Integrating Information and Communication Technology into the Teaching of Basic Technology Among Selected Junior Secondary Schools in Iseyin Local Government Area, Oyo State

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Abstract

This study evaluates the integration of Information and Communication Technology (ICT) into the teaching of Basic Technology among selected junior secondary schools in Iseyin Local Government Area Oyo State. Three research questions guided the study and a descriptive survey research design was employed. The population of this study comprises 48 Basic Technology teachers in the 22 public secondary schools in Iseyin L.G.A. Total enumeration was used to select the 48 Basic Technology teachers as the study sample. Data was collected using structured questionnaires titled 'Integration of ICT Questionnaire (IICTQ)'. The questionnaire was based on 4-point modified Likert Scale of Strongly Agreed (SA-4), Agreed (A-3), Disagreed (D-2) and Strongly Disagreed (SD-1). The questionnaire was face and content validated by three experts from the Department of Technology Education, Emmanuel Alayande University of Education, Oyo. 0.89 reliability coefficient was obtained through Cronbach Alpha reliability coefficient. Data collected were analyzed using descriptive and inferential statistics. Findings revealed need for substantial investment in ICT infrastructure, comprehensive training programs for teachers, and continuous technical support to enhance the effective integration of ICT in teaching and learning. Addressing these challenges is crucial for leveraging the potential

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of ICT to improve educational outcomes in Nigerian secondary schools. Therefore, it was recommended that ICT centres should be established in all level of education and fund be made available to purchase computers and other ICT equipment.

Keywords: Information and Communication Technology, Basic Technology, Teaching, and Junior Secondary Schools.

Background to the Study

In recent years, the integration of information and Communication Technology (ICT) in education has revolutionized the teaching and learning process globally. ICT has been recognized as a critical tool for enhancing educational outcomes, facilitating innovative teaching methods and preparing students for the demands of the 21st-century workforce (Ratheeswari, 2018). The rapid advancement of digital technologies has enabled educators to provide more engaging, interactive and personalized learning experiences. Countries worldwide are increasingly adopting ICT to bridge the gap between traditional education and modern technological advancements, ensuring that students are well-equipped with the necessary skills to thrive in a digital era (AlQashouti, Yaqot, & Menezes, 2024)

In Africa, the adoption of ICT in education has been gaining momentum, albeit at a slower pace compared to other regions. The continent faces unique challenges such as limited access to infrastructure, financial constraints, and a shortage of trained personnel (Joseph, 2019). However, there have been significant strides in recent years, with various governments and organizations investing in ICT infrastructure and training programs. Initiatives such as the African Union's Continental Education Strategy for Africa 2016-2025 emphasize the importance of ICT in achieving quality education and fostering economic development. Despite the hurdles, there is a growing recognition of the transformative potential of ICT in improving educational access, quality and equity across the continent (Digital Economy for Africa, 2019).

Nigeria, the most populous country in Africa, has been actively working towards integrating ICT into its educational system. The Nigerian government, through policies such as the National

Policy on Information Technology and the National ICT in Education Policy, aims to harness the power of ICT to enhance educational delivery and management (Agbetuyi & Oluwatayo, 2012). Efforts are made to equip schools with ICT facilities, train teachers and develop digital curricula. However, challenges such as inadequate funding, poor infrastructure and limited internet connectivity continue to impede progress. Despite these challenges, there are pockets of success where ICT integration has led to improved learning outcomes and increased students' engagement (Arias, Evans, , & Santos, 2019).

Oyo State, located in southwestern Nigeria, is no exception to the national trend of integrating ICT in education. The state has made commendable efforts to incorporate ICT into its educational framework, particularly in secondary schools. Various programs and initiatives have been launched to provide schools with the necessary ICT tools and resources, train teachers in digital literacy and promote the use of technology in teaching and learning (Olufunke, 2012). However, the extent of ICT integration varies across schools, with some institutions facing significant resource constraints. The study on the uses of ICT in teaching Basic Technology in secondary schools in Oyo State aims to shed light on the current state of ICT integration, identify the benefits and challenges, and provide recommendations for enhancing the effectiveness of ICT in education within the State

Statement of Problem

It is obvious that some schools still struggle with limited access to technological resources, inadequate infrastructure and insufficient training for teachers. This raises concerns about the effectiveness of ICT in bridging educational gaps and equipping teachers with the necessary skills to thrive in a digital world. The uneven implementation of ICT not only hampers the quality of education but also exacerbates existing inequalities among teachers, leaving many without the benefits that digital tools can provide (Afzal, Khan, Daud, Ahmad, & Butt, 2023). Furthermore, the lack of a cohesive strategy and sufficient support for ICT integration in Oyo State's secondary schools undermines the potential benefits that these technologies can

offer. Teachers often face difficulties in incorporating ICT into their teaching practices due to limited professional development opportunities and insufficient technical support. This situation is compounded by financial constraints that limit schools' ability to maintain and upgrade ICT infrastructure. Consequently, the full potential of ICT to enhance the teaching of Basic Technology, a subject, crucial for students' understanding of modern technological concepts and skills remains largely untapped.

