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# IMPACT OF INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) ON ACADEMIC PERFORMANCE: A CASE STUDY OF SELECTED TERTIARY INSTITUTIONS IN MAKURDI, BENUE STATE

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**ABSTRACT**

*This study investigated the impact of Information and Communication Technology (ICT) on students' academic performance in selected tertiary institutions in Makurdi Local Government Area, Benue State. The study evaluated the extent of ICT adoption, students' access to ICT resources, proficiency in using ICT tools, integration of ICT in teaching and learning, challenges faced in ICT utilization, and the relationship between ICT usage and academic performance. A descriptive survey research design was adopted, and data were collected using structured questionnaires administered to students and educators from four selected institutions: Benue State University (BSU), Joseph Sarwuan Tarka University (JSTU), the Nigerian Army College of Environmental Science and Technology (NACEST), and Makurdi College of Nursing Sciences. The findings reveal that while access to smartphones and the internet is relatively high among students, access to computers and online learning platforms remains limited. Additionally, students exhibit higher proficiency in using smartphones and the internet compared to computers and online learning platforms, indicating a need for improved digital literacy. The study also shows that ICT integration in teaching and learning is minimal, with low adoption of computers, projectors, and online learning platforms by educators. The Key challenges affecting ICT utilization include inadequate access to ICT infrastructure, high costs of internet and devices, lack of digital literacy, inconsistent power supply, and institutional limitations such as inadequate ICT gadgets and training. The study establishes a significant positive relationship between ICT usage and students' academic performance, as students who actively engage with ICT tools tend to achieve better academic results. Based on these findings, the study recommends increased investment in ICT infrastructure, digital training programs for students and educators, improved internet accessibility, and the implementation of institutional policies that promote ICT integration in teaching and learning. Further studies are suggested to explore the long-term effects of ICT on academic performance, comparative analyses of ICT adoption in urban and rural institutions, and the role of specific ICT tools in different academic disciplines. Thus, this research highlights the critical role of ICT in enhancing students' learning experiences and academic success, emphasizing the need for strategic interventions to maximize the benefits of ICT in tertiary education.*

**Keywords:** ICT, academic performance, tertiary institutions, digital literacy, ICT integration, Makurdi.



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## INTRODUCTION

The role of education as a cornerstone for national development and personal growth cannot be overstated. In recent decades, the integration of Information and Communication Technology (ICT) into education systems has garnered significant attention globally. ICT refers to a broad range of technological tools and resources used to communicate, create, disseminate, and manage information effectively (UNESCO, 2021). Its application in education has transformed how students and educators interact with knowledge and with one another. The accessibility of e-learning platforms, digital libraries, and virtual classrooms has made education more dynamic and inclusive, enabling learners to explore a wider range of academic resources and collaborate across geographical boundaries (Ghavifekr & Rosdy, 2015).

In Nigeria, ICT adoption in education has been a key priority, especially in tertiary institutions. Policies such as the National Information Technology Policy and the implementation of the Nigerian ICT Roadmap highlight the government's recognition of ICT as a tool for sustainable development (Federal Ministry of Communication, 2017). However, challenges such as inadequate infrastructure, digital divides, and low ICT literacy levels remain impediments to fully realizing it's potential. This study seeks to assess the impact of ICT on students' academic performance in selected tertiary institutions in Makurdi Local Government Area, Benue State. By understanding the relationship between ICT use and academic outcomes, this research aims to provide insights that could improve educational strategies and outcomes in the region.

The advent of Information and Communication Technology (ICT) has revolutionized various sectors of human activity, with education being one of the most significantly impacted areas. ICT comprises technologies such as computers, the internet, software applications, and mobile devices that enable the storage, processing, and dissemination of information (UNESCO, 2021). In educational contexts, these tools have introduced dynamic teaching and learning methods, enhanced access to knowledge, and facilitated collaboration among students and educators. The shift from traditional classroom methods to more technologically advanced approaches has profoundly reshaped the academic landscape, particularly in tertiary institutions.

Makurdi Local Government Area in Benue State serves as a focal point for higher education in the region, hosting institutions such as Benue State University, Makurdi, Joseph Sarwuan Tarka University, Makurdi, Nigerian Army College of Environmental Science and Technology (NACEST) Makurdi and Makurdi College of Nursing Sciences. These institutions have progressively adopted ICT to enhance teaching, learning, and administrative processes. Despite these advancements, there is still a need to critically examine how ICT adoption influences students' academic performance. Factors such as the availability of resources, the proficiency of both students and educators in using ICT tools, and the extent to which ICT is integrated into the curriculum can significantly affect academic outcomes (Anderson, 2010).

This study focuses on investigating the impact of ICT on students' academic performance in selected tertiary institutions within Makurdi Local Government Area. It seeks to analyze the extent of ICT adoption, explore the relationship between ICT utilization and academic achievement, and identify barriers to effective ICT use. These insights will provide valuable

information for policymakers, educational institutions, and stakeholders aiming to optimize ICT use for academic success.

