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THE AVAILABILITY AND UTILIZATION OF INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) IN THE MANAGEMENT OF COLLEGES OF EDUCATION IN SOUTH-EAST NIGERIA

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Abstract

The study examined the availability and utilization of Information and Communication Technology (ICT) facilities in the management of Colleges of Education (COEs) in the South-Eastern states of Nigeria. Three research questions guided the study, and three corresponding null hypotheses were tested at a 0.05 level of significance. A descriptive survey design was adopted for the study. The study population comprised 8,908 administrators, including 407 academic administrators and 8,501 non-academic administrators from twelve (12) Colleges of Education, representing federal, state, and private institutions. A sample of 378 respondents was selected, consisting of 15 academic administrators and 363 non-academic administrators across 12 COEs in the five states. Data were collected using a researcher-developed questionnaire titled *Availability and Utilization of ICT Facilities in the Management of COEs in South-East Questionnaire.* The instrument was validated by three experts, and its reliability was determined with a stability coefficient of 0.78 and an internal consistency of 0.73. Mean and standard deviation were used to answer the research questions, while a t-test was employed to test the null hypotheses at a 0.05 level of significance. The findings revealed that ICT facilities were available to a high extent and were considered adequate; however, their utilization was low. Additionally, administrators possessed ICT competencies for effective utilization to a low extent. Based on these findings, it was recommended that adequate alternative power supply should be provided to complement the existing power infrastructure, ensuring the effective utilization of ICT facilities in COEs. Furthermore, periodic training should be conducted for administrators to enhance their competencies.

Keywords: ICT, COEs Tertiary education, application of ICT

Introduction

Formal education is a crucial driver of national development, fostering sustainable growth and individual transformation. It equips individuals with the necessary knowledge, skills, and values for productivity and national progress. To ensure education remains functional and practical, Nigeria adopted the 9-3-4 educational system in 2006, comprising nine years of basic education, three years of senior secondary education, and four years of tertiary education Uwaifo and Uddin (2009). Each level plays a vital role in economic development. Tertiary education, in particular, prepares individuals with expertise and training for national progress and includes universities, specialized language centers, Colleges of Education, Polytechnics, and Monotechnics. Colleges of Education are a vital component of Nigeria's tertiary education system, responsible for training teachers who

obtain the Nigerian Certificate in Education (NCE) to teach in Junior Secondary Schools and Technical Colleges (Neji, 2016). These institutions, categorized into basic education, technical subjects, and special education, were formerly affiliated with universities before coming under the National Commission for Colleges of Education (NCCE) in 1989. Ugwuanyi, and Eze, (2009), affirm that effective management, involving planning, organization, and resource coordination, is crucial for their success. Okorji, and Unachukwu,(2014) posit that , many Colleges of Education, particularly in South East Nigeria, face challenges such as poor academic planning, inefficient record-keeping, and delays in examination results and student graduations. Despite available resources, management inefficiencies persist, necessitating the integration of Information and Communication Technology (ICT) for improved administration. ICT, which involves digital tools for information processing and communication, enhances decision-making and efficiency in educational management Odeh,(2014). Various ICT facilities, including college information systems, computers, internet services, and electronic classrooms, can improve productivity if adequately available and utilized. The effective integration of ICT in Colleges of Education requires assessing its accessibility, adequacy, and the digital literacy of administrators and faculty to ensure optimal utilization.

ICT is widely used in Colleges of Education for student record-keeping, result processing, and computer-based examinations. (Yusuf, 2005) maintain that the effectiveness of these facilities depends on their accessibility, operational condition, and adequacy. This study evaluates the extent of ICT integration in the management of Colleges of Education in South East Nigeria by examining the availability, adequacy, and utilization of ICT resources, as well as the computer literacy of administrators. (Peretomode,2012) coincide that adequacy is crucial, as many institutions lack sufficient ICT infrastructure for effective administration. Even when ICT facilities are available, they are often underutilized, limiting their potential benefits. Effective utilization is essential for improving administrative efficiency, yet research indicates that many tertiary institutions in Nigeria fail to maximize ICT resources. This study seeks to assess how ICT can enhance the management of Colleges of Education, addressing challenges in accessibility and usage to improve institutional effectiveness and national development.

