CONSTRAINTS TO EFFICIENT USE OF MACHINE LEARNING IN TEACHING BUSINESS EDUCATION COURSE CONTENTS IN DELTA STATE UNIVERSITIES

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Abstract

The study investigated the perceived challenges to comprehensively using machine learning in the delivery of business education courses in Delta State universities. In order to achieve the objectives of the study, three research questions were raised and three null hypotheses were tested at 0.05 level of significance guided the study. The study adopted the descriptive survey research design. The population of the study comprised of fifty-two (52) business education lecturers in three government owned universities in Delta State. The entire population was studied. A structured questionnaire titled "Constraints to efficiently using machine learning in teaching business education course content (CEUMLTBECC)" was used for data collection. The research instrument was validated by three experts in the Department of Business Education in Delta State University, Abraka. The study adopted the Cronbach Alpha reliability method to ascertain the consistency of the research instrument. It yielded a co-efficient of 0.93 adjudged reliable for this study. The descriptive statistics such as mean and standard deviation were used to answer the research questions, while an independent t-test was adopted to test the null hypotheses. The findings of the study revealed that that financial limitations, human financial constraints, human resources, and skills constraints, institutional and managerial constraints enormously impacted the comprehensive use of machine learning in the delivery of business education courses in universities in Delta State. Based on the findings of the study, it was recommended amongst others: higher institutions should delve into partnership with private technology firms and nongovernmental organizations to procure financial resources and technical support.

Key words: Constraints, Machine Learning, Teaching, Business Education, Course Content

Introduction

The fast growth of technology in the 21st century has transformed a variety of factors including education. Machine learning (ML) which is sub-component of AI has sprung up as an indispensable tool that could improve teaching and learning experiences. It opens the door for individualized learning predictive analytics, and adaptive pedagogical techniques which could enormously enhance learning outcomes (Baker & Inventado, 2014). In the context of Business Education, machine learning provides the capacity to dissect students' academic attainment, customize learning patterns, and automate managerial tasks, thereby fostering a more dynamic and conducive learning environment (Chen, 2020).

However, despite its innovative capacity, the application and appropriate application of machine learning in the delivery of business education courses in universities in Nigeria remains vague. A variety of problems could hinder the sound and comprehensive integration into the system of education. These encompass insufficient ICT infrastructure, paucity of proficient lecturers, insufficient funds, and resistance to change among lecturers and tertiary institutions (Adewale & Oyewole, 2022). In addition to all of these challenges, obstacles linked to data availability and administration further exacerbate the adoption of machine learning in universities in Nigeria. Since machine learning is heavily dependent on training models, the unavailability of relevant and structured datasets in education occupies a significant problem (Oladokun, 2021).

One of the main obstacles in the context of Nigerian setting is the digital divide. Numerous universities particularly in rural settings, struggles with restricted access to reliable internet

connections and modern digital materials (Eze, 2019) These ICT infrastructures blockades not only retard the incorporation of machine learning tools but also restrict students' and lecturers' capacity to use available materials comprehensively. Additionally, the cost of procuring and maintaining digital tools like machine learning systems could be prohibitive for numerous institutions that function on low budgets.

Another main factor is the perceived paucity of proficient personnel. Incorporating machine learning into teaching entails skills and proficiency in both business education and data science, a synthesis that is still scarce in numerous universities (Adewale & Oyewole, 2022). Numerous lecturers are not adequately equipped in the application of machine learning tools and devices which retards their capacity to integrate these technologies into their pedagogical techniques. In the addition to that, the paucity of in-service training programs that emphasizes on AI and ML in education further worsens the situation (Ibrahim, 2018).

Beyond digital and skills-driven problems, institutions resistance to change also plays a vital role in reducing the pace of the application of machine learning in business education. This perceived resistance is mostly influenced by a lack of comprehension of the dynamics of machine learning and could be appropriated to improve the instructional process which leads to a tendency to sustain existing protocol. Notably, data privacy and ethical considerations elucidates another structure of difficulty in the adoption of machine learning in education. The application of students' data to train machine learning models raises issues about privacy, consent and the prospective misappropriation of personal data (Floridi, 2020). These obstacles could be systematically resolved to ensure that the application of machine learning in business education lines ups with ethical principles and legal standards. Based on these obstacles, it is imperative to investigate the problems to the comprehensive use of machine learning in the delivery of business education courses contents in universities in Nigeria. Comprehending these blockades would provide the framework for orchestrating techniques to overcome them, inspiring the complete potential of machine learning to be attained in higher institutions in Nigeria. The effective use of machine learning in the delivery of business education courses in public universities in Nigeria seems to be bedeviled by numerous factors. However, the obstacles to be assessed in this study are which could be largely compartmentalized into financial constraints, human resource and skills constraints and institutional and administrative constraints. (Eze, 2019)

