have not yet achieved full implementation. At this stage, adoption is often hindered by contextual constraints rather than cognitive or attitudinal limitations. Structural deficiencies, including inadequate ICT infrastructure, limited access to AI-enabled tools, insufficient professional training, and weak



institutional policy frameworks, continue to impede deeper integration (Akinwale & Taiwo, 2022; Ojo & Adeniran, 2024). Consequently, the moderate level of adoption observed in this study is better understood as a function of systemic constraints rather than a deficit in lecturer awareness or willingness.

The findings from research question two on the relationship between AI Adoption and Instructional Quality revealed a strong and statistically significant positive relationship between artificial intelligence adoption and instructional quality. This indicates that increased engagement with AI technologies is associated with enhanced instructional effectiveness, reflected in improved lesson structuring, delivery strategies, assessment practices, and learner engagement.

This result is theoretically grounded in established models of technology integration. The Technology Acceptance Model posits that perceived usefulness serves as a primary determinant of both technology adoption and subsequent performance outcomes (Venkatesh & Bala, 2021). Complementarily, the Technological Pedagogical Content Knowledge framework emphasizes that optimal instructional effectiveness emerges from the intersection of technological competence, pedagogical knowledge, and subject-matter expertise (Mishra & Koehler, 2006). The present findings provide empirical validation of these theoretical propositions by demonstrating that AI adoption enhances instructional outcomes.

Chai et al. (2022) demonstrated that AI-enabled instructional systems improve teaching efficiency and foster higher levels of student engagement through adaptive and interactive learning environments. Similarly, Alam and Ahmad (2022) reported that AI-driven learning analytics enhance instructional decision-making by enabling lecturers to tailor teaching strategies based on real-time student data. Collectively, these findings reinforce the position that AI functions as a critical enabler of instructional quality.

The test of the first hypothesis established a statistically significant relationship between artificial intelligence adoption and instructional quality, leading to the rejection of the null hypothesis. This confirms that AI adoption is significantly associated with instructional effectiveness among business education lecturers.

This finding aligns with prior empirical studies that have consistently documented positive associations between technology integration and teaching outcomes. Salako and Olatunji (2022) reported that the adoption of digital technologies enhances instructional delivery, promotes active learner engagement, and improves overall teaching effectiveness in Nigerian tertiary institutions.

The findings further demonstrate that artificial intelligence adoption significantly predicts instructional quality, indicating that it functions as a substantive determinant of teaching effectiveness. The regression analysis revealed that AI adoption accounts for a meaningful proportion of the variance in instructional quality, thereby underscoring its explanatory power within the instructional context.

This result is consistent with existing empirical evidence. Bolarinwa et al. (2024) found that the integration of AI into instructional processes enhances lesson preparation, delivery, and evaluation in higher education settings. Similarly, Dwivedi et al. (2023) argued that AI technologies improve teaching effectiveness through the automation of routine tasks and the facilitation of adaptive learning systems that respond to individual learner needs.

The predictive influence of AI adoption can also be interpreted through the lens of instructional efficiency. Mhlanga (2023) observed that AI reduces the administrative burden



associated with teaching tasks, particularly in areas such as grading and feedback provision. This reallocation of effort enables lecturers to devote greater attention to higher-order pedagogical functions, including learner support, critical engagement, and instructional refinement. Consequently, AI adoption not only correlates with instructional quality but exerts a direct and substantive influence on it.

Conclusion

The study established that artificial intelligence adoption among business education lecturers in Colleges of Education in Anambra State remains at a moderate level, reflecting partial integration into instructional practice. Despite this, the findings demonstrate that AI adoption is strongly associated with instructional quality and serves as a significant predictor of teaching effectiveness. This indicates that AI functions not merely as a supplementary instructional tool but as a critical determinant of pedagogical performance.

The evidence suggests that increased engagement with AI technologies enhances key dimensions of instructional quality, including lesson planning, delivery, assessment, and learner engagement. However, the persistence of moderate adoption highlights the influence of systemic constraints, particularly in relation to infrastructure, technical competence, and institutional support. The study therefore concludes that while the potential of AI to transform instructional practice is substantial, its realization depends on the extent to which enabling conditions are strengthened within Colleges of Education.

Recommendations

1. Colleges of Education should institutionalize continuous professional development programmes that focus on the pedagogical integration of artificial intelligence. Training should move beyond awareness to emphasize practical application in lesson delivery, assessment, and adaptive learning.
2. Government and educational authorities should prioritize investment in digital infrastructure, including reliable internet access, AI-compatible devices, and relevant software systems, to facilitate effective integration of AI technologies.
3. Colleges should establish dedicated technical support units to provide ongoing assistance to lecturers in the deployment and maintenance of AI tools. This will reduce operational challenges and enhance confidence in technology use.
4. Academic departments should incorporate AI integration into teaching evaluation and monitoring systems in order to ensure sustained adoption and alignment with instructional objectives.
5. Institutional policies should be developed to guide the ethical and pedagogical use of AI in teaching. These policies should address issues such as academic integrity, data privacy, and responsible use of AI tools.



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