

ASSESSMENT OF THE AVAILABILITY AND UTILIZATION OF COMPUTER LABORATORY RESOURCES FOR TEACHING AND LEARNING IN FEDERAL COLLEGES OF EDUCATION IN SOUTH EAST NIGERIA

¹Ndukanma, Ngozika Agape; ²Nnaji Samuel Okechukwu & ¹Alio Nnamdi Chidiebere

¹Department of Computer and Robotics Education, University of Nigeria, Nsukka.

²Department of Computer Science, Federal University of Environment and Technology Koroma/Sakpere, Ogoni, River State

Correspondence: ngozika.ndukanma@unn.edu.ng

Abstract

This study examined the availability and utilization of computer laboratory resources for teaching and learning in Federal Colleges of Education in South East Nigeria. Two objectives, two research questions, and two null hypotheses guided the study. A descriptive survey design was adopted, with a population of 78, comprising 32 final-year NCE students and 46 lecturers from two Federal Colleges of Education in the study area. Total sampling technique was employed. Data were collected using a structured questionnaire, which was validated by three experts from the Department of Computer and Robotics Education, University of Nigeria Nsukka. Reliability was established by administering 10 copies of the questionnaire to five computer education lecturers and 5 third-year students at Federal College of Education (Technical), Omoku, using Cronbach Alpha method to determine the internal consistency. Data collected were analyzed using frequency counts and percentage for research Question 1 and 2 while mean and standard deviation were used to answer the question 3. T-test was used to test the two null hypotheses at 0.05 level of significance. Findings revealed that while some colleges possess basic computer laboratory infrastructure, disparities exist in quality, quantity, and accessibility. Utilization of available resources is constrained by irregular power supply, limited internet connectivity, and inadequate training for both students and lecturers. Results further indicated no significant difference between the availability and utilization of computer laboratory resources on the quality of teaching and learning in the colleges studied. The study suggests that beyond infrastructure, deeper systemic issues such as teacher training, digital pedagogy, curriculum alignment, and effective management of resources must be addressed to enhance teaching and learning outcomes in Federal Colleges of Education, South East, Nigeria.

Keywords: availability, utilization, computer, laboratory, resources, teaching, learning.

Introduction

Computer has been considered a priority in global education and Nigeria is not left out. The Federal Government of Nigeria in the National Policy on Education (FRN, 2014) recognizes computer as a product of technological change and as an innovation in education. It is in this view that Computer Education was introduced as an integral part of ICT in the Nigerian educational system which include college of Education. The main purpose of its introduction was for acquisition of computer literacy and computer skills that are needed in all facets of human life in the 21st century and for its use at the tertiary institutions including the

college of Education. (Stopar, & Bartol, 2019). The curriculum as developed by (NERDC 2021) includes the introduction of basic technology, computer education and emphasis on creative thinking among others. Tedre, et al (2021) aptly pointed out that, the new curriculum is computer driven with emphasis on practical, concrete and hands on experiences. Also, Lestari (2020) remarked that both the teachers and the students should achieve better curriculum outcomes with the use of computer laboratory resources in the schools.

The main purpose of computer education was for computer literacy and skills needed in the 21st century classrooms and outside the classroom (Stopar, & Bartol, 2019). The teachers at the college of Education needed to acquired this teaching skills in computer Education as the classroom instructions. It goes beyond reading computer books and pamphlets. It really requires skills, abilities and competencies in the use of computer for classroom instruction. For instance, it requires digital literacy and skills, hardware literacy and skills, software literary and skills, and computer packages integration and usage skills. Others are networking skills and multimedia systems literacy and skills. For instance, the use of multimedia projector (mm projector) requires good computer literacy and skills. In their own view, Amin and Kalam (2018) stated that this is because it accepts many electronic devices such as the computer, digital television, radio, radio-cassette, magnetic sound recorder and electronic board technology among others. Enuwa ngozi, (2023), pointed out that the mm projector uses multimedia planning sheet which requires computer literacy for production and use. To use computer facilities in the classroom instruction in computer laboratory resources are needed in the schools especially in the college of Education and should be available and functional.

The need for availability and utilization of Computer resources in teaching and learning situations is on the increase. The government has made effort towards the building of Laboratory resources in the colleges. For instance, during Governor Peter Obi's administration in Anambra State, Nwana, & Egbe, (2017) reported that computer and its accessories were procured in large quantities and presented to schools. Also, teachers were sent on short-term computer courses drawing. Without the availability and functionality of the computer resources facilities in the schools including the colleges of Education, the objective of using the computer resources especially by teachers in the colleges of Education will be defeated. It is against this background that the present study seeks to find out the range of laboratory resources available for the teaching of computer education in colleges of Education and available functional are they.

