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Integration of Machine Learning as Correlate of Core Curriculum and Minimum Academic Standards (CCMAS) Implementation for Business Education in South-East, Nigeria

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ABSTRACTS: The main purpose of the study was to investigate the integration of machine learning as a correlate of Core Curriculum and Minimum Academic Standards (CCMAS) implementation for business education as perceived by business educators in South-East, Nigeria. Two research questions guided the study. Correlational research design was used for the study. The population of the study comprised 68 business educators from seven public universities in South-East, Nigeria, Two structured validated questionnaires were used to collect data for the study. The reliability of the instrument was achieved through a pilot study and it data from the pilot study yielded co-efficient values of 0.84 and 0.78 for instruments A and B respectively. Pearson product moment correlational coefficient was used to analyze data. The findings of the study revealed that there is a high positive relationship between the integration of machine learning and the development of core practical contents (psychomotor) and of the theoretical basis for entrepreneurship development content in business education programmes in South-East Nigeria. Based on these findings, the researcher recommended among others that the Federal and State Governments should make available funding for the development of information and communication technology and artificial intelligence infrastructure for the smooth integration of machine learning in business education programmes in universities and other tertiary institutions.

KEYWORDS: Integration, Machine Learning, CCMAS, Implementation, Business Education

INTRODUCTION

The business education programme is a broad discipline that includes an instructional curriculum designed to impart the knowledge, skills, vocational training, and aptitudes essential for all citizens to effectively manage their personal businesses and participate in the economic system. Students of business education are expected to acquire the relevant skills, competencies, and knowledge in key areas of business. According to Edokpolor and Egbri (2017), the business education programme is a distinctive academic course that equips its graduates with the skills to operate independently as self-employed individuals and as employers of labour. Olatoye et al. (2020) opined that the objectives of business education include, among others, providing students with opportunities for practical job preparation or vocational studies to enable them to deliver effective and efficient services in office, distributive, and service occupations.

Additionally, it aims to prepare students based on their interests and aptitudes with the necessary skills, knowledge, and attitudes to enter, advance, and succeed in a business career. Musa (2020) defined business education as a collection of courses/subjects that is concerned with the acquisition, development and inculcation of the proper value for the survival of the individual and the society, the development of the intellectual capacities of individuals to understand and appreciate the environment; the acquisition of both physical and intellectual skills which will enable individuals to develop into useful members of the community, the acquisition of an objective view of local and external environment. Oludare et al. (2022) stated that business education is a programme designed to equip students with a range of skills in areas such as accounting, marketing, office technology and management (OTM), and more recently, entrepreneurial education. Hassan et al. (2024) argued that the inclusion of business education in the curriculum of Nigerian public universities brought a sense of economic optimism and heightened awareness of the role education can play in combating global poverty in the country. However, Ile and Okafor (2021) contended that the educational outcomes of universities are often misaligned with the industrial and socioeconomic needs of Nigeria, largely due to an overemphasis on paper qualifications rather than actual competence. They further asserted that the business education programme

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has not met its intended objectives as outlined by the Federal Republic of Nigeria (FRN, 2013), primarily due to the failure of university administrations to properly implement the curriculum.

Curriculum plays a crucial role in education, serving as the foundation for both learning and teaching in educational institutions. It is defined as the collection of planned educational experiences designed to enable students to achieve specific learning outcomes or goals. This framework includes the content, instructional strategies, and assessment methods used to facilitate learning and evaluate student achievement, underscoring its importance in the overall educational process. Curriculum is an educational programme of experience offered to the learner under the guidance of a school to effect certain changes in behaviour of the learner (Akpan, et al., 2018). The curriculum for the business education programme is structured into modular unit courses, where each module is designed to equip students with specific professional skills that can be directly applied in the workplace. This modular approach focuses on achieving end results, ensuring that upon completing each unit, students acquire practical abilities that enhance their employability. The effectiveness of the credit unit system in this context relies heavily on the alignment between educational institutions and industry. To this end, the curriculum is crafted with behavioural objectives to clearly outline the expected performance of students after they successfully complete certain courses. Despite these carefully planned provisions, many graduates of business education still face significant challenges in securing employment. This issue led to the revision of the curriculum for Nigerian universities, resulting in the introduction of the Core Curriculum and Minimum Academic Standards (CCMAS) by the National Universities Commission (NUC) in 2023.

