

Lecturers' Perceived Effectiveness of Computer-Assisted Instruction System in Teaching General Studies Courses in Public Tertiary Institutions in Anambra State

¹Nwankwo, Madeleine Chinyere PhD; ²Umeadi Frank Somtoo

¹Department of Science Education, Nnamdi Azikiwe University, Awka.

²Department of Computer Science Education, Federal College of education (Tech), Umunze

DOI: <https://doi.org/10.51583/IJLTEMAS.2026.150300021>

Received: 11 March 2026; Accepted: 16 March 2026; Published: 02 April 2026

ABSTRACT

This study investigated the effectiveness of Computer-Assisted Instructional Strategies (CAIS) in teaching General Studies (GS) courses in public tertiary institutions in Anambra State, Nigeria. Specifically, it examined lecturers' perceptions of CAIS in fostering students' critical thinking, self-confidence, technical proficiency, and learning outcomes, while also exploring challenges and institutional support structures. A mixed-method design was adopted, combining quantitative and qualitative approaches. The quantitative strand employed survey questionnaires administered to male and female GS lecturers, with hypotheses tested using the t-test at 0.05 significance level. The qualitative strand involved semi-structured interviews with lecturers across universities, polytechnics, and colleges of education, thematically analysed to capture experiences and perceptions. Findings revealed that lecturers generally perceived CAIS as effective in enhancing students' critical thinking, confidence, and digital competence, with mean ratings above the 2.50 benchmark. T-test results showed no significant gender differences in perceptions, suggesting shared experiences across male and female lecturers. Qualitative insights highlighted CAIS as valuable in managing large GS classes, fostering debate and analytical reasoning, and promoting self-confidence, especially through interactive tools, online forums, and multimedia. However, persistent challenges—including epileptic electricity, poor internet connectivity, inadequate ICT facilities, and limited institutional support—significantly constrained CAIS adoption. Lecturers maintained generally positive attitudes toward CAIS but emphasized the need for sustained training, infrastructural development, and supportive policies. The study concludes that CAIS holds strong potential for transforming GS instruction in Nigeria, but institutional investment, equity of access, and capacity-building remain critical for maximising its impact.

Keywords: Computer-Assisted Instruction System (CAIS); Multimedia; Computer Technology; Computer Studies; Communication and Networking.

INTRODUCTION

The integration of technology into education has driven a crucial shift from traditional, teacher-centered instruction to dynamic, digital learning environments. In Nigeria, modern educational demands have begun to exceed the capabilities of conventional teaching alone, necessitating a reassessment of instructional practices to address a swiftly changing academic landscape (Oluwatosin & Bolanle, 2024). This need is particularly evident in foundational, interdisciplinary courses like the General Studies (G.S.) program. The G.S. curriculum is designed to cultivate well-rounded, adaptable graduates by expanding their intellectual horizons and fostering critical thinking, civic duty, and cultural awareness (National Open University of Nigeria, 2024; Ogbu, 2023).

Despite its foundational importance, the execution of G.S. courses in Anambra State faces profound challenges. Institutions grapple with overwhelming student populations, high failure rates, and the continued reliance on antiquated teaching methodologies (Anike, 2024; Oguejiofor & Obidile, 2023). Conventional instructional

methods struggle to engage the diverse academic backgrounds and learning styles present in these exceptionally large classes (Wallis, 2023). Consequently, there is a pressing need for educators to transition from being sole knowledge transmitters to collaborative facilitators, a shift that requires the adoption of modern pedagogical approaches (Eslit, 2023).

To address these educational gaps, the Computer-Assisted Instruction System (CAIS) has emerged as a promising solution. CAIS utilizes interactive, multimedia-rich digital platforms to deliver educational content, facilitating both individualized and collaborative learning experiences (Adewoye & Olaseni, 2022; Onochie & Ishiwu, 2022). While CAI possesses strong qualities that can enhance school performance by promoting a student-centered approach (Rawat & Sood, 2021; Wali & Ahmad, 2021), its practical implementation in Nigerian public tertiary institutions raises valid concerns. Stakeholders note that the mere presence of technology does not guarantee its effective utilization or translate to anticipated enhancements in student performance.

Consequently, this study investigates the actual perceived effectiveness of CAIS among lecturers teaching G.S. courses in public tertiary institutions across Anambra State. By capturing the direct experiences and perceptions of the educators who implement these systems, the research aims to uncover any discrepancies between the theoretical advantages of CAIS and its practical reality. Ultimately, this will yield evidence-based insights to guide future policy recommendations, optimize resource distribution, and improve teacher training.