Financial constraints, human resource and skills constraints, and institutional and administrative constraints largely retards the comprehensive application of machine learning in the delivery of business education courses in universities in Nigeria. The huge cost linked with acquiring and sustaining machine learning tools, including hardware, software, and proficient individuals. The huge financial cost needed for procuring and maintaining machine learning technologies encompasses: hardware, software, qualified personnel, accelerates an enormous financial burden on institutions functioning with low budgets. This financial limitation reduces their capacity to invest in and sustain emerging technological materials. In furtherance of the above, there is paucity of qualified staff with knowledge in machine learning and data science, worsened by inadequate training and professional development programs for lecturers. This shortage of trained personnel limits the comprehensive incorporation of machine learning into the curriculum. Furthermore, resistance to change and bureaucratic obstacles inside academic settings worsen the situation.

Numerous tertiary institutions are reluctant to apply emerging technologies as a result of the choice of conventional techniques and managerial obstacles that slow down the decision-making mechanism and adoption of transformative pedagogical tools. Cumulatively these obstacles create

a huge obstacle to using machine learning effectively in business education, impacting the overall content quality and delivery of the instructional process.

Statement of the Problem

The incorporation of machine learning in business education programmes in universities in Nigeria poses an enormous for enhancing the teaching efficacy and students' learning outcomes. However, numerous obstacles retard its comprehensive use. First, numerous universities, particularly in rural communities, are bereft of ICT infrastructure like strong internet connectivity and sophisticated computer systems required for adopting machine learning tools. In addition to that, there is a paucity of proficient lecturers with instructional and technical proficiency in machine learning aided by a paucity of in-service training programmes and initiatives. Financial constraint also poses a huge stumbling block, as the huge cost of procuring a digital change among lecturers and managers. In addition to that, resistance to digital change among lecturers and managers, coupled with issues about obstructing conventional pedagogical techniques, retards the application of machine learning. Conclusively, the perceived paucity of relevant, systematically structured, digitalized students' data limits the ability to cultivate machine learning models allocated to business education. Addressing these constraints is critical to unlocking the full potential of machine learning in enhancing business education in Nigerian universities.

Research Questions

The study was guided by the following research questions:

1. What are the financial constraints to the efficient use of machine learning in teaching business education course content in Delta State universities?
2. What are the human resource and skills constraints to efficiently using machine learning in teaching business education course content in Delta State universities?
3. What are the institutional and administrative constraints to efficiently using machine learning in teaching business education course content in Delta State universities?

Research Hypotheses

The study was guided by the following hypotheses:

1. There is no significant difference in the mean responses of male and female business education lecturers on the financial constraints to efficient use of machine learning in teaching business education course content in Delta State universities.
2. A significant difference does not exist in the mean responses of male and female business education lecturers on human resources and skills constraints to the efficient use of machine learning in teaching business education course content in Delta State universities.
3. There is no significant difference in the mean responses of male and female business education lecturers to the institutional and administrative constraints to efficient use of machine learning in teaching business education course content in Delta State universities.

Methodology

The study adopted a survey research design. The study area covered the state-owned universities in Delta State, namely Delta State University, Abraka, University of Delta, Agbor and Southern Delta University, Ozoro. The population of the study was 52 business education lecturers in the three named state universities in Delta State, Nigeria. A structured questionnaire titled "Constraints to efficiently using machine learning in teaching business education course contents (CEUMLTBECC)" that three experts validated was used for data collection. The instrument's reliability was determined with the Cronbach Alpha, which yielded a reliability coefficient of 0.93, adjudged reliable for this study. The mean and standard deviation were used to answer the research questions, while an independent t-test was used to test the null hypotheses. The data collection was carried out using a 15-item questionnaire developed by the researchers based on the extensive

literature reviewed. The instrument was structured on four-point response scales of strongly agree (SA), agree (A), disagree (D), and strongly disagree (SD) with numerical values of 4, 3, 2, and 1, respectively. Out of 52 copies distributed, 52 copies were returned, giving a 100% return rate. Weighted means and standard deviations were used to answer the research questions. Decisions on the research questions were made using the lower and upper limits of the mean based on a four-point scale as follows: strongly agree (SA) 50-4.00, agree (A) 50 -3.49, disagree (D) 50 -2.49, strongly disagree (SD) 50-1.49.

