INTEGRATING EMERGING TECHNOLOGIES IN CURRICULUM IMPLEMENTATION AT THE TERTIARY EDUCATION LEVEL IN GOMBE STATE: SYNOPSIS OF TEACHERS AND CURRICULUM SPECIALISTS

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Abstract
The study investigated the integration of selected emerging technologies for curriculum implementation in College of Education Billiri, Gombe State. The survey research design was used for the study. All lecturers, instructors and technicians totalling 149 constitute the research population with 123 respondents cutting across 5 schools randomly selected as sample size. A Likert-style questionnaire; Emerging Technologies for Tertiary Education Assessment Survey (ET-TEA**)** was used as research instrument. The instrument's reliability was tested using the Guttmann Split-Half reliability coefficient for reliability which resulted to coefficient of 0.884. Mean and standard deviation were used to answer research questions while one-sample t-test was used to test the hypotheses at the 0.05 level of confidence. The study found that; awareness of emerging technologies for curriculum implementation among the respondents was slightly above average and on the other hand real usage in teaching-learning (implementation) of curriculum was at a low level due to several reasons. The study concluded that tertiary education lecturers like College of Education in Gombe State are often knowledgeable and motivated to utilize emerging technologies, institutional shortcomings in resources and planning often undermine potential though. The study hence recommended that the government should initiate a curriculum implementation workshop and other training programs to change this anomaly.
Key Words: Emerging Technologies, Curriculum Implementation, Tertiary Education

Introduction
Implementation of curriculum is a cardinal component in education and development. One of the key units of the United Nations' sustainable development 2030 agenda is quality education. This component aims to entrench inclusive and equitable quality education for all. To achieve this, emerging technologies have been shown to become an essential tool towards this goal. Nwuke and Yellowe (2025) posited that the integration of emerging technologies in 21st-century classrooms has the potential to transform teaching and learning processes. This was corroborated by Olatoye, Salami, Olore, and Adepoju (2022). The implication is that emerging technologies have created a paradigm shift in the entire education system. According to

Haleem, Javaid, Qadri, and Suman (2022), it is not only a knowledge provider but also a co-creator of information, a mentor, and an assessor. Emerging technologies for curriculum implementation have made teaching and learning easier for both teachers and students. Students in modern times use various software and tools to create presentations and projects. Similarly, lecturers and teacher have a plethora of technological tools at their expense for creation and implementation of both content and learning experiences. Clinton and Ronoh (2024) asserted that there has been a change in the education dynamics due to new and emerging technologies which has created a brand-new exciting possibility for improving teaching and learning process. These emerging technologies aid in increasing interest in research for lectures in tertiary institutions and propel substantial motivation for curriculum implementation as supported by Isiyaku, Ayub, and Abdulkadir (2019). Thus tertiary institutions in Nigeria boast of better, more scientific and yet more efficient and effective ways and strategies for curriculum implementation.

The importance of emerging technologies in curriculum implementation in the 21st century teaching and learning processes can never be overstressed. Before COVID-19 usage of emerging technologies such as Virtual Reality Applications (VRA), AI tools and modes were scarcely used in Nigeria for teaching and learning processes. This changed with the emergence of the COVID and the post-COVID era which forced the educational system particularly tertiary institutions to look inward and explore more modern avenues of implementing curriculum. What is however very important to be emphasized is the stratagems for integration and usage to harnessed its immeasurable benefits.

The National Policy on Education (FRN, 2013) emphasizes the need to prepare teachers with the necessary skills and knowledge to use ICT efficiently. As a result, teacher education programs are designed to incorporate ICT training, with the goal of developing professionals capable of meeting the needs of modern classrooms. However, the practical application of these policies often faces obstacles such as weak enforcement, limited opportunities for ongoing professional development, and educators' reluctance to embrace change. Research indicates that even when ICT resources are accessible, many teachers still lack the confidence or ability to integrate them effectively into their teaching (Harris, Mishra & Koehler, 2009).

