Benefits and Challenges of ICT Curriculum Implementation among Senior Secondary Schools in Gombi Education Zone, Adamawa State, Nigeria

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ABSTRACT

This study assessed the Benefits and Challenges of ICT Curriculum Implementation in Public Senior Secondary Schools in Gombi Education Zone, Adamawa State, Nigeria. Utilizing a descriptive survey research design, the study sampled 196 respondents (18 ICT teachers and 178 students) through purposive sampling across 8 selected schools. Data were collected using a structured questionnaire, content and face validity test of the instrument demonstrated a high reliability coefficient of r=0.95 at a 0.05 significance level. Findings indicate that while implemented ICT Curriculum have significantly enhanced teaching and learning outcomes, several critical barriers persist. Primary challenges include insufficient funding, a shortage of technical expertise, and inadequate infrastructural facilities. The study concludes that effective ICT Curriculum Implementation have fosters professional development, student engagement, and inclusive education by providing broader access to digital resources. The study recommended a short – term and a long – term to overcome the ICT challenges; short –term; teacher training and provision of teacher's workshops for capacity development. Long – term; National Policy on Education be reformed to formally implement ICT Curriculum into the National Curriculum and that government funding for public secondary schools be increased to support digital infrastructure.

Keywords: Information and Communication Technology (ICT), Curriculum, Implementation, ICT in education, Urban and Rural schools.

INTRODUCTION

The developmental process of any nation is fundamentally anchored in the values and priorities of its educational system (FGN, 2004). Education serves as the catalyst for sustainable livelihoods, with the curriculum and teaching staff serving as the primary mechanisms for fostering national growth. While education is defined as the transmission of knowledge, skills, and values, it must occur within diverse learning environments to ensure holistic development. It is a transformative process that equips students with creative ideas and practical competencies, shaping them into responsible, visionary citizens capable of driving national progress.

Background to the Study

Education serves as the primary vehicle for the transmission and preservation of societal culture and moral values. Scholars such as Cremin (1976) and Fafunwa (1989) describe it as a structured process designed to refine a student's mental and physical faculties while aligning their behaviour with societal expectations. Historically, education relied on traditional, teacher-centered methods. While these structured approaches—characterized by direct instruction and rote memorization—allow for efficient content delivery and

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standardized assessment, they often fail to engage students actively or accommodate diverse learning needs (Sorokun & Pilusheh, 2022).

In contrast, modern pedagogical shifts emphasize inclusively and student participation through the implementation of Information and Communication Technology (ICT). ICT encompasses a wide array of digital tools, including wireless networks, interactive software, and hardware like laptops and projectors. The implementation of ICT Curriculum in the classroom transforms learning into a dynamic, global experience, allowing for multi-modal instruction (text, video, and image) and fostering critical thinking.

Despite the National Policy on ICT in Education's (2019), which mandates an implementation of ICT, significant challenges remain in Nigeria Education System today, particularly within the Gombi Education Zone, Adamawa State. Current challenges include inadequate infrastructure, inconsistent power supply, and a lack of teacher proficiency. This study aims to assess the Benefits and Challenges of ICT Curriculum Implementation among Public Senior Secondary Schools Gombi Zone, Adamawa State, investigating how these challenges contribute to the declining performance of students in their learning process and during computer-based examinations.

Statement of the Problem

Despite a pedagogical shift from teacher-centered to student-centered methodologies, tangible educational outcomes remain stagnant. Current literature suggests a pervasive lack of engagement among students, largely because schools have struggled to translate ICT (digital technology) implementation into practical skill development. Although the 2019 National Policy on ICT mandates computer-based instruction within the Nigerian Education System, implementation remains critical. This urgency is underscored by the persistence of traditional teaching styles and external disruptions such as COVID-19, banditry, and terrorism. Furthermore, minimal student participation in ICT-driven classrooms may contribute to declining performances in the Joint Admission and Matriculation Board (JAMB) examinations—a trend of significant concern to educational stakeholders. This study specifically examines these dynamics within the Gombi Education Zone.

