DOPTION OF MACHINE LEARNING PEDAGOGY FOR ACADEMIC STAFF DELIVERY IN OFFICE TECHNOLOGY AND MANAGEMENT PROGRAMME IN TERTIARY INSTITUTIONS IN SOUTHWEST, NIGERIA

OMIDIJI, Samuel Ajetomobi[1] & OLATUNJI, Rufus Oladimeji[2]
Office Technology & Management Department
Federal Polytechnic, Ado Ekiti
Omidiji_sa@fedpolyado.edu.ng, olatunji.rufus@yahoo.com
08038355170, 08060802680

Abstract

This study explores the adoption of machine learning pedagogy for academic staff instructional delivery in tertiary institutions in Southwest Nigeria. The objective of the study was to identify the machine learning software needed by office technology and management academic staff for instructional delivery in tertiary institutions in Southwest Nigeria. Three research questions and one null hypothesis guided the study. The population of the study comprised all office technology and management lecturers in tertiary institutions in the Southwest of Nigeria. Sixteen lecturers were randomly selected from the 163 lecturers in the tertiary institutions offering office technology and management programmes. A structured questionnaire was used for the study. The questionnaire was validated by three experts from the Test and Measurement, Business Education, and Office Technology and Management departments. Reliability of the instrument was ensured using Cronbach's alpha, and a reliability coefficient of 0.81 was obtained. The data collected were analysed using means and standard deviations for the research questions and correlations for testing the hypotheses. The findings revealed that OTM academic staff have been adopting machine-learning pedagogy for the instructional delivery of OTM courses. The study concluded that the latest innovative strategies for the adoption of machine learning pedagogy are highly required, and that machine learning facilities are needed for the instructional delivery of OTM courses. It was recommended that the management of the institutions should procure the latest machine learning facilities, with reliable networking, such as internet connectivity, to enhance the performance of the OTM lecturers. Also, OTM lecturers should be sent for training and retraining to upskill in the application of machine learning pedagogy for instructional delivery in the new normal, enhancing performance.

Keywords: Machine Learning, Academic Staff, Office Technology and Management and Tertiary Institutions

Introduction

The office technology and management programme is a subset of business education that deals with the acquisition of functional occupational skills that will enable its graduates to perform effectively and efficiently in the automated global world of work. The introduction of office technology and management programmes into the educational curriculum of the country was borne out of the need to provide occupational skills for graduates who may want to develop a requisite interest in office-related occupations in the paperless office and digitalised global business environment, which is information and communication driven. The office technology and management programme was introduced and changed from secretarial studies to bridge the gaps that were created by the paradigm

shift from the analogue mode of performing secretarial duties to the digitalised working business environment.

During the era of secretarial studies, the focus was purely on the use of manual equipment such as the Olympia typewriter, so the products of secretarial studies cannot operate the latest facilities in the global market nor use software applications. Thus, the graduates produced seem to lack the requisite digital skills needed in the global market due to deficiencies in instructional delivery that prevent personalising learning experiences, predicting student performance, automating teaching and learning activities, and providing data-driven insights. Cletus et al. (2025) define pedagogy as the art and science of teaching learners in a formal school system, with a results-oriented approach aligned with curriculum goals and objectives. The application of statistical models and algorithms using computers and their software from data recognition to automate tasks, identify students' strengths and weaknesses and learning preferences. Pedagogical approaches are diverse ways and techniques that OTM lecturers can employ to support the teaching and learning process and instructional delivery in the OTM programme.

