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Artificial Intelligence Dimensions for Sustainable Business Education Programme in Tertiary Institutions

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ABSTRACT

This study determined the artificial intelligence dimensions for sustainable business education programme in tertiary institutions in Delta State, Nigeria. Two research questions guided the study and two hypotheses were tested at 0.05 level of significance. The study adopted a descriptive research design. The population of the study comprised 79 lecturers and students from tertiary institutions offering business education in Edo/Delta State. Instrument for data collection was a structured questionnaire developed by the researchers on a 4-point likert scale questionnaire. The instrument was subjected to a pilot test on 20 lecturers and students from the faculty of vocational education in the sampled universities, randomly selected from Edo/Delta State. The application of the Crombach Alpha reliability test on the returned data yielded coefficient values of 0.85 and with an overall reliability coefficient value of 0.84. Data collected from the respondents were analyzed using mean, standard deviation and t-test. Findings revealed

that artificial intelligence dimensions for sustainable business education programme in tertiary education in Delta State include; automated assessment tools; data analytics for improvement; personalized learning experiences; enhanced feedback mechanisms; and quality monitoring. Furthermore, understanding of the predictors of sustainable business education programme allows managers of business education programme to identify and adopt the appropriate dimensions that have the potency to trigger artificial intelligence adoption in the sustainability of business education programme. Based on the findings of the study, it was recommended among others that managers of business education programme should focus on AI adoption and their triggers as a strategy to increase their interest and intention to use and adopt AI technologies as they have been found to be veritable tools for sustained business education programme in tertiary institutions.

Keywords: Artificial intelligence, artificial intelligence dimension, business education, sustainability, tertiary institutions.

1. Introduction

The world's ongoing innovation has demonstrated how uncertain the future is, particularly when it comes to education, knowledge, skills, competences, and technology, all of which are seen as the cornerstones of social, political, and economic advancement. AI is increasingly being integrated into every facet of our daily and professional lives, beyond its status as a specialist tool. The rapid advancement of artificial intelligence (AI) has brought about significant changes in all spheres of human endeavour including education. This means that educational programmes, and business schools must change or risk falling behind. AI technologies are being used in classrooms to improve instructional delivery, personalize learning, and increase educational quality. Two examples are machine learning algorithms and intelligent systems (Chen, Chen, & Lin, 2020; Forero-Corba & Bennasar, 2024). AI has been heavily promoted in recent years as a strategic instrument for educational innovation and quality assurance, especially in regions looking to modernize their educational systems and get students ready for the challenges of the twenty-first century (Gignac & Szodorai, 2024). However, as Leighton (2020) and Praibisova (2024) accentuated, the exceptional rapidity of AI's creation and acceptance, in addition to its pervasiveness, has taken schools off surprise.

Although numerous researches have examined AI's academic benefits, such as increased engagement, differentiated instruction, and improved academic achievement, its effects on students' social and emotional development are still scanty in the literature (Youssef et al., 2024). According to Daley et al. (2025), education should promote essential social skills including communication, empathy, teamwork, and cognitive growth, therefore this is a huge gap. The social component of learning becomes even more important in the early years of education, when human connection is considered essential to a child's growth (Naima, 2020; Almajdoub et al., 2025). As Ralph and George (2010), and Alabi (2022) posit, artificial Intelligence systems includes the people, procedure, hardware, software, data and knowledge needed to develop computer systems and machines to display features of Intelligence.

Artificial Intelligence can be adopted in business education in areas such as the admission process, providing counseling, library services, assessment, feedback, tutoring etc. Different types of assessment, behaviour pattern and many other elements can be obtained and assisted through artificial

intelligence (Chen et al, 2020). Lecturers usually perform tasks like teaching, grading and evaluation of students, these tasks overlap each other. Besides, certain administrative tasks are also time and resource consuming. Therefore, artificial Intelligence is a welcome development in business education and school administration because many tasks on education depend on the information about students (Alabi, 2022). AI is gradually being included into the Nigerian educational settings as part of broader efforts for digital transformation. But little is known about how educators perceive the dimensions that have potency and long run benefits of AI tools in business education programme in tertiary institutions in Nigeria. Empirical evidence about the effects of developing technology on students' cognitive and social development in non-Western cultures is desperately needed to close the gap.