Purpose of the study

The primary objective of this research is to;

1. Evaluate the Benefits of ICT Curriculum Implementation on Teachers and Students among Public Senior Secondary Schools within the Gombi Education Zone, Adamawa State.
2. Identify the specific Challenges hindering ICT Curriculum Implementation in both urban and rural Public Senior Secondary Schools within the Gombi Education Zone.

Research Questions

Consequently, the research addresses two central questions:

1. What are the Benefits of ICT Curriculum Implementation on the Teachers and Students academic experience among Public Senior Secondary Schools within the Gombi Education Zone?
2. What Challenges hindering effective ICT Curriculum Implementation among Urban and Rural Public Senior Secondary Schools within Gombi Education Zone?

Research Hypotheses

H_O1: There is no significant difference in the mean responses of teachers and students regarding ICT Curriculum Implementation between Urban and Rural Secondary Schools.

H_O2: There is no significant difference in the perceived Challenges hindering ICT Curriculum Implementation between Urban and Rural Schools.

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LITERATURE REVIEW

Concept of ICT Curriculum Implementation

Implementation acts as the critical bridge between educational planning and the realization of intended outcomes. It is a systematic, stage-by-stage process of executing policies and programs to achieve specific objectives within a set timeframe. As defined by Schmid, Brianza and Petko (2021), implementation represents the methodology by which plans are operationalized into tangible projects. In educational contexts, this process is mandatory for translating policy into reality. According to National Policy on ICT in Education (2019), successful implementation hinges on the clarity of objectives and the availability of essential resources. It further elaborates that implementation is a multifaceted undertaking, encompassing the mobilization of resources, and the design of program, the establishment of ICT laboratory, the effective organization of staff to deliver benefits to the students.

Benefits of ICT Curriculum Implementation

The implementation of an ICT Curriculum significantly bolsters student educational outcomes and future professional prospects. Its impact spans academic performance, digital literacy, and career readiness.

Enhancement of Academic Performance: The ICT Curriculum strengthens cognitive functions, critical thinking, and problem-solving capacities. By engaging in computer programming, students learn to decompose complex problems into manageable parts, fostering logical and analytical reasoning that carries over into other subjects (Surajo, Tanimu, Mamman and Shu'aibu, 2024).

Digital Literacy and Technological Competence: Proficiency in digital tools is a prerequisite for modern success. Onifade et al. (2021) posit that an ICT Curriculum provides the foundational skills necessary to navigate digital environments, evaluate information credibility, and utilize technology for collaboration. This exposure allows students to adapt to a rapidly evolving technological landscape (Agbo, Oyelere, Suhonen, and Tukiainen, 2019).

Career Readiness and Employability: The modern labour market increasingly values technological proficiency. As noted by Auma and Achieng (2020), the demand for skills in software development, data analysis, and information technology is rising. By grounding students in these areas, the curriculum prepares them for diverse paths—from engineering to data science—while fostering the creativity and adaptability employers demand (Gbeleyi, Awaah, Okebukola, Shabani and Potokri 2022).

Challenges hindering ICT Curriculum Implementation

Despite these established benefits, several structural and institutional factors impede the effective implementation of the ICT Curriculum in Nigerian schools such as;

Inadequate Funding

The education sector in Nigeria frequently suffers from insufficient budgetary allocations. Ogunode and Adah (2021) highlights that funding often falls below the UNESCO-recommended 26% of national budgets, with historical data confirming a consistent failure to meet this threshold. This under funding directly results in a lack of basic infrastructure, a scarcity of qualified personnel, and a shortage of instructional materials.

Economic Volatility

Nigeria's economic dependence on unstable oil revenue hampers consistent government spending on education. Because education is a driver of long-term economic growth (Federal Ministry of Education, 2004), the government's inability to fund it during periods of low growth creates a cyclical challenge. Significant

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revenue shortfalls between projected and actual budgets have severely constrained the implementation of basic education initiatives.

Insecurity

Insecurity currently diverts vast financial resources away from essential development sectors like education. The annual budgetary prioritization of counter-insurgency and defense, such as the multi-billion naira allocations seen between 2015 and 2021, leaves little room for the capital-intensive requirements of school ICT infrastructure (Ogunode and Adah, 2021).

