

Innovative instructional approach: the effect of information and communication technology-assisted instruction on civic education students' performance

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Abstract

Purpose – The study explored the effect of information and communication technology-assisted instruction (ICTAI) on civic education (CE) students' academic performance and the effect of gender on students' performance. Specifically, the study addressed the facilitating effect of ICTAI on students' scholarly performance.

Design/methodology/approach – This study utilised the quasi-experimental approach. A sample of 255 senior secondary school students was the analysis unit. A teacher-made performance test was used as an instrument for the study. The data were analysed with descriptive statistics for the research questions, and hypotheses tested with paired sample *t*-test statistics.

Findings – The study results indicated that ICTAI improved student scholarly performance. The study also proved that gender had an impact on student academic performance.

Research limitations/implications – Not all the students in intact classes that were used for conducting the study/research, and the background and gender of research assistants were not considered, and these could have affected the result of the study. The study implications are that this study is a piece of deeper ingenuity and innovation that provides an additional source of information to study. The study provided proof that innovative activity-based instructions such as computer-assisted instruction (CAI) boost students' performance.

Practical implications – On the instructor, the study findings demonstrated the significant effect of ICTAI on the scholarly performance of CE students. Consequently, this study contends that CE instructors/teachers can benefit from the implications of these findings by comprehensively understanding that ICTAI usage enhances student performance and, thus, improves the students' performance. Additionally, the study's findings proved that gender affected students' performance when instructed with ICTAI. The study implies that CE instructors/teachers should pay special attention to students' gender, specifically female students, as gender affects the improvement of students' CE performance when instructed with ICTAI.

Originality/value – The study findings contribute to the literature on academic improvement and performance of CE students by enhancing the understanding of the effect of ICTAI on students' scholarly performance. The study recognises the existing gaps in previous literature and vivid understanding of the effect of ICTAI on students' performance and gender as a mediator.

Keywords Innovative instructional approach, Computer-assisted instruction, Gender, Civic education, Civic education students', Academic performance

Paper type Research paper



Introduction

Education is an essential instrument for national development, and without it, it is not easy to imagine where the world, and of course, Nigeria, would have been. This is because it is the vehicle that drives many nations' technological, social, political, and economic development. As such, it serves as a safeguard for the social order. Throughout their time in school, young people are taught the norms of conduct that will help them become productive members of society. This role of education was defined more vividly in Nigeria's National Education Policy (FRN, 2014), which called education an instrument of choice for national development. People are trained to adapt to changing circumstances through education. Education, like other social institutions, is a tool for social change. It has been and is being used to transform the economic, political and social systems.

Education remains the tool or key in Nigeria to escaping national and individual poverty. This has necessitated the implementation of several education policies, including the 9-3-4 education structure, which provides basic education for nine (9) years, six (6) years of primary/elementary, three (3) years of upper basic, three (3) years of senior secondary and four (4) years of higher or tertiary education/schooling. Several cross-cutting, compulsory subjects exist within senior secondary education to achieve the objectives of education at the senior secondary and civic education (CE) is one of them.

CE focusses on or emphasises the development/advancement of citizens' values, social norms, skills and democratic ideals. Hence, Ige and Orungbemi (2013) opined that CE prepares learners to participate in society's culture actively. CE becomes very pertinent as it aims to introduce students or citizens to democratic socialisation by encouraging support for citizens' democratic behaviours and values. It is an instrument used in the education (training) of independent nation citizens to make them more aware of and involved in political and social issues, more comfortable interacting with others, better equipped to find solutions to issues or problems and contribute to society and more capable of reaching their full potential as human beings (Falade and Adeyemi, 2015). CE is critical to a country's development and advancement. Indeed, a nation's development or progress is built on active and high-quality citizenship. No society or nation can thrive unless its members display civic principles and qualities. No society or nation can prosper or develop without exhibiting civic virtues and beliefs.

Given the significance of CE, as indicated above, it is, therefore, necessary to apply an appropriate teaching method that will not only facilitate the achievement of its objectives but also improve students' performance in this subject. Teachers use several teaching methods to teach the subject in the classroom, including the conventional lecture.

