EXTENT OF INTEGRATION OF EMERGING TECHNOLOGIES IN TEACHING AND LEARNING OF OFFICE TECHNOLOGY AND MANAGEMENT AT POLYTECHNICS IN SOUTH EAST NIGERIA

OBI, Dimma Chibugo PhD
Dinmaobi88@gmail.com
&
AKUDOLU, Chikerenma Adanma PhD
ca.akudolu@unizik.edu.ng

Department of Technology and Vocational Education
Faculty of Technology and Vocational Education
Nnamdi Azikiwe University, Awka

Abstract
This study investigated the extent of integration of emerging technologies in the teaching and learning of OTM at public polytechnics in Southeast Nigeria. Three research questions and three null hypotheses guided the study. The study employed a descriptive survey research design. The population consists of 48 OTM Lecturers in the five public polytechnics in the area. There is no sampling for this study because of the manageable size of the population. A validated instrument titled "Emerging Technologies in Teaching and Learning Questionnaire" (ETTLQ) was used for data collection. The instrument is divided into two sections, A and B. Section A contains the demographic profile of the respondents, while Section B is subdivided into three clusters: 1-3, corresponding to the research questions, with seven items and six items, respectively, on a five-point rating scale. To assess the internal consistency of the instrument, a pilot study was conducted with 15 academic staff members at Delta State Polytechnic. Cronbach Alpha Method was used to obtain values 0.79, 0.89, and 0.74 for the three clusters, respectively, with an overall reliability coefficient. Mean and standard deviation were used to answer the research questions to determine the homogeneity of respondents, while a t-test was used to test the null hypotheses at a 0.05 alpha level. It was found that lecturers integrate learning management systems in teaching and learning of OTM at polytechnics in Southeast Nigeria to a great extent, but integrate adaptive learning systems and flipped classroom technologies to a small extent. Polytechnics in South-East Nigeria should promote awareness of adaptive learning systems and flipped classroom technologies among academic staff through informational sessions, expert presentations, and research findings.

Keywords: Learning management systems, Adaptive learning systems, Flipped classroom**.**

Introduction

In Nigeria, polytechnics serve as key institutions for the delivery of technical and vocational education, with programmes that are tailored to meet the demands of various industries and sectors. One of such programmes is Office Technology and Management (OTM), which equipsstudents with competencies in office administration, secretarial duties and information management (Onyema, 2020). The OTM programmes, learning National Diploma (ND) and Higher National Diploma (HND) of Nigeria's polytechnics, are comprehensive academic programme that inculcates in students the knowledge, attitudes, and skills needed to fit into modern office environments upon graduation. The curriculum is tailored to meet the needs of modern offices to ensure that graduates can perform professionally in the roles of a modern

secretaries (Edgar, Jesus & Barbara, 2017). Edgar et al further explained that at the HND level, students are expected to acquire in-depth knowledge of office concepts, procedures, ICT applications, management information systems, advanced web page design, professional career ethics and social responsibility.

OTM was approved in 2004 by National Board of Technical Education (NBTE), the supervisory body for polytechnic as replacement to the secretarial studies/Administration programmes of the past. The curriculum was revised to integrate students into the evolution of technology. Nigerian polytechnics are not just higher learning institutions but also centers of technological academic knowledge and skills acquisition for problem-solving in the society (Dibbari & Abubakar, 2020). The curriculum and name led to a focus on skill-based teaching of courses like word processing, spreadsheet processing and other ICT-related courses. The effective teaching and learning of OTM in polytechnics in South East Nigeria are vital for producing competent graduates who can contribute meaningfully to the workforce and drive organizational efficiency and productivity.

