



**FUTURITY**  
OF SOCIAL SCIENCE

DOI: <https://doi.org/10.57125/FS.2024.06.20.06>

**How to cite:** Alutu, C. E. (2024). Impacts of Computer-Managed Instruction in Basic Technology Education in Junior Secondary Schools in Anambra State. *Futurity of Social Sciences*, 2(2), 103-119. <https://doi.org/10.57125/FS.2024.06.20.06>

## Impacts of Computer-Managed Instruction in Basic Technology Education in Junior Secondary Schools in Anambra State

*Chidozie Emeka Alutu*

*M.Ed., Lecturer, School of education, department of educational foundation and administration, Nwafor Orizu College of Education, Nsugbe, Anambra State, Nigeria, <https://orcid.org/0000-0001-7089-1468>*

*Correspondence email: [alutu.emeka@nocen.edu.ng](mailto:alutu.emeka@nocen.edu.ng).*

**Received:** March 22, 2024 | **Accepted:** June 2, 2024 | **Published:** June 14, 2024

**Abstract:** This study utilised a cross-sectional survey design in order to evaluate the impact of computer-managed instruction (CMI) on teaching basic technology in junior secondary schools in Anambra State. Covering the Onitsha Education Zone, the study employed a multi-stage sampling to select 20 schools and 840 students and teachers. Data was collected through a structured questionnaire assessing CMI availability and impact, validated by experts and tested for reliability. The questionnaires were administered over a month, with data analysed using the SPSS software and statistical techniques. The results indicated a positive correlation between CMI integration and enhanced learning experiences, with students reporting increased motivation, interest, and engagement in Basic Technology lessons. Additionally, CMI is found to enhance problem-solving abilities, confidence in learning, and performance outcomes. Both teachers and students recognize the transformative possibilities of CMI, despite differences in their perceptions. These findings underscored the importance of embracing technological advancements in education to cultivate dynamic learning environments. The study offers practical implications for educational stakeholders,

advocating for the continued integration of CMI to meet the evolving needs of students and prepare them for success in a digital age.

**Keywords:** Computer-managed instruction, Basic technology education, Junior secondary schools, Cross-sectional survey, Anambra State

## Introduction

Computer-managed instruction has revolutionized the way basic technology education is taught. Through CMI, students are now able to engage with the material in a more interactive and dynamic manner, which has resulted in increased excitement and interest in the subject (Ahmed, 2023). Additionally, CMI has improved problem-solving abilities among students by providing them with opportunities for hands-on learning and experimentation (Suarez et al., 2023). Furthermore, the use of computer technology in teaching basic technology has not only increased students' confidence but also their participation in various academic activities, including homework and extracurricular tasks (Lee et al., 2024). Moreover, CMI has facilitated easier comprehension of complex concepts and instructions, making learning more accessible and enjoyable for students (Rezuanova et al., 2023).

Voogt and Fisser (2015) posit that the development of computer technology from processing information to also supporting communication has augmented its potential for education. The integration of computers with communication systems, including audio and video technology, has led to the use of terms such as multimedia or digital media (Ionescu et al., 2024). The increasing integration of technology, such as computers and various devices, into daily life necessitates a reassessment by educational experts of the impact and possibilities of technology in educational settings and how it can be studied (Weng & Chiu, 2023). Computer-managed instruction is used to manage several components of the teaching process, including scheduling, record-keeping, and evaluation. Computer-managed instruction is also known as computer-mediated instruction (CMI). A computer gathers, manages, and stores data in the CMI to guide students through personalised learning experiences (Zhang, 2021).

In terms of both services and applications, it mandates the use of computers in the sphere of education. When a student uses computer software, the computer can effectively handle the data on his progress, including his performance on each test item, keeping track of his shortcomings and strengths, providing the teacher with helpful feedback, etc. (Ani et al., 2020; Rosenberg-Kima et al., 2022). The system that maintains this kind of bookkeeping in the educational space is known by the acronym CMI. Digital design, programming basics, and computer literacy, with interactive tutorials and video lectures, are examples of CMI that students can access at their leisure (Lee, 2023). Teachers can use the system to track students' development and provide tailored comments based on how they perform. The learner's present level of knowledge, together with any shortcomings or gaps, should be evaluated (Bednar, 2022; Hung et al., 2022).