Machine learning, according to Adewale and Oyewole (2022), is a branch of artificial intelligence (AI) that focuses on enabling computers to learn from data without being explicitly programmed. It uses algorithms to analyse data, identify patterns and make predictions or decisions. These algorithms improve their performance over time as they are exposed to more data. Machine learning is trained on datasets, allowing students to learn from patterns and make predictions based on the requisite skills acquired. The application of machine learning pedagogy can continuously enable learners to access image recognition and numerous natural language processing capabilities. There are different types of machine learning, including supervised, unsupervised, and reinforcement learning. The 21st-century global world of work demands the integration of machine learning pedagogy into the skill acquisition in the OTM programme in order to produce graduates with the requisite skills and competencies to manipulate AI-driven tools and software in the digitalised global world of work and compete favourably with their contemporaries. It is therefore imperative for the OTM facilitators to utilise various machine-learning pedagogies for academic delivery. When educational institutions integrate machine learning pedagogy into office technology and management programmes, students will be prepared to enter the AI-driven business world and perform effectively. The disparity in students' skill gaps can be addressed by applying model-building machine learning. (Omosidi, et. al., 2024).

Model-building machine-learning category can be employed by OTM lecturers in their instructional delivery to facilitate an enhanced teaching and learning process. Correctly predicting students' academic performance is imperative in the 21st century to elevate educational outcomes in the office technology and management programme. Globally, there is a rapid advancement in the utilisation of machine learning pedagogy by lecturers and facilitators, which has enhanced students' academic performance and their acquisition of requisite knowledge, skills, and competencies needed in the contemporary global world of work dominated by digital-based activities. The improvement in the adoption of machine learning pedagogy systems is pronounced and invaluable for the students' academic performance, whereby students can learn at their own pace and in a result-oriented. The adoption of machine-learning pedagogical technologies for instructional delivery has undoubtedly enhanced students' academic performance. These machine learning pedagogical technologies have been found to possess the antecedents and capability to improve the quality of instructional delivery in the tertiary institutions. It has the potential to support curriculum implementation and real-time interaction between the lecturers and the students, resulting in improved learning outcomes. (Uzo-Okonkwo et. al., 2020). Adewale and Oyewole (2022) observed that the adoption of machine

learning pedagogy is potentially effective in enhancing instructional delivery and improving academic outcomes by adapting content to individual student needs, improving efficiency through automated grading and administrative tasks, and enhancing student outcomes by identifying at-risk learners for early intervention.

Statement of the Problem

The application of machine learning pedagogy in teaching office technology and management courses holds great potential for improving learning outcomes and providing students with the requisite skills and effectiveness to thrive in the global world of work. Machine learning pedagogy is a relief to office technology and management lecturers from strenuous activities of service delivery, and as an innovative way of lecture delivery to keep pace with technological skills needed in the modern office. The application of machine learning to instructional delivery in the office technology and management programme has not yielded the desired results. The graduates were still roaming the streets for jobs. The employers of labour also complained about skill deficiencies. However, many scholars have emphasised the need to apply machine learning pedagogy in office technology and management programmes to achieve results-oriented outcomes and the goals and objectives of producing qualified and competent graduates for the labour market. It seems that this has not been fully achieved. Empirical review of previous researchers revealed that this could be due to inadequate machine learning facilities for teaching and learning activities. Additionally, there seems to be a shortage of skilled educators with both pedagogical and technical proficiency in machine learning. Moreover, it appears that there is resistance to technological change among office technology and management lecturers, and concerns about disrupting traditional teaching methods and mainstreaming the full adoption of machine learning pedagogy. Thus, the unavailability of digitised and structured student data seems to impede the adoption of machine learning pedagogy in office technology and management programmes. It is imperative to address the constraints to unlock the potential of adopting machine learning in the Office Technology and Management programme to improve and enhance academic delivery among the Office Technology and Management lecturers. Based on these established problems, the researcher tends to investigate the adoption of machine learning pedagogy for academic staff delivery in office technology and management programmes in tertiary institutions in the South-West, Nigeria.

Purpose of the Study

The primary purpose of this study was to determine the adoption of machine learning in Office Technology and Management programme by academic staff for instructional delivery in tertiary institutions in South west. Specifically, the study sought to:

i. Identify the machine learning software needed by Office Technology and Management academic staff for instructional delivery in tertiary institutions in South West Nigeria.
ii. Ascertain the level of utilisation of machine learning by Office Technology and Management academic staff for instructional delivery in tertiary institutions in South West Nigeria.
iii. Determine the prospect of machine learning on the academic staff instructional delivery in tertiary institutions in South West Nigeria.