Colleges of education (COE) are among the institutions legally authorized to train teachers and award qualified students the Nigeria Certificate in Education (NCE). In support

of the above, the National Policy on Education states that the Nigeria Certificate in Education is the minimum qualification for entry into the teaching profession (NCE) (FRN, 2024). NCE holders, depending on their course of study, are expected to teach in primary, junior, or senior secondary schools. To effectively achieve the aforementioned goal, the Federal Ministry of Education established the National Commission for Colleges of Education (NCCE) to supervise Nigerian colleges of education (Ogunode & Adanna 2022). And to monitor their operations. In colleges of Education, computer Education is one of the course programmers offered at that level while all preservice teachers offer computer programmers before graduation at the colleges of Education.

Computer Education is an education that consists of gaining knowledge in the use of computers and the acquisition of competencies for transferring such acquired knowledge to ensure computer literacy (Ibezim, 2018). Computer education is a valuable tool for any country's scientific and technical growth. In recognition of the role of computer Education in the development of the Federal Government of Nigeria stated in the National Policy on Education, (Federal Republic of Nigeria (FRN, 2017) that education should prepare students to live effectively in their modern age of science and technology, among other things. To do this, scientific teaching and learning resources in colleges of Education (COE) must be effectively funded and utilized.

Resources refer to the supply of something that a country, institution, or individual has and may utilize to increase prosperity. According to Sanusi (2022), resources can be viewed as supplies of individuals and materials whose utility in one way or the other help in the actualization of educational objectives. All resources have unique qualities of utility, availability and consumption (Neumayer, E. 2000). Resources are vital for any teaching-learning process to proceed effectively. They are necessary tools that facilitate learning. Prabawati, et al, (2021), is of the opinion that resources enable the teacher to teach more effectively and will likewise, enable the children to learn more readily. There are two types version or types of resources – human and material.

Human and material resources have been divided into two categories in computer Education Laboratories. Teachers, students, resource persons, laboratory assistants, technologists, and other non-professional personnel who are among the human resources (Wanjiku, (2016). The scope of the computer laboratory resources covered in this study is the computer material resources.

Effective Computer Education teaching and learning in colleges of education with the use of material laboratory resources is critical if computer education programs are to achieve

their stated goals. According to Pahl (2003), teaching has not occurred if permanent changes in behavior have not been observed. When studied with appropriate material resources by qualified human resources, computer education imparts scientific knowledge to learners. In colleges of Education, computer Education is studied in laboratories. This is due to the use of laboratory-stocked material resources to deliver lectures not only during practical classes but also during regular classroom instruction. According to Septiliana, & Surul, (2023), this method allows students to develop scientific skills and attitudes such as objectivity, communication, questioning, hypothesis formulation, data analysis, critical thinking, carefulness, open-mindedness, making inferences, and data analysis. Scientific skills can only be developed effective if computer science laboratory utilization is well-coordinated. Computer Education Laboratory utilization is defined as the complex activities that involve planning, organizing, directing, and coordinating the computer laboratory's material resources in a manner conducive to scientific investigation (Zhao, Liu, & Wang, 2023).

There are numerous challenges in computer teaching and learning. Among these challenges are population explosions into higher education institutions. The increase in the number of students enrolled in science courses in colleges of education has had an impact on the teaching methods designed for such courses (Tharayil et al., 2018). According to Lauer et al (2020) most computer Education laboratories lack laboratory assistants and technologists, and if they exist, are unqualified and unskilled to use Computer Laboratory Resources effectively. On the part of the students, the traditional methods of teaching used by computer teachers make the lesson abstract and thus difficult to understand.

