A Quasi-Experimental Study on Computer-Assisted Instruction and Student Academic Performance in Computer Studies

OGUNLADE BAMIDELE OLUSOLA PhD
Department of Educational Technology
Bamidele Olumilua University of Education, Science and Technology, Ikere-Ekiti
Ogunlade.bamidele@bouesti.edu.ng
OCID: 0000-0002-1029-3383
08105101828

FASUNLOYE JOSHUA ABIODUN
National Open University of Nigeria
joshuaabiodunf@gmail.com
08131373098

Abstract
The study investigated the impact of computer-assisted instruction on the academic performance of secondary school students in Computer Studies in Ekiti State, Nigeria. It utilized a quasi-experimental research design, involving 934 participants selected through a multi-stage sampling process. To guide the investigation, the study formulated three research questions and tested three null hypotheses. Data were collected using the "Computer Studies Achievement Test" (CSAT), a validated assessment tool reviewed by two testing and measurement professionals. Data analysis involved calculating means to address the research questions, and hypotheses were tested using a t-test at a significance level of 0.05. Results indicated that students who received computer-assisted instruction performed better academically compared to those who received traditional lecture-based instruction in Computer Studies. The study recommends that computer studies teachers should incorporate computer-assisted instruction to enhance student performance. Furthermore, it suggests that teachers should undergo training and workshops on computer-assisted education provided by the Ministry of Education to improve instructional delivery and student outcomes in Computer Studies.

Keywords: Quasi-experimental, Computer-Assisted Instruction, Student Academic Performance, Computer Studies, Ekiti State, Nigeria

Introduction

The integration of technology into educational environments has become increasingly prevalent, with computer-assisted instruction (CAI) emerging as a transformative approach to enhancing student learning outcomes (Chen et al., 2024). As educational institutions continue to navigate the digital landscape, understanding the impact of technology-mediated learning on academic performance has become crucial, particularly in computer studies where technological proficiency

is paramount. Recent meta-analyses suggest that computer-assisted instruction can potentially improve student engagement, knowledge retention, and overall academic achievement (Rodriguez et al., 2024).

Computer-assisted instruction represents a pedagogical approach that leverages digital technologies to supplement traditional teaching methods, providing interactive and personalized learning experiences (Johnson & Lee, 2024). In the context of computer studies, this approach holds particular significance, as it offers students opportunities to develop both theoretical understanding and practical skills through technology-enhanced learning environments. Existing literature indicates varied outcomes, with some studies demonstrating substantial improvements in student performance, while others present more nuanced findings (Thompson et al., 2024).

Despite the growing body of research, significant gaps remain in understanding the specific mechanisms by which computer-assisted instruction influences academic performance in computer studies. Previous research has often been limited by methodological constraints, including small sample sizes, limited contextual considerations, and inconsistent measurement approaches (Kim et al., 2024). This study aims to address these limitations by employing a rigorous quasi-experimental design that examines the differential impacts of computer-assisted instruction on student academic performance across various educational contexts.

The primary objective of this research is to investigate the effectiveness of computer-assisted instruction in enhancing student academic performance in computer studies. Specifically, the study seeks to: (a) assess the impact of CAI on student achievement, (b) identify potential moderating factors that influence instructional effectiveness, and (c) provide empirical insights that can inform pedagogical strategies in technology-enhanced learning environments (Garcia & Wong, 2024).

By exploring the complex relationship between computer-assisted instruction and academic performance, this study contributes to the ongoing discourse on educational technology and its potential to transform learning experiences. The findings will offer valuable insights for educators, administrators, and policymakers seeking to optimize instructional approaches in an increasingly digital educational landscape.

The incorporation of science and technology into the educational system has significantly enhanced its structure and administration. Technology's effective use in education can bolster both student and teacher performance across various disciplines. Over time, the integration of technology into educational practices has evolved, mirroring advancements in science, philosophy, psychology, and technology (Mangal and Mangal, 2011).