One major aspect of CMI is Learning Management Systems (LMS). According to Ryann (2009) a learning management system (LMS) refers to a software application designed for the purpose of administering, documenting, tracking, reporting, automating, and delivering educational courses, training programs, materials, or learning and development programs. Phillippo and Krongard (2012) posits that Learning Management Systems (LMSs) are primarily centered on the delivery of online learning, yet they have an extensive array of applications. LMSs act as a versatile platform for online

content, accommodating a variety of courses, both asynchronous and synchronous in nature. The primary objective of designing LMSs was to pinpoint and address areas of insufficiency in training and learning through the utilization of analytical data and reporting (Akhmedova & Rahmatova, 2024; Ryann, 2009).

Learning Management Systems (LMSs) possess the capability to proficiently manage courses, users, and roles. Furthermore, LMSs enable teachers in designing automated assessments and assignments for learners. In addition, LMSs provide a platform where students can effectively exchange feedback amongst themselves (Gupta et al., 2024; Phillip & Krongard, 2012). According to Shaji (2021), Learning Management Systems (LMSs) can offer educational content, track assignment progress, and give feedback on student performance. Learning Management Systems (LMS) serve as a virtual learning platform that enhances the learning process for both educators and learners (Wu, 2024). In the context of online learning, LMS facilitates and reinforces the learning process for teachers and students alike.

By providing integrated structures that encourage online collaborative-groupings, professional development, discussions, and communication among its users, LMS creates an inclusive environment that enables academic progress. This was highlighted in previous studies by Dias and Dinis (2014), Oakes (2002) as a standard feature of LMS. A few examples of LMS are Moodle, Blackboard, and Canvas, which can be very useful in the teaching of basic technology. In summary, LMSs are a valuable tool for teaching Basic Technology. Additionally, LMSs serve as a commendable demonstration of Computer-Managed Instruction (CMI) by providing a platform that efficiently manages various aspects of the educational process (Kelly-Jackson, 2024; Shaji, 2021). Blackboard is a crucial learning management system that has gained widespread adoption among educational institutions. The active participation and engagement of students with Blackboard is a fundamental platform that has the potential to enhance learning outcomes, and as such, it is imperative for students to possess a strong understanding of this system (Khatter et al., 2024; Zitha et al, 2023).

The blackboard offers a complete platform for managing all areas of the instructional process efficiently and effectively, which makes it a great tool for CMI in teaching basic technology generally (Tunmibi et al., 2015; Zoet, 2023). Another tool in Learning Management Systems is Moodle. This is free and open-source software that allows educators to create online courses and manage virtual classrooms (Quansah & Essiam, 2021; Suárez et al., 2022). It provides a platform for teachers to create and deliver course content, track student progress, and facilitate communication between students and teachers. Moodle is widely used in educational institutions around the world (Arifin et al, 2023; Tunmibi et al., 2015).

Tunmibi et al. (2015) defined Canvas as a cloud-based learning management system (LMS) used by many educational institutions and organisations to manage online and blended learning programmes. It provides tools for course creation, content delivery, assessment, and communication between teachers and students. Finally, CMI allows for better communication between teachers, students, and parents, which can help improve learning outcomes. CMI tools can be used to create and manage online courses, track student progress, and provide feedback on student performance (Veluvali & Suriseti, 2022). They can also be utilised for developing assessments that evaluate student learning outcomes and provide valuable data for enhancing instruction. In attempting to comprehend the utilisation of CMI as a technological instrument crafted to facilitate pedagogy and scholarship, it is imperative to elaborate on the concept of technology. The word "technology"

comes from the Greek terms "TECHNE" and "LOGIA," which both refer to the study of craft or art. In essence, technology is a methodical approach to carrying out tasks or resolving issues for the benefit of humanity (de Weck, 2022; Mphahlele & Korkmaz, 2023). Technology is the result of applying knowledge in a practical way, using consistent methods to achieve particular objectives. It includes the utilisation of various tools, materials, and systems, leading to both physical and non-physical outcomes like software and machinery (Morel & Spector, 2022).