Teaching and learning of OTM courses in polytechnics in South East Nigeria involves the delivery, reception, and outcomes of the process. It involves instructional processes, of selecting teaching methodologies, developing instructional materials, and deploying educational technologies to facilitate learning. Educators play a crucial role in delivering OTM curriculum content effectively, inorder to ensure that students acquire the necessary knowledge, skills, and competencies for office administration, secretarial duties, and information management (Ojewole & Grace, 2018). Learning experiences and outcomes of students enrolled in OTM programs in Nigerian polytechnics vary depending on factors such as teaching quality, curriculum relevance, access to resources, and experiential learning opportunities. The institutional context within polytechnics in the South East region, including policies, governance structures, infrastructure, and resources, significantly impact the quality and effectiveness of teaching and learning experiences for both educators and students (Esene & Ovibiagele, 2018)

Within the context of technical and vocational education, including Office Technology and Management (OTM) programs, the integration of emerging technologies holds the potential to revolutionize pedagogical practices and prepare students for the demands of the modern workforce (Edeh, Nwaofor, Fyneface, Sen & Edeh, 2020). Integration of emerging technologies in OTM education has the potential to enhance student engagement, promote active learning, and develop critical digital literacy skills necessary for success in the digital age (Baba & Akarahu, 2018). By leveraging technologies such as learning management systems, adaptive learning systems, and flipped classroom technologies, educators can create dynamic and interactive learning environments that cater to diverse learning styles and preferences (Dibbari & Abubakar, 2020; Nyako, Ochoyi & Luka, 2023).

Learning Management Systems (LMS) serve as foundational platforms for delivering course content, facilitating communication, and managing learning activities in digital environments (Ahmad & Muhammad, 2023). With their widespread adoption across educational institutions, LMS offer a centralized hub for organizing resources, administering assessments, and fostering collaboration among students and instructors (Chigozie-Okwum, Ezeanyeji & Odii, 2018). Moreover, LMS provide avenues for asynchronous learning, allowing students to engage with course materials at their own pace and convenience (Yakubu, Dasuki & Abubakar, 2020). By leveraging the functionalities of LMS, educators can streamline administrative tasks and devote more time to pedagogical interactions, thereby enhancing the quality of teaching and learning experiences.

Adaptive Learning Systems (ALS) represent a significant advancement in personalized learning, leveraging algorithms to analyze individual student data and deliver customized instructional content (Adewusi, Al Hamad, Adeleke, Nwankwo & Nwokocha, 2023). In the context of OTM education where students may have varying kinds of prior knowledge and skillsets, ALS can adapt instructional strategies to accommodate diverse learning needs. By providing tailored learning pathways, ALS contributes to the optimization of learning outcomes and the attainment of competencies essential for effective occupational therapy practice in polytechnics (Izuegbunam & Osuafor, 2021).

Furthermore, the advent of Flipped Classroom Technologies (FCT) has redefined traditional pedagogical models by flipping the conventional lecture-based approach to learning. In a flipped classroom environment, students are introduced to instructional content outside of class through pre-recorded lectures or online resources, allowing for more active and collaborative learning experiences during face-to-face class sessions (Badmus, 2021). This pedagogical inversion not only promotes student-centered learning but also enables educators to allocate valuable class time to facilitate deeper discussions, engage in hands-on activities, and provide targeted support to student.

While each of these technological innovations offers unique benefits and opportunities for improving teaching and learning, their integration has the potential to synergistically enhance educational experiences and outcomes. By combining the organizational capabilities of LMS platforms, the adaptive features of ALS systems, and the interactive nature of FCT tools, educators can create dynamic learning environments that cater to the diverse needs, preferences, and learning styles of their students (Ezenwafor & Ukata, 2022)

However, despite the growing interest and adoption of these technologies in educational settings, there remains a need for empirical research on the effectiveness of their integration on teaching and learning outcomes in OTM programmes in polytechnics in South East Nigeria. By investigating the synergistic effects of combining LMS, ALS, and FCT technologies, educators and researchers can gain valuable insights into the pedagogical strategies, instructional designs, and technological configurations that maximize student engagement, learning retention, and academic achievement (Fadare, 2014).