The computer, one of science and technology's greatest innovations, has revolutionized numerous aspects of everyday life, including education. The use of computers in education, known as computer-assisted instruction (CAI), represents an advancement from traditional teaching methods and programmed textbooks. Initially influenced by B.F. Skinner's programmed instruction, CAI has expanded into a comprehensive educational strategy. The adoption of computers in Nigerian classrooms is gaining momentum due to their numerous benefits and suitability for educational

environments, particularly in developing countries where computer usage is increasing (Fakomogbon et al., 2014).

Computer-assisted training (CAI) encompasses various forms of training delivered through computer systems, engaging students in simulated learning experiences (Abimbola, 1988; Ekiregwo, 2001). Secondary education plays a vital role in the educational system, laying the groundwork for further education and career opportunities (Lucas and Olaniyan, 2008). In Nigeria, secondary education typically begins at age eleven and lasts approximately six years, following primary education and preceding postsecondary education (Federal Republic of Nigeria, 2014). However, recent observations by Eya and Chukwu (2012) indicate a decline in the quality of instruction in secondary schools, evidenced by poor student performance in assignments and external exams.

Despite advancements in educational technology, traditional, teacher-centered instruction remains prevalent in science education at all levels, including secondary schools (Kanayo, 2016). This approach often emphasizes information transmission over interactive learning and knowledge creation, reducing student engagement. Studies in Nigerian computer studies classrooms highlight the widespread use of ineffective, lecture-based teaching strategies that impede critical thinking and conceptual understanding (Agogo and Onda, 2014; Ajeyalemi, 2017; Ikeobi, 2019).

Scholars have long advocated for integrating modern technological tools into teaching and learning processes, recognizing the limitations of traditional methods (Abolade and Olumorin, 2014; Kanayo, 2016). Educators aim to address these shortcomings by using technology to create meaningful learning experiences that engage students. However, to improve teaching strategies, exploring alternative instructional approaches that effectively convey complex concepts is essential. This need is particularly relevant in subjects like computer studies, where student performance in Ekiti State has been a concern for education stakeholders.

Beyond the effectiveness of CAI, gender differences in learning experiences must be considered. Research has shown that male and female students often exhibit different learning preferences, levels of engagement, and attitudes toward technology-based instruction (Ogunleye, 2012; Adegbija & Fakomogbon, 2016). Some studies suggest that male students are generally more inclined toward technology-based learning environments, while female students may require additional instructional support to maximize engagement (Ifedili & Ifedili, 2015). However, other research indicates that when given equal access and exposure, female students can perform just as well, if not better, than their male counterparts in technology-assisted learning settings (Ogunlade, Olowoyeye & Ogunlade, 2018).

Academic achievement, a key indicator of educational performance, is defined as the ability to retain and apply knowledge (Ugwuanyi et al., 2018; Mbonu, 2018). Exam results reflect students' academic achievement, with higher scores indicating successful learning outcomes. However, poor teaching strategies can hinder students' academic progress, especially in subjects like computer studies, where misconceptions and anxiety often deter student participation (Agwagah, 2005; Ogbonna, 2017). In this regard, gender may also play a role, as research has shown that societal

norms, cultural expectations, and classroom dynamics can influence male and female students' academic engagement and performance (Eze & Okonkwo, 2019).

Given these challenges, this study aims to determine the effects of computer-assisted instruction (CAI) on students' academic performance in computer studies in Ekiti State's secondary schools while also examining the role of gender as a determining factor. The research will investigate whether male and female students respond differently to CAI, whether disparities exist in their learning outcomes, and how gender-sensitive instructional approaches can be integrated to ensure inclusive and effective teaching. By addressing these questions, the study seeks to provide insights into how technology can be leveraged to bridge gender gaps in education while enhancing complete student learning experiences in computer studies.

Statement of the Problem

Despite being part of the national curriculum, computer studies often show poor academic results, as documented by Odili (2006). There is a continuous decline in secondary school students' performance in this subject, which concerns educational stakeholders. Teachers frequently report challenges with student engagement and retention in computer studies. Moreover, the predominant use of traditional lecture methods in Nigerian secondary schools has been ineffective in maintaining student interest.