Propose of the Study: The purpose of this study was to determine lecturers' perceived effectiveness of using the Computer-Assisted Instruction System (CAIS) in teaching General Studies (GS) courses in public tertiary institutions in Anambra State, Nigeria. Specifically, the study measured the perceived degree to which CAIS achieves its intended objectives by:

1. Investigating lecturers' perceived effectiveness of the computer-Assisted Instruction System (CAIS) in fostering students' critical thinking in General Studies courses;
2. Assessing lecturers' perceived effectiveness of CAIS in influencing students' self-confidence in General Studies courses;
3. Examining lecturers' perceived effectiveness of CAIS in developing students' technical proficiency with CAIS tools for General Studies courses;
4. Determining lecturers' perceived effectiveness of CAIS in achieving student learning outcomes in General Studies courses;
5. Exploring perceived strategies that can enhance the effectiveness of CAIS in teaching General Studies courses in public tertiary institutions in Anambra State, Nigeria.

Research Questions:

The study sought to answer the following research questions:

1. To what extent do lecturers perceive the Computer-Assisted Instruction System (CAIS) as effective in fostering students' critical thinking in General Studies courses?
2. To what extent do lecturers perceive CAIS as effective in influencing students' self-confidence in General Studies courses?
3. To what extent do lecturers perceive CAIS as effective in developing students' technical proficiency with CAIS tools for General Studies courses?
4. To what extent do lecturers perceive CAIS as effective in achieving student learning outcomes in General Studies courses?
5. What are the perceived strategies that can enhance the effectiveness of CAIS in teaching General Studies courses in public tertiary institutions in Anambra State, Nigeria?

Hypotheses: The stated null hypotheses below were tested at 0.05 level of significance;

1. There is no significant difference between the mean rating of male and female GS lecturers' perceived effectiveness of CAIS in fostering students' critical thinking based on their attitude towards CAI.

2. There is no significant difference between the mean rating of male and female GS lecturers' perceived effectiveness of CAIS in influencing students' self-confidence based on their attitude towards CAI.
3. There is no significant difference between the mean rating of male and female GS lecturers' perceived effectiveness of CAIS in developing students' technical proficiency with CAIS tools based on their attitude towards CAI.
4. There is no significant difference between the mean rating of male and female GS lecturers' perceived effectiveness of CAIS in achieving student learning outcomes based on their attitude towards CAI.

Method: The qualitative data from the interviews was analysed using thematic analysis. This process involved transcribing the interviews, systematically coding the data, and identifying recurring themes and patterns. The themes from this qualitative analysis were used to provide context and depth to the quantitative findings, explaining the underlying reasons for the lecturers' perceptions and experiences with CAIS. The study was conducted in Anambra State. A population of Ninety-Eight (98) respondents. It consists of all the academic staff of the public tertiary institutions in Anambra state who have utilized CAIS to teach general studies courses in the public universities, polytechnics, and colleges of education in Anambra state. The sample for the study is Fifty (50) respondents, which included all GS academic staff who have used CAIS to teach GS courses and in the public universities, polytechnics, and colleges of education in Anambra state. Despite the population being manageable, the census approach was inapplicable since not all GS lecturers have used the CAIS in teaching GS courses. The sampling technique used a proportional distribution method to choose respondents from the academic institutions.

Instrument: 40 structured standardized questions CAIS was selected. The instrument used was divided into two sections, A and B. Section A was designed to obtain demographic information about the respondents, while section B contained 40 items aligned with the specific purposes of the study. The content of Section B was divided into five clusters to measure the perceived effectiveness of CAIS:

Cluster B1: This cluster contains 8 items that measured the extent to which lecturers perceive CAIS as effective in fostering students' critical thinking in General Studies courses.

Cluster BII: This cluster contains 8 items and was used to assess the extent to which lecturers perceive CAIS as effective in influencing students' self-confidence in General Studies courses.

Cluster BIII: This cluster contains 8 items and was designed to gauge the extent to which lecturers perceive CAIS as effective in developing students' technical proficiency with CAIS tools for General Studies courses.

Cluster BIV: This cluster contains 8 items and provided information on the extent to which lecturers perceive CAIS as effective in achieving student learning outcomes in General Studies courses.

Cluster BV: This cluster contains 8 items aimed at identifying the perceived strategies that can enhance the effectiveness of CAIS in teaching General Studies courses in public tertiary institutions in Anambra State, Nigeria.