The standard deviation was used to determine the homogeneity or otherwise of the opinions of the respondents. The independent t-test statistics of no significant difference were used to test the null hypotheses. The significant value (at 2-tail) was compared with the 05 level of significance at the appropriate degree of freedom. The null hypothesis was not rejected where the significant value was less than the 05 level of significance value at an appropriate degree of freedom; otherwise, the null hypothesis was rejected.

Results

The results of the study obtained were presented in Tables based on the research questions and hypotheses that guided the study.

Research Question 1

What are the financial constraints to the efficient use of machine learning in teaching business education course content in universities in Delta State?

The data for answering the research question three is presented in Table 3 below.

Table 1: Mean ratings and standard deviation of the financial constraints to the efficient use of machine learning in teaching business education course content in universities in Delta State

S/N	Item Statements	$\bar{X}$	SD	Remarks
1.	High cost of purchase of adequate machine learning facilities for teaching and learning business education constitutes a problem in my School	3.11	0.93	**Agree**
2.	High cost of installation of machine learning facilities by the machine leaning engineers is a major limiting factor	3.22	0.86	**Agree**
3.	Delay in the release of fund due to the huge amount involved for purchase of required machine learning facilities for teaching and learning is a problem.	3.34	0.83	**Agree**
4.	High cost of maintenance of installed machine learning facilities constitute a major constraint	3.07	0.91	**Agree**
5.	Most of the cheap and affordable machine learning facilities for use in the school of teaching and learning are of low quality.	3.21	0.85	**Agree**

6.	There is insufficient financial support from the government for the supply of adequate machine learning facilities for teaching and learning.	3.21	0.87	**Agree**
7.	The support received from the community Members/educationally inclined philanthropists Towards provision of machine learning for teaching and learning in the school are inadequate.	2.91	0.94	**Agree**
9.	People are not allowed enough access to the available machine learning facilities for academic use due to the associated high cost of the machine learning.	3.07	0.90	**Agree**
10.	High cost of subscribing for band-width is a major limiting factor for internet browsing	3.38	0.82	**Agree**
	Grand Mean	**3.29**	**3.54**	**Agree**

Note: *X = Mean, SD = Standard Deviation, N = Number of Respondents.*

Data presented in Table 1 above revealed that, the mean ratings of the responses of the respondents on all the ten (10) items relating to challenges of cost of machine learning facilities in the teaching and learning of business education had mean values that ranged between 2.91 to 3.38 which are all greater than the cut-off point value of 2.50 on a 4-point rating scale. The above findings revealed that the business lecturers agreed that all the identified 10 items are financial constraints of machine learning facilities in the teaching and learning of business education in Delta State Universities. The values of the standard deviation for all the 10 items as revealed in the table ranged between 0.82 to 0.94; this showed that the responses of the respondents are close to one another and to the mean.

Research Question 2

What are the human resource and skills constraints to efficiently using machine learning in teaching business education course content in Delta State universities?

Table 1: Mean ratings and standard deviation of the respondents on the human resource and skills constraints to efficiently using machine learning in teaching business education course content in Delta State universities

S/N	Item Statements	$\overline{X}$	SD	Remarks
1.	Shortage of skilled personnel.	3.54	0.60	**Agree**
2.	Insufficient training programmes.	3.43	0.75	**Agree**
3.	Lecturers' obnoxious perception of machine learning.	3.30	0.84	**Agree**
4.	Reluctance of lecturers to consistently use machine Learning.	3.38	0.78	**Agree**
5.	Lack of pedagogical expertise.	3.49	0.64	**Agree**
6.	Difficulty in recruiting qualified staff.	3.39	0.73	**Agree**

7.	Limited research and development capacity.	3.53	0.62	**Agree**
8.	Insufficient funds to procure AI-driven tools.	3.47	0.70	**Agree**
9.	Misappropriation of funds for the procurement of AI-driven tools .	3.49	0.71	**Agree**
10.	Poor maintenance culture of lecturers in the use of available AI-driven tools.	3.37	0.71	**Agree**
	Grand Mean	**3.29**	**0.69**	**Agree**

Note: *X = Mean, SD = Standard Deviation, N = Number of Respondents*

The findings from the data presented in Table 2 above revealed that the business lecturers agreed that all the identified 10 items. The low level of standard deviation shows that the respondents are homogenous in their responses to the items as the human resource and skills constraints to efficiently using machine learning in teaching business education course content in Delta State universities. The values of the standard deviation for all the 10 items in the table ranged between 0.59 to 0.85; this implied that the responses of the respondents are close to one another and to the mean.