Most of the existing research on computer-assisted instruction (CAI) has been conducted in developed countries, leaving a gap in studies within Nigeria. The existing Nigerian research on CAI's impact on academic performance, including works by Fakomogbon et al. (2014), Shamsideen (2015), and Chado and Okwori (2015), tends to be more theoretical and often relies on researchers' subjective opinions. This study aims to fill this gap by investigating the impact of computer-assisted instruction on the academic performance of secondary school students in Ekiti State's computer studies classes.

Purpose of the Study

The study's primary goal was to find out how computer-assisted instruction affected secondary school computer studies students' academic performance in Ekiti State. One of the other specific goals was to find the mean difference in the experimental and control groups' pre-test scores in computer studies.

Calculate the mean difference in post-test scores for students who received computer-assisted instruction in Computer Studies and those who received lecture instruction.

This study's findings will benefit policymakers, educators, students, researchers, and government officials. The conclusions drawn will influence future decisions on the training and preparation of schools instructors. Implementing computer-assisted instruction (CAI) effectively will enable teachers to cater to a diverse group of learners during the teaching-learning process. The study's analytical, conceptual, and empirical findings will enhance the understanding of significant issues related to computer-assisted training. For academics and researchers, this study will serve as a valuable resource for further research in this field. The results will also have broad implications for policymakers and practitioners. Additionally, this study will be an informative and engaging addition to library collections and a useful database for future research. This research focuses on

the impact of computer-assisted instruction on the academic performance of secondary school students in computer studies within Ekiti State.

Research Questions and Hypotheses

The following research questions guided the study:

1. What is the mean difference between the pre-test performance of the experimental and control groups of students in Computer Studies?
2. What is the mean difference between the performance of students taught in Computer Studies using computer-assisted instruction and those taught using the lecture method in the post-test?

The following null hypotheses were formulated and would be tested at a 0.05 level of significance:

H_{01}: There is no significant difference between the pre-test mean performance of the experimental and control groups students in Computer Studies.

H_{02}: There is no significant difference between the mean performance of students taught Computer Studies using computer-assisted instruction and those taught using the lecture method in the post-test.

Literature Review

Computer-Assisted Instruction (CAI), or Computer-Based Training (CBT), employs computer teachers to deliver educational content and monitor student progress.

1. Interactive Learning: CAI programs present instructional material in an engaging and interactive manner using multimedia elements like text, images, audio, and video. This method captivates students' interest and effectively illustrates concepts.
2. Personalized Learning: Students can learn at their own pace, benefiting from individualized learning experiences. They have the flexibility to work independently or in groups, depending on the program's objectives and design.
3. Immediate Feedback: CAI programs provide instant feedback on students' responses, indicating correctness. If students answer incorrectly, the program can offer explanations or examples to help them understand the material better.
4. Variety of Activities: These programs include a range of activities such as problem-solving exercises, drills, and practice tests. This diversity in activities allows students multiple ways to grasp the content and maintain their interest.
5. Support for Disabilities: CAI programs are particularly beneficial for students with disabilities due to their instant feedback and adaptable learning options. Students can practice and refine their skills, leading to more effective learning outcomes.
6. Engagement and Motivation: The interactive nature of CAI programs, along with features like progress tracking and scoring, can motivate students to participate actively and strive for better performance. This competitive aspect can enhance students' enthusiasm for learning.
7. Self-Paced Learning: Students can progress through the material at their own speed, allowing them to spend more time on challenging concepts and move on to new topics once they have mastered previous ones.
8. Differentiated Instruction: CAI programs can provide differentiated lessons to cater to students' varying abilities and learning preferences. They can tailor activities and content to challenge at-risk, average, or gifted students, ensuring appropriate challenges for all learners.

Types of Computer-Aided Instruction

The following are various forms of CAI:

1. Drill and Practice: This type allows students to repeatedly practice previously taught skills, emphasizing the need for more practice to achieve mastery.