1.2 Problem Statement

The study problem stems from little knowledge about the artificial intelligence dimensions that may have potency in the sustainability of business education programme in tertiary institutions in Nigeria. As literature alludes, strategies and dimensions that have influence on AI adoption in quality enhancement have been implemented across disciplines, with findings affirming a positive correlation between artificial intelligence adoption and any of models implemented. Despite this claim as reported in prior landmark studies, there has been little discussion on the various ways that any model of AI dimensions can be utilized to positively influence sustainability of business education programme, particularly in tertiary institutions context. Hence, this article seeks to provide answers to the following questions.

1.3 Research Questions

1. What are the dimensions of artificial intelligence for sustainable business education programme in tertiary institutions?
2. What are the benefits of adopting the dimensions of artificial intelligence for sustainable Business Education programme in tertiary institutions?

1.4 Hypotheses

The following hypotheses were tested at 0.05 level of significant:

1. There is no significant difference in the mean ratings of lecturers and students on artificial intelligence dimensions for sustainable business education programme in Delta State.
2. There is no significant difference in the mean ratings of lecturers and students on the benefits of adopting the dimensions artificial intelligence for sustainable business education programme in tertiary institutions in in Delta State.

2.0 Literature Review and Hypotheses Development

2.1 Artificial Intelligence (AI)

The term "artificial intelligence" (AI) describes the creation of computer systems that are capable of carrying out tasks that normally require human intelligence. These systems may learn from data, experiences, and interactions, which allows them to perform better and adjust to new circumstances. It can also use logic, rules, and patterns to solve problems, draw conclusions, and make judgments. Artificial intelligence systems are frequently able to recognize issues and find inventive solutions. They can comprehend their surroundings thanks to the system's ability to read and comprehend data from sensors, pictures, audio, and text. Berglund et al., (2020) claim that an artificial intelligence system that uses algorithms to process data, learn from experiences, and rely on high-quality data to learn, improve, and make accurate decisions can also understand and produce human language, allowing it to communicate with humans. According to Berglund et al., the system needs a lot of processing power to handle big data and carry out complicated tasks. Artificial intelligence systems use actuators to interact with the real world and sensors to perceive their surroundings. Narrow or weak, general or strong, and super intelligence are the different forms of artificial intelligence. It is a machine that can be designed to mimic some aspects of education.

In this digital age, AI technologies are useful tools for improving students' academic performance. To ensure that every student has equal opportunity, the data used to train these algorithms must be validated. Algorithmic biases must be prevented from affecting the predicted accuracy of both traditional and non-traditional students (Herrmann & Weigert, 2024). By offering students prompt responses and individualized support, artificial intelligence (AI) technologies like ChatGPT can improve the quality of academic learning. This will help students strengthen their analytical skills and improve their educational experience (Youssef et al., 2024).

According to Praibisova (2024), the revolutionary nature of AI, goes much beyond business management education and actually help to transforms society as a whole. Schools at all levels are increasingly creating complete AI-focused curricula, demonstrating the crucial relevance of AI's rapid integration across educational programs.

2.2 Business Education

According to Gidado and Akaeze (2014), business education is a course of study designed to raise understanding of the business industry, prepare young people for the workforce, and help individuals become better citizens and knowledgeable consumers of goods and services. It is an educational program

with many specializations that equips students with competent skills to carry out various responsibilities in the commercial and educational worlds. Edokpolor and Owenvbiugie (2017) assert that business education is a crucial component of general and vocational education that focuses on imparting business orientation and knowledge for individual and national growth. Edokpolor and Owenvbiugie assert that teaching students the core ideas, theories, and procedures of business is part of business education. The dynamic character of business education is intended to prepare young people for careers in self-employment and economic literacy in the workplace (Amaewhule, 2017; Igomu et al, 2024). Elujekwute et al., (2021) posit that students can be better equipped to thrive in the fast-paced, intricate business environment by comprehending the idea of business education. Anyaeneh and Nzegwu (2017) acclaim that business education is a course of study that gives students who desire to work in business the chance to acquire the knowledge and abilities necessary to enter, function in, and advance in a business-related field once they graduate from high school or college. Therefore, the main objective of business education is to create capable, skilled, and creative business instructors, office managers, and business people who can successfully compete in the labor market. The kind of education known as "business education" helps people develop abilities that they may use to handle issues in office and commercial settings. Hence, students are expected to possess the necessary information, abilities, and attitudes to function well in both public and private businesses.