Matters have become more pronounced with the fast emergence of several new technologies which seems to be deliberated crafted to promote better, efficient and effective curriculum implementation experiences for teachers, teachers, lecturers and students. Teachers and academics who can hardly explore Information Communication Technology (ICT) tools and Artificial Intelligence (AI) may certainly struggle with the use of Learning Management System(LMS), Online course creation tools, Virtual Learning Environments (VLEs), Gamification platforms, Collaborative tools: Google Workspace, Microsoft Teams, project-based learning among others to say the least. Yet there is the advent of several educationally aligned technologies for curriculum implementation which if utilized could yield a harvest of professional teaching and great academic achievement for students. Some of these emerging

technologies include; Online course creation tools, Virtual Learning Environments (VLEs), Gamification platforms, Collaborative tools: Google, Workspace, Microsoft Teams, project-based learning, Assessment and feedback tools e.g. Turnitin, Quizlet and Kahoot, Microlearning platforms: Curatr, Grovo, Qstream AI-powered Adaptive Learning platforms like DreamBox, Curriculum Associates and Smart Sparrow. Emerging technologies notionally refers to technological tools, modes and models that are developing or advancing usage of or which have been but are now upgrading operations and advancing diverse creation and developments in the 21st century. The applications of emerging technologies have been there for a while, and they have been developing for decades (Namatherdhala, Mazher, & Sriram, 2019). However, the global adoption of developing technologies was expedited by the COVID-19 pandemic in 2020 (Cone et al., 2022). The education sector saw significant changes as a result of the epidemic. For this reason, new technologies are always changing the way curriculum is implemented, which helps to accommodate various types of learners, improve research, and help students do better academically.

Curriculum implementation conceptually donates the congregation of strategies, skills and methods employed for teaching and learning spanning numerous processes and stages. Okello and Kagochi (2019) define curriculum implementation as the process of putting the officially prescribed curriculum into practice through the interaction of teachers, learners, and learning resources in a given context. On the other hand, Urevbu (2020) states that Curriculum implementation involves the translation of curriculum objectives into classroom practice, where teachers interpret and deliver content to achieve desired learning outcomes. In tertiary institutions which is the focal point for this study especially teacher education, implementation spells success and achievements in all dimensions.

UNESCO (2021) defines tertiary institutions as all post-secondary education institutions including universities, colleges, technical training institutes, and vocational schools that provide learning at the higher education level. To Salmi and Bassett (2018) tertiary institutions are organizations that offer academic, professional, or technical education beyond the secondary school level, often leading to the award of degrees, diplomas, or certificates. It is based on these that this study set to investigate emerging technologies in curriculum implementation at the tertiary education level in Gombe state. The Purpose of the study was to assess the awareness, availability and usage as well as investigate the readiness and challenges affecting the integration of emerging technologies for curriculum implementation in tertiary Education in Gombe state.

Objectives of the Study

The main objectives of the study include to:

1. determine the extent to which lecturers in Gombe state tertiary institutions are aware of integrating emerging technologies for curriculum implementation.

2. ascertain the rate of availability of emerging technologies for integration in curriculum implementation in tertiary education in Gombe state.
3. determine the extent of readiness of tertiary education in Gombe state for integrating emerging technologies for curriculum implementation.
4. examine the challenges affecting the integration of emerging technologies for curriculum implementation in tertiary education in Gombe state tertiary institutions.

Research Questions

1. To what extent are lecturers in Gombe state tertiary institutions aware of integrating emerging technologies for curriculum implementation?
2. What is the rate of availability of emerging technologies for integration in curriculum implementation in tertiary education in Gombe state?
3. To what extent is tertiary education in Gombe state ready for integrating emerging technologies for curriculum implementation?
4. What are the challenges affecting the integration of emerging technologies for curriculum implementation in tertiary education in Gombe state tertiary institutions?

Hypotheses

H_{o1}: There is no significant level of awareness for integration of emerging technologies for curriculum implementation among lecturers in tertiary institutions in Gombe State.

H_{o2}: There is no significant availability and usage of emerging technologies for teaching and learning in Gombe State tertiary institutions.

H_{o3}: Tertiary education institutions in Gombe State are not significantly ready for integration of emerging technologies for curriculum implementation.

H_{o4}: There are no significant challenges affecting the integration of emerging technologies in teaching and learning in Gombe State tertiary institutions.