A nation cannot attain its aspirations of greatness without investing in technology to develop some of its natural resources. The level of technology in any nation determines how much of its natural resources are used. Therefore, technological advancement is crucial to improving people's quality of life. The extent to which technical literacy is encouraged significantly affects the standard of living that people experience in society (Anyadike et al., 2023; Onatere-Ubrurhe & Ubrurhe, 2024). Technology has enhanced social interaction, travel, and communication methods. Therefore, it is essential for all individuals, regardless of gender, to possess digital literacy skills. As a proactive measure, Basic Technology has been included in the Nigerian junior secondary school curriculum. The subject covers areas such as woodwork, metalwork, electronics, and technical drawing. It covers a variety of topics, including computer literacy, digital design, programming basics, and internet usage. The curriculum is designed to promote creativity, innovation, and problem-solving skills among students. In line with this, Basic technology is taught as a standalone subject or integrated into other subjects like science, health, and physical education.

### *Research Problem*

This study addressed several research gaps and formulated its research problem based on the findings and implications of existing literature. Firstly, although previous research recognizes the advantages of Computer-Managed Instruction (CMI) in education in general, there is a lack of specific studies focusing on its effects in the field of Basic Technology education at the junior secondary level in Anambra State, Nigeria. Most existing studies either generalize across various subjects or focus on higher educational levels, neglecting the unique needs and outcomes associated with CMI in Basic Technology specifically.

Furthermore, existing literature frequently overlooks the detailed perspectives and real-life encounters of both educators and learners regarding the implementation of CMI in the Nigerian academic landscape. This study bridged these gaps by conducting a detailed cross-sectional survey that included both teachers and students from a representative sample of schools in the Onitsha Education Zone. By collecting quantitative data through structured questionnaires and employing statistical analysis, the study provided nuanced insights into how CMI impacts motivation, engagement, problem-solving abilities, and overall academic performance in Basic Technology.

The research problem focused on the evaluation of the specific benefits and challenges associated with CMI in Basic Technology education. The absence or poor implementation of Computer-Managed Instruction (CMI) in Basic Technology education in Junior Secondary Schools in Anambra State which creates several significant problems. This prevents students from developing crucial digital literacy skills needed for success in today's world. Without access to Computer-Managed Instruction (CMI), students may struggle to effectively use computers and other digital tools, which puts them at a disadvantage in their academic and future career endeavors. The absence of CMI also reduces the interactive and engaging elements of learning basic technology. Traditional methods often rely on theoretical explanations without practical applications facilitated by CMI, which can limit students' understanding and retention of complex technological concepts.

Additionally, the absence of CMI can contribute to disinterest and disengagement among students, as it fails to leverage technology's potential to enhance learning experiences. This can lead to decreased motivation to actively participate in Basic Technology lessons, resulting in poorer academic outcomes overall. Furthermore, without CMI, teachers may struggle to adapt their instructional methods to cater to diverse learning styles and abilities effectively. This can perpetuate a cycle of outdated teaching practices that do not align with current educational standards emphasising hands-on learning and technological integration.

### *Research Focus*

The research focused on the evaluation of the impacts of Computer-Managed Instruction (CMI) on basic technology education in junior secondary schools in Anambra State. It aims to assess how CMI influences student performance, engagement, and retention of technological skills. The study examines the effectiveness of CMI compared to traditional teaching methods, considering factors such as teacher readiness, student motivation, and the availability of technological resources. It also explored the challenges and opportunities associated with implementing CMI in diverse school settings, including urban and rural areas, to provide comprehensive insights into enhancing technology education through innovative instructional methods.

### *Research Aim and Questions*

Objectives:

1. To ascertain how students respond to teaching Basic Technology using computer-managed instruction.
2. To determine the impact of computer-managed instruction **use** in the teaching and learning of Basic Technology.

Research Questions:

1. How do students respond to teaching when computer-managed instruction is integrated in teaching process?
2. To what extent does the use of computer-managed instruction impact teaching and learning Basic Technology?