Table 1: Questionnaire Distribution and Return Rate Based on Institution

Name of Institution	Number of Copies Administered	Number of Copies Returned	Response Rate (%)
Nnamdi Azikiwe University Awka	12	10	83.3
Federal Polytechnic Oko	10	8	80
Federal College of Education (Technical) Umunze	10	8	80

National Open University of Nigeria, Anambra State	10	8	80
Nwafor Orizu College of Education Nsugbe	8	6	75
Anambra State Polytechnic Mgbakwu	Nil	Nil	Nil
TOTAL	50	40	80

Table 1 illustrates the distribution and return rates of questionnaires across various institutions. A total of 50 questionnaires were administered, with 40 successfully returned, yielding an overall response rate of 80%. Notably, the Federal College of Education (Technical) Umunze and Federal Polytechnic Oko, and the National Open University of Nigeria, Anambra State recorded identical return rates of 80%, with 10 questionnaires distributed in each institution and 8 returned. Nnamdi Azikiwe University Awka had a response rate of 83.3%, with 12 questionnaires administered and 10 returned. In contrast, Nwafor Orizu College of Education Nsugbe had a lower return rate of 75%, with 8 out of 10 questionnaires returned. It is important to note that there were no questionnaires distributed at Anambra State Polytechnic Mgbakwu, resulting in a return rate of nil for that institution. In total, across all institutions, 40 questionnaires were returned out of the 50 distributed. This data will provide a solid foundation for the subsequent analysis of lecturers' perceptions regarding the effectiveness of the Computer-Assisted Instruction System (CAIS) in teaching General Studies courses.

Table 2: Distribution of Respondents by Gender

Gender	Number of Copies Distributed	Number of Copies Returned	Response Rate (%)
Males	27	22	81
Females	23	18	78
TOTAL	50	40	80

Table 2 presents the gender distribution of the study sample. Out of 50 questionnaires distributed, 27 were administered to males and 23 to females. Of these, 22 male respondents returned their questionnaires, representing a response rate of 81 percent, while 18 females returned theirs, giving a slightly lower response rate of 78 percent. In total, 40 questionnaires were successfully retrieved, resulting in an overall response rate of 80 percent. The data indicates that male respondents were slightly more represented in the study than females, though the difference was minimal. This balance suggests that the perspectives of both genders were fairly captured in the research, thereby strengthening the representativeness of the findings.

Table 3 Cluster BI: The extent to which lecturers perceive CAIS as effective in fostering students' critical thinking in General Studies courses

S/N	ITEM	Male GS Lecturers			Female GS Lecturers		
		\bar{x}	SD	Remarks	\bar{x}	SD	Remarks
1	CAIS effectively promotes students' ability to analyze complex information presented in General Studies courses.	3.14	2.73	VHE	2.89	2.62	HE
2	The use of CAIS encourages students to evaluate and synthesize different sources of information.	2.91	2.54	HE	2.67	2.33	HE

3	CAIS tools help students to identify logical fallacies and biases in course materials.	2.32	2.04	LE	2.33	2.05	LE
4	CAIS is effective in developing students' problem-solving skills in GS topics.	2.55	2.34	HE	2.61	2.33	HE
5	Students who use CAIS are more likely to generate innovative solutions to course-related problems.	2.82	2.47	HE	2.78	2.45	HE
6	The interactive nature of CAIS fosters students' ability to make informed judgments.	3.14	2.70	VHE	2.94	2.70	HE
7	CAIS provides opportunities for students to critically reflect on their learning process.	3.09	2.71	VHE	2.89	2.71	HE
8	The use of CAIS helps students to construct well-reasoned arguments in GS courses.	3.14	2.73	VHE	3.00	2.65	VHE
	CLUSTER MEAN & SDEV.	2.89	2.533	HE	2.764	2.481	HE

Key: 3.0 to 4.0 corresponds to VHE; 2.5 to 2.99 corresponds to HE; 1.5 to 2.49 corresponds to LE; and Below 1.5 corresponds to VLE.

Table 3 presents lecturers' perceptions of the extent to which the Computer-Assisted Instruction System (CAIS) fosters critical thinking in General Studies (GS) courses. The results show that male lecturers rated items 1, 6, 7, and 8 very highly (means ranging from 3.09–3.14), indicating strong agreement that CAIS promotes analysis of complex information, reflective practice, informed judgment, and construction of well-reasoned arguments. Female lecturers also rated these items positively, though slightly lower, with item 8 reaching “Very High Extent.” Both male and female lecturers rated item 3 (“CAIS helps students identify logical fallacies and biases”) low (means of 2.32 and 2.33), suggesting a limitation of CAIS in this area. Other items—such as CAIS’s role in fostering evaluation, synthesis, problem-solving, and innovation—were rated within the “High Extent” range by both groups. The cluster means (male: 2.89; female: 2.76) confirm that lecturers generally perceive CAIS as effective to a high extent, with only minor gender differences. Overall, the findings suggest CAIS is valued for promoting critical thinking in GS courses, though it may require complementary instructional strategies to address skills like identifying biases and fallacies.