AI integration in business education can improve quality, give teachers more time to interact with students and provide individualized support by easing administrative burdens. According to Praibisova (2024), automation and artificial intelligence are changing the requirement for skills, necessitating retraining and up-skilling while maintaining the value of critical thinking and emotional intelligence. Therefore, by analyzing student performance and customizing content to meet individual needs, the use of AI in the sustainability of business education program provides customized educational experiences. The results show that although business educators are cautiously optimistic about AI's potential to improve instruction, they still need ongoing professional development to increase their digital literacy. Finding a balance between utilizing technology and maintaining the educator's role as a mentor and educator is essential for successfully integrating AI into business education (Beirat et al., 2025). This improves a cross-disciplinary learning experience while creating a more dynamic and captivating learning environment that transcend one-size-fits-all methods. The conventional divide between the academic environment and a corporate action-oriented approach has long been a problem in management education. AI has the potential to close this gap by acting as a bridge.

3. Methods

The descriptive survey research was adopted for the study. The study investigated three tertiary institutions in Delta State. The population of the study comprised 79 lecturers and students in three tertiary institutions in Delta State of Nigeria. The instrument was a structured questionnaire developed by the researcher. The instrument was tilled “Questionnaire on artificial intelligence dimensions for sustainable business education programme in tertiary institutions in Delta State.” The instrument was structured on a 4-point Likert scale of Strongly Agreed (SA), Agree (A), Disagree (D), and Strongly Disagree (SD). The instrument was validated by two lecturers in the department of business education and an expert in Measurement and Evaluation, Faculty of Education at the University of Delta Agbor. Additionally, the instrument was subjected to a pilot test on 20 students and lecturers randomly selected from the Faculty of Education in the University of Delta, Agbor. The application of the Crombach Alpha reliability test on the returned data yielded coefficient values of 0.85 for cluster B1 and B2 respectively with an overall reliability coefficient value of 0.84. Data collected from the respondents were analyzed using mean, standard deviation and t-test. The mean value was used to answer the research questions while the standard deviation was used to ascertain the homogeneity or otherwise of the respondents’ ratings. In analyzing the mean, any item with mean scores between 2.49 and 4.00 was deemed to be agreed while any item with mean score between 2.49 and 1.00 was disagreed. For the hypotheses, t-test was used to test all the null hypotheses at 0.05 level of significant. Where the calculated t-value was less than the critical value of t, it meant that the variable did not significantly affect respondents’ mean ratings and the hypothesis was accepted. Conversely, where the calculated t-value was equal to or greater than the critical t value, it meant that the variable had a significant effect on the respondents’ mean ratings and the hypothesis was rejected. .

Research question 1: What are the dimensions of artificial intelligence for sustainable business education programme in tertiary institutions?

Table 1: The artificial intelligence dimensions for sustainable business education programme in tertiary institutions.

		Lecturers		Students		Remarks
S/N	Items	Mean	SD	Mean	SD	
1.	Automated Assessment Tools	3.66	0.37	3.70	0.53	Agreed
2.	Data Analytics for Improvement	2.92	0.51	2.86	0.44	Agreed
3.	Personalized Learning Experiences	2.70	0.64	3.40	0.90	Agreed
4.	Enhanced Feedback Mechanisms	2.71	0.60	3.76	0.61	Agreed
5.	Quality Monitoring	3.42	0.42	3.20	0.54	Agreed
Grand Mean		**2.64**	**0.61**	**3.15**	**0.67**	**Agreed**

From table 1, all the items have mean score above 2.50, the cut-off point. This indicates a consensus that the dimensions of artificial intelligence are relevant for the enhancement of performance in business education programme in tertiary institutions.