Corruption and Resource Mismanagement

Transparency International reports emphasize that corruption remains a major deterrent to educational development. Challenges such as resource misallocation, procurement fraud, and the embezzlement of funds meant for classroom infrastructure prevent effective teaching. Ogunode and Ahaotu, (2021) identifies corruption as the most significant barrier to quality improvement, as it facilitates the diversion of funds that could otherwise stabilize the sector.

Human Resource Deficits

The "engine room" of any educational system is the teacher. However, the system faces a critical shortage of ICT-proficient educators. Data from UNESCO (2004) and various reports indicate that fewer than 50% of teachers in tertiary institutions possess the necessary pedagogical and ICT competencies for effective service delivery, significantly undermining curriculum implementation.

Inadequate Infrastructure s

Effective ICT instruction is impossible without functional infrastructure, including reliable power, computer laboratories, and internet access. Studies by Ogunode and Adah (2020) and Bonnie and Lucky (2020) confirm that the prevalence of inadequate facilities in many secondary schools leaves students unprepared for the demands of the digital age.

Policy Instability

Frequent administrative changes and the lack of policy continuity have stymied progress. Ogunode and Ahaotu (2021) observes that shifts in political governance often lead to the abandonment of previous administrations' educational policies. This instability results in a fragmented system where many well-intended ICT policies exist only as unrealized blueprints, never reaching full implementation due to a lack of sustained commitment from successive governments.

METHODOLOGY

Design

The study employs a descriptive survey research design, utilizing structured questionnaires to gather data from the Gombi Education Zone, which includes the Hong, Gombi, Song, and Girei Local Government Areas (LGAs).

Population

The population consist of Urban and Rural Public Senior Secondary Schools in Gombi Education Zone of Adamawa State, Nigeria. The Zone has four local government areas; Girei, Song, Gombi and Hong respectively.

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Table 1: Distribution of Schools, Teachers, and Students in Gombi Education Zone

LGAs	Schools	ICT Teachers	Students
Girei	18	24	15,930
Song	22	19	9,112
Gombi	20	28	11,751
Hong	34	42	22,625
Total	**94**	**113**	**59,418**

Sampling and Instrumentation

A purposive sampling technique was used, the researcher selected eight "Grade A" secondary schools. A total of 196 participants (178 students and 18 ICT teachers) were chosen via simple random sampling. Data was collected using a researcher-designed questionnaire based on a four-point Likert Scale (ranging from Strongly Agree to Strongly Disagree).

Validity and Reliability

The instrument underwent face and content validation by experts from the Department of Science Education at Adamawa State University, Mubi. Reliability was confirmed using Cronbach's Alpha, yielding a high coefficient of 0.95, indicating strong internal consistency.

Data Analysis

Data were analyzed using Mean ($\bar{x}$) and Standard Deviation via SPSS software. A mean score of 2.50 served as the decision point for acceptance or rejection of research items.

RESULTS

Research Question one: What are the Benefits of ICT Curriculum Implementation to Teachers and Students in Senior Secondary Schools in Gombi Education Zone?

Table 2: Benefits of ICT curriculum implementation

S/NO	Statements	N	SA	A	D	SD	Mean.	Std Dev	Decision
1	ICT Curriculum would promote collaborative teaching and learning in schools	196	193	3	-	-	3.91	0.28	Accepted
2	ICT tools (multimedia) improves engagement, motivation and participation among teachers and students in schools	196	196	-	-	-	4.00	0.00	Accepted
3	ICT provides easy access to large subject content	196	196	-	-	-	4.00	0.00	Accepted
4	Use of ICT tools would provide better performance and flexibility in teaching and learning	196	193	3	-	-	3.99	0.09	Accepted
5	ICT tools and facilities enhance quality of teaching and learning through audio-virtual classroom	196	189	7	-	-	3.96	0.19	Accepted
	Grand Mean						**3.97**		**Accepted**

Result from table 2 above shown that, the responses of teachers and students on the assessment of the benefits of ICT Curriculum Implementation in Senior Secondary Schools in Gombi Education Zone. Mean score of 3.97 was obtained indicating implementation of ICT curriculum have advantages on teachers and students. The

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overall grand mean score of 3.79 obtained, signifies the acceptance that ICT Curriculum Implementation have great benefits on the Teachers and Students in Gombi Education Zone, Adamawa State.