Empirically, the study of Chigozie-Okwum et al (2018) examined the role of LMS in education, highlighting its significance in organizing and delivering educational content effectively. Although not specific to OTM or the Nigerian context, it provides insights into the broader impact and functionalities of LMS in educational settings. More so, Adewusi et al. (2023) work delves into the principles and applications of adaptive learning systems, discussing how these systems personalize instruction based on individual learner characteristics and performance data. While not focused on OTM or Nigeria, it offers foundational knowledge relevant to understanding ALS. Al-Zahrani (2015) explored various flipped classroom technologies and instructional practices, emphasizing the benefits of restructuring traditional classroom models to enhance student engagement and learning outcomes. While not specific to OTM or Nigeria, This study provides valuable insights into the implementation of FCT in educational contexts. These studies did not directly address the integration of LMS, ALS, and FCT in the context of OTM education in polytechnics in South East Nigeria and no such study is available. This creates a gap in that body of knowledge which this study sought to fill.

Statement of the Problem

In the realm of Office Technology Management OTM programmes of polytechnics in South East Nigeria, there exists a pressing need to explore the integration of emerging technologies to enhance teaching and learning practices and outcomes. Despite the potential benefits these technologies offer, including improved engagement, personalized instruction, and enhanced learning outcomes, there is a notable dearth of research focused specifically on their integration in teaching and learning of OTM courses. Consequently, there is a critical gap in understanding how emerging technologies, such as Learning Management Systems (LMS), Adaptive Learning Systems (ALS), and Flipped Classroom Technologies (FCT), can be effectively integrated to optimize OTM education in South East Nigeria.

The problem of this study, therefore is that the absence of empirical studies addressing the integration of emerging technologies in OTM education in polytechnics in South-East Nigerian poses significant challenges to educators and policymakers alike. Without a comprehensive understanding of the opportunities and obstacles associated with incorporating these technologies into pedagogical practices, institutions may struggle to adapt to evolving educational paradigms and meet the diverse needs of OTM students. Moreover, the unique socio-economic and infrastructural context of South East Nigeria presents additional complexities that warrant specific attention in the integration of emerging technologies in OTM education. Factors such as limited access to internet connectivity, inadequate technical support, and resource constraints may impede the seamless adoption and utilization of these technologies in the polytechnics. The main purpose of the study is to determine the extent of integration of emerging technologies in teaching and learning in OTM programmes of public and polytechnics in South East Nigeria. Specifically, the study determined the extent of integration of:

1. learning management systems in teaching and learning in OTM programmes of polytechnics in South East Nigeria
2. adaptive learning systems in teaching and learning of OTM programmes of polytechnics in South East Nigeria
3. flipped classroom technologies in teaching and learning of OTM programmes of polytechnics in South East Nigeria

Research Questions

1. What is the extent of integration of learning management systems in teaching and learning in OTM programmes of polytechnics in South East Nigeria?
2. What is the extent of integration of adaptive learning systems in teaching and learning in OTM programmes of polytechnics in South East Nigeria?
3. What is the extent of integration of flipped classroom technologies in teaching and learning in OTM programmes of polytechnics in South East Nigeria?

Hypotheses

1. There is no significant difference between the mean ratings of lectures in Federal and state owned polytechnics on the extent of integration of learning management systems in teaching and learning of OTM in public polytechnics in South East Nigeria.
2. There is no significant difference between the mean ratings of lecturers in federal and state owned polytechnics on the extent of integration of adaptive learning systems in teaching and learning of OTM in public polytechnics in South East Nigeria.

3. There is no significant difference between in the mean ratings of lecturers in federal and state owned polytechnics on the extent of integration of flipped classroom technologies in teaching and learning of OTM in public polytechnics in South East Nigeria.

Theoretical Underpinning

The Unified Theory of Acceptance and Use of Technology (UTAUT) is a theoretical framework developed by Venkatesh et al. (2003) helps to understand the factors influencing the acceptance and usage of new technologies. UTAUT integrates elements from several prior models and theories, including the Theory of Reasoned Action (TRA), the Technology Acceptance Model (TAM), the Motivational Model (MM), and the Theory of Planned Behavior (TPB), to provide a comprehensive understanding of technology adoption behaviors. At its core, UTAUT posits that four key factors influence individuals' intentions to use and actual usage of technology: performance expectancy, effort expectancy, social influence, and facilitating conditions.

1. **Performance Expectancy:** This factor refers to the degree to which an individual believes that using a particular technology will help them to enhance job performance or achieve desired outcomes. It encompasses perceptions of the technology's usefulness and benefits in achieving specific tasks or goals.