Objectives of the Study

The main objective of this study is to examine the integration of ICT in the teaching of Basic Technology in junior secondary schools in Iseyin L.G.A. Specifically, the study sought to;

i. determine the available ICT resources and infrastructure available in secondary schools for teaching Basic Technology;
ii. examine how ICT tools facilitate innovative teaching methods and personalized learning experiences; and
iii. investigate the barriers to effective ICT resources integration in secondary schools for teaching Basic Technology.

Research Questions

The following research questions guided the study

i. What are the available ICT resources and infrastructure available in secondary schools for teaching Basic Technology?
ii. To what extent do ICT tools facilitate innovative teaching methods and personalized learning experiences?
iii. What are the barriers to effective ICT resources integration in secondary schools for teaching Basic Technology?

Methodology

This study adopted a descriptive survey research design to assess the integration and utilization of ICT in the teaching of Basic Technology in secondary schools across four Local Government Areas (LGAs) in Oyo Metropolis, Oyo State, Nigeria. The population of this study

comprises 48 Basic Technology teachers in the 22 public secondary schools in Iseyin L.G.A. Total enumeration was used to select the 48 Basic Technology teachers as the study sample. The instrument for data collection was a structured questionnaire titled 'Integration of ICT Questionnaire (IICTQ)'. It was made of two-part A and B. Part A solicited demographic data from the respondents while section B was made of items statements directed towards the research questions. The questionnaire was based on 4-point modified Likert Scale of Strongly Agreed (SA-4), Agreed (A-3), Disagreed (D-2) and Strongly Disagreed (SD-1). The questionnaire was face and content validated by three experts from the Department of Technology Education, Emmanuel Alayande University of Education, Oyo. A pilot test of the instrument was done and 10 Basic Technology teachers Oyo West LGA and a Cronbach Alpha reliability coefficient was used to obtained 0.89 reliability coefficient which was considered high enough for the study. Data was collected by the researchers with the aid of two research assistants. Frequency count, percentage and descriptive statistics were used to answer the research questions.

Results and Discussion

Research Question 1: What are the available ICT resources and infrastructure available in secondary schools for teaching Basic Technology?

Table 1: Availability of ICT Resources and Infrastructures

Items	SA	A	D	SD	Mean	Std. Deviation
1. The school has a well-equipped computer lab for Basic Technology classes.	72 (29.8%)	96 (39.7%)	54 (22.3%)	20 (8.3%)	2.91	0.94
2. There are sufficient number of	50 (20.7%)	88 (36.4%)	66 (27.3%)	38 (15.7%)	2.62	1.01

computers available for students in Basic Technology classes.						
3. The school has reliable internet access to support ICT-based learning.	44 (18.2%)	78 (32.2%)	78 (32.2%)	42 (17.4%)	2.51	0.98
4. The available ICT resources are up-to-date and relevant to the Basic Technology curriculum.	58 (24.0%)	96 (39.7%)	60 (24.8%)	28 (11.6%)	2.76	0.98
5. There are adequate multimedia resources (e.g., projectors, interactive whiteboards) available for teaching Basic Technology.	60 (24.8%)	98 (40.5%)	54 (22.3%)	30 (12.4%)	2.78	1.00

SA = Strongly Agreed, A =Agreed D = Disagreed SD = Strongly Disagreed
Source: Authors Survey, 2024.

Table 1 depicted the availability of ICT resources and infrastructures and the analysis results shows that the availability of ICT resources and infrastructure is limited in some schools. For instance, computers are available in all schools, but only 45% of the total required numbers of computers are present. Internet access is available in 25% of the schools, projectors in 7.9%, and interactive whiteboards in

36.25%. The findings on the limited availability of ICT resources and infrastructure in schools are supported by the work of Amponsah, Aboagye, Narh-Kert, Commey-Mintah and Boateng (2022) who investigated ICT integration in rural secondary schools in Rwanda and found significant barriers, including inadequate ICT equipment, poor internet connectivity, and insufficient power supply. These challenges hindered effective ICT integration, aligning with the reported limited availability of ICT tools such as computers and internet access in school. Mapisa and Makena (2024) also explored ICT adoption in primary schools in South Africa's Amathole East District. Their study revealed that many schools lacked sufficient computers. This scarcity reflects the broader issue of inadequate ICT resources for effective teaching and learning

Research Question 2: To what extent does ICT tools facilitate innovative teaching methods and personalized learning experiences?