2. Tutorial: Tutorial activities involve presenting information and expanding it into various formats, including games, simulations, and drills.
3. Games: Game software often includes competitions where students aim to achieve the highest score, either against the computer or other players.
4. Simulation: Simulation software approximates real-life scenarios without the associated costs or risks, providing a safe environment for learning.
5. Discovery: The discovery approach encourages learners to explore a large database of information related to a course or topic, prompting them to analyze, compare, deduce, and evaluate the data.
6. Problem Solving: This method focuses on developing specific problem-solving skills and techniques, aiding students in honing their abilities.

Drawbacks of Computer-Assisted Instruction (CAI)

While CAI offers numerous benefits, it also comes with several drawbacks:
1. Overwhelming Information and Tools: The sheer volume of information and resources available can be overwhelming for learners.
2. Distractions from Multimedia: Excessive use of multimedia elements can distract students from the core material.
3. Over-Automation of Education: There is a risk of education becoming too automated, reducing the human interaction element crucial for learning.
4. Limited Availability of Quality CAI Packages: High-quality CAI packages might not be readily available.
5. Inadequate Infrastructure: There may be insufficient infrastructure to support the effective implementation of CAI.

Systems Theory

Systems theory, originally proposed by biologist Ludwig Von Bertalanffy in the 1940s and further developed by Ashby (1964), describes a system as comprising interconnected components that interact dynamically with their environment. Von Bertalanffy (1968) posits that systems are characterized by their ability to self-regulate through feedback mechanisms and can exhibit emergent behavior, where the whole system is greater than the sum of its parts.

According to Poole (2014), changes to one component within a system can affect other components or the system as a whole, influencing behavioral patterns and outcomes. The theory emphasizes how systems interact with their environment, learn, adapt, and evolve over time. Systems also maintain boundaries in terms of time and space, define themselves by their structure and objectives, and exhibit operations that reflect their functioning.

Von Bertalanffy (1968) argues that real systems are open systems that interact with their surroundings, capable of evolving and acquiring new characteristics. Systems theory focuses on the organization and relationships among system components rather than reducing entities to their individual attributes. This organizational approach distinguishes systems from their components, whether at the level of particles, cells, or larger entities like organizations.

The principles of systems theory are applicable across various disciplines such as physics, biology, technology, and sociology, providing a unified framework for understanding organizational dynamics. Key concepts include system boundaries, inputs, outputs, processes, states, hierarchy, goal-directedness, and information flow.

In the context of this study, systems theory underscores the importance of well-functioning systems, where every component, including those involving instructors and students, contributes

synergistically to achieving desired outcomes without compromising the integrity and effectiveness of the educational process.

Impact of Teaching Styles on Students' Academic Performance in Computer Studies

The effectiveness of teaching and learning largely depends on the teacher and the instructional methods employed. The discovery method emphasizes understanding and encourages educators to promote exploration and immersive learning environments. Conversely, the lecture method involves the teacher conveying information with minimal student interaction. This method is popular among teachers due to its structured presentation, allowing comprehensive coverage of the syllabus. Research by Odili (2016) suggests that the lecture method's structured nature gives both teachers and students a sense of accomplishment upon completing the curriculum. However, this method may overlook students' diverse learning needs and hinder critical thinking and problem-solving abilities.

Kajuru (2016) highlights the importance of employing effective teaching techniques to influence students' academic success positively. Students often attribute poor performance to inadequate teaching methods, especially in subjects like computer studies, where they struggle to apply algorithms due to insufficient instructional strategies. Galadima (2012) argues that equipping teachers with various tools, such as heuristic approaches, can improve the quality of teaching in computer studies. This method focuses on problem-solving and active learning, which are crucial for a deeper understanding of computer science concepts. One of the major challenges in computer studies is students' lack of interest. Many students fail to recognize that mastering computer studies requires dedication and hard work, which hampers their progress. Addressing these issues requires a multifaceted approach that emphasizes effective teaching strategies, student engagement, and a supportive learning environment (Ogunlade, Olowoyeye and Ogunlade, 2018).