The CCMAS, which supersedes the former Benchmark Minimum Academic Standards (BMAS), is designed to make Nigerian university education more attuned to the needs of society. The new curriculum is intended to reflect the realities of the 21st century, addressing both current and future academic disciplines within the Nigerian university system. Under CCMAS, 70% of the curriculum consists of core courses essential to each degree, while the remaining 30% allows universities the flexibility to introduce creative courses tailored to their areas of specialisation. The business education programme is one of the disciplines covered under this new curriculum framework. According to the NUC (2023), the philosophy behind the business education programme is to provide students with the knowledge, skills, and competencies necessary for economic self-sufficiency and independence, enabling them to secure meaningful employment, lead fulfilling lives, and contribute positively to society. The programme is designed in response to the needs of the business community, ensuring that the education and training offered align with the competencies required for both current and emerging job opportunities.

Furthermore, the NUC (2023) outlined seven key features of the business education programme under CCMAS, which include an emphasis on civic and social learning, enhanced development of practical and cognitive skills for effective teaching, increased focus on financial literacy, a strong theoretical foundation for entrepreneurial development, and preparation in career development and professional business ethics. The programme also aims to equip students with innovative and pragmatic skills necessary for operating in a digital environment and global market practices, alongside an emphasis on professional accounting courses that bridge the gap between academic knowledge and industry practice. To meet the demands of the 21st century, CCMAS requires that business education undergraduates be exposed to entrepreneurship and other practical-oriented courses, often delivered in classrooms or laboratories, to ensure they are well-prepared for the evolving job market.

The importance of incorporating artificial intelligence, particularly machine learning, into business education programmes to adapt to the changing educational system. Integrating Machine learning into teaching practices in business education programmes can effectively cultivate high-quality talents that align with the current demands of society and the economy. Machine learning, a key area of AI, involves creating algorithms and models that enable computers to learn from data, make predictions, and improve their performance over time without the need for explicit programming. In the context of business education in universities, machine learning presents numerous applications that can enhance teaching and learning, personalise educational experiences, and provide valuable insights into student performance within vocational education programmes (Organisation for Economic Co-operation and Development (OECD), 2021).

One significant application of machine learning in business education is personalised learning. By analysing data on individual students, such as their learning preferences, strengths, and weaknesses, machine learning algorithms can tailor instructional content and methods to meet the specific needs of each student (Jagwani, 2019). This approach allows for customised learning experiences, enabling students to progress at their own pace and in a manner that best suits their learning style. Furthermore, machine learning can be utilised for automated grading and assessment within business education programmes (Settles et al., 2020). Furthermore, machine learning can analyse data on students' learning conditions and achievements over time, generating detailed reports that educators can use to identify learning obstacles and develop targeted intervention strategies (Wang, 2019). This application of AI not only streamlines assessment processes but also enhances the ability of educators to address individual student needs effectively. However, the extent to which the integration of machine learning correlates the implementation of CCMAS in universities in South-East, Nigeria has not been empirically proven. Thus, the need for the study.

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STATEMENT OF THE PROBLEM

The business education programme in universities in South-East, Nigeria as a whole, is expected to equip graduates with the necessary skills for the modern workplace. However, despite technological advancements and the development of business innovations, the programme continues to produce graduates who struggle to adapt to the global job market. Employers frequently criticize these graduates, including those from business education, for lacking essential skills in areas such as management, marketing, accounting, and ICT. This skills gap seems to have prompted the National Universities Commission (NUC) to introduce the redesigned Core Curriculum and Minimum Academic Standards (CCMAS). Unfortunately, despite the introduction of CCMAS, there has been little progress in enhancing the employability of graduates.

It is concerning that, despite the introduction of CCMAS, business education programmes remain largely traditional, with limited integration of machine learning technologies in teaching and administration. This is evident in the continued use of conventional lecture-based methods, which stifle innovation and hinder the adoption of personalised learning systems, a key feature of modern university education worldwide. The lack of machine learning integration may be contributing to the high unemployment rates among graduates in South-East, Nigeria. As technology, particularly machine learning and automation, increasingly shapes the job market, graduates are left ill-prepared to meet these demands. The consequences are severe, with high unemployment fostering frustration and potentially leading to increased criminal activity. The researcher investigated the integration of machine learning as correlate of Core Curriculum and Minimum Academic Standards (CCMAS) implementation for business education in South-East, Nigeria.