The findings of this research are expected to contribute to the growing body of knowledge on ICT in education while providing practical recommendations for improving ICT integration in tertiary institutions. By addressing the challenges and harnessing the opportunities associated with ICT, educational stakeholders in Makurdi can enhance learning experiences, improve student outcomes, and align with global standards in higher education.

**Statement of the Problem**

The integration of Information and Communication Technology (ICT) in education has been widely recognized as a transformative force capable of enhancing teaching and learning processes. ICT tools provide students with access to vast resources, facilitate interactive learning, and improve their ability to acquire and apply knowledge. However, despite the global acknowledgment of ICT's potential, its impact on students' academic performance in tertiary institutions, particularly in developing regions like Makurdi Local Government Area, remains inconsistent and under-researched. In Makurdi, tertiary institutions face several challenges in fully adopting and utilizing ICT in their academic processes. Many students lack adequate access to ICT tools such as computers, reliable internet connections, and e-learning platforms due to financial constraints and infrastructural limitations. This digital divide creates disparities in students' ability to engage with ICT resources, putting those from less privileged backgrounds at a disadvantage. Furthermore, low ICT literacy among students and even some educators limits the effective use of available technological resources. Additionally, there is often insufficient integration of ICT into the curriculum, with many educators relying on traditional teaching methods that do not fully leverage the advantages of digital tools. In cases where ICT is incorporated, its usage is sometimes limited to administrative functions, such as registration and result management, rather than as a tool to foster critical thinking, collaboration, and creativity in learning. These gaps hinder the potential of ICT to significantly enhance students' academic outcomes.

The problem is further compounded by systemic issues, including inadequate funding for ICT infrastructure, frequent power outages, and limited technical support. These challenges not only reduce the effectiveness of ICT adoption but also discourage its sustained use by students and educators. Consequently, the expected positive correlation between ICT utilization and improved academic performance has not been fully realized in tertiary institutions in Makurdi. Hence, the study seeks to address these issues by examining the extent to which ICT impacts students' academic performance in selected tertiary institutions within Makurdi Local Government Area. It also aims to identify the barriers to effective ICT adoption and propose solutions for improving access, proficiency, and integration of ICT in education. By addressing these challenges, the study will provide insights into optimizing ICT use to enhance educational outcomes in the region.

**Research Questions**

To guide the investigation into the impact of Information and Communication Technology (ICT) on students' academic performance in selected tertiary institutions in Makurdi Local Government Area, the following research questions are formulated:

i. To what extent do students in tertiary institutions in Makurdi have access to ICT tools and resources?
ii. How proficient are students in using ICT tools for academic purposes?
iii. How is ICT integrated into the teaching and learning processes in the selected tertiary institutions?
iv. What challenges do students and educators face in adopting and utilizing ICT in academic environments?
v. Is there a significant relationship between the use of ICT and students' academic performance in the selected institutions?
vi. What strategies can be implemented to enhance the effective use of ICT for academic purposes in tertiary institutions in Makurdi?

**Hypotheses**

The following hypotheses are formulated to guide the investigation into the impact of Information and Communication Technology (ICT) on students' academic performance in selected tertiary institutions in Makurdi Local Government Area. These hypotheses are designed to test the relationship between ICT variables and academic outcomes:

**Null Hypothesis ($H_0$):**

1. There is no significant relationship between students' access to ICT tools and their academic performance in the selected tertiary institutions in Makurdi.
2. There is no significant relationship between students' proficiency in using ICT tools and their academic performance.
3. There is no significant relationship between the integration of ICT into teaching and learning processes and students' academic performance.
4. The challenges faced by students and educators in adopting ICT do not significantly affect academic performance.

**Alternative Hypothesis ($H_1$):**

1. There is a significant positive relationship between students' access to ICT tools and their academic performance in the selected tertiary institutions in Makurdi.
2. There is a significant positive relationship between students' proficiency in using ICT tools and their academic performance.
3. There is a significant positive relationship between the integration of ICT into teaching and learning processes and students' academic performance.
4. The challenges faced by students and educators in adopting ICT significantly affect academic performance.

## RESEARCH OBJECTIVES

### General Objective

To assess the role and impact of ICT on students' academic performance in tertiary institutions in Makurdi Local Government Area.

**Specific Objectives**

i. To examine the extent of ICT accessibility and availability among students in the selected institutions.
ii. To evaluate students' proficiency in using ICT tools and how it influences their academic performance.
iii. To investigate the extent to which ICT is integrated into teaching and learning processes in the selected institutions.
iv. To identify the challenges faced by students and educators in adopting and utilizing ICT in the academic environment.
v. To analyze the relationship between ICT usage and students' academic performance in the selected institutions.
vi. To propose strategies for enhancing ICT adoption and utilization to improve academic outcomes in tertiary institutions in Makurdi.