Hypotheses:

1. There is no significant difference in the mean responses of teachers and students on responses to computer-managed instruction in teaching and learning Basic Technology.
2. There is no significant difference in the mean responses of teachers and students on the impact of computer-managed instruction in teaching and learning Basic Technology.

### *Literature Review*

The study was rooted in Constructivism, a learning theory emphasising learners' active construction of knowledge through reflection, mental modelling, and integration of new information. This pedagogical approach, advocated by Elliott et al. (2000) and Mcleod (2024), asserts learners' role in shaping their understanding within specific contexts, with technology facilitating Constructivist learning environments (Tam, 2000). In addition, the Design and

Technology (D&T) framework highlights the creative process of technology, drawing on knowledge from various fields (Wilson & Harris, 2004). The Technological Pedagogical Content Knowledge (TPACK) framework emphasizes the importance of educators using technology effectively (Kurt, 2018). Integration of the 4Cs framework (Collaboration, Communication, Critical Thinking, Creativity) is crucial for technological literacy in a modern society (Pardede, 2020). However, it's essential to tailor theoretical frameworks to students' needs, resources, and learning outcomes (Makewa, 2019). The study incorporates behaviourist, cognitivist, and constructivist theories, advocating for interactive and engaging instructional materials (McLeod, 2024). In the context of Computer-Managed Instruction (CMI) in Basic Technology education in Anambra State's junior secondary schools, these frameworks guide effective implementation. By integrating principles of technology education, students develop technological literacy through hands-on problem-solving (Wilson & Harris, 2004). Thus, understanding these theories informs the study's approach to assessing the impacts of CMI on Basic Technology education, acknowledging the diverse perspectives and methodologies necessary for comprehensive analysis.

## Research Methodology

### *General Background*

The study adopted a cross-sectional survey design to assess the impact of computer-managed instruction (CMI) on teaching basic technology in junior secondary schools in Anambra State. This design facilitates data collection through questionnaires, enabling researchers to gather insights from a representative sample of the target population, consisting of both teachers and students. The study took place in the Onitsha Education Zone, covering Onitsha North, Onitsha South, and Ogbaru local government areas. This region has a blend of urban and rural characteristics. With many Igbo-speaking people working in different fields, the study looks at how teaching and learning are done in junior secondary schools in the zone. It takes into account the fast pace of technological advancements influencing education.

### *Sample*

The study involves a total of 1,092 junior secondary school students and teachers from 28 public schools in the Onitsha Education Zone. The research uses a multi-stage sampling technique, starting with randomly selecting 70% of schools from each zone, which amounts to 20 schools. From each school, one Basic Technology teacher and 10 students from each level (1, 2, and 3) are chosen at random, resulting in a total of 20 teachers and 840 students.

### *Instrument and Procedures*

Data collection depended on a structured questionnaire known as 'Impact of Computer-Managed Instruction in Teaching and Learning Basic Technology in Junior Secondary Schools Questionnaire' (ICMITLBTJSSQ). This questionnaire was divided into two sections: one for demographic information and the other for assessing the availability and effectiveness of CMI. Various Likert scales were employed to gauge respondents' opinions on CMI utilisation and its effects. The instrument underwent validation by three experts from educational psychology and guidance and counseling departments. Their feedback informs revisions to ensure clarity and relevance. Reliability testing involves distributing the questionnaire to 20 respondents from neighboring schools, with a subsequent re-administration after a week. The resulting reliability coefficient of 0.88 demonstrates the instrument's consistency. Questionnaires are administered by

the researcher and assistants, with a one-month period allocated for both distribution and retrieval. Respondents are given five days to carefully complete the questionnaires.

### Data Analysis

Data analysis employed statistical techniques such as mean, standard deviation, and chi-square, facilitated by Statistical Product and Service Solution software (SPSS, version 20). The test-retest method verified the instrument's reliability, ensuring the accuracy of the gathered data.