Research Questions

The following research questions guided the study.

1. What do office technology and management lecturers require the types of machine learning pedagogy for instructional delivery in tertiary institutions in South west Nigeria.
2. What is the level of utilisation of machine learning by Office Technology and Management academic staff for instructional delivery in tertiary institutions in South West Nigeria?

3. What are the prospects of machine learning on the academic staff's instructional delivery in tertiary institutions in the Southwest, Nigeria?

Research Hypothesis

A null hypothesis was formulated and tested at a 0.05 level of significance.

H_0: There is no significant relationship between machine learning pedagogy and OTM lecturers' instructional delivery in tertiary institutions in Southwest Nigeria.

Methodology

A descriptive survey design was used to conduct the study. Means and standard deviations were used to analyse the three research questions, and correlation was used to test the null hypothesis at the 0.05 level of significance. The population of the study consisted of 163 Office Technology and Management lecturers, where the OTM programme is domiciled in Southwest tertiary institutions, Nigeria. The sample size of 16 OTM lecturers was used for the study. Simple random sampling techniques were used to select the 16 OTM lecturers from the population of 163 lecturers, which constituted 10% of the entire population. The instrument used was a structured questionnaire titled "Questionnaire on adoption of machine learning pedagogy for Instructional Delivery in OTM programme (QAMLPOTMP). The 15 questionnaire were based on the purpose of the study and the research questions. The instrument was validated by three experts from the Department of Vocational and Technical Education and Test and Measurement, Ekiti State University, Ado Ekiti. A pilot study was conducted at Federal University, Oye Ekiti, to establish the instrument's reliability. Cronbach's alpha was used to assess the instrument's reliability, yielding a coefficient of 0.81. Each of the question items was assigned four response options: High Extent (VHE-4 points), High Extent (HE-3 points) Low Extent (LE-2 points) Very Low Extent (VLE-1): the benchmark for the study was determined to be that items with a mean value of 2.50 and above were agreed upon, while those with a mean value below 2.50 were termed to be disagree.

Results

Research Question One

What are the types of machine learning pedagogy required by office technology and management lecturers for instructional delivery in tertiary institutions in Southwest, Nigeria?

Table 1: **Mean and Standard Deviation of responses on the Types of Machine Learning Required by OTM lecturers for Instructional Delivery**

S/N	Item Statements	X	SD	Remark
1	Duolingo	3.68	0.54	VHE
2	Natural Language Processing	3.80	0.56	VHE
3	Deep learning	3.66	0.63	VHE
4	Predictive analytics	3.82	0.41	VHE
5	Artificial Intelligence	3.60	0.73	VHE
6	Computer Vision	3.50	0.82	VHE
7	Data Analytics	3.71	0.55	VHE
8	Neural Network	3.72	0.56	VHE
9	Quizlet	3.80	0.56	VHE
10	Automated Grading	3.62	0.70	VHE
Weighted average		**3.70**	**0.59**	**VHE**

Source: Field Survey, 2025

Table 1 revealed that the responses of lecturers on the types of machine learning pedagogy required by office technology and management lecturers for instructional delivery in tertiary institutions in South west Nigeria The result showed that all the types of machine learning pedagogy outlined were the types of machine learning pedagogy required by OTM lecturers for instructional delivery and teaching and learning activities in tertiary institutions in South West Nigeria with a weighted average mean of 3.70. All 15 items have standard deviation scores ranging from 0.41 to 0.82. This implies that the respondents' responses were not widely dispersed, as they are close to the means. The low standard deviation indicates that the respondents were homogeneous in their responses to the items. This implies that Duolingo, natural language processing, deep learning, predictive analytics, artificial intelligence, computer vision, data analytics, Quizlet, neural networks, and automated grading are the types of machine learning required for instructional delivery by office technology and management lecturers.

Research Question Two

What is the level of utilisation of machine learning by Office Technology and Management academic staff for instructional delivery in tertiary institutions in Southwest, Nigeria?