Table 4: Cluster BII: The extent to which lecturers perceive CAIS as effective in influencing students' self-confidence in General Studies courses

S/N	ITEM	Male GS Lecturers			Female GS Lecturers		
		\bar{x}	SD	Remarks	\bar{x}	SD	Remarks
9	Using CAIS in class increases students' self-assurance in discussing General Studies topics.	2.95	2.58	HE	2.72	2.40	HE
10	CAIS tools contribute to students' belief in their ability	2.95	2.59	HE	2.72	2.43	HE

	to successfully complete GS course assignments.						
11	Students are more confident in their academic abilities after interacting with CAIS.	2.82	2.45	HE	2.67	2.33	HE
12	CAIS effectively reduces students' anxiety about learning complex GS concepts.	2.32	2.09	LE	2.33	2.05	LE
13	The immediate feedback from CAIS helps to build students' confidence.	3.14	2.73	VHE	2.83	2.49	HE
14	Students are more willing to participate in classroom activities when CAIS is used.	2.82	2.49	HE	2.61	2.33	HE
15	CAIS-based learning increases students' overall motivation and confidence in GS courses.	2.82	2.49	HE	2.78	2.43	HE
16	The perceived effectiveness of CAIS contributes positively to students' belief in their learning success.	2.77	2.43	HE	2.56	2.26	VHE
	CLUSTER MEAN & SDEV.	2.82	2.48	HE	2.653	2.342	HE

Key: 3.0 to 4.0 corresponds to VHE; 2.5 to 2.99 corresponds to HE; 1.5 to 2.49 corresponds to LE; and Below 1.5 corresponds to VLE

The analysis of Table 4 reveals that lecturers perceive CAIS as effective in influencing students' self-confidence in General Studies courses. Both male and female lecturers rated most items with mean scores above 2.50, indicating a high extent (HE) of agreement.

Male lecturers rated item 13 ("The immediate feedback from CAIS helps to build students' confidence") with a mean score of 3.14, categorized as "Very High Extent." Female lecturers also rated this item positively, with a mean score of 2.83, indicating a high extent (HE) of agreement. However, both male and female lecturers expressed concerns about CAIS's effectiveness in reducing students' anxiety about learning complex GS concepts, with mean scores of 2.32 and 2.33, respectively, categorized as "Low Extent."

The cluster means for male and female lecturers are 2.82 and 2.653, respectively, exceeding the acceptable benchmark of 2.50. This indicates that both male and female lecturers generally perceive CAIS as effective in influencing students' self-confidence.

The findings suggest that CAIS is perceived as an effective tool for promoting students' self-confidence, particularly in areas such as increasing self-assurance, contributing to students' belief in their ability to complete assignments, and building confidence through immediate feedback. However, there may be areas for improvement, such as reducing students' anxiety about learning complex concepts.

Overall, the results indicate that CAIS is valued for its ability to promote students' self-confidence, but may require complementary instructional strategies to address specific areas of concern.

Table 5: Cluster BIII: The extent to which lecturers perceive CAIS as effective in developing students’ technical proficiency with CAIS tools for General Studies courses

S/N	ITEM	Male GS Lecturers			Female GS Lecturers		
		\bar{x}	SD	Remarks	\bar{x}	SD	Remarks
17	CAIS enhances students’ skills in navigating different software and digital platforms.	2.82	2.45	HE	2.61	2.29	HE
18	Students' ability to use various CAIS tools for research and learning improves significantly.	2.86	2.52	HE	2.67	2.36	HE
19	The use of CAIS helps students to effectively manage digital files and course materials.	2.36	2.13	LE	2.39	2.13	LE
20	Students develop technical troubleshooting skills when problems arise with CAIS tools.	2.32	2.04	LE	2.39	2.13	LE
21	CAIS is effective in preparing students for a technologically driven academic and professional world.	2.64	2.34	HE	2.67	2.31	HE
22	The use of CAIS improves students' technical literacy beyond the scope of General Studies courses.	2.55	2.24	HE	2.67	2.31	HE
23	Students are proficient in using the core functionalities of the CAIS platforms for their studies.	2.64	2.34	HE	2.56	2.24	HE
24	CAIS helps students in understanding and applying new technological tools and applications.	2.32	2.09	LE	2.28	2.03	LE
	CLUSTER MEAN & SDEV.	2.56	2.268	HE	2.528	2.224	HE

Key: 3.0 to 4.0 corresponds to VHE; 2.5 to 2.99 corresponds to HE; 1.5 to 2.49 corresponds to LE; and Below 1.5 corresponds to VLE

Table 5 presents lecturers’ perceptions of the extent to which the Computer-Assisted Instruction System (CAIS) develops students’ technical proficiency with CAIS tools in General Studies (GS) courses. The results indicate a generally positive perception, with both male and female lecturers rating the majority of items within the “High Extent” (HE) category. Male lecturers rated items 17 and 18 highly (means = 2.82 and 2.86), emphasizing CAIS’s contribution to students’ skills in navigating software platforms and conducting digital research. Female lecturers also echoed these perceptions with slightly lower but comparable means (2.61 and 2.67, respectively). Similarly, both groups acknowledged CAIS’s role in preparing students for a technologically driven world (male mean = 2.64; female mean = 2.67) and in broadening their technical literacy beyond GS courses.