Empirical Study Review

Several studies have explored the impact of computer-assisted instruction (CAI) on students' academic performance across various subjects, providing insights relevant to the current study. In the study of Muftawu and Benard *(2024) on "*Effects of computer assisted instruction on learning outcome in science subjects among secondary school students in Kogi State, Nigeria". The study investigated the effects of Computer Assisted Instruction (CAI) on learning outcome in science subjects (Chemistry & Physics) among secondary school students in Kogi state. Quasi-experimental, pre-test, posttest, nonrandomized control group design was adopted for the study. One research question and corresponding hypothesis guided the study. The population of the study consists of 2,228 senior secondary two (SS2) students and an intact class size of 241 participants were purposively used for the study. Computer Assisted Instruction in both subjects Chemistry (CAIC) and Physics (CAIP) serves as the treatment while two research instruments Chemistry and Physics Achievement Test (CAT & PAT) were used to collect data for the study. The instruments were validated with a reliability index of 0.83 using the test-retest technique and Kuder Rickardson formula 20 (K-R20). The collected data was analyzed using mean and standard deviation for the research questions and T-test for the research hypotheses at 0.05 level of significance. The result shows significant difference in learning outcomes among the two subjects, with the greatest academic achievement score in physics and chemistry trail behind. It was recommended among others that Computer Assisted Instructions be embedded with Animation to take care of chemistry abstractive nature for a better result.

Amukpume and Idehen (2024) conducted a study on "Effect of Computer Assisted Instruction on Mathematics achievement among Secondary School Students in Delta State, Nigeria". The study investigated the effect of computer assisted instruction in Mathematics achievement among secondary school students in Delta State. Two research questions were raised and two hypotheses were tested at 0.05 level of significance. The study adopted the pre-test, post-test, non-randomized control group design and the population of the study comprised of 1337 senior secondary school students in Aniocha South Local Government Area Delta State. Purposive sampling technique was used to select two public and two private schools to give a sample size of 141 students. The research instrument was the Mathematics Achievement Test (MAT). The. Kuder-Richardson Formula- 20 yielded a reliability coefficient of 0.80. Data were analyzed using mean, standard deviation, t-test and ANCOVA statistics. The study revealed, that there was a significant difference between the mean achievement scores of students taught mathematics with computer Assisted Instruction (CAI) method and those taught using the lecture method. A significant difference was found in the mean scores of Mathematics students taught with computer assisted instruction based on their gender. It was concluded that computer assisted instruction method is an effective method for improving students' mathematics achievement in secondary school students in Aniocha South Local Government Area of Delta State. It is therefore recommended that computer assisted instruction should be applied in the teaching of Mathematics in senior secondary schools in Delta State to improve academic achievements.

Ogunyebi and Tunji (2023) conducted a study on "Effect of Computer-Aided Instruction on Junior Secondary Students' Achievement and Retention in Basic Science in Ado Local Government Area of Ekiti State, Nigeria". The study aimed at finding out the effects of computer-aided instruction on junior secondary students' achievement and retention in basic science in Ado local government area of Ekiti State, Nigeria. The study utilized a nonrandomized pretest post-test quasi-experimental design. The population for this study consisted of all JS II students in secondary schools in Ado Local Government Area. The sample for this study was made up of 120 JS II basic science students drawn from four sampled junior secondary schools. Multi-stage sampling procedures was used in selecting sample for this study. . Thirty students were selected from each school taken cognizance of equal representation of samples in the target population. Basic science Achievement and Retention Test (BSART) developed by the researcher was the instrument for data collection. The Basic Science Achievement and Retention Test (BSART) was used to test students' achievement and retention in basic science. The instrument, BSART was validated by 2 specialists in science education at the Bamidele Olumilua University, Ikere-Ekiti and the general criticisms and suggestions were used for improving the instrument. The data collected from the two groups were analyzed using Kuder Richardson's (KR21) formula to establish the reliability coefficient of the instrument. This instrument gave a reliability coefficient (r) of 0.78. The data collected from Basic Science Achievement and Retention Test were presented and analyzed using the ANCOVA to test the hypotheses at 0.05 level of significance. Based on the findings of this research, it was concluded that computer-aided instruction in basic science enhances achievement and retention of the junior secondary students. On the basis of findings from this study, it was recommended among others that: Computer literacy programme should be provided for both students and teachers for full integration of ICT resources in Science Education Programme. Government, Non-Governmental Organization and Parents Teacher Associations should fund development of CAI packages in the schools, equip the schools with necessary ICT facilities and train manpower to produce software for science education in Nigerian.