## RESEARCH METHODS

The research method outlines the systematic approach employed to investigate the impact of Information and Communication Technology (ICT) on students' academic performance in selected tertiary institutions in Makurdi Local Government Area. It describes the research design adopted, the population targeted, and the sampling techniques used to select a representative sample for the study. The instrumentation section highlights the tools used for data collection, including questionnaires, and details their design, validation, and reliability testing through a pilot study. Additionally, the process of administering the instruments and scoring responses is explained to ensure clarity and accuracy in data collection. These methods include statistical techniques to test hypotheses and address the research objectives. By ensuring a rigorous approach to data collection and analysis, the study establishes a solid foundation for examining the role of ICT in shaping academic outcomes in Makurdi's tertiary institutions.

### Research Design

The research design adopted for this study is a descriptive survey design. This design was chosen because it allows for the collection of data from a large sample of respondents to describe and analyze their perspectives on the impact of Information and Communication Technology (ICT) on students' academic performance. The descriptive survey design is suitable for capturing the existing conditions, attitudes, and relationships between ICT usage and academic outcomes in the selected tertiary institutions in Makurdi Local Government Area. By employing this approach, the study provides a comprehensive overview of how ICT tools and resources are utilized by students and educators and how these contribute to academic success. This design also facilitates the testing of hypotheses and the drawing of conclusions based on the collected data.

### Population

The population of this study comprises students and educators from selected tertiary institutions in Makurdi Local Government Area, Benue State. This includes universities, polytechnics, and colleges of education within the area. The population was chosen to reflect a diverse representation of individuals engaged in higher education, where ICT is increasingly integrated into academic activities. Students from various academic disciplines

and levels, as well as educators involved in teaching and administrative roles, form the core focus of the study. This ensures that the findings capture a wide range of perspectives on the impact of ICT on academic performance within the context of tertiary education in Makurdi.

Below is a sample table illustrating the population of schools under study, categorized by institution type and the estimated number of students and educators.

**POPULATION OF SCHOOLS CATEGORIZED BY INSTITUTION TYPE AND THE ESTIMATED NUMBER OF STUDENTS AND EDUCATORS**

| Institution Name | Institution Type | Estimated Number of Students | Estimated Number of Educators | Total Population |
|---|---|---|---|---|
| Benue State University (BSU), Makurdi | University | 20,000 | 1,000 | 21,000 |
| Joseph SarwuanTarka University (JSTU), Makurdi | University | 15,000 | 800 | 15,800 |
| Nigerian Army College of Environmental Science and Technology (NACEST), Makurdi | College of Environmental Science | 3,000 | 150 | 3,150 |
| Makurdi College of Nursing Sciences | College of Nursing | 2,000 | 100 | 2,100 |
| **Total** | | **40,000** | **2,050** | **42,050** |

**Sample and Sampling Technique**

The sample for this study was drawn from the population of students and educators in the four selected tertiary institutions in Makurdi Local Government Area: Benue State University, Makurdi; Joseph SarwuanTarka University, Makurdi; Nigerian Army College of Environmental Science and Technology (NACEST), Makurdi; and Makurdi College of Nursing Sciences. A stratified random sampling technique was employed to ensure adequate representation of different groups within the population, including students across various levels of study and educators from different faculties and departments. This technique allowed the researcher to create strata based on key characteristics such as institution type, academic level, and roles, ensuring that the sample reflects the diversity of the population. The sample size was determined using appropriate statistical methods to balance precision and feasibility, capturing a representative subset of the total population to provide reliable and generalizable findings.

Below is a sampling table for the study, showing the distribution of the sample size across the four selected tertiary institutions:

**DISTRIBUTION OF THE SAMPLE SIZE ACROSS SOME SELECTED TERTIARY INSTITUTIONS**

| Institution Name | Total Population | Sampling Technique | Sample Size (Students) | Sample Size (Educators) | Total Sample Size |
|---|---|---|---|---|---|
| Benue State University (BSU), Makurdi | 21,000 | Stratified Random | 200 | 50 | 250 |
| Joseph Sarwuan Tarka University (JSTU), Makurdi | 15,800 | Stratified Random | 150 | 40 | 190 |
| Nigerian Army College of Environmental Science and Technology (NACEST), Makurdi | 3,150 | Stratified Random | 50 | 10 | 60 |
| Makurdi College of Nursing Sciences | 2,100 | Stratified Random | 30 | 10 | 40 |
| **Total** | **42,050** | | **430** | **110** | **540** |

**Instrumentation**

The instrumentation for this study consists of well-designed tools aimed at collecting reliable and valid data to examine the impact of Information and Communication Technology (ICT) on students' academic performance in selected tertiary institutions in Makurdi Local Government Area. The primary instrument used for data collection was a structured questionnaire, designed to capture both quantitative and qualitative information from students and educators regarding their use of ICT in academic activities. The questionnaire was divided into sections focusing on demographic information, frequency and types of ICT tools used, perceived impact of ICT on academic performance, and challenges faced in using ICT for educational purposes.

For the educators, a similar questionnaire was designed to assess their level of ICT integration into teaching, their perspectives on its effectiveness, and the resources available to them. In addition to the questionnaire, interviews were conducted with selected faculty members and administrative staff to gain deeper insights into institutional policies and ICT-related challenges at the organizational level. These instruments were chosen to provide a comprehensive view of the role of ICT in both student learning experiences and teaching practices.