Table 2: Mean and Standard Deviation of responses on the level of application of machine learning by Office Technology and Management academic staff for instructional delivery

S/N	Item Statements	X	SD	Remark
1	Duolingo	3.71	0.55	VHE
2	Natural Language Processing	3.80	0.56	VHE
3	Deep learning	3.66	0.63	VHE
4	Predictive analytics	3.82	0.41	VHE
5	Artificial Intelligence	3.60	0.73	VHE
6	Computer Vision	3.50	0.82	VHE
7	Data Analytics	3.71	0.55	VHE
8	Neural Network	3.72	0.56	VHE
9	Quizlet	3.80	0.56	VHE
10	Automated Grading	3.62	0.70	VHE
Weighted average		**3.70**	**0.59**	**VHE**

Source: Field Survey, 2025

Table 2 revealed lecturers' responses regarding the level of utilisation of machine learning software systems in tertiary institutions in Ekiti State. The result showed that all the machine learning systems outlined were utilised by the lecturers to a very great extent, with a weighted average mean of 3.70. All 15 items have standard deviation scores ranging from 0.41 to 0.82. This implies that the respondents' responses were not widely dispersed, as they are close to the means. The low standard deviation indicates that the respondents were homogeneous in their responses. This implies that machine learning systems were utilised to a very great extent by office technology and management academic staff for instructional delivery in tertiary institutions in Southwest, Nigeria.

Research Question Three

What are the prospects of machine learning on the academic staff's instructional delivery in tertiary institutions in Southwest, Nigeria?

Table 3: Mean and Standard Deviation of responses on the prospect of machine learning on the academic staff for instructional delivery

S/N	Item Statements	X	SD	Remark
1	Accurate Prediction of Students' success	3.71	0.55	VHE
2	Early identification of at-risk students	3.80	0.56	VHE
3	Personalized learning experience	3.66	0.63	VHE
4	Early Intervention	3.82	0.41	VHE
5	High-Accuracy Prediction	3.60	0.73	VHE
6	Improved educational decision making	3.50	0.82	VHE
7	Enhanced student Motivation	3.71	0.55	VHE
8	Data – Driven insight	3.72	0.56	VHE
9	Data Analysis competency	3.80	0.56	VHE
10	Data Quality and Availability	3.62	0.70	VHE
Weighted average		**3.70**	**0.59**	**VHE**

Source: Field Survey, 2025

Table 3 revealed lecturers' responses to the prospects of applying a machine learning pedagogy system in tertiary institutions in Ekiti State. The result showed that accurate prediction of students' success, early identification of at-risk students, early intervention, data-driven insight, and data analysis competency are prospects of a machine learning pedagogy system in tertiary institutions in Ekiti State. This was reflected with a weighted average of 3.70. All 10 items have standard deviation scores ranging from 0.41 to 0.82. This implies that the respondents' responses are not widely dispersed, as they are close to the means. This suggests that machine learning pedagogy system enhances and improve academic performance in tertiary institutions in the Southwest, Nigeria.

Testing of Hypothesis

H_0: There is no significant relationship between machine learning pedagogy and OTM lecturers' instructional delivery in tertiary institutions in Southwest Nigeria.

Table 4: Correlation analysis of machine learning pedagogy and OTM lecturers' instructional delivery in tertiary institutions in Southwest Nigeria.

Variable	N	Mean	SD	Df	Cal r-value	P-value	Decision
Machine Learning Pedagogy	30	3.03	0.84				
				28	1.972	0.236	Rejected
OTM lecturers Instructional Delivery	30	2.77	0.94				

P<0.05 alpha level

Source: Field Survey 2025

Table 3 revealed that the calculated r-value of 1.972, while the p-value (0.236) is less than the significance level of 0.05 for 33 degrees of freedom. Thus, the hypothesis that there is no significant relationship between machine learning pedagogy systems and students' academic performance in tertiary institutions in Ekiti State was rejected. This means there is a substantial relationship between the machine learning pedagogy system and students' academic performance in tertiary institutions in the South-West of Nigeria.