Statement of the Problem

The integration of ICT in Colleges of Education is expected to enhance efficiency in student records management, result processing, transcript handling, electronic payments, and staff administration. However, poor management practices persist, particularly in academic planning. Lecturers often handle excessive workloads across multiple programs, leading to delays in result processing and extended graduation timelines. Inefficient record-keeping results in financial discrepancies for students and administrative difficulties in staff management, including recruitment, promotions, and salary administration. These challenges make institutional management cumbersome and ineffective. This study aims to assess the availability and utilization of ICT facilities in improving the management of Colleges of Education in the region.

Purpose of the Study

The main objective of this study is to investigate the availability and utilization of ICT in the management of Colleges of Education in South East Nigeria. Specifically, the study aims to:

1. Determine the extent to which ICT facilities are available for managing Colleges of Education.
2. Assess the adequacy of ICT facilities in the management of Colleges of Education.
3. Examine the extent to which ICT facilities are utilized in the management of Colleges of Education.

Research Questions

The following research questions guide the study:

1To what extent are ICT facilities available in the management of Colleges of Education?

2 How adequate are the available ICT facilities for managing Colleges of Education?

3To what extent are the available ICT facilities utilized in the management of Colleges of Education?

Hypotheses

The following null hypotheses were tested at a 0.05 level of significance:

1. There is no significant difference between the mean responses of academic and non-academic administrators regarding the availability of ICT facilities in the management of Colleges of Education.
2. Academic and non-academic administrators concerning the adequacy of availability of ICT facilities does not have any significant effect on the management of Colleges of Education.
3. There is no significant difference between the mean responses of academic and non-academic administrators on the extent of ICT facility utilization in the management of Colleges of Education.

Review of related literature

Conceptual framework

Availability of ICT in Colleges of Education Management

The availability of ICT infrastructure is crucial for its effective utilization in education management. It determines the efficiency of management operations, as accessibility and adequacy of up-to-date ICT tools impact institutional functionality. Availability is defined as the ease of access and readiness of ICT facilities (Mormah, 2017), encompassing factors such as reliability, maintainability, serviceability, and accessibility (RIAC, 2014). Reliability ensures ICT systems function under set conditions, while maintainability refers to their restoration after malfunctions. Serviceability involves external support to sustain operations. Ensuring ICT availability enhances management efficiency in Colleges of Education.

$$\text{Availability} = \frac{\text{Agreed service time} - \text{Down time}}{\text{Agreed service Time}} \times 100$$

$$\text{Classical Availability is expressed as Availability} = \frac{\text{Time Available}}{\text{Time promise}} \times 100$$

According to Tella (2011), the concept of ICT availability is defined as the "parameters of fitness for use." He explained that a product is considered available when it is in an operable state. The total time in an operative state (uptime) consists of the time spent (1) in active use and (2) in standby mode. Conversely, the total time in a non-operative state (downtime) includes (3) the time spent on active repair (i.e., diagnosis and resolution) and (4) the time spent waiting for spare parts, paperwork, etc. Availability can be mathematically expressed as: This definition aligns with that of Egomo, Enyi, and Tah (2012), who described availability as a measure of the degree to which a system is operable and ready for use at any given time. In this study, ICT availability refers to facilities that are functional and accessible within Colleges of Education in South-East Nigeria at the time of the study.

Adequacy of ICT Facilities in the Management of Colleges of Education

Adequacy of ICT facilities refers to the sufficiency of available resources for effective utilization in education management. Mormah (2017) defined adequacy as the abundance of computer facilities that enable efficient use, while Ugwuanyi (2013) described it as the presence of sufficient resources for a specific purpose. Wealthier societies tend to have well-equipped institutions, leading to better management and improved educational outcomes (Mormah, 2017). Oyovwe-Tinuoye and Adogbeji (2015) emphasized that adequate ICT resources enhance institutional management and student learning. However,

many Colleges of Education lack sufficient ICT facilities for daily administration.

Utilization of ICT for Effective Management of Colleges of Education

Utilization refers to the actual application of available resources to improve efficiency. Mormah (2017) defined utilization as the effective use of ICT tools, such as e-learning materials, internet connectivity, video conferencing, and virtual libraries, to enhance administrative processes. ICT facilities commonly used in education management include computers, projectors, teleconferencing equipment, email, and mobile devices (Ajuzie & Akukwe, 2015; Okolocha & Nwadiani, 2015). While some studies (Neji, 2016; Masino & Niño-Zarazúa, 2016) indicate that ICT tools are effectively utilized, others (Obi, 2016; Maisamari et al., 2018; Abubakar, 2016) suggest that administrators lack the necessary competencies, leading to underutilization. This study examines the extent of ICT usage in managing Colleges of Education.