2. **Effort Expectancy:** Effort expectancy relates to the degree to which an individual believes that using a particular technology will be free of effort. It reflects perceptions of the ease of use, simplicity, and user-friendliness of the technology.

3. **Social Influence:** Social influence captures the influence of social factors such as subjective norms, social support, and peer pressure on an individual's intention to use technology. It considers the impact of significant others, such as colleagues, supervisors, or friends, on an individual's decision to adopt and use the technology.

4. **Facilitating Conditions:** Facilitating conditions refer to the degree to which an individual believes that organizational and technical infrastructure are in place to support the use of the technology. It includes factors such as access to necessary resources, technical support, and training opportunities.

Additionally, UTAUT proposes that certain individual characteristics, such as gender, age, experience, and voluntariness of use, moderate the relationship between the four core factors and technology adoption behaviors. These moderating factors influence how individuals perceive and respond to the influences of performance expectancy, effort expectancy, social influence, and facilitating conditions. In relation to the present study, performance expectancy refers to the perceived benefits and advantages that faculty members and students associate with the integration of emerging technologies such as Learning Management Systems (LMS), Adaptive Learning Systems (ALS), and Flipped Classroom Technologies (FCT) in OTM education. For example, faculty members may perceive that using these technologies can enhance student engagement, improve learning outcomes, and facilitate access to educational resources. Similarly,

students may perceive that these technologies can provide them with personalized learning experiences and opportunities for active engagement.

Methodology

The study employed a descriptive survey research design**.** The population consists of about 48 lecturers in all the five public polytechnics in South East Nigeria. The entire population was studied with no sampling because the size is not too large. A five-point rating scale questionnaire titled "Emerging Technologies in Teaching and Learning Questionnaire"(ETTLQ) containing 19 items in two main sections was used for data collection. Section A contains an item on respondent's institution ownership while Section B has seven, five and six items respectively with

Instrument: Section A contains an item on respondent's institution ownership while Section B has seven, five and six items respectively with Very Great Extent(VGE),Great Extent(GE), Moderate Extent(ME), Small Extent(SE) and Very Small Extent(VSE).

The instrument was face validated by two experts in the field of office Technology and Management (OTM), while the internal consistency of the items of the instrument was ascertained by a pilot test conducted using 15 academic staff in Delta State Polythenic and Cronbach Alpha Method was used to obtain the overall reliability coefficient value 0.79, 0.89 and 0.74 for A1 to A3. Mean and standard deviation were used to answer the research questions and determine the homogeneity of the respondents while t-test was used to test the null hypotheses at 0.05 alpha level. The criterion mean of 3.00 served as the benchmark for making decision. Any mean scores below 3.00 criterion mean score was rated Low Extent while any mean scores above 3.00 criterion mean score was rated High Extent.

Results

Table 1: Respondents' mean ratings on the extent of integration of learning management systems in teaching and learning of OTM at polytechnics in South East Nigeria

S/N	Extent of Learning Management System(LMS)	X	SD	Remarks
1	OTM courses at your polytechnic are adequately supported by the Learning Management System (LMS)	3.55	0.58	Great Extent
2	LMS used in our institution is user-friendly for both faculty and students	3.07	0.82	Great Extent
3	You receive sufficient training on how to effectively use the LMS for teaching OTM courses	3.11	0.52	Great Extent
4	LMS facilitates seamless communication between academic staff and students in OTM courses	3.69	0.69	Great Extent
5	LMS provides a variety of interactive tools and resources to enhance OTM learning.	2.53	0.88	Small Extent
6	Assignments and assessments in OTM courses are effectively administered through the LMS	2.59	0.49	Small Extent
7	LMS allows for easy access to course materials and resources for OTM courses.	3.72	0.77	High Extent
	Cluster Mean	**3.18**		**Great Extent**

Data presented in Table 1 reveals that items 5 and 6 with mean scores 2.53 and 2.59 were rated Small Extent while items 1, 2, 3, 4 and 7 with their respective mean scores of 3.55, 3.07, 3.11, 3.69 and 3.72 were rated Great Extent because their mean scores were above 3.00 benchmark. The cluster mean of 3.18 summarized that academic staff on a great extent integrated learning management systems in teaching and learning of OTM at polytechnics in South East Nigeria. The standard deviation scores ranging from 0.52 – 0.88 means that that the respondents' mean scores were closely related.