Research Question two: What are the Challenges hindering Implementation of ICT Curriculum in Urban and Rural Public Senior Secondary Schools in Gombi Education Zone?

Table 3: Challenges hindering Implementation of ICT Curriculum

S/NO	Statements	N	SA	A	D	SD	Mean	Std. Dev.	Decision
1	Poor funding, lack of infrastructures, erratic power supply, lack of computer lab, high cost of data and unreliable internet service and inadequate teachers	196	196	-	-	-	4.00	0.00	Accepted
2	Lack of technical support and maintenance for ICT labs and equipment in schools	196	194	2	-	-	3.99	0.10	Accepted
3	There is limited access to up-to-date educational software like computer-based learning software	196	148	48	-	-	3.76	0.43	Accepted
4	Inadequate time allocated for teaching of ICT in schools	196	196	-	-	-	4.00	0.00	Accepted
5	Large class size affects teaching and learning using computer system for individual in a computer lab	196	196	-	-	-	4.00	0.00	Accepted
	Grand Mean						**3.95**		**Accepted**

Result from table 3 shown that, mean score of 3.95 obtained, which is higher than 2.50. This implies that the respondents are of opinion that lack of fund to implement ICT Curriculum in Public Senior Secondary Schools in Gombi Education Zone. The results further indicated that, there is lack of technician for system maintenance in schools. There is limited access to up - to - date educational software, inadequate time to deliver lesson and the large class size have affected implementation of ICT Curriculum in Public Senior Secondary Schools. Therefore, the grand mean score of 3.95 obtained, signifies the overall acceptance that, inadequate funding, bad maintenance culture inadequate computers, lack of adequate teachers and poor power supply do hinder implementation of ICT Curriculum in Public Senior Schools in Gombi Education Zone.

Testing of Hypotheses

Ho1: There is no significant difference in the mean response of Teachers and Students on ICT Curriculum Implementation in Senior Secondary Schools in Gombi Education Zone.

Table 4. T – test Analysis on the Mean Response of Teachers and Students on ICT Curriculum Implementation in Schools in Gombi Education Zone.

School Location	N	Mean	Std. Dev.	Df	t-value	p-value	Decision
Urban	120	10.00	0.00				
				195	3.74	0.000	Significant
Rural	76	9.83	0.35				

Result from table 4 shown that the p-value of 0.000 is less than 0.05 level of significance ($p<0.05$), therefore we reject the null hypothesis and conclude that there is significant difference in the mean response of Teachers and Students on ICT Curriculum Implementation among Urban and Rural Public Senior Secondary Schools in Gombi Education Zone.

Ho2: There is no significant difference in the challenges hindering ICT curriculum implementation among urban and rural public senior secondary schools.

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Table 5: Summary of T - test Analysis on the Challenges hindering ICT Curriculum Implementation Public Schools in Gombi Education Zone.

School Location	N	Mean	Std.Dv	Df	t-value	p-value	Decision
Urban	120	10.00	0.00				
				195	9.60	0.000	Significant
Rural	76	9.67	0.27				

Result from table 5 shown that the p value of 0.000 is less than 0.05 level of significance ($p<0.05$), therefore we reject the null hypothesis and conclude that there is significant difference in the Challenges hindering ICT Curriculum Implementation between Urban and Rural Public Senior Secondary Schools in Gombi Education Zone. These indicated lack of equitable share of ICT tools and facilities such as Computer sets, Internet facilities and ICT laboratory among others, between the Urban and Rural Public Senior Secondary Schools in Gombi Education Zone for ICT Curriculum Implementation.