Theoretical Framework

This study is anchored on the Diffusion of Innovations theory (DOI)

Diffusion of Innovation Theory by Rogers (2003)

The Diffusion of Innovations Theory explains how, why, and at what rate new ideas and technologies spread within a society. Developed by Everett Rogers, a professor of rural sociology, in 1962, the theory describes diffusion as the process through which an innovation is communicated over time via specific channels among members of a social system. According to Rogers, four key elements influence the spread of new ideas: innovation, communication channels, time, and the social system. The adoption process relies heavily on human capital, meaning that an innovation must be widely accepted to become self-sustaining. At a certain point, the rate of adoption reaches a critical mass, where it becomes widely accepted and spreads rapidly.

The S-Curve of Innovation Adoption

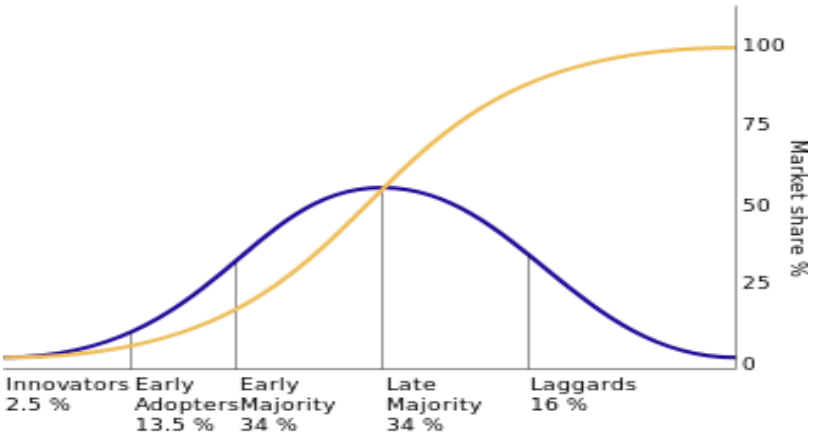

Fig 2 S curve adapted from Rogers (1962)

As successive groups of consumers adopt a new technology, its market share eventually reaches saturation. This pattern follows the S-curve, a logistic function that represents consumer behavior in adopting or accepting new ideas. The theory categorizes adopters into five groups:

- **Innovators** – The pioneers who introduce the new idea.
- **Early adopters** – The bold individuals willing to try the innovation early.
- **Early majority** – Those who adopt the innovation after seeing its benefits from early adopters.
- **Late majority** – Individuals who adopt the innovation once it becomes widely accepted.

- **Laggards** – Those who resist change and are slow to adopt the innovation.

This adoption pattern applies to the use of ICT in schools, illustrating how, when, and why educational institutions integrate and utilize ICT facilities. The critical mass in ICT adoption within Colleges of Education in South-East Nigeria is achieved when highly respected individuals—such as academic and non-academic administrators—begin using ICT tools for administrative and instructional purposes. Rogers emphasized that innovation adoption follows a structured process in which individuals pass through five stages:

1. **Knowledge** – Becoming aware of the innovat[illegible]
2. **Persuasion** – Forming an opinion about its usefulness.
3. **Decision** – Choosing whether to adopt or reject it.
4. **Implementation** – Integrating the innovation into daily practices.
5. **Confirmation** – Reinforcing the decision based on outcomes.

The diffusion process is influenced by communication channels, social norms, opinion leaders, change agents, types of innovation decisions, and the consequences of innovation adoption. Importantly, the perception of an innovation, rather than purely scientific evaluation, often determines how quickly and widely it spreads

Fig. 3: Five stages in the Decision Innovation process adapted from Roger (2003).

Stages of Innovation Adoption: The knowledge stage occurs when an individual is first exposed to an innovation but lacks sufficient information about it. At this point, they have not yet been motivated to seek further details, In the persuasion stage, the individual becomes interested in the innovation and actively seeks more information about its features, benefits, and potential applications. The decision stage involves evaluating the innovation by weighing its advantages and disadvantages. At this point, the individual determines whether to adopt or reject it. Rogers noted that this stage is highly personal and subjective, making it difficult to gather empirical evidence. During the implementation stage, the individual begins to use the innovation to varying degrees based on their needs and circumstances. At this point, they assess its practicality and may seek additional information to optimize its application. The confirmation stage is when the individual finalizes their decision to continue using the innovation. This phase is both personal and social, as individuals reflect on their choice and validate it through interactions with others. These five stages can be grouped into two broad categories: availability and utilization. According to Rogers' theory, utilization—which includes implementation and confirmation—depends on availability, which consists of knowledge, persuasion, and decision. The latter must precede the former. This study examines the availability and utilization of ICT as part of the diffusion of innovation in the management of Colleges of Education in South-East Nigeria.