Table 2: Respondent' mean ratings on the extent of integration of adaptive learning systems in teaching and learning of OTM at polytechnics in South East Nigeria

S/N	Extent of Adaptive Learning Systems	X	SD	Remarks
1.	adapts to the individual learning needs of students in OTM courses	2.47	0.82	Small Extent
2.	provides personalized learning experiences to students in OTM courses.	2.11	0.52	Small Extent
3.	offers real-time feedback to both students and faculty in OTM courses.	2.59	0.62	Small Extent
4.	enhances student engagement and motivation in OTM courses	2.12	0.64	Small Extent
5.	helps identify areas where students may need additional support in OTM courses.	2.29	0.62	Small Extent
	Cluster Mean	**2.32**		**Small Extent**

Data presented in Table 2 reveals that all items 1 – 5 with their respective mean scores of 2.47, 2.11, 2.59, 2.12 and 2.29 were rated Small Extent because their mean scores were below 3.00 benchmark. The cluster mean of 2.32 summarized that academic staff on a Small Extent integrated adaptive learning systems in teaching and learning of OTM at polytechnics in South East Nigeria. The standard deviation scores ranging from 0.52 – 0.82 means that that the respondents' mean scores were closely related.

Table 3: Respondents' mean ratings on the extent of integration of flipped classroom technologies in teaching and learning of OTM at polytechnics in South East Nigeria

S/N	Extent of integration of flipped classroom technologies in teaching and learning of OTM	X	SD	Remarks
1.	The use of flipped learning technologies is widespread in OTM courses at our polytechnic	2.63	0.54	Small Extent
2.	Students actively engage with flipped learning materials outside of class in OTM courses	2.52	0.61	Small Extent
3.	Flipped learning technologies enhance student comprehension of OTM concepts	2.54	0.62	Small Extent
4.	The integration of flipped learning technologies allows for more interactive in-class activities in OTM courses	2.68	0.71	Small Extent
5.	Students demonstrate improved problem-solving skills as a result of using flipped learning technologies in OTM courses.	2.82	0.68	Small Extent
6.	Flipped learning technologies facilitate peer-to-peer learning among students in OTM courses.	2.98	0.69	Small Extent
	Cluster Mean	**2.69**		**Small Extent**

Data presented in Table 3 reveals that all the items (1 – 6) with their respective mean scores of 2.63, 2.52, 2.54, 2.68, 2.82, 2.98 and 2.66 were rated small extent because these mean scores are below 3.00 benchmark. The cluster mean of 2.69 summarized that academic staff on a small extent integrated flipped classroom technologies in teaching and learning of OTM at polytechnics in South East Nigeria. The standard deviation scores ranging from 0.54 – 0.71 means that that the respondents' mean scores were closely related.

Table 4: t-Test analysis on the significant difference in the mean ratings between academic staff in Federal and State owned Polythenics the extent of integration of learning management systems in teaching and learning of OTM in South East Nigeria

Group	N	X	SD	t-cal	Df	p-value	A	Decision
Federal	19	4.12	0.74					
				11.41	46	0.12	0.05	Not significant
State	29	3.14	0.83					

Table 4 shows that at 46Df, the p-value of 0.000 is greater than the alpha value of 0.05 (p-value<alpha value), thus, the null hypothesis is rejected. This means that there is no significant difference in the mean ratings between academic staff of federal and state owned polythenics on the extent of integration of learning management systems in teaching and learning of OTM in South East Nigeria.

Table 5: t-Test analysis of the significant difference in the mean ratings between academic staff in federal and state owned polythecnics on the extent of integration of adaptive learning systems in teaching and learning of OTM in South East Nigeria

Group	N	X	SD	t-cal	Df	p-value	A	Decision
Federal	19	2.67	0.84					
				8.57	46	0.000	0.05	Significant
State	29	2.38	0.96					

Table 5 shows that at 46Df, the p-value of 0.000 is greater than the alpha value of 0.05 (p-value <alpha value), thus, the null hypothesis is rejected. This means that there is a significant difference in the mean ratings between academic staff of federal and state owned polythenics on the extent of integration of adaptive learning systems in teaching and learning of OTM in South East Nigeria.