## Results

**Table 1**

### *Demographic Characteristics of Teachers and students*

Demographic Characteristic	Teachers	Students
Gender		
Male	8 (44.4%)	406 (50.1%)
Female	10 (55.6%)	404 (49.9%)
Class		
JSS1	6 (33.3%)	225 (27.8%)
JSS2	7 (38.9%)	387 (47.8%)
JSS3	5 (27.8%)	198 (24.4%)
Teaching Experience		
Less than 5 years	6 (33.3%)	
6-10 years	8 (44.4%)	
More than 10 years	4 (22.2%)	
Awareness of CMI		
Yes	18 (100%)	819 (100%)
No	0 (0.0%)	0 (0.0%)

Table 1 delineates the demographic makeup of teachers and students. It reveals a slight majority of female teachers (55.6%) compared to males (44.4%), while among students, males dominate (50.1%) over females (49.9%). Class-wise, JSS2 students are most numerous (47.8%), followed by JSS1 (27.8%) and JSS3 (24.4%). In teaching experience, a significant proportion of teachers have 6-10 years of experience (44.4%), while fewer have less than 5 years (33.3%) or over 10 years (22.2%). Encouragingly, all teachers (100%) and students (100%) exhibit awareness of computer-managed instruction (CMI). This comprehensive breakdown underscores gender, class, teaching tenure, and CMI awareness distribution among participants, elucidating crucial demographic facets of the surveyed cohort.

### *Research Question 1: How do Students Respond to Teaching when Computer-Managed Instruction is Integrated in Teaching Process?*

**Table 2**

### *Extent of Students' Response to Computer-Managed Instruction*

S/No	Item	To a great extent	To a little extent	Not at all	Not applicable
		F (%)	F (%)	F (%)	F (%)

1	Learning is motivated when using computer-managed instruction for learning Basic Technology	463 (55.9)	103 (12.4)	89 (10.7)	173 (20.9)
2	Computer-managed instruction has increased interest of students in Basic Technology	348 (42.0)	224 (27.1)	143 (17.3)	113 (13.6)
3	Students attend Basic Tech lessons more when computer technology is used	374 (45.2)	285 (34.4)	68 (8.2)	101 (12..2)
4	Computer-managed instruction activities in Basic Tech are always interesting and engaging	486 (58.7)	123 (14.9)	105 (12.7)	114 (13.7)
5	Students are more eager to do their Basic Tech home work when using computer technology	390 (47.1)	285 (34.4)	68 (8.2)	85 (10.3)
6	Students' participation in holiday and week-end Basic Tech activities has increased using computer technology	493 (59.5)	102 (12.3)	87 (10.5)	146 (17.6)

The table 2 shows the extent of students' response to computer-managed instruction in Basic Technology. The table has six items, each with four response options: "To a great extent," "To a little extent," "Not at all," and "Not applicable." The table also shows the frequency and percentage of students' responses for each item. The results show that for the item "Learning is motivated when using computer-managed instruction for learning Basic Technology," 55.9% of students responded "To a great extent," while only 12.4% responded "To a little extent." For the item "Computer-managed instruction has increased interest of students in Basic Technology," 42.0% of students responded "To a great extent," while 27.1% responded "To a little extent." For item 1 "Students attend Basic Tech lessons more when computer technology is used," 45.2% of students responded "To a great extent," while 34.4% responded "To a little extent."

In Basic Tech class, students find computer-managed instruction activities to be interesting and engaging, with 58.7% responding that they agree to a great extent, and only 14.9% responding to a little extent. When it comes to doing their Basic Tech homework using computer technology, 47.1% of students said they are more eager to do it to a great extent, while 34.4% responded to a little extent. Additionally, the use of computer technology has led to an increase in students' participation in holiday and weekend Basic Tech activities, with 59.5% responding to a great extent, and only 12.3% responding to a little extent.

### *Research Question 2: To what Extent Does the Use of Computer-Managed Instruction Impact Teaching and Learning Basic Technology?*

**Table 3**

*Extent of the Impact of Computer-Managed Instruction on Teaching Basic Technology*

S/No	Item	To a great extent	To a little extent	Not at all	Not applicable
		F (%)	F (%)	F (%)	F (%)
1	CMI has enhanced students' problem-solving abilities in relation to Basic Tech	334 (40.3)	222 (26.8)	99 (12.0)	173 (20.9)