DISCUSSION OF RESULTS

Benefits of ICT Implementation

The findings from research question one revealed that ICT Curriculum Implementation have benefits on the learning activities, the respondents admitted that the use of ICT tools and facilities would provide collaborative, improve engagement, motivation and participation among teachers and students. The implementation of ICT tools and facilities would provide access to large subject content online; provide better performance and flexibility in teaching and learning. Adequate provision of ICT tools and facilities in schools would enhance quality of teaching and learning, the findings implies that respondents do admit that ICT tools and facilities in schools have positively impact the teachers and students. This is in line with what Goldhaber, Khuan and Allysa (2021), that ICT tools and facilities integration and implementation in schools have positively impact the teachers and students with quality methods of teaching. Also, Ogunode and Ahaotu (2021) and Bonnie, Lucky and Tijani (2020) opined that ICT tools and facilities in schools have positively good effect on teaching and learning if implemented. Therefore, the overall mean score of 3.97 obtained is greater than 2.50 signifies the overall acceptance that ICT tools and facilities pose positive impact on the teachers students.

Challenges to Implementation

The results from research question two discovered the challenges impeding implementation of ICT Curriculum schools in Gombi Education Zone. The mean score of 3.95 obtained, which is higher than 2.50 indicates that the respondents acknowledged that there is lack of funding to provide adequate ICT tools and facilities for implementation of ICT Curriculum like, computer laboratory, constant power supply, employ skilled teachers and to provide ICT tools and facilities for effective learning activities in schools. Other factors that pose challenge to implementation of ICT Curriculum in senior secondary schools are; lack of technician for maintenance, lack of current educational software for learning and inadequate time allocated for teaching of ICT. Also, large number of students in classrooms do negatively affects the use of ICT tools and facilities in laboratory. Therefore, mean score of 3.95 implies that the respondent admitted that poor funding, lack of school infrastructures, poor power supply, lack of technical support and maintenance, lack of up – to – date educational software, inadequate time allocated for ICT lesson and large number of students in classroom do pose a great challenge in hindering implementation of ICT curriculum in urban and rural schools. This is in line with Ogunode and Ahaotu (2021) whom investigate challenges faced by Ministry of Education in strategies and plan to implement ICT curriculum in schools for teaching and learning. Based on this result obtained from the research questions raise, it is clearly revealed that the schools are faced with challenges that hinder Implementation of ICT Curriculum in schools in Gombi Education Zone.

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Hypothesis Testing

Hypothesis One: Statistical analysis yielded a p-value of 0.000 ($p < 0.05$). Consequently, the null hypothesis was rejected, indicating a significant difference in how teachers and students perceive ICT implementation in Gombi public schools. While this study found a divergence in views, it partially contrasts with Onwukwe, Attamah, Ibrahim, and Emmanuel (2020), who previously found more uniform perspectives in the same region.

Hypothesis Two: Similarly, with a p-value of .000, the null hypothesis was rejected. This confirms a significant disparity in the challenges faced by urban versus rural schools. However, both groups consistently identified poor funding, a lack of professional development for teachers, and erratic power supply as shared burdens, supporting the thematic findings of Onwukwe et al. (2020).

CONCLUSION

The integration of ICT in senior secondary schools is a vital catalyst for professional development and student success. It fosters self-directed learning, improves pedagogical techniques, and provides essential access to global digital resources. To remain competitive in the 21st century, ICT must move from an optional resource to a core component of the educational experience.

Recommendations

The recommendations are categories into two phases;

Short- term

1. Teachers training institutes like Institutes of Education, College of Education, and National Teachers Institutes and so on should make ICTs course compulsory for all the teachers under training to make them familiar with the use of ICTs in teaching and learning.
2. Workshops should be organized for teachers training and professional development programs that focus on ICT Curriculum Implementation in classroom. The training should emphasize pedagogical strategies for utilizing technology to enhance students/teachers engagement, individualize instruction, and promote critical thinking ability/skills. Teachers should be trained to develop technical skills on ICT, to navigate and access online resources for educational purpose.

Long – term

1. Collaboration funding among the education stakeholders, the Federal and State government alongside NGOs and old boys association should collaborate to provide sustainable funding for computer hardware, high –speed internet, and reliable power infrastructure.
2. Educational stakeholder and administrators should prioritize the provision of adequate ICT infrastructure and internet facilities in schools. This should include ensuring access to computers, tablets, internet connectivity and educational software. Policy should be in place to provide equitable access to ICT resources for Urban and Rural schools.
3. Curriculum Reform, Policy makers should modernize the existing curriculum to make ICT-driven instruction compulsory, ensuring students are equipped for the modern technology.

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