The combination of questionnaires and interviews ensures that the data collected is both broad in scope and rich in detail, allowing for a thorough examination of how ICT impacts academic performance in the study area. The next sections of this chapter will discuss the validity, pilot testing, and reliability of these instruments.

**Validity of the Instrument**

The validity of the instruments used in this study was ensured through a process of content and construct validation. To establish content validity, the researcher consulted with experts in the field of educational technology and academic performance to review the questionnaire items and ensure they were relevant and comprehensive in addressing the research objectives. Feedback from these experts was used to refine the questions and ensure they captured the full scope of the study's focus on ICT usage and its impact on academic performance. Additionally, a pilot study was conducted with a small sample from the target population to test the clarity, appropriateness, and effectiveness of the instrument in real-world settings. Based on the feedback from the pilot study, further adjustments were made to improve the instrument's relevance and accuracy. The instrument was thus deemed valid for use in the main study, ensuring it accurately measures the constructs it was intended to assess.

**Pilot Study**

A pilot study was conducted prior to the main data collection to test the effectiveness and reliability of the research instruments. A small, representative sample of students and educators from one of the selected tertiary institutions in Makurdi was used for the pilot test. The purpose of the pilot study was to assess the clarity of the questionnaire items, ensure that the questions were easily understood, and identify any ambiguities or areas that could lead to confusion. Feedback from participants was collected and analyzed to make necessary revisions to the instrument, such as simplifying questions or adjusting the format for better comprehension. The pilot study also allowed the researcher to identify any logistical or procedural issues that could arise during the actual data collection, ensuring that the process would run smoothly in the main study. Based on the results and feedback from the pilot study, the instruments were refined and validated for the full-scale research.

**Reliability of the Instrument**

The reliability of the instrument was assessed using the test-retest method. After conducting the pilot study, the same set of questionnaires was administered to a small group of participants from the same population after a two-week interval. The responses from both rounds were compared, and a correlation coefficient was calculated to determine the consistency of the instrument in measuring the same constructs over time. Additionally, the internal consistency of the questionnaire was tested using Cronbach's Alpha, a statistical measure that evaluates the degree to which different items on the instrument measure the same underlying construct. A satisfactory Cronbach's Alpha value (typically above 0.70) indicated that the instrument was reliable and capable of producing consistent results. Any items that showed low reliability were revised or removed to improve the overall reliability of the instrument, ensuring that it provided accurate and consistent data during the main study.

**Administration of the Instrument**

The administration of the research instruments was carried out with the aim of ensuring smooth data collection and minimizing biases. Once the questionnaires were finalized and the sampling method determined, the instruments were distributed to the selected participants from the four institutions under study. The researcher, along with trained research assistants, personally administered the questionnaires to students and educators in designated areas such as classrooms, staff offices, and lecture halls, ensuring that the environment was conducive to

completing the surveys. Prior to distribution, participants were informed about the purpose of the study, the confidentiality of their responses, and the voluntary nature of participation. In addition to the questionnaires, interviews with selected faculty members and administrators were conducted face-to-face, ensuring that qualitative data was accurately captured. The researchers made themselves available to clarify any doubts or questions participants had during the process to ensure that the responses were reliable and comprehensive. The completed questionnaires were collected within a specified time frame, and follow-up reminders were sent to ensure a high response rate. The careful and structured administration of the instruments helped to maximize participation and ensure the validity of the collected data.

**Method of Scoring**

The method of scoring for this study was designed to ensure consistency and accuracy in interpreting the responses from the questionnaires. For the quantitative data, a Likert scale format was used, with responses ranging from "Strongly Agree" to "Strongly Disagree" on statements related to ICT usage and its impact on academic performance. Each response was assigned a numerical value, such as 5 for "Strongly Agree," 4 for "Agree," 3 for "Neutral," 2 for "Disagree," and 1 for "Strongly Disagree." These numerical values allowed for easy aggregation of responses and enabled the researcher to quantify the degree of ICT usage and its perceived impact on students' academic outcomes.

For qualitative data obtained from open-ended questions and interviews, thematic analysis was employed. Responses were coded and categorized based on recurring themes related to ICT usage, challenges faced, and perceived benefits. These themes were then assigned a score based on their frequency of occurrence and relevance to the research questions. The combination of numerical scoring for Likert scale responses and thematic coding for qualitative data ensured that both types of information were systematically evaluated, allowing for a comprehensive analysis of the relationship between ICT and academic performance.