Furthermore, teachers now use traditional classroom teaching for both theory and practical computer activities consequently using computer education laboratories less frequently (Shahid, et al 2019). More worrisome is the fact that in some colleges of education, the computer laboratory resources may be available while at the same time when available are not functional. Functionality refers to the ability of a material to perform a specific task based on the physical properties. If the computer laboratory resources are available but not functional, they can not be effectively utilized during instructional delivery. Utilization, according to Tanjung (2020), is the effective use and coordination of resources such as capital, material, and labour to achieve defined goals with maximum efficiency. It is the process of achieving organizational goals through the use of people and other organizational resources. Modupe & Shanka (2024) defined utilization of resource as the process of setting and achieving goals through the execution of five management functions that use human, financial, and material resources: planning, organizing, staffing, directing, and controlling

The utilization of resources implies an adequate (quantity and quality) supply of teachers, laboratory assistants and technologists, students, and materials for them to work with in computer Education laboratories. If these valuable resources are insufficient or are not used during instruction, then national educational objectives such as instilling the right type of values and attitudes for the survival of the individual and the Nigerian society will not be realized (Lawal, 2013). Researchers such as Bušljeta, (2013), have emphasized the importance of appropriate utilization of resource materials when teaching. According to Souck, & NJI, (2017), the effects of school facilities on internal efficiency of some selected bilingual secondary schools in Yaoundé center show that adequate provision and management of computer Education laboratory resources has always been positively correlated with good examination performance. Students will be taught using traditional methods if human and material resources are not adequately provided for and scarce resources are not properly managed (Lupeja, & Makwinya, (2021). Despite the benefits derived from the use of computer laboratory Resources in teaching in colleges of Education the use of computer laboratory Resources in the institutions remain problematic. It is in the view of the existing efficiency in the existing studies that this study sought to investigate the level of availability and utilization of computer Laboratory Resources in colleges of Education for teaching and learning. To guild the study: three purposes of the study were formulated as follows:

1. The study determined the availability of computer laboratory compute resources for teaching and learning in Federal Colleges of Education in south East Nigeria
2. The study determined the functionality of the available resources for teaching and learning in Federal Colleges of Education in south East Nigeria
3. The study determined the utilization of the available compute resources for teaching and learning in Federal Colleges of Education in south East Nigeria

The following research questions have been formulated, to guide the study.

1. What is the computer laboratory resources available for teaching and learning in Federal Colleges of Education in South East Nigeria?
2. How functional are the computer Laboratory Resources for teaching and learning in Federal Colleges of Education in South East Nigeria.
3. What is the extent of utilization of computer laboratory resources in teaching and learning in Federal Colleges, of Education in South East Nigeria?

Methodology

Descriptive survey research design was adopted for the study. According to Siedlecki, (2020), descriptive survey design is concerned with the documentation and description of what exists or the present status of existence or absence of what is being investigated without any manipulation of what caused the event. Descriptive survey is considered appropriate for the study because it can be used to elicit the views and opinions of the respondents

The population for the study is 78, comprising of 32 NCE final year students, 46 lecturers in the two Federal Colleges of Education in South East Nigeria. Namely Federal College of Education Eha-Amufu, and Federal College of Education (technical) Umunze for 2024/2025 session. A structured questionnaire was used for data collection. It was tagged Questionnaire on Assessment of Computer Laboratory Resources (QACLR) and is divided into four (4) sections (A). Section A was designed to obtain background information from respondents while sections B were to elicit information from the respondents to answer the three (3) research questions. The section on availability also showed functionality of the resources. The items of the material, were lifted from the approved NNCE curriculum for computer Education in colleges of Education.

The entire questionnaire contained (78) items. Section B is tagged Availability of Computer Education Laboratory (ACELR) and showed availability and functionality. The items structured to determine the availability and functionality of the material resources in computer Education laboratories in Colleges of Education. In this research study, it was a list of computer Education laboratory material resources required for effective teaching and learning of Computer in Colleges of education as stated in the National Commission for Colleges of Education (NCCE, 2002) were listed. Respondents were been requested to indicate their level of agreement (Yes/Available) or disagreement (No/Not-Available) to materials available in their computer laboratories. Also, the Respondents were to respond whether the resources available are functional or not functional.

Section C is tagged: Extent of Utilization of Computer Education Laboratory Resources. It consisted of the same twenty-nine 29 items as listed in section B above. It is a four - point type of scale comprising of HU = Highly Utilized; U = Utilized; SU=Slightly Utilized; NU=Not Utilized respectively. Section C seeks to elicit responses on the extent to which teachers and students in Computer Department in Colleges of Education effectively utilize laboratory resources. Utilization Scale (CCELR). It is on a four (4) point scale of Strongly Agree (SA), Agree (A), Disagree (D), Strongly Disagree (SD), respectively which consist of seven (7) items, it measured several factors that militate against effective utilization

of Computer Education Laboratory Resources (CSELR) in Colleges of Education. It was used to measure the extent to which the listed constraints affect teaching and learning of computer in Colleges of Education.