Purpose of the Study

The main purpose of the study was to investigate the integration of machine learning as a correlate of Core Curriculum and Minimum Academic Standards (CCMAS) implementation for business education as perceived by business educators in South-East, Nigeria. The specific purpose of the study was to investigate:

1. The integration of machine learning as a correlate of the development of core practical contents (psychomotor) of business education programmes in South-East, Nigeria.
2. The integration of machine learning as a correlate of the development of a theoretical basis for entrepreneurship development contents (cognitive) of business education programmes in South-East, Nigeria.

Research Questions

The following research questions guided the study:

1. What is the relationship between machine learning and the development of core practical contents (psychomotor) of business education programmes in South-East, Nigeria?
2. What is the relationship between machine learning and the development of a theoretical basis for entrepreneurship development contents (cognitive) of business education programmes in South-East, Nigeria?

METHOD

The correlational research design was adopted for the study. The study will be conducted in public universities in South-East, Nigeria. The population of the study comprised 68 business educators from seven public universities in South-East, Nigeria. Two structured questionnaires were used to collect data for the study. The first questionnaire was titled "Questionnaire on Integration of Machine Learning in Business Education (QIMLBE)." The instrument contains 10 items of the integration of machine learning in business education. The second instrument was titled "Questionnaire on Implementation of Core Curriculum and Minimum Standards for the Nigeria University System (QICCMSNUS)'. It was developed by the researcher. The instrument measured the implementation of CCMAS in business education. It contains 13-item statements in two clusters; 1 and 2. Cluster 1 contains six-item statements implementation of business education core practical and cognitive development contents (psychomotor) and Cluster 2 contains seven-item statements on Implementation of business education theoretical basis for entrepreneurship development contents (cognitive)**.** Both instruments are structured on a four point rating scale of Very High Extent (VHE), Extent (HE), Low Extent (LE) and Very Low Extent (VLE). The instruments were validated by three experts in the Department of Technology and Vocational Education, Faculty of Education, Nnamdi Azikiwe University, Awka.

The reliability of the instruments was established through a pilot test. The questionnaires were administered to 10 business educators in Delta State who were not included in the population of the study. The data collected were analyzed using Cronbach Alpha and coefficient values of 0.84 for QIMLBE while a reliability co-efficient value of 0.81 was achieved for QICCMSNUS. The instrument was administered to the respondents with the help of four research assistants. Out of the 68 questionnaires administered, 57 copies were retrieved and used for the analysis of data. Pearson Product Moment Correlational Statistics was used for data

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analysis. The co-efficient "r" obtained was used to ascertain how each of the independent variables correlate the dependent variable. The research questions were interpreted as follows:

Correlation Coefficient	Interpretations
0.8 to 1.0 (negative or positive)	Very High
0.6 to 0.8 (negative or positive)	High
0.4 to 0.6 (negative or positive)	Average
0.2 to 0.4 (negative or positive)	Low
0.0 to 0.2 (negative or positive)	Very Low (no relationship)

RESULTS

Research Question 1

What is the relationship between integration of machine learning and the development of core practical contents (psychomotor) of business education programmes in South-East, Nigeria?

Table 1: Summary of Pearson Correlation Analysis between Machine Learning and the Development of Core Practical Contents (Psychomotor) of Business Education Programmes in South-East, Nigeria

		Integration of Machine Learning	Development of Core Practical Contents (Psychomotor)	Remark
Integration of Machine Learning	Pearson Correlation	1	.722**	High Positive relationship
	Sig, (2-tailed)		.000	
	N	57	57	
Development of Core Practical Contents (Psychomotor)	Pearson Correlation	.722**	1	
	Sig, (2-tailed)	.000		
	N	57	57	

** Correlation is significant at the 0.05 level (2-tailed).

The data presented in Table 1 indicate that the Pearson's Correlation Coefficient is (r = 0.72), demonstrating a low positive relationship between integration of machine learning and the development of core practical contents (psychomotor) of business education programmes in South-East, Nigeria. This suggests that the integration of machine learning in business education, would significantly enhance the development of core practical contents (psychomotor) of business education programmes in South-East, Nigeria. Therefore, there is a high positive correlation between integration of machine learning and the development of core practical contents (psychomotor) of business education programmes in South-East, Nigeria.

Research Question 2

What is the relationship between machine learning and the development of a theoretical basis for entrepreneurship development contents (cognitive) of business education programmes in South-East, Nigeria?