2	Using Computer technology has improved students' confidence in learning the Basic Technology skills	436 (52.7)	209 (25.2)	56 (6.8)	127 (15.3)
3	Students are more eager to do their Basic Tech home work when using computer technology	404 (48.8)	198 (23.9)	99 (12.0)	127 (15.3)
4	Students' participation in holiday and week-end Basic Tech activities has increased using computer technology	421 (50.8)	83 (10.0)	166 (20.0)	158 (19.1)
5	Use of computer technology improves students' performance in Basic Tech	410 (49.5)	14 (17.4)	147 (17.8)	127 (15.3)
6	Using Computer technology has made learning Basic Tech easier	395 (47.7)	164 (19.8)	83 (10.0)	186 (22.5)
7	Using Computer Technology has made Students desire to pursue a career in Technology in future	327 (39.1)	275 (33.2)	102 (12.3)	127 (15.3)
8	The use of computer-managed instruction simplifies difficult instructions in Basic Technology.	348 (42.0)	264 (31.9)	119 (14.4)	97 (11.7)

Table 3 shows the extent of the impact of Computer-Managed Instruction (CMI) on teaching Basic Technology. The table has 8 items that were evaluated based on the extent to which CMI has enhanced students' problem-solving abilities, improved their confidence in learning Basic Technology skills, increased their participation in holiday and weekend Basic Technology activities, made learning Basic Technology easier, and more rewarding. The results show that for item 1, 40.3% of the respondents indicated that CMI has enhanced students' problem-solving abilities to a great extent, while 26.8% affirmed to a little extent, and 12.0% said not at all.

For item 2, 52.7% of the respondents revealed that using computer technology has improved students' confidence in learning Basic Technology skills to a great extent, while 25.2% and a little extent, and 6.8% indicated not at all respectively. For item 3, 48.8% of the respondents agreed that students are more eager to do their Basic Tech homework when using computer technology to a great extent, while 23.9% admitted a little extent, and 12.0% said not at all. For item 4, 50.8% of the respondents pointed that students' participation in holiday and weekend Basic Tech activities has increased using computer technology to a great extent, while 10.0% said to a little extent, and 20.0% said not at all.

For item 5, 49.5% of the respondents indicated that the use of computer technology improves students' performance in Basic Tech to a great extent, while 17.4% revealed to a little extent, and 17.8% indicated not at all. For item 6, 47.7% of the respondents avowed that using computer technology has made learning Basic Tech easier to a great extent, while 19.8% signified to a little extent, and 10.0% denoted not at all. For item 7, 39.1% of the respondents assured that using computer technology has made students desire to pursue a career in Technology in the future to a great extent, while 33.2% indicated to a little extent, and 12.3% said not at all. For item 8, 42.0% of the respondents confirmed that the use of computer-managed instruction simplifies difficult instructions in Basic Technology to a great extent, while 31.9% and 14.4% respondents admitted not at all respectively.

*Null Hypothesis (H<sub>0</sub>1): There is no Significant Difference in the Mean Responses of Teachers and Students on Responses to Computer-Managed Instruction in Teaching and Learning Basic Technology*

**Table 4**

*Mean Comparison of Teachers and Students on Students' Responses to Computer-Managed Instruction in Teaching and Learning Basic Technology*

S/No	Item	Mean score of Teachers	Mean score of Students	T value	P value	Remarks
1	Learning is motivated when using computer-managed instruction for learning Basic Technology	2.11±1.23	1.96±1.23	.507	.612	Not significant
2	Computer-managed instruction has increased interest of students in Basic Technology	2.22±1.11	2.02±1.07	.505	.620	Not significant
3	Students attend Basic Tech lessons more when computer technology is used	1.94±1.06	1.87±1.00	.791	.429	Not significant
4	Computer-managed instruction activities in Basic Tech are always interesting and engaging	4.00± 2.00	2.36±1.00	.758	.458	Not significant
5	Students are more eager to do their Basic Tech home work when using computer technology	1.89±1.08	1.81±0.96	.299	.765	Not significant
6	Students' participation in holiday and week-end Basic Tech activities has increased using computer technology	2.11±1.28	1.86±1.18	.285	.779	Not significant

The table 4 compares the mean scores of teachers and students on students' responses to computer-managed instruction in teaching and learning Basic Technology and there are six items listed in the table, each with their respective mean scores for teachers and students.