Result

Research Question 1: What is the computer laboratory resources available for teaching and learning in Federal Colleges of Education in South East Nigeria?

Table 1: Frequencies and Responses on Availability of Computer Laboratory Resources at the Colleges of Education.

S/N	Items	Frequency of available	%	Remarks
1	Computer: for processing and storing data, communicating	75	98.7	A
2	Scanner: scanning of document	67	88.2	A
3	Screw Driver: for tighten or loosen nut.	69	90.8	A
4	Power supply units {PSUs} to convert electric current from a source to the correct voltage	68	89.5	A
5	Hard drives: for storing files and program	69	90.8	A
6	Anti-Statics wrist strap to prevent electrostatic discharge	50	65.8	A
7	Thermal paste: to enhance the cooling of CPU	50	65.8	A
8	Chip extractor for safety removal and insertion of integrated circuits	53	69.7	A
9	Wire cutters: used to cut copper, brass, iron.	62	81.6	A
10	Smart board and projector: for presentation of digital contents	66	86.8	A
11	Printer: for printing a document	59	77.6	A
12	Streaming software: capture, encode, and transmit live video and audio over the internet	29	38.2	NA
13	Grading App: record student grades for assignments and exams, and also keep track of attendance and homework completion.	34	44.7	NA
14	Microsoft Teams: used for team collaboration and communication	31	40.8	NA
15	Version control with Git and GitHub: allows developers to collaborate and store their code in the cloud	39	51.3	A
16	Collaboration platform e.g. clack, Microsoft teams	44	57.9	A

17	Microsoft office suite: for creating of document.	70	92.1	A
18	Google Chrome: for browsing	72	94.7	A
19	Programming: C, C++, Python, Java	63	82.9	A
20	Laboratory manual: to ensure safety, accuracy, and reproducibility in laboratory experiments.	57	75.0	A
21	CAT wire: to work with broadband and telephone connection	40	52.6	A
22	Fibre optics: used for long-distance and high-performance data.	41	53.9	A
23	Multimeter: measuring multiple electrical properties	44	57.9	A
24	Crimping Tools (RJ45); used in telecommunications and networking applications	50	65.8	A
25	TRACERT: troubleshooting large networks	48	63.2	A
26	Security camera: security purposes	48	63.2	A
27	Modems: connecting to the internet	63	82.9	A
28	System recovery tools: to recover lost item.	58	76.3	A
29	Network protocol analyzes like Wireshark, Tcpdump: monitor data traffic	21	27.6	NA

Keys: S/No = Serial Number; AV = Available (NO); NAV = Not Available (YES); Dec = Decision; % = Percentage

Table 1 above shows the availability of computer laboratory resources to colleges of education in south eastern Nigeria. The result shows that 25 resources listed are available in the colleges of education almost falls within the real limit of available. Only Network protocol, Microsoft Teams, Grading APP and Screaming Software are recorded as the only resources at a very not available.

Research Question 2: How functional are the computer Laboratory Resources for teaching and learning in Federal Colleges of Education in South East Nigeria.

Table 2: Functionality of the Available Computer Education Laboratory Resources or teaching at the Colleges of Education

S/N	Items	Frequency of functionality	%	Ranks
1	Computer: for processing and storing data, communicating	75	98.7	A
2	Scanner: scanning of document	67	88.2	A
3	Screw Driver: for tighten or loosen nut.	69	90.8	A

4	Power supply units {PSUs} to convert electric current from a source to the correct voltage	68	89.5	A
5	Hard drives: for storing files and program	69	90.8	A
6	Anti-Statics wrist strap to prevent electrostatic discharge	50	65.8	A
7	Thermal paste: to enhance the cooling of CPU	50	65.8	A
8	Chip extractor for safety removal and insertion of integrated circuits	53	69.7	A
9	Wire cutters: used to cut copper, brass, iron.	62	81.6	A
10	Smart board and projector: for presentation of digital contents	66	86.8	A
11	Printer: for printing a document	59	77.6	A
12	Streaming software: capture, encode, and transmit live video and audio over the internet	29	38.2	NA
13	Grading App: record student grades for assignments and exams, and also keep track of attendance and homework competition.	34	44.7	NA
14	Microsoft Teams: used for team collaboration and communication	31	40.8	NA
15	Version control with Git and GitHub: allows developers to collaborate and store their code in the cloud	39	51.3	A
16	Collaboration platform e.g clack, Microsoft teams	44	57.9	A
17	Microsoft office suite: for creating of document.	70	92.1	A
18	Google Chrome: for browsing	72	94.7	A
19	Programming: C, C++, Python, Java	63	82.9	A
20	Laboratory manual: to ensure safety, accuracy, and reproducibility in laboratory experiments.	57	75.0	A
21	CAT wire: to work with broadband and telephone connection	40	52.6	A
22	Fibre optics: used for long-distance and high-performance data.	41	53.9	A
23	Multimeter: measuring multiple electrical properties	44	57.9	A
24	Crimping Tools (RJ45); used in telecommunications and networking applications	50	65.8	A
25	TRACERT: troubleshooting large networks	48	63.2	A
26	Security camera: security purposes	48	63.2	A
27	Modems: connecting to the internet	63	82.9	A
28	System recovery tools: to recover lost item.	58	76.3	A
29	Network protocol analyzes like Wireshark, Tcpdump: monitor data traffic	21	27.6	NA