Discussion of Findings

This study examines the types of machine learning pedagogy system facilities in tertiary institutions in the Southwest, Nigeria. Showed that respondents agreed that machine learning pedagogy system software facilities identified were needed by the lecturers for enhanced students' academic performance in a tertiary institution in the Southwest of Nigeria. The identified machine learning systems include: Duolingo, Natural Language Processing, Deep Learning, Predictive Analytics, Artificial Intelligence, Computer Vision, Data Analytics, Quizlet, Neural Networks, and Automated Grading. The findings of this study were in agreement with the findings of Emeasoba and Akiebie (2025), who identified the types of machine learning pedagogy systems and Artificial Intelligence software, including Natural Language Processing, Deep learning, Predictive analytics, and Artificial Intelligence, that are needed in Enugu State universities for the teaching and learning process. Similarly, Ogbusuo and Abosede (2025) conducted their study and found that Automated grading, Deep learning, Predictive analytics, Artificial Intelligence, and machine learning systems are needed for teaching and learning activities in tertiary institutions in Nigeria.

The findings of this study regarding the level of utilisation of machine learning systems by lecturers in tertiary institutions in South West, Nigeria revealed that respondents agreed that machine learning pedagogy was used to enhance staff academic delivery in tertiary institutions in South West, Nigeria. The machine learning pedagogy and software used include: Duolingo, Natural Language Processing, Deep Learning, Predictive Analytics, Artificial Intelligence, Computer Vision, Data Analytics, Quizlet, Neural Networks, and Automated Grading. The findings of this study were in agreement with those of Ademiluyi et al. (2025), who found that the level of application of artificial intelligence facilities by the lecturers of business education was very high. They were fully utilised for the teaching and learning process in tertiary institutions offering business education courses in Osun State. The findings of this study aligned with those of Cletus et al. (2025) and Ibrahim (2018), who reported that lecturers of business education in tertiary institutions in Rivers State used a machine learning system.

The findings of this study regarding the prospect of machine learning systems among lecturers in tertiary institutions in South West, Nigeria, revealed numerous prospects for the adoption of machine learning pedagogy to enhance staff academic delivery. The utilised machine learning pedagogy and software enhance and improve instructional delivery through accurate prediction of students' success, early identification of at-risk students, Data analysis competency, and data–driven insights. The findings of this study corroborate those of Cletus et al. (2025) and Adebayo (2019), who argued that the adoption of machine learning systems by lecturers of business education in tertiary institutions in Rivers State has tremendous prospects, such as Personalised learning experiences and proficiency in machine learning fundamentals.

The findings of the study revealed a significant relationship between the machine learning system and staff's academic delivery in Southwest tertiary institutions. This is because OTM lecturers were able to utilise Duolingo, Natural Language Processing, Deep learning, Predictive analytics, Artificial Intelligence, Computer Vision, Data Analytics, Quizlet, Neural Network, and Automated Grading. These findings are in consonance with the submission of (Omosidi et al., 2024) who opined that there is a positive relationship between machine learning systems and students' academic performance at the University of Ilorin. Similarly, the findings is also in agreement with the findings of Onwubuya et al. (2025), Ibukun, and Akinwamide, (2023), who discovered a positive relationship between machine learning systems and students' learning. The findings of this study also aligned with those of Adebayo (2019), who found a significant positive relationship between e-learning and students' academic performance in secondary schools in Ilorin, Kwara State.

Conclusion

The adoption of machine learning pedagogy for academic staff delivery in office technology and management programmes in tertiary institutions in the Southwest revealed significant impediments that must be addressed to harness the full potential of machine learning pedagogy in teaching and learning OTM courses. The study highlighted the type of machine learning pedagogy required by office technology and management lecturers for instructional delivery in the office technology and management programme. The availability of these facilities will enhance and improve instructional delivery in the OTM programme. The level of utilisation of machine learning by office technology and management lecturers determines the potential of machine learning in enhancing academic delivery of OTM lecturers to achieve the goals and objectives of producing competent and qualified graduates to the labour market.