However, notable limitations emerged. Both male and female lecturers rated items 19, 20, and 24 below the 2.50 benchmark, indicating that CAIS is less effective in helping students manage digital files, troubleshoot technical issues, and adopt new technological applications. This suggests a gap between acquiring basic functional skills and mastering advanced or independent technical competencies. The cluster means of 2.56 (males) and 2.53 (females) both exceed the 2.50 benchmark, confirming overall agreement that CAIS fosters technical proficiency to a high extent. Nonetheless, the findings highlight the need for complementary institutional support, such as structured digital literacy programs, to strengthen students' ability to troubleshoot and apply emerging tools effectively.

Table 6: Cluster BIV: the extent to which lecturers perceive CAIS as effective in achieving student learning outcomes in General Studies courses

S/N	ITEM	Male GS Lecturers			Female GS Lecturers		
		\bar{x}	SD	Remarks	\bar{x}	SD	Remarks
25	CAIS is highly effective in helping students achieve the stated learning objectives of GS courses.	2.77	2.45	HE	2.56	2.29	HE
26	The use of CAIS leads to improved academic performance and higher grades in General Studies.	2.59	2.32	HE	2.61	2.31	HE
27	Students show a deeper understanding of complex GS concepts after using CAIS.	2.77	2.45	HE	2.50	2.24	HE
28	CAIS effectively improves students' retention and recall of course information.	3.18	2.75	VHE	3.00	2.60	VHE
29	The use of CAIS makes it easier for students to apply theoretical knowledge to practical scenarios.	2.68	2.35	HE	2.56	2.24	HE
30	CAIS is effective in promoting collaborative learning among students.	2.95	2.59	HE	2.61	2.31	HE
31	The instructional design of CAIS leads to significant improvements in student learning outcomes.	2.59	2.30	HE	2.56	2.24	HE
32	CAIS facilitates a more personalized learning experience that results in better outcomes.	3.05	2.61	VHE	2.83	2.47	HE
	CLUSTER MEAN & SDEV.	2.82	2.477	HE	2.653	2.336	HE

Key: 3.0 to 4.0 corresponds to VHE; 2.5 to 2.99 corresponds to HE; 1.5 to 2.49 corresponds to LE; and Below 1.5 corresponds to VLE

Table 6 presents the perceptions of male and female General Studies lecturers regarding the effectiveness of the Computer-Assisted Instruction System (CAIS) in achieving student learning outcomes. Overall, both male and female lecturers expressed a positive view of CAIS's impact on student learning. Male lecturers rated item 25,

which assesses CAIS's effectiveness in helping students achieve stated learning objectives, with a mean score of 2.77, categorized as "High Extent." Female lecturers rated this item slightly lower at 2.56 but still within the same category. In item 28, which focuses on the improvement of retention and recall of course information, male lecturers scored it at 3.18 ("Very High Extent"), while female lecturers rated it at 3.00, indicating strong agreement that CAIS significantly aids memory retention. Furthermore, both groups recognized the potential of CAIS in promoting collaborative learning (item 30), with male lecturers scoring it at 2.95 and female lecturers at 2.61, both indicating "High Extent." The cluster means reveal that male lecturers have an average score of 2.82 and female lecturers 2.65, both exceeding the benchmark of 2.50. This suggests a consensus that CAIS is effective in achieving student learning outcomes. However, areas for improvement remain, particularly in ensuring CAIS effectively enhances deeper understanding and application of theoretical knowledge, as indicated by the lower scores for items related to these aspects. Overall, the findings reinforce CAIS's perceived value in enhancing educational outcomes in General Studies courses.

Table 7: Cluster BV: The perceived strategies that can enhance the effectiveness of CAIS in teaching General Studies courses in public tertiary institutions in Anambra State, Nigeria

S/N	ITEM	Male GS Lecturers			Female GS Lecturers		
		\bar{x}	SD	Remarks	\bar{x}	SD	Remarks
33	Providing adequate technical support for lecturers is a key strategy to enhance CAIS effectiveness.	2.91	2.54	A	2.94	2.47	A
34	Regular professional development and training sessions for lecturers on new CAIS tools would be beneficial.	3.14	2.70	SA	3.00	2.60	SA
35	Improving the internet and power infrastructure in institutions would significantly enhance CAIS.	3.00	2.63	SA	2.89	2.49	A
36	Developing course-specific CAIS content that is highly relevant to the Nigerian context is essential.	3.00	2.59	SA	2.83	2.49	A
37	Integrating CAIS use as a formal requirement in all GS course curricula would be an effective strategy.	2.86	2.52	A	2.89	2.40	A
38	The provision of dedicated and well-equipped computer laboratories for GS students would improve effectiveness.	2.91	2.58	A	2.94	2.26	A
39	Regular maintenance and updating of CAIS hardware and software are crucial for its effectiveness.	3.14	2.73	SA	3.00	2.65	SA
40	There should be a consistent institutional policy that supports the long-term implementation of CAIS.	2.91	2.52	A	2.83	2.49	A
	CLUSTER MEAN & SDEV.	2.98	2.601	A	2.916	2.484	A

Key: 3.0 to 4.0 corresponds to SA; 2.5 to 2.99 corresponds to Agree; 1.5 to 2.49 corresponds to D; and Below 1.5 corresponds to SD.