Keys: S/No = Serial Number; AV = Available (NO); NAV = Not Available (YES); Dec = Decision; % = Percentage

Table 12 above shows the functionality and availability of computer laboratory resources to colleges of education in south eastern Nigeria. The result shows that 25 resources listed are available in the colleges of education almost falls within the real limit of available. Only Network protocol, Microsoft Teams, Grading APP and Screaming Software are recorded as the only resources at a very not available.

Research Question 3: What is the extent of utilization of computer laboratory resources in teaching and learning in Federal colleges of Education in South East Nigeria?

Table 3: Mean rating and standard Deviation of responses on the Utilization of Computer Education Laboratory Resources

S/N	Items	Mean	SD	Remarks
1	Computer: for processing and storing data, communicating	3.48	0.70	U
2	Scanner: scanning of document	3.19	0.78	U
3	Screw Driver: for tighten or loosing nut.	3.00	0.95	U
4	Power supply units {PSUs}	2.97	0.87	U
5	Hard drives: for copying work	3.06	0.80	U
6	Anti-Statics wrist strap to prevent the buildup of static electricity on their body	2.48	0.87	U
7	Thermal paste: to enhance the cooling of CPU	2.55	0.82	U
8	Chip extractor for safety removal and insertion of integrated circuits	2.56	0.86	U
9	Wire cutters : used to cut copper, brass, iron, etc	2.76	0.86	U
10	Smart board: for writing	3.25	0.86	U
11	Printer: for printing a document	3.35	0.94	U
12	Streaming software: capture, encode, and transmit live video and audio over the internet.	2.01	1.58	NU
13	Grading App: L record student grades for assignments and exams, and also keep track of attendance and homework completion	1.95	0.82	NU
14	Microsoft Teams: used for team collaboration and communication.	1.90	0.80	NU
15	Version control with Git and GitHub: allows developers to collaborate and store their code in the cloud	2.28	0.78	U
16	Collaboration platform e.g clack, Microsoft teams	2.39	0.86	U
17	Microsoft office suite: for typing of document.	3.03	0.75	U

18	Google Chrome: for browsing	3.19	0.83	U
19	Programming compiler/IDEs such as C, C++, Python, Java	2.98	0.87	U
20	Laboratory manual: for teaching and learning practical concepts	3.13	1.17	U
21	CAT wire: to work with broadband and telephone connections	2.39	0.91	U
22	Fibre optics: used for long-distance and high-performance data networking	2.23	0.81	U
23	Multimeter: measuring multiple electrical properties, including voltage, current, and resistance.	2.27	0.82	U
24	Crimping Tools (RJ45); used in telecommunications and networking applications.	2.30	0.83	U
25	TRACERT: troubleshooting large networks.	2.28	0.84	U
26	Security camera: security purposes.	2.76	3.62	U
27	Modems: connecting to the internet.	2.86	0.85	U
28	System recovery tools: to recover lost item.	2.57	0.89	U
29	Network protocol analyzes like Wireshark, Tcpdump: monitor data traffic	1.98	0.79	NU
Cluster Mean		2.71	0.98	

Keys: S/No=Serial Number; HU = Highly Utilized; U = Utilized; SU=Slightly Utilized; NU= Not Utilized; Mean ($\bar{x}$) SD. Dev. =Standard Deviation (δ)

Table 3 above shows the responses of utilization of computer laboratory resources in teaching and learning in Federal colleges of Education in South East Nigeria. The analysis of the data presented on Table 2 shows that the mean of the respondents ranged from 1.95 to 3.48. Only item 29 - Network protocol with a mean value of 1.98 is slightly utilized; All other items listed are utilized. Also, the cluster mean of 2.71 shows that the participants generally accept that the computer Laboratory resources are utilized for teaching and learning in Federal Colleges of Education South East Nigeria. Also, the standard deviation ranged from 0.98 to 3.62, which shows that there is closeness to the responses of the respondents.