Empirical Review

Several studies have examined the adequacy and utilization of ICT in education management. Akindoju et al. (2014) investigated ICT adequacy and usage among computer science lecturers in Lagos tertiary institutions, revealing that ICT resources were largely inadequate and

rarely utilized for skill development. Gambari and Chike-Okoli (2010) conducted a similar study in Niger State tertiary institutions, finding insufficient ICT facilities and no significant link between availability and effective utilization. Olusesan and Adu (2016) assessed ICT integration in universities, reporting gaps in essential ICT resources despite some available tools. Ademiluyi (2016) examined ICT use in Osun State secondary schools, concluding that resources were scarce and underutilized despite government efforts. While these studies focused on different education levels, the present study extends the investigation to Colleges of Education, evaluating ICT availability, utilization, administrator competence, and associated challenges. Tella (2011) examined ICT availability and usage in South-Western Nigeria's Colleges of Education, revealing inadequate ICT infrastructure and low utilization. Amesi and Yellowe (2018) assessed ICT availability in Rivers State universities, finding limited access to essential tools such as multimedia projectors, internet facilities, and interactive whiteboards. Similarly, Ezenwafor and Soneye (2018) investigated ICT adequacy in business education programs in South-West Nigeria, reporting insufficient ICT resources and poor utilization. While these studies focused on specific aspects of ICT in education, the present study expands the investigation to Colleges of Education, examining ICT availability, adequacy, utilization, administrator competence, and barriers to ICT integration.

Methodology

The collected data was analyzed using both descriptive and inferential statistics. Mean and standard deviation were employed to answer the research questions, while a t-test was used to test the null hypotheses at a 0.05 level of significance. To determine the extent of availability and utilization of ICT facilities in research questions 1, 2, and 3, real limit values were applied as follows: 1.00 – 1.49 = Very Low Extent, 1.50 – 2.49 = Low Extent, 2.50 – 3.49 = High Extent, 3.50 – 4.00 = Very High Extent. The t-test was used to analyze differences in the responses of academic and non-academic administrators for the five null hypotheses at a 0.05 significance level. A null hypothesis was rejected if the P-value was less than the alpha value (0.05), while it was accepted if the P-value was greater than or equal to the alpha value (0.05).

ITEMS	$\bar{X}$	S D	Remarks
Desktop Computer for every Administrator (connected to the Internet	3.31	0.68	High Extent
Computer Laboratory	3.26	0.81	High Extent
Laptop connected to the net (for all lecturers)	3.43	0.72	High Extent
	3.00	0.89	High Extent
School Cybercafé Institutional Web Site (www) &	3.34	0.62	High Extent
Functional E-mail	3.11	0.53	High Extent
Address	3.13	0.57	High Extent
Scanner, Printer and other accessories	3.26	0.67	High Extent
Television set	3.22	0.87	High Extent
Satellite Dish for global information	2.53	0.92	High Extent
Close Circuit Television (CCTV)	2.56	0.87	High Extent
Internally produced educational software	3.17	0.83	High Extent
Commercially produced educational software	3.41	0.76	High Extent
Audiotape player	3.24	0.54	High Extent
Videotape player	3.33	0.48	High Extent
Slide projector	3.45	0.51	High Extent
Power point multimedia projector	3.40	0.47	High Extent
Digital Video Cameras	3.26	0.71	High Extent
Overhead projector & Transparencies	3.23	0.65	High Extent
Projection screen Opaque projector			
Grand Mean	**3.20**	**0.69**	

Results and Discussion

Research Question One: To what extent are ICT facilities available in the management of Colleges of Education?

Table 4.1: Mean rating and standard deviation of academic and Non-academic administrators on the extent ICT facilities are available in the management of Colleges of Education. The analyzed data in Table 4.1 indicates that all 19 items had mean scores ranging from 2.50 to 3.49, which falls within the real limit of 2.50 to 3.49 on a 4-point rating scale. The standard deviation for all 19 items ranged from 0.47 to 0.92, suggesting minimal variation in respondents' responses. This implies that the respondents agreed that all 19 items represented ICT facilities available to a high extent in the management of Colleges of Education, with only slight differences in their responses.