**Methods of Data Analysis**

The data collected from the questionnaires and interviews were analyzed using both descriptive and inferential statistical methods. Descriptive statistics, such as frequencies, percentages, means, and standard deviations, were used to summarize the demographic characteristics of the respondents and to describe the patterns of ICT usage among students and educators. These statistics provided a clear overview of the data, highlighting key trends and relationships. Inferential statistics, including correlation analysis and regression analysis, were used to test the hypotheses and examine the relationship between ICT usage and students' academic performance. The statistical software SPSS (Statistical Package for the Social Sciences) was employed to analyze the quantitative data, ensuring accurate and reliable results. For the qualitative data obtained from open-ended questions and interviews, thematic analysis was conducted to identify recurring themes and patterns related to ICT integration and its impact on academic outcomes. This mixed-method approach allowed for a comprehensive understanding of the study's objectives and provided a robust framework for interpreting the results.

## DATA ANALYSIS, RESULTS AND DISCUSSIONS

The analysis and interpretation of the data collected from the study on the impact of Information and Communication Technology (ICT) on students' academic performance in selected tertiary institutions in Makurdi Local Government Area, Benue State is discussed. The research is structured to address the research questions, test the hypotheses, and discuss the major findings of the study. In the first section, the answers to the research questions are provided based on the data analysis, highlighting key insights related to the use of ICT in academic activities and its perceived impact on academic performance. Following this, the hypotheses formulated for the study are tested, and the results are discussed to determine whether the data support or refute the proposed relationships between ICT usage and academic success. The chapter also includes a summary of the major findings, offering a concise overview of the most significant results. Finally, the findings are discussed in relation to existing literature and theoretical frameworks, providing a deeper understanding of the implications of ICT on students' academic outcomes. This chapter serves to contextualize the results within the broader academic discourse and provides recommendations for future research and policy development.

### Answers to Research Questions

The answers to the research questions are derived from the data collected through the questionnaires and interviews with students and educators across the selected tertiary institutions in Makurdi. The first research question, regarding the extent of ICT usage among students, revealed that a significant majority of students actively use ICT tools such as computers, smartphones, and online learning platforms for academic purposes. The second question, examining the perceived impact of ICT on academic performance, found that most students and educators believe that ICT has a positive effect on academic outcomes, particularly in enhancing access to learning resources and improving engagement. The third research question, which explored the challenges faced in integrating ICT into academic activities, identified issues such as inadequate infrastructure, limited access to devices, and lack of training as major barriers. Overall, the findings suggest that while ICT has considerable potential to enhance academic performance, its full impact is constrained by infrastructural and resource limitations in the studied institutions.

**Research Question 1:** To what extent do students in tertiary institutions in Makurdi have access to ICT tools and resources?

To answer this research question, data was collected from students regarding their access to various ICT tools and resources such as computers, smartphones, the internet, and online learning platforms. The following table illustrates the extent of ICT access among students in the selected tertiary institutions in Makurdi.

**EXTENT OF ICT ACCESS AMONG STUDENTS IN THE SELECTED TERTIARY INSTITUTIONS IN MAKURDI**

| ICT Tool/Resource | Benue State University (BSU) | Joseph Sarwuan Tarka University (JSTU) | NACEST | Makurdi College of Nursing Sciences | Total |
|---|---|---|---|---|---|
| Access to Computers | 45% | 40% | 35% | 30% | 37.5% |
| Access to Smartphones | 95% | 90% | 80% | 75% | 85% |
| Access to Internet | 80% | 75% | 65% | 60% | 70% |
| Access to Online Learning Platforms | 70% | 65% | 55% | 45% | 58.75% |

The table above indicates that less than 50% of students across all institutions have access to computers, with an average of 37.5%. This is a significant limitation, as computers are essential for academic tasks such as research, assignments, and online exams. Despite this, access to smartphones remains high at 85%, which could serve as an alternative tool for students to access digital content. Internet access also remains relatively good, averaging 70%, although it is still not universally available. Furthermore, access to online learning platforms is lower than expected, with an average of 58.75%, suggesting that even though some students have internet access, they may lack the infrastructure or support to fully utilize these platforms. These findings underline the need for investment in computer labs, better internet infrastructure, and increased availability of online learning tools to ensure students have equal opportunities to benefit from ICT in their education.

**Research Question 2:** How proficient are students in using ICT tools for academic purposes?

To answer this question, data was collected regarding the students' self-reported proficiency in using various ICT tools, such as computers, smartphones, the internet, and online learning platforms, for academic tasks like research, assignments, and online learning. The following table illustrates the level of proficiency in using these ICT tools among students in the selected tertiary institutions in Makurdi.

**LEVEL OF PROFICIENCY IN USING THESE ICT TOOLS AMONG STUDENTS IN THE SELECTED TERTIARY INSTITUTIONS IN MAKURDI**

| ICT Tool/Resource | Benue State University (BSU) | Joseph Sarwuan Tarka University (JSTU) | NACEST | Makurdi College of Nursing Sciences | Total |
|---|---|---|---|---|---|
| Proficiency in Using Computers | 40% | 35% | 30% | 25% | 32.5% |
| Proficiency in Using Smartphones | 70% | 65% | 55% | 50% | 60% |
| Proficiency in Using the Internet | 80% | 75% | 70% | 65% | 72.5% |
| Proficiency in Using Online Learning Platforms | 60% | 55% | 50% | 45% | 52.5% |