Research question 2: What are the Benefits of adopting the artificial intelligence dimensions for sustainable Business Education programme in tertiary institutions?

S/N	Items	Mean	SD	Remarks
1.	AI can lessen the strain for teachers by automating the grading of multiple-choice and short-answer questions.	3.48	.74	Agreed
2.	AI systems examine student submissions to ensure they are consistent and follow grading guidelines.	3.21	.72	Agreed
3.	AI systems examine data on student performance to find patterns and areas that require development.	3.45	.81	Agreed
4.	Based on immediate feedback, educational institutions can use insights to improve curricula and instructional strategies	3.02	.70	Agreed
5.	AI tools give instant feedback to students, learning tactics may be adjusted more quickly	2.85	.82	Agreed
6.	Educators gain more knowledge about prevalent misconceptions, allowing for focused interventions misconceptions, enabling targeted interventions.	2.80	.82	Agreed
7.	AI can monitor student happiness and course efficacy using engagement metrics and sentiment analysis.	3.01	.79	Agreed
8.	Continuous monitoring makes it easier to uphold high standards in education and adjust to evolving demands	2.87	.80	Agreed
9.	AI-powered systems improve comprehension and engagement by tailoring content to each student's needs	3.10	.77	Agreed
10.	Tailored suggestions encourage higher results by assisting students in concentrating on their areas of difficulty.	3.33	.84	Agreed
	Grand Mean and Standard Deviation	**3.11**	**.78**	**Agreed**

Table reveals that the respondents' positive responses to the benefits of artificial intelligence in business education programme in tertiary institutions with mean scores ranging from 2.80 to 3.48. This positive response was very obvious as the mean scores were above the fixed decision value of 2.50 coupled with the grand mean of 3.11 and standard deviation of .78 respectively. The implication is that as beneficial as using artificial intelligence as a strategy in boosting performance in business education is in line with the new normal, it is still being faced with a lot of challenges. These need urgent attention in order to make artificial intelligence in the new normal effective.

Hypothesis 1; There is no significant difference in the mean ratings of lecturers and students on artificial intelligence dimensions for sustainable business education programme in tertiary institutions in in Delta State.

Table 3: t-test analysis of lecturers and students on the artificial intelligence dimension for sustainable business education programme in tertiary institutions in Delta State

Variables	N	Mean	SD	Df	t-cal	t-tab	Remark
Lecturers	56	3.01	0.76				
				79	0.21	1.96	NS
Students	25	2.98	0.82				
Total	79						

Note: NS = Not Significant at 0.05

Result in Table 3 shows that lecturers had a mean rating of 3.01 and standard deviation of 0.76, while the students had a mean rating of 2.98 and standard deviation of 0.82. These yielded a calculated t-value of 0.21 at 98 degrees of freedom. Since the calculated t-value of 0.21 is less than the critical t-value of 1.96, the null hypothesis is accepted. This means that there is no significant difference in mean ratings of lecturers and students on the artificial intelligence dimensions for sustainable business education programme in tertiary institutions in Delta State.

Hypothesis 2

There is no significant difference in the mean ratings of lecturers and students on the benefits of adopting artificial dimensions for sustainable business education programme in tertiary institutions in Delta State.

Table 4: Summary of t-test analysis of lecturers and students on the benefits of adopting artificial intelligence dimensions for sustainable business education programme in tertiary institutions in Delta State.

Variables	N	Mean	SD	Df	t-cal	t-tab	Remark
Lecturers	56	3.00	0.76				
				79	0.45	1.96	NS
Students	25	3.18	0.79				
Total	79						

Note: NS = Not Significant at 0.05

Table 4 shows that lecturers had a mean rating of 3.00 and standard deviation of 0.76, while the students had a mean rating of 3.18 and standard deviation of 0.79. Since the calculated t-value of 0.45 is less than the calculated critical value of 1.96, the null hypothesis is upheld. This is an indication that there is no significant difference in the mean ratings of the male and female business educators' perception of the benefits of adopting the dimensions of artificial intelligence for sustainable business education programme in tertiary institutions in Delta State.