Research Question Two: What is the extent of adequacy of available ICT facilities in the management of Colleges of Education?

Table 2: Mean rating and standard deviation of the academic and Non-academic administrators on the extent of adequacy of available ICT facilities in the management of Colleges of Education

S/NO	ITEMS	X	S D	Remarks
1.	Desktop Computer for every Administrator (connected to the Internet)	2.38	0.80	Low Extent
	Computer Laboratory	2.37	0.72	Low Extent
2.	Laptop connected to the net (for all lecturers)	2.11	0.72	Low Extent
	School Cyber café	2.41	0.93	Low Extent
3.	Institutional Web Site (www) & Functional E-mail Address	2.40	0.62	Low Extent
		2.44	0.98	Low Extent
4.	Scanner, Printer and other accessories	2.36	0.76	Low Extent
	Television set	2.03	0.81	Low Extent
5.	Satellite Dish for global information	1.82	0.75	Low Extent
	Close Circuit Television (CCTV)	2.11	0.73	Low Extent
	Internally produced educational software	2.10	0.56	Low Extent
6.	Commercially produced educational software	2.21	0.61	Low Extent
7.	Audiotape player	2.42	0.90	Low Extent
8.	Videotape player	2.28	0.80	Low Extent
	Slide projector	2.37	0.51	Low Extent
9.	Power point multimedia projector	2.10	0.81	Low Extent
10.	Digital Video Cameras	2.26	0.69	Low Extent
11.	Overhead projector & Transparencies	2.35	0.81	Low Extent
12.	Projection screen	2.13	0.71	Low Extent
	Opaque projector	**2.24**	**0.75**	
13.	**Grand Mean**			

The analyzed data in Table 4.2 indicates that all 19 items had mean scores ranging from 1.82 to 2.44, which falls within the real limit of 1.50 to 2.49 on a 4-point rating scale. The standard deviation for all 19 items ranged from 0.51 to 0.98, suggesting minimal variation in respondents' responses. This implies that the respondents agreed that all 19 available ICT facilities were adequate to a low extent in the management of Colleges of Education, with only slight differences in their responses. The analyzed data in Table 4.3 revealed that three items (1, 6, and 7) had mean scores ranging from 2.72 to 2.96, which falls within the real limit of 2.50 to 3.49 on a 4-point rating scale. The standard deviation for these three items ranged from 0.80 to 0.90, indicating minimal variation in respondents' responses. This suggests that respondents agreed that these three ICT facilities were utilized to a high extent in the management of Colleges of Education. Additionally, the data in Table 4.3 showed that 16 items (2, 3, 4, 5, 8, 9, 10, 11, 12, 13, 14, 15,

16, 17, 18, and 19) had mean scores ranging from 1.43 to 2.44, which falls within the real limit of 1.50 to 2.49 on a 4-point rating scale. The standard deviation for these items ranged from 0.80 to 0.90, indicating slight variations in respondents' responses. This implies that the respondents agreed that these 16 ICT facilities were utilized to a low extent in the management of Colleges of Education.

Research Question Three: To what extent are the available ICT facilities utilized in the management of Colleges of Education?

Table 3: Mean rating and standard deviation of the academic and Non-academic administrators on the extent the available ICT facilities are utilized in the management of Colleges of Education.

S/NO	ITEMS	$\bar{X}$	S D	Remarks
1.	Desktop Computer for every Administrator (connected to the Internet)	2.72	0.85	High Extent
2.	Computer Laboratory	2.43	0.76	Low Extent
	Laptop connected to the net (for all lecturers)	2.44	0.98	Low Extent
3.	School Cyber café	2.38	0.86	Low Extent
4.	Institutional Web Site (www) & Functional E-mail Address	2.21	0.83	Low Extent
		2.85	0.90	High Extent
5.	Scanner, Printer and other accessories	2.96	0.80	High Extent
	Television set	2.43	0.91	Low Extent
	Satellite Dish for global information	2.36	0.75	Low Extent
6.	Close Circuit Television (CCTV)	1.88	0.72	Low Extent
7.	Internally produced educational software	2.28	0.67	Low Extent
8.	Commercially produced educational software	1.43	0.81	Low Extent
9.	Audiotape player	2.22	0.77	Low Extent
10.	Videotape player	2.28	0.90	Low Extent
11.	Slide projector	2.31	0.83	Low Extent
12.	Power point multimedia projector	2.21	0.84	Low Extent
13.	Digital Video Cameras	2.34	0.72	Low Extent
14.	Overhead projector & Transparencies	2.32	0.81	Low Extent
15.	Projection screen	2.21	0.77	Low Extent
16.	Opaque projector	**2.33**	**0.73**	
	Grand Mean			

Hypothesis One: There is no significant difference between the mean responses of academic and non-academic administrators on the extent ICT facilities are available in the management of Colleges of Education.