Methodology

The study employed the survey design to investigate the phenomenon. A researcher-structured questionnaire was designed tagged: Emerging Technologies for Tertiary Education Assessment Survey (ET-TEA**).** The instrument reliability was tested using the Guttmann Split-Half reliability coefficient for reliability which resulted to coefficient of 0.884. Data was collected using Direct Administration Technique (DAT) by the researcher. 123 were returned from five Schools covering 10 departments and diverse fields or disciplines in the College. Senior lecturers and instructors were main respondents. Mean and standard deviation were used to answer research questions while one-sample t-test was used to test the hypotheses at the 0.05 level of confidence. The result is presented in the various tables followed by the interpretation and analysis leading to findings and recommendations accordingly.

Results

RQ 1: To what extent are lecturers in Gombe state tertiary institutions aware of integrating emerging technologies for curriculum implementation?

Table1: Mean and Standard Deviation on awareness for emerging technologies

Awareness	N	Mean	Std Dev.
I am aware of the availability of emerging technologies for curriculum implementation in my institution	123	3.19	0.507
I am aware of digital platforms that help for delivery or access to course content.	123	3.59	0.486
I can identify specific emerging technologies relevant to and for my teaching.	123	3.51	0.5
I am aware of emerging technologies such as LMS, AI, VR tools, or simulation software as part of the curriculum delivery process.	123	3.15	0.527
I have received training on using digital tools for curriculum implementation.	123	2.93	0.808
Cumulative Mean		**3.274**	**0.2721**

Table 1 shows the cumulative mean of 3.274 and standard deviation of 0.2721. This implies that the awareness level of lecturers in the tertiary institution is high since the mean is above 2.5 as average. The research question 1 is thereby answered; lecturers and instructors are well aware of the existence of emerging technologies for the implementation of curriculum.

H_{01}: There is no significant level of awareness for integration of emerging technologies for curriculum implementation among lecturers in tertiary institutions in Gombe State

Table 2: t-test for the awareness of emerging technologies for curriculum implementation

	N	Mean	std	df	t	Sig. (2-tailed)	Mean Diff
Awareness	123	3.27	0.272	4	-178.490	.000	-21.72600

Table 2 showed a one-sample t-test of the awareness of emerging technologies for curriculum implementation in tertiary institutions in the state. With the P-value of .000 which is less than the confidence level of 0.05 ($p = 0.000 \leq 0.05$), the hypothesis which state that There is no significant level of awareness for integration of emerging technologies for curriculum implementation among lecturers in tertiary institutions in Gombe State is hereby rejected. The implication is that there is significant level of awareness for integration of emerging technologies for curriculum implementation among lecturers in tertiary institutions in Gombe State.

RQ 2: What is the rate of availability of emerging technologies for integration in curriculum implementation in tertiary education in Gombe state?

Table 3: Mean and Standard Deviation on availability of emerging technologies

	N	Mean	Std Dev.
I use digital tools (e.g., LMS, AI, multimedia, virtual labs) to deliver curriculum content.	123	2.23	0.421
I design or adapt lessons to include emerging technologies.	123	1.31	0.907
I collaborate with colleagues to implement technology-enhanced curriculum.	123	1.15	0.932
Emerging technologies are readily available in my department.	123	2.07	1.073
I received adequate training to use emerging technologies in my teaching.	123	1.90	0.298
Cumulative Mean		**2.132**	**.1575**

Using table 3, the research question 2 is answered. The overall Mean and Standard deviation; 2.13 and 0.157 respectively showed that the lecturers and instructors are not utilising emerging technologies in curriculum implementation hence, the cumulative mean is low.

H_{o2}: There is no significant availability and usage of emerging technologies for teaching and learning in Gombe State tertiary institutions.

Table 4: t-test for the availability of emerging technologies for curriculum implementation

N	Mean	Std	df	t	Sig. (2-tailed)	Mean Diff
123	2.13	0.15	4	-324.573	.152	-21.72600

The one-sample t-test for hypothesis 2 shown in table 4 with the P-value of 0.152 depict that the hypothesis is accepted since p = 0.152 is greater than 0.05 ($p = 0.152 \geq 0.05$). The implication is that there is actually no significant availability and usage of emerging technologies for teaching and learning in Gombe State tertiary institutions.