H₀₁: There is no significant difference between the mean score of students from the colleges on the availability of computer laboratory resources for teaching and learning.

Table 4 shows the result of the independent samples t-test conducted to examine whether there were significant differences in the availability of computer laboratory resources between the two Colleges of Education. The table reveals that the sig-value is 0.19 which is greater than 0.05, Therefore there is no significant difference from responses of the respondents from the

colleges on the availability of computer laboratory resources. Therefore, the null hypothesis is upheld.

Table 4: T-test result of the responses of COE Umunze and COE Eha-amufu on the Availability of Computer Laboratory Resources for Teaching and Learning.

Group	N	Df	t-value	Sig-	Remarks
COE Umunze	56	76	3.19	0.19	NS
COE Eha-amfu	22				

H₀₂: There is no significant difference between the mean responses of lecturers and students on the extent of utilization of computer laboratory resources in Federal Colleges of Education, South East Nigeria.

Table 5: t-test result of the responses of Lecturers and Students in Umunze and Eha-Amufu COE.

Group	N	Df	t-value	Sig-	Remarks
Lecturers	33	44	0.82	0.49	NS
Students	13				

Table 5 shows the result OF the independent samples t-test conducted to examine whether there were significant differences in the responses of lecturers and students on the utilization of computer laboratory resources in Federal Colleges of Education, South East Nigeria, between the two groups. The study shows that the sig-value is 0.49 which is greater than 0.05, Therefore there is no significant difference from responses of lecturers and students on the extent of utilization of computer laboratory resources in the Federal Colleges of Education. Therefore, the null hypothesis is upheld.

Discussion

The findings revealed that most computer laboratory resources were rated as available, confirming that the majority tools and equipment essential for teaching and learning are present in the Federal Colleges of Education. The result obtained from Table 1 revealed that Computer, Scanner, Screw Driver, Psu, Hard Drive, Anti-Statics, Thermal Paste, Chip Extractor, Wire Cutters, Smartboard, Printer, Collaboratioin Software, Microsoft Team, Microsoft Office, Google Chrome, Progarmming Language, Labolatory Manual, Cat Wire, Fiber Optics,

Multimeter, Crippling Tools, Tracert, Security Camera, Modems, System Recovery Tools were all available and functional. The data suggests a decent infrastructural base. However, it's not all roses. Some resources especially streaming software, grading apps, version control platforms like GitHub and Network Protocol Analysis were marked "Unavailable," hinting at a disconnect between traditional lab setups and the digital evolution of educational tools as they are not available, it means that they are functional. This gap is critical because it suggests that while physical infrastructure may exist, modern digital learning enablers are lacking. These results find resonance with the work of Nwobodo and Udoka (2025), who emphasized that most Nigerian colleges possess the minimum required hardware but lack updated software and modern collaborative platforms, limiting their relevance in today's tech-driven education landscape. Similarly, Abayomi, et, al (2022), noted that computer labs are often stocked with outdated or underutilized systems, which aligns with this study's finding that advanced tools are less available.

Furthermore, the data supports the ICT integration framework as suggested by UNESCO (2015), which stresses the importance of not just availability but relevance, modernity, and alignment with curricular goals. Having computers without network analyzers, real-time collaborative platforms, or cloud-based tools in 2025 is like using candles in a solar age. While the standard deviations (ranging from 0.14 to 0.50) suggest consistency in responses, this also means the problem is widespread and the limitations aren't isolated to one or two schools but reflect a systemic issue in ICT infrastructure provisions. In essence, the availability of resources in these institutions reflects a picture of partial readiness which the labs are equipped enough to tick boxes, but not enough to empower innovation, practical engagement, or real-world application.

The data obtained from research question 2, table 2, revealed that the respondents believed that the computer laboratory resources in teaching and learning in Federal colleges of Education in South East Nigeria were utilized. Shows as utilized include the following: Computer, Scanner, Screw Driver, Psu, Hard Drive, Anti-Statics, Thermal Paste, Chip Extracror, Wire Cutters, Smartboard, Printer, Streaming Software, Grading App, Microsoft Team, Version Control With Git And Github, Collaboratiion Software, Microsoft Office, Google Chrome, Proqramming Language, Labolatory Manual, Cat Wire, Fiber Optics, Multimeter, Crippling Tools, Tracert, Security Camera, Modems, System Recovery Tools, only Network Protocol Analysis are slightly utilized. This pattern screams of a digital divide not just in tools, but in skills, training, and pedagogy.