Table 6: T-test analyses of the difference between the mean responses of academic and non-academic administrators on the extent ICT facilities are available in the management of Colleges of Education.

Groups	Number	Mean	S.D	D.F	T.Cal	P.Value	Decision
Academic Administrators	15	3.23	0.54	376	0.37	0.712	Not Significant
Non-Academic Administrators	363	3.17	0.62				

The data on table 4.6 showed a t-calculated value of 0.37 with a P. value of 0.712 which is greater than 0.05 at 0.05 level of significance. This implies that the null hypothesis, which

states that there is no significant difference between the mean responses of academic and non-academic administrators on the extent ICT facilities are available in the management of Colleges of Education was retained.

Hypothesis Two Academic and non-academic administrators concerning the adequacy of availability of ICT facilities does not have any significant effect on the management of Colleges of Education

Table 7: t-test analysis of the difference between the mean responses of academic and non-academic administrators on the extent of adequacy of available ICT facilities in the management of Colleges of Education.

Groups	Number	Mean	S.D	D.F	T.Cal	P.Value	Decision
Academic Administrators	15	2.11	0.83	376	-0.2	0.042	Significant
Non-Academic Administrators	363	2.15	0.76				

The data in Table 4.7 revealed a t-calculated value of -0.2 with a p-value of 0.042, which is less than 0.05 at the 0.05 level of significance. This indicates that the null hypothesis, which states that there is no significant difference between the mean responses of academic and non-academic administrators regarding the adequacy of available ICT facilities in the management of Colleges of Education, was rejected. Therefore, a significant difference exists between the mean responses of academic and non-academic administrators on this issue.

Hypothesis Three: There is no significant difference between the mean responses of academic and non-academic administrators on the extent available ICT facilities utilized in the management of Colleges of Education.

Table 8: t-test analysis of the difference between the mean responses of academic and non-academic administrators on the extent available ICT facilities utilized in the management of Colleges of Education.

Groups	**Number**	**Mean**	**S.D**	**D.F**	**T.Cal**	**P.Value**	**Decision**
Academic Administrators	15	2.26	0.89	376	0.57	0.571	Not Significant
Non-Academic Administrators	363	2.15	0.73				

The data on table 4.8 showed a t-calculated value of 0.57 with a P. value of 0.571 which is greater than 0.05 at 0.05 level of significance. This implies that the null hypothesis, which states that there is no significant difference between the mean responses of academic and non-academic administrators on the extent of available ICT facilities utilized in the management of Colleges of Education was retained.

Findings

The study found that various ICT facilities, including desktop computers, scanners, printers, televisions, and digital projectors, were available to a high extent for managing Colleges of Education. However, other essential ICT resources, such as internet-enabled laptops, school cybercafés, CCTV systems, and educational software, were only available to a limited extent. Despite this availability, ICT facilities were generally inadequate for effective college management. While some ICT tools, like desktop computers and printers, were highly utilized, others—such as computer laboratories, institutional websites, and projectors—were underutilized. There was no significant difference in the perception of academic and non-academic administrators regarding ICT availability and utilization. The findings align with prior research indicating inadequate ICT provisions and low utilization in Nigerian tertiary institutions.

Conclusion

The study concluded that while ICT facilities such as computers, printers, projectors, and institutional websites were available in Colleges of Education, they were inadequate and underutilized. Additionally, administrators lacked the necessary competencies for optimal ICT use. Challenges such as limited access, poor power supply, and inadequate technical support further hindered effective utilization.

To address these issues, the study recommends:

1. **Adequate ICT Provision** – Colleges should ensure the sufficient supply of ICT facilities to support academic and administrative functions.
2. **Alternative Power Supply** – Institutions should invest in backup power sources like generators or solar energy to maintain ICT operations.
3. **Regular ICT Training** – Periodic training should be provided for administrators to improve their ICT skills and enhance institutional management.

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