Table 2: Frequency of ICT Tools Utilization

Items	SA	A	D	SD	Mean	Std. Deviation
1. ICT tools are used regularly during Basic Technology lessons.	68 (28.1%)	104 (43.0%)	48 (19.8%)	22 (9.1%)	2.90	0.94
2. Teachers use educational software to enhance the learning of Basic Technology concepts.	54 (22.3%)	102 (42.1%)	60 (24.8%)	26 (10.7%)	2.76	0.96
3. ICT tools are integrated into both theoretical and practical aspects of Basic Technology teaching.	60 (24.8%)	106 (43.8%)	54 (22.3%)	22 (9.1%)	2.84	0.94
4. Students are given	62 (25.6%)	92 (38.0%)	64 (26.4%)	24 (9.9%)	2.79	0.97

assignments that require the use of ICT tools in Basic Technology.						
5. ICT tools are used for collaborative learning activities in Basic Technology classes.	66 (27.3%)	98 (40.5%)	52 (21.5%)	26 (10.7%)	2.84	0.99

SA = Strongly Agreed, A =Agreed D = Disagreed SD = Strongly Disagreed
Source: Authors Survey, 2024

The frequency of ICT tools utilization is as shown in Table 2. The results indicated that most respondents (60%) agreed or strongly agreed that ICT tools facilitate innovative teaching methods and personalized learning experiences. However, 17.5% disagreed and 5% strongly disagreed, indicating mixed perceptions. This result corroborates with Randieri (2024) highlights that AI-powered personalized learning tools significantly enhance teaching by tailoring educational content to individual needs. However, mixed perceptions persist, with some educators and students expressing concerns about over-reliance on technology and its potential to replace traditional teaching methods. This aligns with the 17.5% who disagreed and 5% who strongly disagreed in the findings, indicating varied views on ICT's role in education. Johnson, Jacovina, Russell and Soto (2016) emphasize that teachers' attitudes towards ICT integration play a critical role in its adoption. Their study found that while many educators recognize the potential of ICT to improve teaching methods, barriers such as inadequate training and support contribute to skepticism among a minority, reflecting the mixed perceptions observed in the findings.

Research Question 3: What are the barriers to effective ICT resources integration in secondary schools for teaching Basic Technology?

Table 4: Perceived Barriers to ICT Integration

Items	SA	A	D	SD	Mean	Std. Deviation
1. Lack of adequate funding is a major barrier to effective ICT integration in schools.	88 (36.4%)	104 (43.0%)	36 (14.9%)	14 (5.8%)	3.10	0.89
2. Insufficient ICT training for teachers limits the effective use of ICT tools.	92 (38.0%)	108 (44.6%)	36 (14.9%)	6 (2.5%)	3.18	0.77
3. Inadequate technical support and maintenance for ICT resources hinder their effective use.	80 (33.1%)	112 (46.3%)	38 (15.7%)	12 (5.0%)	3.08	0.85
4. Limited access to up-to-date ICT resources is a significant barrier.	74 (30.6%)	100 (41.3%)	50 (20.7%)	18 (7.4%)	2.95	0.90
5. There is a lack of time allocated for teachers to integrate ICT into their lessons.	66 (27.3%)	96 (39.7%)	64 (26.4%)	16 (6.6%)	2.88	0.94

SA = Strongly Agreed, A =Agreed D = Disagreed SD = Strongly Disagreed
Source: Authors Survey, 2024

Table 3 indicated the perceived barriers to ICT integration. The results show that the major barriers to effective ICT integration identified by the respondents include lack of ICT resources (70.8%), inadequate training for teachers (53.3%), insufficient technical support (35.8%), resistance to change by teachers (18.3%), and lack of maintenance and upkeep (25.8%). This result corroborates the work of Tarman, Kilinç & Aydin (2019) conducted a comprehensive study on barriers to technology integration in Turkish social studies education, revealing that external obstacles such as insufficient technology access and lack of administrative support are significant barriers to effective ICT integration. Their findings align with the high percentage of respondents noting a lack of resources as a primary challenge. Taole (2022) examined barriers to ICT integration in higher education and found that inadequate teacher training was a critical factor hindering effective technology use in classrooms, corroborating the 53.3% of respondents in your findings who identified this issue.

Conclusion

The study concluded that the use of ICT as a tool for teaching basic technology is inadequate in Nigeria education sector. There is an urgent need for the development of an ICT friendly curriculum in basic technology and other subjects in Nigeria junior secondary schools. This will provide the pathway for easy application of ICT in the teaching of basic technology. The findings revealed that most junior secondary schools in Nigeria are not equipped for the application of teaching students, its only for administrative purpose and even for personal purposes.

Recommendations

Based on the findings of this study, the following recommendations were proffered;

1. Governments should encourage and make capacity building compulsory for basic technology teachers through training, seminar and conference on ICT related.

2. Teachers should also be provided with needed hi-tech resources, technical and administrative support to persuade them productively in teaching and learning.
3. ICT centres should be established at all levels of education and funds available to purchase computers and other ICT equipment.

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