The results show that in line with Hypothesis 3, for items 1 to 6, the p-values are all greater than 0.05, indicating that there is no significant difference between the mean scores of teachers and students for each item.

*Null Hypothesis (H<sub>0</sub>2): There is no Significant Difference in the Mean Responses of Teachers and Students on the Impact of Computer-Managed Instruction in Teaching and Learning Basic Technology*

**Table 5**

*Mean Comparison of Teachers and Students on the Impact of Computer-Managed Instruction in Teaching and Learning Basic Technology*

S/No	Item	Mean score of Teachers	Mean score of Students	T value	P value	Remarks
1	CMI has enhanced students' problem-solving abilities in relation to Basic Tech	2.50±1.50	2.16±1.16	1.356	.176	Not significant
2	Using Computer technology has improved students' confidence in learning the Basic Technology skills	2.11±1.13	1.84±1.09	1.309	.207	Not significant
3	Students are more eager to do their Basic Tech home work when using computer technology	2.11±1.18	1.93±1.10	1.037	.300	Not significant
4	Students' participation in holiday and week-end Basic Tech activities has increased using computer technology	2.28±1.17	2.07±1.01	.999	.331	Not significant
5	Use of computer technology improves students' performance in Basic Tech	2.11±1.18	1.98±1.13	.671	.503	Not significant
6	Using Computer technology has made learning Basic Tech easier	2.22±1.26	2.07±1.01	.627	.538	Not significant
7	Using Computer Technology has made Students desire to pursue a career in Technology in future	2.33±1.08	2.03±1.06	.722	.470	Not significant
8	The use of computer-managed instruction simplifies difficult instructions in Basic Technology	2.33±1.34	1.95±1.01	.688	.501	Not significant

The table 5 compares the mean scores of teachers and students on the impact of computer-managed instruction in teaching and learning basic technology. There are 8 items in the table, each representing a different aspect of computer technology usage in teaching and learning. The mean scores of teachers and students are provided for each item, along with the T-value, p-value, and remarks indicating the significance of the difference between the mean scores. The table shows that for all 8 items, the mean score of teachers is slightly higher than that of students, but the differences are not statistically significant ( $p > 0.05$ ). Hypothesis 4 is not rejected.

## Discussion

The study involved a total of 18 teachers (55.6% males and 44.4% females) and 810 students (50.1% males and 49.9% females). The results of the tables indicate that the study achieved a well-balanced representation of both male and female participants among students and teachers. There were more teachers and students of JSS2 classes, suggesting a potential inclination or exposure to CMI within this particular class. Furthermore, a majority of the teachers possessed teaching experience ranging from 6 to 10 years, potentially indicating a heightened interest in CMI within this specific group. Further finding shows that all the teachers and students were aware of computer-managed instruction. This is in conformity with Madudili (2020) where it stated that the adoption of ICT (Information and Communication Technologies) in teaching and learning processes has led to the use of computers and other technological gadgets for curriculum content delivery in Nigeria. Hence, acknowledging the awareness of the CMI in the schools. This finding agrees that there is a very high awareness level of CMI among teachers and students of Basic Technology in secondary schools will make a profound impact in teaching and learning.

The study suggests that students demonstrate a favourable reaction to computer-managed instruction. This indicates that computer technology has the potential to enhance students' inclination towards Basic Technology, their attendance in instructional sessions, their completion of assignments, and their involvement in supplementary activities. Hypothesis 3 remains unchallenged as there was no noticeable variation in the average answers provided by teachers and students. This is in line with Jesse et al. (2015) who established that individuals who receive computer-assisted instruction (CAI) demonstrate significantly better performance in the field of science compared to those who are taught using conventional instructional techniques (CIT). In contrast to conventional instructional methods, Tunmibi et al. (2015) found that the implementation of e-learning promotes the enhancement of communication skills and personal attributes, including autonomy, analytical perception, and abstraction. Furthermore, the findings are consistent with the study conducted by Ahiatrogah et al. (2013), which demonstrated that the group exposed to Computer Assisted Instruction (CAI) achieved higher performance compared to the group that received traditional instructional approaches. These findings provide evidence that when Basic Technology education places a high emphasis on CMI (Computer-Mediated Instruction), it enables students and teachers to take full advantage of the benefits associated with it.