Table 7 details the perceived strategies that lecturers believe can enhance the effectiveness of the Computer-Assisted Instruction System (CAIS) in teaching General Studies courses in public tertiary institutions in Anambra State, Nigeria. Overall, both male and female lecturers expressed strong support for various strategies aimed at improving CAIS. Notably, item 34, which emphasizes the importance of regular professional development and training for lecturers on new CAIS tools, received the highest ratings, with male lecturers scoring it at 3.14 ("Strongly Agree") and female lecturers at 3.00. This reflects a consensus on the necessity of ongoing training to maximize CAIS effectiveness. Items 33 and 39 also garnered significant support, highlighting the importance of providing adequate technical support and ensuring regular maintenance and updates of CAIS hardware and software. Both male (3.14) and female (3.00) lecturers strongly agreed on the latter, indicating a shared belief in the foundational role of reliable technical infrastructure.

Other strategies, such as improving internet and power infrastructure (item 35) and developing course-specific content relevant to the Nigerian context (item 36), received high ratings, with both groups agreeing on their importance for enhancing CAIS effectiveness. The overall cluster means indicate that male lecturers scored an average of 2.98 and female lecturers 2.92, both categorized as "Agree." This suggests a broad consensus among lecturers on the strategies that can strengthen CAIS's role in teaching General Studies. These insights emphasize the need for institutional commitment to support CAIS through training, infrastructure improvements, and content development tailored to local contexts.

Tests for Hypotheses

The hypotheses stated were tested using the T-test at a 0.05 level of significance with the aid of computer application (Excel). The aim was to determine whether there is a significant difference between the mean ratings of male and female GS lecturers regarding the perceived effectiveness of CAIS in four key areas: fostering students' critical thinking, influencing self-confidence, developing technical proficiency, and achieving learning outcomes.

Table 8: Summary of T-test on the hypothesis that there is no significant difference between the mean rating of male and female GS lecturers' perceived effectiveness of CAIS in fostering students' critical thinking based on their attitude towards CAI.

t-test: Two Sample for Means - CLUSTER BI		
	<i>Male GS Lecturers</i>	<i>Female GS Lecturers</i>
Mean	2.8222222	2.702469136
Known Variance	0.1212213	0.076196845
Observations	8	8
Hypothesized Mean Difference	0	
t	0.8085641	
P(T<=t) one-tail	0.209383	
t Critical one-tail	1.6448536	
P(T<=t) two-tail	0.4187659	
t Critical two-tail	1.959964	

The null hypothesis 1 states there is no significant difference between the mean rating of male and female GS lecturers' perceived effectiveness of CAIS in fostering students' critical thinking.

The T-test analysis yielded a calculated t-value of 0.8085641 at the 0.05 level of significance. This calculated t-value is compared against the t-critical value for a two-tailed test, which is ± 1.959964 . Since 0.8085641 falls within the acceptable range (it is greater than -1.959964 and less than $+1.959964$), the result is non-significant. Furthermore, the two-tailed P-value is 0.4187659, which is much greater than the 0.05 significance level. Consequently, there is insufficient evidence to reject the null hypothesis. The hypothesis of no significant difference between the mean ratings of male and female lecturers regarding CAIS effectiveness in fostering critical thinking is accepted.

Table 9: Summary of T-test on the hypothesis that there is no significant difference between the mean rating of male and female GS lecturers' perceived effectiveness of CAIS in influencing students' self-confidence based on their attitude towards CAI.

t-test: Two Sample for Means - CLUSTER BII		
	<i>Male GS Lecturers</i>	<i>Female GS Lecturers</i>
Mean	2.761111111	2.59382716
Known Variance	0.084220615	0.052688615
Observations	8	8
Hypothesized Mean Difference	0	
t	1.356310635	
P(T<=t) one-tail	0.087500177	
t Critical one-tail	1.644853627	
P(T<=t) two-tail	0.175000353	
t Critical two-tail	1.959963985	

The null hypothesis 2 states there is no significant difference between the mean rating of male and female GS lecturers' perceived effectiveness of CAIS in influencing students' self-confidence.