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Table 2: Summary of Pearson Correlation Analysis between Machine Learning and the Development of Theoretical Basis for Entrepreneurship Development Contents (Cognitive) of Business Education Programmes in South-East, Nigeria

		Integration of Machine Learning	Development of Core Practical Contents (Psychomotor)	Remark
Integration of Machine Learning	Pearson Correlation	1	.673**	High Positive relationship
	Sig, (2-tailed)		.000	
	N	57	57	
Development of Core Practical Contents (Psychomotor)	Pearson Correlation	.673**	1	
	Sig, (2-tailed)	.000		
	N	57	57	

** Correlation is significant at the 0.05 level (2-tailed).

The data presented in Table 2 indicate that the Pearson's Correlation Coefficient is (r = 0.67), demonstrating a low positive relationship between integration of machine learning and the development of theoretical basis for entrepreneurship development contents (cognitive) of business education programmes in South-East, Nigeria. This suggests that the integration of machine learning in business education, would significantly enhance the development of theoretical basis for entrepreneurship development contents (cognitive) of business education programmes. Therefore, there is a high positive correlation between integration of machine learning and the development of theoretical basis for entrepreneurship development contents (cognitive) of business education programmes in South-East, Nigeria.

DISCUSSION

The findings of the study revealed that there is a high positive correlation between integration of machine learning and the development of core practical contents (psychomotor) of business education programmes in South-East, Nigeria. The finding of the study indicate a high positive correlation between the integration of machine learning and the enhancement of core practical contents (psychomotor) in business education programmes in South-East, Nigeria. This high positive relationship can be attributed to the transformative potential of machine learning in business education. The finding of the study may have resulted because incorporating machine learning would enable business educators can organize instructional materials to better suit individual learning styles, thereby improving students' practical skills. Machine learning also facilitates more efficient and accurate assessments, enabling continuous feedback and personalized learning experiences, which are crucial for developing psychomotor skills. These findings are consistent with previous research. For instance, Jagwani (2019) and Wang (2019) emphasize that machine learning enhances personalized learning and data-driven decision-making in education, leading to improved student outcomes. Furthermore, Settles et al. (2020) support the idea that machine learning can automate grading and assessments, providing timely and relevant feedback that is essential for skill development. The positive impact of machine learning on psychomotor development is particularly relevant in business education, where hands-on skills and practical application are critical for students' success in the modern workforce.

The findings of the study revealed a high positive positive correlation between the integration of machine learning and the development of the theoretical basis for entrepreneurship development content in business education programmes in South-East Nigeria. This correlation suggests that incorporating machine learning into these programmes significantly enhances the cognitive aspects of entrepreneurship education. One possible reason for this finding is that machine learning offers innovative tools and methods for understanding and teaching complex theoretical concepts, making the learning process more dynamic and engaging. Business educators through the integration of machine learning can create more personalized and effective learning experiences that resonate with students, thereby fostering a deeper understanding of entrepreneurship principles. The findings of the study aligns with Jagwani (2019) who reported that machine learning can tailor educational content to individual learning styles, improving comprehension and retention of complex subjects like entrepreneurship. Furthermore, Settles et al. (2020) found that machine learning enhances the feedback mechanisms in educational programmes, allowing for more accurate assessment and targeted improvements. The integration of these advanced technologies into the curriculum not only modernizes education but also ensures that students are better prepared to meet the demands of the contemporary job market, particularly in entrepreneurial roles.

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CONCLUSION

The researcher concludes based on the findings of the study that business educators opined that the integration of machine learning would enhance the implementation of Core Curriculum and Minimum Academic Standards (CCMAS) in business education in South-East, Nigeria. The integration of machine learning would enhance the development of core practical contents (psychomotor) and of the theoretical basis for entrepreneurship development content in business education programmes in South-East Nigeria. It is therefore imperative that measures are put in place to promote the integration of machine learning in business education.

RECOMMENDATIONS

Based on the findings of the study, the researcher recommended among others that:

1. The Federal and State Governments should make available funding for the development of information and communication technology and artificial intelligence infrastructure for the smooth integration of machine learning in business education programmes in universities and other tertiary institutions.
2. Administrators of business education programmes should go into partnership with private ICT firms for the provision of funding, infrastructure and resources for the integration of machine learning in business education programme.
3. Administrators of business education programme should organize in-service training programmes aimed at educating teachers on machine learning tools and best practices in applying machine learning technologies in the business education programme.

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