RQ 3: To what extent is tertiary education in Gombe state ready for integrating emerging technologies for curriculum implementation?

Table 3: Mean and Standard Deviation on readiness of tertiary institutions for use of emerging technologies

	N	Mean	Std Dev.
There is inadequate funding in allocation for digital education infrastructure in my institution.	123	3.2	0.786
There is insufficient institutional support for integrating emerging technologies in my institution.	123	3.49	0.632

My institution does not adequately include digital competence in professional development programs for lecturers.	123	2.03	0.652
My institution does not provides sufficient access to modern digital tools for teaching.	123	2.72	0.771
I do not feel well prepared and supported to continue using technology in curriculum delivery.	123	2.69	0.691
Cumulative Mean		**2.826**	**0.557**

Table 5 shows the cumulative mean of 2.826 and standard deviation of 0.557. This implies that the readiness level of tertiary education institutions to use emerging technologies for curriculum implantation is yet low as average. The research question 3 is thereby answered; **tertiary** education institutions in Gombe state are not significantly ready for integrating emerging technologies for curriculum implementation.

H_{03}: Tertiary education institutions in Gombe State are not significantly ready for integration of emerging technologies for curriculum implementation.

Table 6: t-test for the readiness of tertiary education institution on emerging technologies for curriculum implementation

N	Mean	Std	df	t	Sig. (2-tailed)	Mean Diff
123	2.82	0.55	4	.261	1.307	.32600

Table 6 showed a one-sample t-test on the readiness of tertiary education institutions in Gombe state for usage of emerging technologies for curriculum implementation. With the P-value of .261 which is greater than the confidence level of 0.05 ($p = 0.261 \geq 0.05$), the hypothesis which state that Tertiary education institutions in Gombe State are not significantly ready for integration of emerging technologies for curriculum implementation is hereby accepted. The implication is that there is no significant level of readiness for integration of emerging technologies for curriculum implementation in tertiary institutions in Gombe State.

RQ 4: What are the challenges affecting the integration of emerging technologies for curriculum implementation in tertiary education institutions in Gombe state tertiary institutions?

Table7: Mean and Standard Deviation on challenges against usage of emerging technologies

	N	Mean	Std Dev.
Inadequate infrastructure limits effective technology use in teaching.	123	3.39	0.49
Power supply and internet access are major obstacles in this institution	123	3.61	0.49
Lack of training affects how I integrate technology into the curriculum implementation.	123	2.97	0.662
Some students are not prepared to engage with digital curriculum implementation tools.	123	2.99	0.928
My institution's funding do not adequately support innovative teaching with emerging technology.	123	3.02	0.627
Cumulative Mean		**3.196**	**0.2887**

Using table 7, the research question 4 is answered. The overall Mean and Standard deviation; 3.196 and 0.2887 respectively showed that the lecturers and instructors have huge challenges against the utilising emerging technologies in curriculum implementation. This mean is high implying numerous challenges been grabbled with.

H_{04}: There are no significant challenges affecting the integration of emerging technologies in teaching and learning in Gombe State tertiary institutions.

Table 8: t-test for the challenges against usage of emerging technologies for curriculum implementation

N	Mean	Std	df	t	Sig. (2-tailed)	Mean Diff
123	3.19	0.28	4	-168.846	.000	-21.80400

Table 8 showed a one-sample t-test on the challenges of emerging technologies for curriculum implementation in tertiary education institutions in the state. With the P-value of .000 which is less than the confidence level of 0.05 ($p = 0.000 \leq 0.05$), the hypothesis which state that There are no significant challenges affecting the integration of emerging technologies in teaching and learning in Gombe State tertiary education institutions is hereby rejected. This imply that there are significant challenges affecting the integration of emerging technologies in teaching and learning in Gombe State tertiary education institutions among lecturers and instructors.

Discussion of Findings

Studies in Nigeria show that academic staff generally demonstrate fairly high awareness of modern teaching technologies (Olatoye, Salami, Olore, and Adepoju, 2022). For instance, research in Oyo State revealed that vocational and technical education lecturers recognized a range of digital tools and understood their potential value in teaching. This awareness is often shaped by factors like professional training, exposure to global educational practices, and

personal digital skills. Moreover, teachers' confidence in using ICT and the enjoyment they derive from it also play a key role (Isiyaku, Ayub, and Abdulkadir, 2019).