The analysis produced a calculated t-value of 1.356310635. Testing this in a two-tailed analysis at the 0.05 level, the calculated t-value is less than the positive t-critical value of 1.959963985 and greater than the negative critical value. This indicates that the calculated t-value falls within the region of acceptance. Additionally, the two-tailed P-value is 0.175000353. Since this P-value is greater than the 0.05 significance level, the difference is considered non-significant. Therefore, the null hypothesis, which states there is no significant difference in the mean ratings between male and female lecturers regarding CAIS effectiveness in influencing students' self-confidence, is accepted.

t-test: Two Sample for Means - CLUSTER III		
	<i>Male GS Lecturers</i>	<i>Female GS Lecturers</i>
Mean	2.505555556	2.471604938
Known Variance	0.06995753	0.049231824
Observations	8	8
Hypothesized Mean Difference	0	
t	0.295019143	

P(T<=t) one-tail	0.383989628	
t Critical one-tail	1.644853627	
P(T<=t) two-tail	0.767979256	
t Critical two-tail	1.959963985	

Table 10: Summary of T-test on the hypothesis that there is no significant difference between the mean rating of male and female GS lecturers' perceived effectiveness of CAIS in developing students' technical proficiency with CAIS tools based on their attitude towards CAI.

The null hypothesis 3 states there is no significant difference between the mean rating of male and female GS lecturers' perceived effectiveness of CAIS in developing students' technical proficiency with CAIS tools.

The T-test resulted in a calculated t-value of 0.295019143. Comparing this to the two-tailed t-critical values of ± 1.959963985 , the calculated t-value is well within the acceptable range. The two-tailed P-value is 0.767979256, which is significantly higher than the 0.05 level of significance. This large P-value confirms that any observed difference in the mean ratings between male and female lecturers' perceptions of CAIS effectiveness in developing students' technical proficiency is due to chance. As a result, the null hypothesis of no significant difference in mean ratings is accepted.

Table 11: Summary of T-test on the hypothesis that there is no significant difference between the mean rating of male and female GS lecturers' perceived effectiveness of CAIS in achieving student learning outcomes based on their attitude towards CAI.

t-test: Two Sample for Means - CLUSTER IV		
	<i>Male GS Lecturers</i>	<i>Female GS Lecturers</i>
Mean	2.761111111	2.59382716
Known Variance	0.076472681	0.057318244
Observations	8	8
Hypothesized Mean Difference	0	
t	1.372025562	
P(T<=t) one-tail	0.08502774	
t Critical one-tail	1.644853627	
P(T<=t) two-tail	0.17005548	
t Critical two-tail	1.959963985	

The null hypothesis 4 states there is no significant difference between the mean rating of male and female GS lecturers' perceived effectiveness of CAIS in achieving student learning outcomes.

The analysis yielded a calculated T-value of 1.372025562. In the two-tailed analysis at the 0.05 significance level, this calculated T-value is greater than -1.959963985 and less than $+1.959963985$, falling within the acceptance region. Furthermore, the two-tailed P-value is 0.17005548. Since the P-value is greater than the 0.05 significance level, the observed difference in mean ratings is not statistically significant. Consequently, the null hypothesis, which asserts there is no significant difference between the mean ratings of male and female lecturers regarding CAIS effectiveness in achieving student learning outcomes, is accepted.

DISCUSSION OF FINDINGS

These findings highlight the potential of CAIS to enhance teaching and learning in public tertiary institutions in Anambra State, while also identifying critical challenges that must be addressed to maximize its effectiveness.

- 1. Overall Experience with CAIS:** Lecturers generally reported a positive experience with Computer-Assisted Instruction Systems (CAIS), noting its potential to enhance teaching, especially in large classes. However, challenges such as power outages and inadequate internet connectivity significantly hindered effective usage.
- 2. Fostering Critical Thinking:** CAIS was found to effectively promote critical thinking through interactive tools and online discussions. Lecturers cited successful instances of using online polling and multimedia case studies, although student engagement varied based on access to technology.
- 3. Influence on Self-Confidence:** The use of CAIS was associated with increased self-confidence among students, particularly for those who are shy. However, students without access to devices often felt excluded, highlighting a digital divide that affects overall confidence levels.
- 4. Technical Challenges:** Frequent technical issues, including power outages and network disruptions, were reported by lecturers. They employed various coping strategies, such as pre-downloading materials, but these challenges underscored systemic barriers to effective CAIS implementation.
- 5. Preparation for a Digital World:** CAIS was recognized as a tool for equipping students with digital skills necessary for the workforce. However, the uneven implementation and infrastructural limitations affected its overall effectiveness in preparing students.
- 6. Institutional Support:** There was a strong consensus among lecturers that institutional support for CAIS is inadequate. Recommendations for improvement included increased training and better infrastructure to facilitate effective integration of CAIS.
- 7. Recommendations for Improvement:** Suggested improvements included investing in reliable power supply and internet connectivity, providing regular training for lecturers, ensuring equitable access to devices for students, and developing supportive institutional policies.