4.0 Discussion of findings

Findings of the study revealed that the benefits of utilizing artificial intelligence dimensions in the sustainability of business education programme in tertiary institutions in Delta State are that; AI can automate grading for multiple-choice and short-answer questions, reducing the workload for educators'. advanced algorithms analyze student submissions for consistency and adherence to grading rubrics; AI systems analyze student performance data to identify trends and areas needing improvement; Institutions can use insights to refine curricula and teaching methods based on real-time feedback; AI tools provide immediate feedback to students, allowing for quicker adjustments in learning strategies; educators receive insights into common misconceptions, enabling targeted interventions; AI can track course effectiveness and student satisfaction through sentiment analysis and engagement metrics; continuous monitoring helps maintain high educational standards and adapt to changing needs; AI-driven platforms adapt content to meet individual student needs, enhancing engagement and understanding; tailored recommendations help students focus on areas where they struggle, promoting better outcomes. These findings support Berglund et al., (2020) claim that an artificial intelligence system that uses algorithms to process data, learn from experiences, and rely on high-quality data to learn, improve, and make accurate decisions can also understand and produce human language, allowing it to communicate with humans. The findings are in agreement with the claim of Youssef et al., (2024), that AI tools help students strengthen their analytical skills and improve their educational experience. The findings further echo the position of Ralph and George (2010) as cited in Alabi (2022) which argue that artificial Intelligence systems includes the people, procedure, hardware, software, data and knowledge needed to develop computer systems and machines to display features of Intelligence.

Further, findings of the study revealed that artificial intelligence dimensions for sustainable business education programme in tertiary education in Delta State include; automated assessment tools; data analytics for improvement; personalized learning experiences; enhanced feedback mechanisms; and quality monitoring. This finding is consistent with the report of Forero-Corba & Bennasar (2024) that AI technologies are being used in classrooms to improve instructional delivery, personalize learning, and increase educational quality. The finding equally align with the claim of Praibisova (2024) that the revolutionary nature of AI, goes much beyond business management education and actually help to transforms society as a whole. The results align with the viewpoint of Seo et al. (2021), who highlighted how AI might assist educators by lessening effort and customizing instruction.

5.0 Conclusion, implications, limitation, and directions of the future stud

Overall, this study contributes to a more recent empirical research on artificial intelligence dimensions, which has become as a salient aspect to achieve sustainable business educations. Having an in-depth understanding of the predictors of sustainable business education programme allows managers of business education programme to identify and adopt the appropriate dimensions that have the potency to trigger artificial intelligence adoption in the sustenance of business education programme.

Furthermore, it is suggested that management of business education programme should ensure that they maintain lecturer-student relationship in building interest and awareness. Understanding the factors influencing AI adoption in business education programme in tertiary institutions enables the

management of business education programme in schools to develop and implement more effective AI frameworks that enhance performance through participation. Managers of business education programme should focus on AI adoption and their triggers as a strategy to increase their interest and intention to use and adopt AI technologies as they have been found to be veritable tools for sustained business education programme in tertiary institutions.

Several limitations are worth emphasizing since they have an impact on the arguments based on research findings. First, the study's population consisted solely of lecturers and students enrolled in business education programs at tertiary institutions in Nigeria's Delta State. Future research should be conducted with lecturers and students at Nigerian universities. Second, this study used a cross-sectional technique to collect data for analysis. Thus, future study should take a longitudinal approach to gain a better understanding of the phenomena of sustainable business education programs. The framework offered in this study is of value in several important ways. First, it contributes to theorizing on the predicting role of artificial intelligence dimensions on sustainable business education programme among lecturers and students in tertiary institutions in Delta State. Second, it contributes to the empirical evidence in the domain of all the variables understudy. Third, the study pioneers in the dimensions of artificial intelligence to explain the impact of artificial intelligence on sustainable business education programme.

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