The findings suggest that the utilization of Computer-Managed Instruction (CMI) has a positive impact on the teaching of Basic Technology. This can be seen through the development of students' problem-solving skills, increased confidence in acquiring Basic Technology abilities, and heightened participation in extracurricular Basic Technology activities outside of regular school hours. Additionally, the incorporation of computer technology improves performance in Basic Technology and makes learning easier. Furthermore, the use of CMI could influence students' career aspirations, inspiring them to pursue a future in the Technology field. Nevertheless, some respondents expressed that CMI has not had any impact on the instruction of Basic Technology, which suggests that there may be certain limitations to its effectiveness. The present study aligns with the findings of Jesse et al. (2015) who demonstrated that computer-assisted instruction (CAI) outperforms conventional instructional techniques (CIT) in the domain of science, and similarly, it is also effective in imparting knowledge in the realm of Basic Technology.

The limitations of the study included the sample size constraints, the regional specificity, and the implementation variability among schools. These limitations could affect the generalizability of

results beyond Anambra State, as findings may not represent broader educational contexts or different socio-economic environments. Additionally, variations in infrastructure and teacher readiness could influence outcomes, limiting applicability to schools with similar conditions. Thus, while insights are valuable locally, caution is needed when extrapolating findings to diverse educational settings or regions with different resources and policies. **Conclusions and Implications**

## Conclusion

In conclusion, the study on the impacts of Computer-Managed Instruction (CMI) in Basic Technology education in junior secondary schools in Anambra State illuminated the significant role of technology in shaping modern educational practices. Through a comprehensive analysis of teachers' and students' perceptions, demographic characteristics, and responses to CMI, valuable insights have been gleaned regarding its effectiveness as an educational tool. The findings reveal a positive correlation between the integration of CMI and enhanced learning experiences for students. Across various aspects such as motivation, interest, engagement, problem-solving abilities, and performance improvement, CMI emerges as a facilitator of enriched educational environments. Moreover, the study underscores the importance of teachers' awareness and readiness to adapt to technological advancements, thereby fostering a conducive atmosphere for effective learning.

While slight variations exist between teachers' and students' perceptions, both groups acknowledge the transformative potential of CMI in Basic Technology education. These insights not only contribute to the body of knowledge on technology-enhanced learning but also provide practical implications for educational stakeholders in Anambra State and beyond. As technology continues to evolve, it is imperative for educational institutions to embrace innovative pedagogical approaches that harness the power of digital tools like CMI. By doing so, they can effectively address the diverse learning needs of students and prepare them for success in an increasingly digital world. In light of these findings, future research endeavors could explore longitudinal studies to assess the long-term impacts of CMI implementation, as well as investigate strategies for overcoming potential barriers to its adoption. Ultimately, by leveraging the benefits of CMI, schools in Anambra State have the opportunity to foster a dynamic learning environment that empowers students with the knowledge and skills needed to thrive in the 21st century.

## Suggestions for Future Research

Future research should explore several key areas. Firstly, longitudinal studies could provide insights into the long-term effects of CMI on student performance and retention of technological skills. Secondly, comparative studies between urban and rural schools could highlight disparities and identify tailored strategies for effective CMI implementation in diverse settings. Moreover, there is a need for research to explore how CMI can be combined with various instructional strategies to identify the best practices in teaching. It is essential to also analyse the impact of educators' training and ongoing professional growth on the implementation of CMI in educational settings. Furthermore, studies focusing on student engagement and motivation in CMI environments can offer valuable data on enhancing the learning experience. Lastly, exploring the impact of CMI on students with special educational needs will ensure inclusive education practices, benefiting all learners in Anambra State.

## Acknowledgements

Acknowledgements are extended to the Onitsha Education Zone authorities, experts in educational psychology, and research assistants for their valuable contributions and support during the course of this study. Their expertise and assistance have significantly enriched the scientific rigor and quality of this research.

## Conflict of Interest

None.

## Funding

The Authors received no funding for this research.

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