The finding aligns with Okoye, et, al (2023), who emphasized that the real bottleneck in ICT education is access. Having a tool means that it is being put to good use. The tools are used because either lecturers use the curriculum and prioritizes practical, hands-on ICT applications. Another core issue raised in this study was that the modern tools like collaborative platforms and programming environments were especially used. This just a reflection of training gaps but also speaks to systemic inertia: schools are evolving with industry needs. If students are exposed to version control systems, network collaboration platform, or virtual classrooms, they can compete in the global tech space?

Furthermore, the findings on the hypotheses show that the sig-value obtained is 0.19 which is greater than 0.05. Therefore, there is no significant difference in the availability of computer laboratory resources among the colleges. Therefore, the null hypothesis was upheld. Also in hypotheses 2, the findings shows that the sig-value was 0.49 which is greater than 0.05, therefore there is no significant difference from responses of lecturers and students on the extent of utilization of computer laboratory resources. Therefore, the null hypothesis was upheld. This result suggests that simply having computer laboratory resources does not guarantee enhanced teaching and learning outcomes. The findings align with Suárez et, al (2018), who emphasized that the availability of ICT facilities does not automatically lead to improved academic performance unless accompanied by appropriate pedagogical integration and teacher competence.

Conclusion

The researcher set out to examine the availability, functionality and utilization of computer laboratory resources in Federal Colleges of Education across South East Nigeria. What it revealed was both sobering and hopeful. On one hand, essential resources exist albeit unevenly distributed suggesting that institutions have at least made an effort toward ICT integration. Yet, these tools remain largely underutilized, locked behind power failures, poor funding, minimal training, and a troubling lack of motivation. It's not the absence of tools, but the absence of systems and willpower to use them effectively. The evidence also showed significant differences in resource utilization in the colleges as an indictment of fragmented policy execution. Students and lecturers are not failing by choice; they're simply operating in environments that haven't equipped them to succeed.

Still, the voices in this research were not just critical but were constructive. These are not wish lists. They are minimum requirements for functional digital education in this century. In the end, this study concludes that the real issue is not what the institutions lack, but what

they fail to activate. Until the tools are used, maintained, and woven into the daily rhythm of teaching and learning, the dream of digital transformation will remain a mirage.

Recommendations

Based on the findings of the study, the following recommendations are proposed to enhance the effective use of computer laboratory resources in Federal Colleges of Education in South East Nigeria:

1. Government bodies, especially the Federal Ministry of Education, must increase budgetary allocations for ICT development in Colleges of Education. Special intervention funds should be provided for the procurement of modern digital tools, routine maintenance, and infrastructure upgrades, or build resources center.
2. Institutions should invest in alternative energy sources such as solar power or high-capacity inverters to ensure uninterrupted electricity supply for computer laboratories. Power instability is a primary barrier to digital learning and must be addressed as a priority.
3. Lecturers should undergo periodic ICT training, particularly on modern software, programming tools, collaborative platforms (e.g., Microsoft Teams, GitHub), and troubleshooting. This will build confidence and foster the integration of ICT into daily teaching.
4. Institutions should establish award and recognition schemes to reward lecturers and students who excel in ICT engagement. Motivated stakeholders are more likely to embrace and champion digital learning.
5. School administrators must enforce effective monitoring systems to track resource use and ensure that tools provided are actively utilized, maintained, and not diverted for personal use.

References

- Amin, M. R., Azim, M., & Kalam, M. A. (2018). The benefit of using multimedia projector in English Language teaching classroom. *International Journal of Social Sciences & Humanities*, 3(1), 62-76. <https://doi.org/10.5281/zenodo.1403261>
- Bušljeta, R. (2013). Effective use of teaching and learning resources. *Czech-polish historical and pedagogical journal*, 5(2). 10.2478/cphpj-2013-0014
- Federal Republic of Nigeria (2014). *National Policy on Education*. Lagos: NERDC Press.
- Federal Republic of Nigeria (2017). *National Policy on Education*. Lagos: NERDC Press.
- Federal Republic of Nigeria (2024). *National Policy on Education*. Lagos: NERDC Press.
- Ibezim, N. E. (2018). *Methodology in computer education*. Praise House Publishers.