Implication of Findings

The findings of this study have critical implications for policy-making, practice, and resource allocation within public tertiary institutions in Anambra State and Nigeria at large.

- 1. Implications for Policy Makers:** The government and institutional management must shift their focus from merely mandating CAIS adoption to funding the foundational infrastructure. Policy must include specific budget lines for alternative power sources (solar, inverter systems), guaranteed internet bandwidth, and regular equipment maintenance. Failure to do so will continue to render CAIS policies ineffective, regardless of pedagogical innovation.
- 2. Implications for Institutional Administration:** Principals and Heads of Departments must address the resource-support gap. They need to institute mandatory, ongoing ICT training and support teams dedicated to the GS unit to reduce the reliance on lecturers' personal efforts. Furthermore, they must explore strategies like subsidizing devices or data plans to bridge the digital divide and ensure equitable access for all students.
- 3. Implications for Lecturers:** The positive findings regarding critical thinking and self-confidence validate the time and effort lecturers invest in CAIS. They should continue to harness interactive and project-based CAI tools while formalizing their use of improvisation and peer support as stop-gap measures, simultaneously advocating collectively for infrastructural improvements.

RECOMMENDATIONS

Sequel to the findings and conclusions of this mixed-methods study, the following recommendations are made:

1. **Prioritize Infrastructural Investment:** The State Government and institutional administrations must make the provision of stable electricity and high-speed internet the number one priority for all tertiary institutions. This should include investing in solar power solutions and dedicated, robust server infrastructure to ensure uninterrupted CAIS functionality.
2. **Mandate and Fund Comprehensive Training:** Institutions should establish mandatory, continuous ICT skills training for all lecturers, focusing not just on using the software but on CAIS content development and troubleshooting strategies. Incentives (e.g., allowances, promotions) should be offered to lecturers who successfully integrate innovative CAIS methods.
3. **Address the Digital Divide Equitably:** Institutions should implement programs to ensure equitable student access. This could involve subsidizing laptops/tablets, providing free or subsidized data access on campus, or creating more, better-equipped 24-hour CAIS laboratories.
4. **Strengthen IT Support and Maintenance:** Institutions must hire and retain dedicated, highly skilled technical staff whose primary role is maintaining and supporting CAIS in the GS unit. A regular maintenance budget should be ring-fenced to prevent delays and system failures.
5. **Integrate CAIS Holistically:** Academic management should ensure CAIS is fully integrated into the curriculum and assessment framework of all General Studies courses, moving beyond its current use primarily for CBT exams and simple presentations.

REFERENCES

1. Adewoye, S. E., & Olaseni, A. O. (2022). A Systematic Review of Factors that Influences the Efficacy of Computer Based Learning. *JETL (Journal of Education, Teaching and Learning)*, 7(2), 166-175.
2. Anike, D. O. (2024). Utilization and Challenges of Information and Communication Technology (ICT) in Teaching and Learning Business Education in Tertiary Institutions in Anambra State, Nigeria. *Online Media and Society*, 5(3), 51-59.
3. Eslit, E. R. (2023). 21st Century teaching: updates, challenges, and best practices. *St. Michael's College, Iligan City, Philippines*.
4. National Open University of Nigeria. (2024). *Policy on General Studies (GST)*. Available at <https://dqa.nou.edu.ng/wp-content/uploads/2024/12/Policy-on-General-Studies-GST.pdf>
5. Ogbu, E. (2023). General studies: The intellectual meeting point for all disciplines in tertiary institutions in Nigeria. *PREORC Journal of Arts and Humanities*, 5(1).
6. Oguejiofor, J. O., & Obidile, J. I. (2023). Effects of Computer-aided Instruction on Students' Performance in Use of English in Tertiary Institutions in Anambra State, Nigeria. *Global Journal of Arts, Humanities and Social Sciences*, 11(10), 58-68.
7. Oluwatosin, A. M., & Bolanle, O. F. (2024). Teachers' education in Nigeria: challenges and the way forward. *World Scientific News*, 188, 67-80.
8. Onochie, P. C. & Ishiwu, I. U. (2022). Application of Information Communication Technology (ICT) Facilities in The Implementation of Social Studies Education Curriculum in Covid-19 Era Among Colleges of Education in Enugu State, Nigeria. *British International Journal of Education and Social Sciences*. 9(4), 4519-6511).
9. Rawat, K. S., & Sood, S. K. (2021). Knowledge mapping of computer applications in education using CiteSpace. *Computer Applications in Engineering Education*, 29(5), 1324-1339.
10. Wali, M., & Ahmad, L. (2021). Computer Assisted Learning (CAL): A Learning Support System Solution. *Webology*, 18(1).
11. Wallis, A. (2023, September 22). What is General Education? Its Purpose and Impact Explained. <https://www.snhu.edu/about-us/newsroom/education/why-are-general-education-courses-important>