The prospect of machine learning in the academic staff's instructional delivery in tertiary institutions in the Southwest might address the issue of skills gaps and solve the problem of unemployment bedevilling graduates from the office technology and management. The full adoption of machine-learning pedagogy in office technology and management lecturers for instructional delivery has the potential to revolutionise how course content is delivered, making it more result-oriented. Effective, efficient, and personalised. This will eventually enhance and improve the advancement of education generally.

Recommendations

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

1. There is a need for the government to provide a policy that will direct and guide machine learning system infrastructure development, where machine learning technological devices should be provided for both students and lecturers to complement the tremendous prospect of adoption of machine learning in Nigerian universities.
2. A sensitisation programme should be put in place by all educational institutions to increase academic staff awareness about the use of machine learning pedagogy in teaching and learning for enhanced instructional delivery.
3. Institution administrators should organize seminars and workshops on regular basis to upgrade business and educators' skills on the application of machine learning software and platforms for instructional delivery.

References

Adebayo, S. (2019). Effects of E-Learning Tools on Students' Academic Performance in Secondary Schools in Ilorin Metropolis, Nigeria. *Journal of Library Science Education & Learning Technology*. 1(1), 25-35.

Ademiluyi, A., Adegboye, A. O & Akande, R. A.(20250 Prospects and challenges of Integrating Artificial Intelligence into Office Technology and Management Programme. *Nigeria Journal of Business Education.* 12 (2), 285-292.

Adewale, T, & Oyewole, O. (2022). Adoption of Machine Learning in Education: Challenges and Prospects in the *Nigerian Context. Journal of Educational Technology*. 19(3), 112-126.

Agboeze, A. (2012). Evaluation of the E-learning program versus traditional lecture instruction for Undergraduate nursing students in the Faculty of Nursing, Teaching and Learning in Nursing. 6(2), 50-58

Cletus, A. A, Otu, F. E, Ogala, C. S & Ogbu, J. A. (2025). Constraints to the Efficient Use of Machine Learning in Teaching Business Education Course Content in Nigeria Universities. *Nigeria Journal of Business Education.* 12 (2), 324-337.

Deborah, O. A., Ogbusuo, G. K. & Abosede, M. A. (2025). Integrating AI into Business Education: Opportunities and Challenges. *Nigeria Journal of Business Education.* 12 (1), 307-310.

Emeasoba, N. C. & Akiebie, B.U. (2025) Application of Artificial Intelligence in Teaching and Learning of Business Education in the University in Enugu State. *Nigeria Journal of Business Education.* 12 (1), 311-322.

Ibrahim, J. (2018). Barriers to integrating machine learning in higher education: The case of Nigerian universities. *Nigerian Journal of Education and Technology*. 13(2), 89-98.

Ibukun, F. A. & Akinwamide, T. K. (2023), Actualising inclusive education through exit slips: A Catholicon to Classroom Marginalization in the Twenty-First Century. *Multidisciplinary Journal of Arts and Language Education (MJALE)* 4(1), 1-8

Ogwunte, P. C., Agburuga, V. & Abung, G. O. (2023). Availability and utilization of digital Resources for entrepreneurship skills acquisition in business Education in Universities in River State. *Nigeria Journal of Business Education.* 10(2), 84-92

Omosidi, A. S., Ajao, R. L. & Ahmed, R. O. (2024). Virtual classroom system and students' academic performance at the University of Ilorin. *Ilorin Journal of Business Education (IJBE)* 6(1), 85-95.

Onwubuya, U. N., Amobi, C. M., & Attah, C. A. (2025). Integration of machine learning as a correlate of core curriculum and maximum academic standards implementation for business education in South East, Nigeria. *Journal of International Cooperation and Development*. 8(1), 29-38.

Uzo-Okonkwo, N., Abaekih, I. S. & Okafor, C. V.(2020) Integrating E-Learning into the teaching of Business Education Courses in Colleges of Education. *Delta Business Education Journal* (DBEJ), *10*(1), 204-210.