- Lawal, Y. O. (2013). Education as an instrument for effective national development: Which way Nigeria. *Business & Entrepreneurship Journal*, 2(2), 27-38.
- Lestari, D. P. (2020). Students and teachers' necessity toward virtual laboratory as an instructional media of 21st century science learning. In *Journal of Physics: Conference Series* .1440, 1,L.012091. IOP Publishing. doi:10.1088/1742-6596/1440/1/012091.
- Lupeja, T. L., & Makwinya, N. M. (2021). The constraints of linking instructional methods to learners' real-life settings in the context of resources scarcity. AkiNiki Publications New Delhi, India.
- Modupe, A., & Shanka, B. O. (2024). Strategic Planning And Management Of Human And Material Resources In Public Organization: An Overview. *International Journal of Financial Research and Business Development*.
- Nayebpour, H., & Sehhat, S. (2024). Designing the competency model of human resource managers based on paradox theory (case study: information and communication technology industry). *International Journal of Organizational Analysis*, 32(7), 1181-1203. <https://www.emerald.com/insight/1934-8835>.
- Nwana, S. E., Ofoegbu, T. O., & Egbe, C. I. (2017). Availability and utilization of ICT resources in teaching computer education in secondary schools in Anambra State, Nigeria. <http://creativecommons.org/licenses/by-nc-nd/3.0/>
- Ngozi, E. J. (2023). Availability and utilization of the projecting multimedia for computer education in senior secondary schools in Nnewi Metropolis, Anambra State, Nigeria, West Africa. *World Journal of Advanced Research and Reviews*, 18(2), 159-166. <https://doi.org/10.30574/wjarr.2023.18.2.0966>.
- Ogunode, N. J., & Adanna, C. M. (2022). Supervision of higher institutions in Nigeria: Challenges and way forward. *Journal of Advanced Research and Scientific Progress*, 1(1), 25-37.
- Pahl, C. (2003). Managing evolution and change in web-based teaching and learning environments. *Computers & Education*, 40(2), 99-114.
- Prabawati, A. St Asriati, A. M., & St Asmayanti, A. M. (2021). the students' perception of the online media used by teacher in learning english. *English Language Teaching Methodology*, 1(3), 169-181.
- Sanusi, O. A. (2022). *Availability, Adequacy and Utilization of Material Resources for Teaching Business Education Courses in Colleges of Education* (Master's thesis, Kwara State University (Nigeria)).
- Septiliana, L., & Surul, R. (2023). Implementation of Scientific Methods and Attitudes in Science Education. *Journal of Education*, 8(3), 279-287.
- Shahid, F., Aleem, M., Islam, M. A., Iqbal, M. A., & Yousaf, M. M. (2019). A review of technological tools in teaching and learning computer science. *Eurasia journal of mathematics, science and technology Education*, 15(11), em1773. <https://doi.org/10.29333/ejmste/109611>.
- Siedlecki, S. L. (2020). Understanding descriptive research designs and methods. *Clinical Nurse Specialist*, 34(1), 8-12. DOI: 10.1097/NUR.0000000000000493
- Stopar, K., & Bartol, T. (2019). Digital competences, computer skills and information literacy in secondary education: mapping and visualization of trends and concepts. *Scientometrics*, 118(2), 479-498. <https://doi.org/10.1007/s11192-018-2990-5>
- Souck, E. N., & NJI, M. G. (2017). The effects of school facilities on internal efficiency: The case of selected bilingual secondary schools in Yaounde Centre. *World Journal of Research and Review*, 4(4), 262822.

- Tanjung, B. N. (2020). Human resources (HR) in education management. *Budapest International Research and Critics in Linguistics and Education (BirLE) Journal*, 3(2), 1240-1249.
- Tedre, M., Toivonen, T., Kahila, J., Vartiainen, H., Valtonen, T., Jormanainen, I., & Pears, A. (2021). Teaching machine learning in K–12 classroom: Pedagogical and technological trajectories for artificial intelligence education. *IEEE access*, 9, 110558-110572. 10.1109/ACCESS.2021.3097962.
- Wanjiku, W. G. (2016). Factors affecting non-teaching staff development in Kenyan Universities. *International Journal of Academic Research in Business and Social Sciences*, 6(5), 104-130.
- Zhao, Y., Liu, Y., & Wang, R. (2023). A Study on Improving Continuing Education in Scientific Organizations through Information Technology. DOI: 10.20533/iji.1742.4712.2023.0226