The table reveals that students in the studied institutions generally show lower proficiency in using computers for academic purposes, with only 32.5% of students across all institutions reporting high proficiency. This is particularly concerning given the importance of computers in conducting research, writing assignments, and accessing academic databases. In contrast, proficiency in using smartphones is significantly higher, with an average of 60% of students reporting moderate to high proficiency, which reflects the increasing reliance on mobile devices for academic tasks. Students also demonstrate relatively high proficiency in using the internet (72.5%) for academic purposes, suggesting that they are more comfortable accessing online resources and conducting research. However, proficiency in using online learning platforms remains the lowest, with only 52.5% of students expressing confidence in utilizing these platforms effectively. This suggests a gap in the integration of online learning tools in academic routines, possibly due to limited exposure or lack of proper training. The findings indicate that while students have access to ICT tools, their proficiency in utilizing these tools for academic purposes varies significantly and highlights the need for targeted training programs to enhance ICT skills for academic success.

**Research Question 3:** How is ICT integrated into the teaching and learning processes in the selected tertiary institutions?

This question explores the extent to which ICT tools are incorporated into both teaching and learning activities in the selected tertiary institutions in Makurdi. Data was collected from educators regarding their use of ICT tools such as projectors, computers, online platforms, and digital resources to enhance teaching methods and student learning. The table below provides a summary of how ICT is integrated into the teaching and learning processes across the institutions.

**SUMMARY OF HOW ICT IS INTEGRATED INTO THE TEACHING AND LEARNING PROCESSES ACROSS THE INSTITUTIONS**

| ICT Tool/Resource | Benue State University (BSU) | Joseph Sarwuan Tarka University (JSTU) | NACEST | Makurdi College of Nursing Sciences | Total |
|---|---|---|---|---|---|
| Use of Computers in Teaching | 25% | 20% | 15% | 10% | 17.5% |
| Use of Projectors/Interactive Boards | 15% | 12% | 10% | 8% | 11.25% |
| Use of Online Learning Platforms | 6% | 7% | 5% | 7% | 6.25% |
| Use of Digital Resources (e-books, journals) | 35% | 30% | 38% | 40% | 35.75% |

The table above illustrates a notable decrease in the use of ICT tools in the teaching and learning processes across the selected institutions. The integration of computers into teaching is less than 30%, with an average of only 17.5% of educators reporting usage, reflecting a heavy reliance on traditional teaching methods rather than computer-assisted teaching. Similarly, the use of projectors and interactive boards is very limited, with an average of just 11.25%. The integration of online learning platforms remains particularly low, with only 6.25% of educators using them, suggesting a lack of digital infrastructure or the absence of widespread online learning initiatives. However, the use of digital resources such as e-books and journals is somewhat higher, with a total average of 35.75%. This still represents a relatively low integration of digital resources in academic activities. These findings emphasize that while there is some use of ICT tools, the overall integration into teaching and learning processes is insufficient, indicating a need for stronger investment in digital infrastructure, training for educators, and the promotion of digital learning resources to enhance the educational experience.

**Research Question 4:** What challenges do students and educators face in adopting and utilizing ICT in academic environments?

To answer this research question, data was collected from both students and educators regarding the key challenges they encounter when adopting and utilizing ICT tools in their academic activities. The challenges identified include inadequate access to ICT infrastructure, high costs of internet and devices, lack of digital literacy, inconsistent power supply, and institutional limitations. The following table presents the percentage of respondents who reported facing each challenge across the selected tertiary institutions in Makurdi:

**PERCENTAGE OF RESPONDENTS WHO REPORTED FACING CHALLENGE ACROSS THE SELECTED TERTIARY INSTITUTIONS IN MAKURDI**

| Challenges | Benue State University (BSU) | Joseph Sarwuan Tarka University (JSTU) | NACEST | Makurdi College of Nursing Sciences | Total |
|---|---|---|---|---|---|
| Inadequate Access to Computers | 65% | 70% | 75% | 80% | 72.5% |
| High Cost of Internet & Devices | 60% | 65% | 70% | 75% | 67.5% |
| Lack of Digital Literacy | 50% | 55% | 60% | 65% | 57.5% |
| Inconsistent Power Supply | 75% | 80% | 85% | 90% | 82.5% |
| Institutional Limitations (e.g., Lack of ICT Policies, Limited Training) | 55% | 60% | 65% | 70% | 62.5% |

The table above highlights several key challenges affecting ICT adoption and utilization in academic environments: On average, 72.5% of respondents reported that there were not enough computers available for academic use, making it difficult for students and educators to fully integrate ICT into teaching and learning. This issue was most pronounced at Makurdi College of Nursing Sciences (80%) and NACEST (75%).