Research Question 3

What are the institutional and administrative constraints to efficiently using machine learning in teaching business education course content in Delta State universities?

The data for answering the research question four is presented in Table 3 below.

Table 3: Mean ratings and standard deviation on the institutional and administrative constraints to use of machine learning in teaching business education courses in Delta State universities.

S/N	Item Statements	X	SD	Remarks
1.	Lack of confidence and self-esteem in the use of Machine learning by staff is a barrier to machine learning adoption for teaching and learning business education and entrepreneurship.	2.68	0.83	**Agree**
2.	Contentment of most lecturers and instructors with conventional methods of teaching and learning without using machine leaning.	3.53	0.58	**Agree**
3.	Poor skills in the application of machine learning for teaching by most lecturers of business education and entrepreneurship.	3.09	0.88	**Agree**
4.	Ineffective machine learning capacity building programmes for the instructors and lecturers in the			

	school.	3.50	0.64	**Agree**
5.	Poor self-development culture among some lecturers and instructors in the use of machine learning.	3.25	0.75	**Agree**
6.	Poor in-service training for the school personnel in machine learning usage for teaching and learning,	3.30	0.69	**Agree**
7.	Lackadaisical attitude of most instructors and lecturers towards machine learning for teaching and learning.	3.21	0.66	**Agree**
8.	Inability of the instructors and lecturers to machine learning hardware and software installation for teaching and learning.	3.18	0.90	**Agree**
9.	The use of machine learning for teaching and learning is never emphasized by school management for lecturers in my school. .	3.25	0.61	**Agree**
10.	Low level of interest, awareness, understanding and acceptance of machine learning for teaching and learning business education course contents.	3.38	0.65	**Agree**
	Grand Mean	**3.26**	**0.91**	**Agree**

Note: $\bar{X}$ = *Mean, SD = Standard Deviation, N = Number of Respondents*

From the data presented in Table 4 above, it was revealed that the mean ratings of the responses of the respondents on all the ten (10) items relating to institutional challenges in effective use of machine learning facilities for teaching and learning of business education and entrepreneurship had mean values that ranged between 2.68 to 3.57 which are all greater than the cut-off point value of 2.50 on a 4point rating scale. The above findings showed that the business lecturers agreed that all the identified 10 items in the table are institutional challenges in effective use of machine learning facilities for teaching and learning of business education and entrepreneurship in Delta State universities. The values of the standard deviation for all the 10 items as revealed in the table ranged between 0.57 to 0.90; this implied that the responses of the respondents are close to one another and to the mean.

Test of Hypotheses

Hypothesis 1: There is no significant difference in the mean responses of male and female business education lecturers on the financial constraints to efficient use of machine learning in teaching business education course content in **Delta State** universities.

Table 4: t-test analysis of responses of Male and Female lecturers on the financial Constraints to Use of Machine Learning in Teaching Business Education Course in Delta State Universities

	Grouping	N	Mean	Std. Deviation	t	df	Sig. (2-tailed)	Decision
Overall	**Female**	38	3.32	0.47				
					-444	877	.657	
	Male	14	3.33	0.46				
NS								

NB: NS= Not Significant; t= t-test calculated; df= Degree of Freedom; and N= Number of Respondents

Table 4 above shows t-score (-0.444) with associate probability of 0.656 being greater than the level of significance of 0.05. Therefore, the null hypothesis was upheld. Hence, this means that there is no significant difference in the mean responses of male and female business education lecturers on the financial constraints to efficient use of machine learning in teaching business education course content in Delta State universities.

Hypothesis 2: A Significant Difference does not exist in the Mean Responses of Male and Female Business Education Lecturers on Human Resources and Skills Constraints to the Efficient Use of Machine Learning in Teaching Business Education Course Content in Delta State Universities.

Table 5: t-test analysis of mean of male and female business education lecturers on Human Resource and Skills Constraints to Use of ML in Teaching Business Education Course in Delta State Universities

	Grouping	N	Mean	Std. Deviation	T	df	Sig. (2tailed)	Decision
Overall	**Female**	36	3.24	0.46				
					-0.326	877	0.745	
	Male	14	3.25	0.44				
NS								

NB: NS= Not Significant; t= t-test calculated; df= Degree of Freedom; and N=Total Number of Respondents

Table 5 above shows t-score (-0.326) with associate probability of 0.745 being greater than the level of significance of 0.05. Therefore, the null hypothesis was upheld. Hence, this means that A

significant difference does not exist in the mean responses of male and female business education lecturers on human resources and skills constraints to the efficient use of machine learning in teaching business education course content in Delta State universities.