However, this awareness does not automatically translate into frequent or effective use. Many lecturers may be familiar with digital tools in theory, but actual practice often faces roadblocks as explored thus: Although awareness exists, large-scale adoption remains constrained by infrastructural and financial barriers. Findings from Eze, Chinedu-Eze and Bello (2018) indicated that even comparatively well-resourced private universities often fail to maximize e-learning opportunities because of poor infrastructure, unstable internet services, and limited institutional backing. Similar challenges are repeatedly noted across studies on Nigerian higher education. Scholars emphasize that in public universities, the effective use of e-learning platforms is undermined by persistent technological shortcomings, including irregular electricity supply, inadequate hardware, and weak IT support systems (Olutola, & Olatoye 2015). Both students and lecturers frequently identify unstable internet access, a shortage of computers, and restricted digital library resources as significant obstacles to technology-driven curriculum delivery (Apuke & Iyendo, 2018). Moreover, even the most creative teaching strategies in Nigeria struggle to succeed in the face of such infrastructural deficits. The scarcity of modern technologies not only limits e-learning but also hinders the broader application of advanced tools such as artificial intelligence and interactive simulations

Readiness in tertiary education extends beyond access to technology, encompassing institutional policies, support systems, and stakeholder attitudes. In Nigerian and wider African contexts, the gap between awareness and readiness is well-documented (Olutola & Olatoye 2015). Institutional un-readiness marked by inadequate training, weak strategic planning, and unsustainable funding remains a major barrier to adoption. Limited staff development and the absence of regular upskilling further constrain effective use, with many lecturers continuing to rely on traditional teaching methods (Eze, Chinedu-Eze, & Bello 2018). Studies also highlight systemic inertia, including resistance to curriculum reform, poorly defined ICT strategies, and weak interdepartmental collaboration. Additionally, resource disparities across regions and faculties reinforce a persistent digital divide within institutions (Ololube, Egbezor, & Kpolovie, 2022).

Findings also indicated several critical challenges hindering the integration of emerging technologies into curriculum implementation in tertiary institutions in Gombe State. These challenges clustered around structural, institutional, and human-capacity factors. The study further revealed significant gaps in staff preparedness. Many lecturers lacked adequate training and regular upskilling opportunities, leading to low confidence in using digital tools. Additionally, resistance to shifting from traditional face-to-face methods to technology-enhanced pedagogy was evident, reflecting a broader issue of institutional inertia. Findings also highlighted institutional un-readiness. Respondents noted the absence of clear ICT policies, insufficient funding allocations, and weak technical support structures. Such limitations were seen as barriers to the sustainable adoption of technology in teaching and learning. Participants

consistently reported inadequate digital infrastructure, including limited computer laboratories, unreliable internet connectivity, and unstable power supply. These deficiencies restricted both staff and students from meaningful engagement with emerging technologies.

Conclusion

In summary, the findings from the Gombe State study fit into a broader body of evidence: while Nigerian tertiary lecturers are often knowledgeable and motivated to utilize emerging technologies, institutional shortcomings in resources and planning often undermine this potential. Strategic, systemic investment and structured change management are necessary for true transformation.

Recommendations

To bridge the gap between awareness, availability of usable emerging technologies and enhance readiness; and to overcome resource limitations, several measures are hereby recommended:

1. Government should initiate a curriculum implementation workshop and other training programs on usage of emerging technologies to change this anomaly. The government should equally do an on-the-spot assessment of facilities for curriculum implementation and initiate funds that will help provide the basic tools and machinery to enhance curriculum implementation in all tertiary education institutions in the state. specifically, there should be:
2. Enhanced funding from government and industry partners for infrastructure upgrades.
3. Improve institutional policy reforms to mainstream technology integration and ongoing professional development for staff.
4. Provision of Strategic partnerships with technology companies or NGOs to provide affordable or subsidized tech tools and,
5. Facilitation of Incremental piloting of blended learning, mobile learning, and digital resource-sharing practices before a full-scale rollout.

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