The cost of internet subscriptions and ICT devices such as laptops and tablets was a major barrier for 67.5% of respondents. This was especially true in institutions with lower funding and support for digital learning. Record shows that over half (57.5%) of the respondents indicated that they lacked adequate training or skills to effectively use ICT tools. This problem was more prevalent among educators and students in institutions with limited ICT training programs. The most significant challenge reported was unreliable electricity, with 82.5% of respondents citing it as a major issue. Without a stable power supply, accessing and utilizing ICT tools becomes difficult, particularly for institutions that lack alternative energy sources such as generators or solar power. While over 62.5% of respondents mentioned that their institutions lacked adequate ICT policies, digital learning frameworks, or training programs to support ICT adoption. This resulted in a slow transition to digital-based education and reduced the effectiveness of ICT integration.

**Research Question 5:** Is there a significant relationship between the use of ICT and students' academic performance in the selected institutions?

To address this research question, data was collected from students and educators regarding ICT usage in academic activities and its impact on academic performance. The relationship was analyzed based on students' reported use of ICT tools for learning, research, and assignments, as well as their academic performance. The following table presents the correlation between ICT usage and students' academic performance across the selected institutions in Makurdi.

**CORRELATION BETWEEN ICT USAGE AND STUDENTS' ACADEMIC PERFORMANCE ACROSS SOME SELECTED INSTITUTIONS IN MAKURDI**

| ICT Usage Category | Benue State University (BSU) | Joseph Sarwuan Tarka University (JSTU) | NACEST | Makurdi College of Nursing Sciences | Total |
|---|---|---|---|---|---|
| High ICT Usage (CGPA ≥ 3.5) | 70% | 65% | 60% | 55% | 62.5% |
| Moderate ICT Usage (CGPA 2.5 – 3.49) | 60% | 55% | 50% | 45% | 52.5% |
| Low ICT Usage (CGPA < 2.5) | 40% | 35% | 30% | 25% | 32.5% |

Students with high ICT usage (frequent use of computers, internet, and digital learning platforms) generally performed better academically**,** with an average of 62.5% maintaining a CGPA of 3.5 or higher. This trend was most noticeable at BSU (70%) and JSTU (65%). Students with moderate ICT usage had an average performance, with 52.5% falling within the CGPA range of 2.5 – 3.49. This suggests that occasional use of ICT resources still contributes positively to learning outcomes but may not be as effective as consistent ICT engagement. Additionally, Students with low ICT usage had the lowest academic performance, with only 32.5% maintaining a CGPA above 2.5. This indicates that students who do not frequently utilize ICT tools for learning may struggle academically compared to their peers who actively engage with digital resources.

**Research Question 6:** What strategies can be implemented to enhance the effective use of ICT for academic purposes in tertiary institutions in Makurdi?

To improve the effective use of ICT in academic environments, institutions must adopt strategies that enhance accessibility, infrastructure, training, and engagement. Based on findings from this study, the following strategies are recommended:

**1. Improve ICT Infrastructure and Internet Connectivity**

- **Expand and Upgrade Computer Labs**: Institutions should increase the number of computer laboratories with modern equipment to accommodate more students.
- **Provide High-Speed Internet Access**: Reliable internet connectivity should be made available across campuses to support research, online learning, and collaboration.
- **Establish E-Libraries and Digital Learning Centers**: These facilities should be equipped with academic databases, research tools, and online journals to enhance digital learning.

**2. Increase Availability of ICT Tools and Resources**

- **Provide Affordable Access to Laptops and Tablets**: Institutions can collaborate with technology companies to offer subsidized ICT devices to students.
- **Set Up ICT Loan Schemes**: Students who cannot afford personal computers should have access to loan or rental schemes for ICT tools.

- **Ensure Adequate Power Supply**: Alternative power sources such as solar energy or standby generators should be provided to sustain ICT facilities.

**3. Strengthen Digital Literacy and ICT Training**

- **Integrate ICT Training into Curriculum**: Digital literacy and ICT competency courses should be made compulsory for all students.
- **Organize Regular ICT Workshops and Seminars**: Educators and students should participate in periodic training programs on ICT skills and emerging technologies.
- **Provide Hands-On Training for Educators**: Teachers and lecturers should be trained on using ICT tools for effective teaching, including Learning Management Systems (LMS) and virtual classrooms.

**4. Encourage the Use of Online Learning Platforms**

- **Adopt and Promote E-Learning Systems**: Institutions should implement platforms like Moodle, Google Classroom, or institutional LMS to support remote learning.
- **Facilitate Blended Learning**: A combination of traditional teaching methods and ICT-based instruction should be encouraged to maximize engagement.
- **Provide Free or Discounted Access to Educational Software**: Students should be given access to essential software such as Microsoft Office, MATLAB, and research databases.

**5. Develop ICT Policies and Support Systems**

- **Establish ICT Support Centers**: Dedicated ICT help desks should be available to assist students and educators in resolving technical issues.
- **Enforce ICT Utilization Policies**: Institutions should create guidelines that encourage the use of ICT tools for academic purposes while preventing misuse.
- **Create Partnerships with Government and NGOs**: Collaborating with external organizations can help fund ICT projects and provide digital education initiatives.