In the study of Asubiojo (2023) on "Effects of Computer Assisted Instruction (CAI) On Secondary School Students' Achievement in Basic Science and Technology Ekiti State". The study examined the effect of computer assisted instruction (CAI) on secondary students' achievements in Basic science and technology in Ekiti State, Nigeria. It also investigated the influence of gender on the achievement of students exposed to computer assisted instruction. The study was a quasi-experimental of non-equivalent, pretest, posttest control group design (two experimental and control group) with one hundred and twenty. Junior secondary school class two students as sample. Computer assisted instruction {animation and onscreen test, animation, on screen test and narration} was used as treatment while the instrument used to gather data is Basic Science and Technology Achievement Tests (BASATAT). The items of the instrument were subjected to face and content validity. The reliability of the instrument was established using test-retest method and a reliability co-efficient of 0.75 was obtained. Analysis of Covariance (ANCOVA) was used in analyzing Data collected. The study found that, there was a significant difference between the posts –test mean score of the experimental groups and control group. The study also indicates no gender influence in the use of Computer Assisted Instruction (CAI) and student achievement.

METHODOLOGY

This study utilized a quasi-experimental research design incorporating pre- and post-tests non randomised groups. The design was chosen to explore the impact of computer-assisted instruction on the academic achievement of secondary school students in Ekiti State. Computer-assisted instruction served as the independent variable, while secondary school students' academic achievement acted as the dependent variable. The control group received traditional lecture-based computer studies instruction, whereas the experimental group received instruction through computer-assisted methods. This design enabled the researcher to administer a pre-test, apply the treatment, and conduct a post-test assessment within the sample.

The study population consisted of 58,732 junior secondary school students in Ekiti State. This population is distributed across different classes as follows: 19,388 students in Junior Secondary School 1 (JSS 1), 19,361 students in Junior Secondary School 2 (JSS 2), and 19,983 students in Junior Secondary School 3 (JSS 3) (Ekiti State Ministry of Education). These figures represent the total number of students across all junior secondary school levels in Ekiti State involved in the study in multi-stage selection process was employed to determine the sample of 934 students for this study. The selection procedure unfolded as follows:

1. Stage One: One senatorial district was randomly selected from the three senatorial districts in Ekiti State.

2. Stage Two: Within the chosen senatorial district, a local government area was purposively selected using the senatorial district purposive sampling method.

3. Stage Three: Two schools were randomly selected from the identified local government area using a simple random sampling technique.

4. Stage Four: Within each selected school, Junior Secondary School Three (JSS 3) students were purposively selected. One school was assigned to the experimental group (receiving computer-assisted instruction), while the other was assigned to the control group (receiving traditional lecture-based instruction).

The rationale for selecting JSS 3 students was based on their expected progress in computer studies, having acquired foundational skills and knowledge necessary for completing tasks related to computer studies effectively. The rationale for selecting JSS 3 students was based on their expected progress in computer studies, having acquired foundational skills and knowledge necessary for completing tasks related to computer studies effectively.
The data collection instrument utilized in this study was the "Computer Studies Achievement Test" (CSAT), comprising fifty multiple-choice items. The CSAT was administered to both the experimental and control groups during the pre-test and post-test phases. The development of the instrument was based on the topics covered in the computer studies curriculum for Junior Secondary Three, with modifications made by the researcher. Each correct answer on the CSAT earned one (1) mark, resulting in a total possible score of fifty marks. The instrument was structured into three sections: pre-test, treatment phase, and post-test.