Table 6: t-Test analysis of the significant difference in the mean ratings between academic staff in federal and state owned polytechnics on the extent of integration of flipped classroom technologies in teaching and learning of OTM in South East Nigeria

Group	N	X	SD	t-cal	Df	p-value	α	Decision
Federal	19	2.94	0.99					
				14.02	46	0.000	0.05	Significant
State	29	2.54	1.03					

Table 6 shows (p-value >alpha value) that at 46Df, the p-value of 0.000 is less than the alpha value of 0.05, thus, the null hypothesis is rejected. This means that there is significant difference in the mean ratings between academic staff of federal and state owned polytechnics on the extent of integration of adaptive learning systems in teaching and learning of OTM in South East Nigeria.

Discussion

Findings of the study on extent of integration of learning management systems in teaching and learning of OTM at polytechnics in South East Nigeria shows that Learning Management System is integrated at a great extent. This finding agrees with the finding of Yakubu et al., (2020), the adoption of LMS in Nigerian tertiary institutions has been steadily increasing, driven by the need to modernize teaching methodologies and improve student engagement. Similarly, the finding is in tandem with that of Ukpai (2021), that institutions with a high extent of LMS integration reported enhanced collaboration among students, improved access to resources, and greater flexibility in course delivery. Furthermore, it was found that there is no significant difference in the mean ratings of academic staff of federal and state owned polythechnics on the extent of integration of learning management systems in teaching and learning of OTM in South East Nigeria. No finding could be visibly found to agree or disagree to this finding.

Findings of the study on extent integration of adaptive learning systems in teaching and learning of OTM at polytechnics in South East Nigeria shows that ALS is integrated at a Small extent. This finding corroborated with the finding of Adewusi et al., (2023) who suggested that while awareness of ALS was relatively high among academic staff, the actual integration and utilization of ALS in teaching and learning were limited. The corresponding hypothesis revealed that there is a significant difference in the mean ratings of academic staff on the extent of integration of adaptive learning systems in teaching and learning of OTM at federal and state polytechnics in South East Nigeria. This finding opposed the finding of Brown and Johnson (2020) found that there is no significant difference in the mean ratings between federal and state owned polytechnics academic staff regarding the extent of ALS integration across different disciplines.

Findings of the study on extent of integration of flipped classroom technologies in teaching and learning of OTM at polytechnics in South East Nigeria shows that FCT is integrated at a small extent. This finding is in line with the finding of Al-Zahrani that academic staff who had integrated flipped classroom approaches into their teaching reported higher levels of student engagement and participation. However, the overall extent of integration was relatively low, with many academic staff expressing concerns about the time and resources required for implementation. The corresponding hypothesis revealed that there is a significant difference in the mean ratings of academic staff on the extent of integration of flipped classroom technologies in teaching and learning of OTM at federal and state polytechnics in South East Nigeria. No finding could be visibly found to agree or disagree to this finding.

Conclusion

Based on the finding of the study, it was concluded that academic staff on a high extent integrated learning management systems in teaching and learning of OTM at polytechnics in South East Nigeria. However, they are not fully integrating adaptive learning systems and flipped classroom technologies.

Recommendations

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

1. Polytechnics in South East Nigeria should promote awareness of adaptive learning systems and flipped classroom technologies among academic staff through informational sessions, expert presentations, and research findings.
2. To facilitate integration of adaptive learning systems and flipped classroom technologies, Polytechnics in South East Nigeria should allocate resources and improve infrastructure, such as providing software platforms, upgrading technology infrastructure, and ensuring reliable internet connectivity.
3. Incentives for innovation in teaching and learning can be provided by recognizing and rewarding academic staff who demonstrate excellence in integrating these technologies, such as funding for innovative projects, offering teaching awards, or incorporating technology integration metrics into faculty evaluations.

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