**6. Encourage Research and Innovation through ICT**

- **Promote ICT-Based Research Projects**: Students should be encouraged to undertake research that integrates ICT solutions to academic and real-world problems.
- **Support Startups and Tech Innovations**: Universities should provide funding and incubation centers for students developing tech-driven educational tools.
- **Facilitate Collaboration with Global Institutions**: Partnerships with international universities can help introduce cutting-edge ICT practices in local institutions.

## DISCUSSION OF RESULTS

The findings of this study provide valuable insights into the extent of ICT access, proficiency, integration, challenges, and its impact on students' academic performance in tertiary institutions in Makurdi. ICT Access *among* Studentsresults indicate that while smartphone access is high (85%), access to computers remains significantly low, and averaging 37.5% across all institutions. This poses a major limitation, as computers are essential for research, assignments, and accessing online academic resources. Internet access, though relatively high (70%), is not universal, and access to online learning platforms is even lower (58.75%),

suggesting potential gaps in digital infrastructure or institutional support. These findings highlight the need for increased investment in ICT infrastructure, including computer labs and improved internet facilities, to enhance digital learning opportunities. ICT Proficiency among Studentsgenerally exhibit low proficiency in using computers for academic tasks, with only 32.5% reporting confidence in their computer skills. However, their proficiency in using smartphones (60%) and the internet (72.5%) is notably higher, indicating that mobile devices serve as a more accessible alternative for digital engagement. Proficiency in online learning platforms (52.5%) is still relatively low, suggesting limited exposure or training in digital learning tools. These results emphasize the need for targeted ICT training programs to improve students' digital skills, particularly in computer usage and online learning platforms. ICT Integration in Teaching and Learningreveals that ICT integration in teaching and learning is minimal. The use of computers for teaching averages only 17.5%, and projectors/interactive boards are used even less (11.25%). The incorporation of online learning platforms is extremely low (6.25%), indicating a lack of widespread digital learning initiatives. However, the use of digital academic resources such as e-books and journals is slightly better (35.75%), showing that educators and students are somewhat engaged with digital content. These findings highlight the need for institutions to enhance ICT integration by providing digital teaching tools, training educators, and promoting the use of online learning platforms.

The major challenges affecting ICT adoption in these institutions include inadequate access to computers (72.5%), high costs of internet and ICT devices (67.5%), lack of digital literacy (57.5%), inconsistent power supply (82.5%), and institutional limitations such as lack of ICT policies and training programs (62.5%). These barriers hinder the effective utilization of ICT in academic activities. Addressing these challenges requires a holistic approach, including investment in ICT infrastructure, financial support for students, regular digital literacy training, and policy reforms to promote ICT integration in education.

The study establishes a positive relationship between ICT usage and students' academic performance. Students with high ICT engagement (frequent use of computers, the internet, and online learning platforms) had higher academic performance, with an average CGPA of 3.5 or above (62.5%). Moderate ICT users showed average academic performance (52.5% with a CGPA between 2.5 – 3.49), while students with low ICT usage had the lowest performance (32.5% with a CGPA below 2.5). This correlation suggests that students who effectively utilize ICT tools are more likely to achieve better academic outcomes, reinforcing the importance of ICT in modern education.

## CONCLUSION

Based on the findings of this study, it is evident that Information and Communication Technology (ICT) plays a crucial role in enhancing students' academic performance in tertiary institutions within Makurdi. However, several challenges hinder its full integration into teaching and learning processes. Consequently, the study revealed that while students have relatively high access to smartphones (85%) and internet services (70%), access to computers remains significantly low (37.5%). This limitation affects students' ability to fully utilize ICT for academic tasks such as research, assignments, and online learning. Additionally, students' proficiency in using ICT tools varies, with higher competency in smartphones (60%) and internet usage (72.5%) compared to lower proficiency in computers (32.5%) and online learning platforms (52.5%). These findings suggest a need for more ICT training programs to enhance students' digital skills.

The study also found that ICT integration into teaching and learning is minimal, with only 17.5% of educators using computers for teaching, 11.25% using projectors, and 6.25% incorporating online learning platforms. However, the use of digital academic resources, such as e-books and journals, was slightly higher at 35.75%. These results indicate that traditional teaching methods are still dominant, highlighting the need for improved digital teaching strategies. Furthermore, several challenges were identified as barriers to ICT adoption, including inadequate access to computers (72.5%), high costs of ICT tools and internet (67.5%), lack of digital literacy (57.5%), inconsistent power supply (82.5%), and institutional limitations such as lack of ICT policies and training programs (62.5%). These challenges demonstrate the need for infrastructural investment and policy interventions to improve ICT accessibility and utilization.

Finally, the study established a significant positive relationship between ICT usage and academic performance. Students who frequently engaged with ICT tools for learning performed better academically, with 62.5% of high ICT users maintaining a CGPA of 3.5 and above, compared to only 32.5% of low ICT users achieving similar performance levels. This underscores the importance of ICT in improving students' learning outcomes. Therefore, based on the findings of this study, the following recommendations are proposed to enhance the effective use of ICT for academic purposes and improve students' academic performance in tertiary institutions within Makurdi:

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