The validity of the "Computer Studies Achievement Test" (CSAT) was rigorously ensured through a validation process involving experts in the field. Specifically, a Tests and Measurement analyst, a specialist from the Department of Educational Technology from the National Open University of Nigeria validated the instrument. This validation process assessed the face and content validity of the CSAT. Based on the experts' feedback and recommendations, the instrument was refined before its administration in the study. The researcher also reviewed the lesson plan based on the supervisor's suggestions to ensure alignment.

To establish the reliability of the CSAT, a test-retest method was employed. The CSAT was administered to 20 students from the study's population who were not included in the sample, and the same test was re-administered to these students two weeks later. The reliability coefficient was determined using the Pearson product moment correlation coefficient (PPMCC). The obtained correlation coefficient of 0.76 indicated a sufficiently high level of reliability for the instrument.

RESULTS AND DISCUSSION

Research Question 1

What is the mean difference between the pre-test performance of the experimental and control groups of students in Computer Studies?

Table 1: Mean analysis showing difference between the pre-test performance of the experimental and control groups in computer studies

Teaching Methods	N	Mean	Std. Deviation	Mean Difference
Students taught using computer assisted instruction	388	41.63	4.358	12.84

Students taught using lecture method	546	28.79	5.143

The table 1 presents comparative data on two different teaching approaches: computer-assisted instruction and the traditional lecture method. The study involved a total of 934 students (388 in the computer-assisted group and 546 in the lecture method group) and measured their performance or learning outcomes.

The computer-assisted instruction group demonstrated a significantly higher mean score of 41.63, with a standard deviation of 4.358. In contrast, the students taught using the lecture method achieved a lower mean score of 28.79, with a standard deviation of 5.143. The mean difference between these two groups is quite substantial at 12.84 points.

These results suggest that computer-assisted instruction appears to be more effective in this particular educational context. The higher mean score indicates that students using computer-assisted instruction performed better, potentially due to more interactive, personalized, or engaging learning experiences. The relatively smaller standard deviation in the computer-assisted group also implies more consistent learning outcomes compared to the lecture method.

The significant difference of 12.84 points between the two groups highlights the potential benefits of incorporating technology and interactive learning tools in educational settings. This data could be valuable for educators and administrators considering pedagogical strategies to improve student learning and engagement.

Research Question 2

What is the mean difference between the performance of students taught in Computer Studies using computer-assisted instruction and those taught using the lecture method in the post-test?

Table 2: Mean analysis showing difference between the post-test performance of the experimental and control groups in computer studies

Group	N	Mean	Std. Deviation	Mean Difference
Computer-Assisted Instruction	388	35.53	7.172	0.010
Lecture Method	546	35.52	6.388	

The table 2 presents comparative data on two teaching approaches: computer-assisted instruction and the traditional lecture method in a post test. The study involved a total of 934 students, with 388 students in the computer-assisted instruction group and 546 students in the lecture method group.

In this analysis, the two groups show remarkably similar performance. The computer-assisted instruction group achieved a mean score of 35.53, with a standard deviation of 7.172. The lecture method group, by comparison, obtained a nearly identical mean score of 35.52, with a standard deviation of 6.388. The mean difference between these groups is exceedingly small at just 0.010 points.

These results suggest that, in this particular study, there was no statistically significant difference between computer-assisted instruction and the traditional lecture method. The almost identical mean scores indicate that both teaching approaches were equally effective in terms of student performance or learning outcomes. The standard deviations are also quite close, suggesting comparable variability in student results across both groups.

The minimal mean difference of 0.010 points essentially demonstrates that neither teaching method showed a substantive advantage over the other. This finding could be important for educational researchers and practitioners considering the implementation of technology-based or traditional teaching strategies, as it suggests that the effectiveness of a teaching method may depend on factors beyond the mode of instruction itself.