Hypothesis 3: There is no significant difference in the mean responses of male and female business education lecturers to the institutional and administrative constraints to efficient use of machine learning in teaching business education course content in Delta State universities.

Table 6: Summary of t-test of Mean of Male and Female lecturers on the Institutional and Administrative Constraints to Use of ML in Teaching Business Education Course in Delta Stata Universities

Grouping	N	Mean	Std. Deviation	T	Df	Sig. (2tailed)	Decision
Female	36	3.24	0.46	-0.326	877	.745	NS
Male	14	3.25	0.44				

NB: NS= Not Significant; t= t-test calculated; df= Degree of Freedom; and N= Number of Respondents

Table 8 above shows t-score (-0.326) with associate probability of 0.745 being greater than the level of significance of 0.05. Therefore, the null hypothesis was upheld. Hence, this means that There is no significant difference in the mean responses of male and female business education lecturers to the institutional and administrative constraints to efficient use of machine learning in teaching business education course content in Delta State universities.

Discussion

This study on research question one identified the challenges in the application of Machine learning in Business Education research in Delta State universities to include: lack of comprehensive public policy on application of AI in education and research, poor knowledge of adaptive learning algorithms required for the use of AI for research conduct, inadequate funding of research and resources required for application of AI in research, lack of required infrastructure for effective use of AI for researches in Delta State universities, unstable power supply is a big challenge in the application of AI in research conduct, wide skill gaps and digital illiteracy in effective application of AI in Nigerian education and researches and weak educational framework that improves the teaching and learning of AI in Nigerian tertiary institutions among others. The findings of the study agreed with the report of Eke, (2023) who identified major problems in implication of Machine learning in research as; poor public policy on application of AI, poor knowledge of adaptive learning algorithms required for the use of AI, inadequate infrastructure for effective use of AI and high cost of training of researchers in effective use of AI. Similarly, the findings of the study also conformed with that of UNESCO (2019) that possible lack of AI local contents and inequalities of the disadvantaged population are more likely to be excluded from AI-powered education and research in developing countries constitute part of the challenges of the use of AI in education and research in Africa. Ekwue, (2023) pointed those challenges of Machine learning usage in African continent can be blamed due to infrastructural decay associated with the lack of access to electricity and low

investment into internet infrastructure. This study on research question two identified strategic measures for application of Machine learning in Business Education research in Delta State universities to include: improved funding education and research with the required AI resources, provision of strong and stable internet services to stimulate the use of AI for research, incorporation of local contents into AI configuration for Nigerian education and research, adequate provision of necessary infrastructure and AI-driven facilities to enhance AI education and researches, formulation of AI-driven policies by government for enhancing adoption of AI in education and research and special intervention fund or subsidy for Machine learning -powered researches. In agreement with the finding of this study, Tarus, Gichoya and Muumbo (2015) found that the expansion of e-learning infrastructure to facilitate the access to e-learning by students, provision of stable power supply, government and institutional funding for ICTs and training of teaching staff and other stakeholders. The findings of this study is also in tandem with that of Oketoobo (2021) who identified measures for stepping up the use of technologies in education and research to include: increased funding and provision of infrastructure such as electricity for driving educational technologies. Ekwue (2023) identified financial resources as means of improving internet infrastructure across Africa for AI-powered education and researches. In addition, the findings of this study corroborated that of UNESCO (2019) who identified measures for stimulating AIpowered education and research to include formulation of comprehensive public policy and development of quality and inclusive data systems that will drive AI-powered research and education.

Conclusion

The study examined the possible challenges and strategic measures for application of Machine learning (AI) in Business Education research in Delta State universities. From the findings that emanated from the study, it is concluded that there are obvious challenges undermining effective application of Machine learning in Business Education research in Delta State universities and that adoption of certain strategic measures in application of Machine learning in Business Education research in Delta State universities will enhance quality and efficiency of research with more reliable outputs in line with global standard.

Recommendations

Based on the findings of the study and the conclusion, the study therefore recommended that:

i There should be formulation of necessary Machine Learning related policy that will help to drive effective and improved application of Machine Learning in Nigerian education and research conducts.

ii There should be improved funding and provision of necessary Machine learning related infrastructures in Delta State universities for research and education use.

iii There should be constant training and retraining of academics on effective use of Machine learning facilities for teaching and learning and research conduct.

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