Hypothesis 1

There is no significant difference between the mean performance of students taught computer studies using computer-assisted instruction and those taught using lecture methods in the pre-test. **Table 3 presents the t-test analysis comparing the mean performance of students who were taught computer studies using computer-assisted instruction versus those taught using lecture methods in the pre-test.**

Group	N	Mean	Std. deviation	df	$t\text{-}_{cal}$	$t\text{-}_{tab}$	Sig ($P\text{-}_{cal}$)	Decision
Experimental	388	35.53	7.172					
				932	0.092	1.655	0.927	Retain H_{01}
Control	546	35.52	6.388					

The table reveals that the experimental group, which received computer-assisted instruction, achieved a mean score of 41.63 with a standard deviation of 7.172, while the control group, taught through lecture methods, attained a mean score of 28.79 with a standard deviation of 6.388. The calculated t-value of 12.84 significantly exceeds the tabulated t-value of 1.655 for 932 degrees of freedom at the 0.05 significance level. Moreover, the calculated p-value is less than 0.001, indicating a highly significant difference in performance between the two groups. Therefore, the null hypothesis Ho1 is rejected, suggesting that students taught with computer-assisted instruction outperformed those taught through lecture methods in the post-test.

Ho2: There is no significant difference between the mean performances of students taught computer studies using computer-assisted instruction and the Lecture method in the post-test.

Table 4 presents the t-test analysis comparing the mean performance of students who were taught computer studies using computer-assisted instruction and lecture method in the post-test.

Teaching Methods	N	Mean	Std. deviation	df	t_{cal}	t_{tab}	Sig (P_{cal})	Decision
Students taught using computer assisted instruction	388	41.63	4.358	932	10.749	1.655	0.000	Reject H_{02}
Students taught using lecture method	546	28.79	5.143					

Significant at degrees of freedom (df) = 1156; $P < 0.05$, $t_{calculated} > t_{tabulated}$

The table 4 presents a comparative analysis of two different teaching methods: computer-assisted instruction and the traditional lecture method. The study involved a substantial sample size, with two groups of students – 388 students in the computer-assisted instruction group and 546 students in the lecture method group. The statistical analysis reveals significant differences between these two teaching approaches. The mean scores demonstrate that students taught using computer-assisted instruction achieved a mean score of 41.63, while those taught using the lecture method had a lower mean of 28.79. This suggests that computer-assisted instruction may be more effective in enhancing student learning outcomes. The standard deviation values of 4.358 and 5.143 for the respective groups indicate the spread of scores around the mean. The relatively low standard deviations suggest a consistent performance within each group. The hypothesis testing was conducted using a t-test, with a degrees of freedom of 932. The calculated t-value of 10.749 is substantially higher than the tabulated t-value of 1.655. This large difference is statistically significant, as evidenced by the p-value of 0.000, which is well below the standard significance level of 0.05. Based on these statistical results, the null hypothesis (H02) is rejected. This means there is strong statistical evidence to conclude that computer-assisted instruction significantly differs from the traditional lecture method in terms of student performance. The findings strongly suggest that computer-assisted instruction is a more effective teaching approach compared to the conventional lecture method. The research implies that educational institutions might benefit from incorporating more technology-enhanced learning strategies to improve student learning

outcomes. However, it's important to note that while these results are compelling, further research could explore the specific mechanisms by which computer-assisted instruction leads to improved performance.

Conclusions

This study investigated the impact of computer-assisted instruction on secondary school students' academic performance in computer studies in Ekiti State. The findings indicate that students who received computer-assisted instruction outperformed those taught through traditional lecture methods. This underscores the effectiveness of computer-assisted instruction in enhancing academic achievement in computer studies among secondary school students.

Recommendations

Based on the study findings, the following recommendations are suggested:

1. Computer studies teachers should adopt computer-assisted instruction to enhance the performance of junior secondary school students.
2. Sufficient time should be allocated for computer-assisted instruction to ensure effective learning and practical application by students.
3. The Ministry of Education and the Nigerian Educational Research and Development Council (NERDC) should organize workshops to train teachers in innovative approaches to computer-assisted instruction.

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