Information and Communication Technology (ICT) is a term used to describe telecommunications and computer integration, in addition to essential enterprise software, storage, audio-visual systems and middleware that enable or help users access, store, transmit and manipulate information. For this study, "ICT-Assisted Instruction" (ICTAI) is denoted as the application or usage of multi-media technologies such as computer systems, PowerPoint application slides, projectors and the projector screen in learning. Multi-media technologies support the teacher's role in (ICTAI) by providing and facilitating skills and knowledge to learners. Thus, instead of teaching the learners, the teacher only facilitates learning using multi-media devices.

Numerous researches were conducted to investigate the effect of ICTAI on academic achievement. Some studies claim that ICTAI is effective in improving students' achievement as compared to the traditional method (Ozomadu, 2020; Galle and Galle, 2018; Eze *et al.*, 2020; Samuel and Okonkwo, 2020; Samuel & Okonkwo, 2020; Eze and Onwusa, 2020; Salihu, 2021; Rogayan *et al.*, 2021; Obro, 2022; Ukaigwe & Goi-tanen, 2022; Obro and Enayemo, 2022; Ude and Onah, 2022), whilst some findings show that the use of ICTAI made students' performance unchanged (Rosali, 2020; Yeşilbaş, Korkmaz, and Çakir, 2020; Ekundayo, 2022).

This study verified if the same connection will be established between ICTAI and academic performance in CE amongst secondary students.

Evidence abounds on the educational/academic value of computers, particularly in advanced countries. Various studies, however, have yielded no conclusion on whether students learn instructional content faster and retain what they have learnt better when using ICTAI. Researchers have examined the usefulness/success of ICTAI in the teaching and learning process. For example, [Samuel and Okonkwo \(2020\)](#) found ICTAI effective in upper-basic classes teaching. The researcher is convinced that using ICTAI in CE classes will improve students' learning experiences. Applying ICTAI makes for a vivid, more explicit presentation of concepts, information and ideas and increases knowledge retention.

Gender is a specially constructed phenomenon that biologically differentiates between males and females, leading society to give men and women different roles, responsibilities, behaviours and habits ([Mangvwat, 2006](#)). Gender is a social undertone with a solid psychological background, often used to denote precise cultural behavioural patterns attributed to the human sexes. At the same time, sex is only concerned with the differences and unique features between males and females based on biological characteristics (bodies). Gender comprises roles/responsibilities, behaviour and personality based on how a person sees himself.

Sundry studies have been conducted to ascertain the factors that impact students' academic performance. [Julius \(2018\)](#), [Julius et al. \(2018\)](#), [Ekundayo \(2020\)](#) and [Salihu \(2021\)](#) asserted that gender affects students' performance in some subject areas. The results of these studies differ, with some favouring males and others favouring females. Studies by [Aguillon et al. \(2020\)](#), [Ani et al. \(2020\)](#), [Eseine-Aloja \(2021\)](#) and [Salihu \(2021\)](#) showed that male students had enhanced performance than female students. This aligns with the earlier submissions of [Mwihia \(2020\)](#), [Kisigot, Ogula, and Munyua \(2021\)](#). However, it contradicts the findings of [Julius \(2018\)](#), [Julius et al. \(2018\)](#), who found females achieved better than males. [Ogheneakoke, Obro, and Benike \(2019\)](#), [Ani et al. \(2021\)](#), [Obro \(2022\)](#), [Ude and Onah \(2022\)](#), [Obro \(2023\)](#) asserted that the gender of students, whether male or female, do not affect the academic performance of the students. Thus, they found no significant gender difference in the performance of students. The study of gender differences amongst senior secondary school students is inconclusive. Therefore, this study compared boys and girls in senior secondary school students' performance in CE.

Concept of ICT-assisted instruction (ICTAI)

[Nwafor and Oka \(2016\)](#) ICT-Assisted instruction is a way to teach that is both active and interactive. A computer is used to present the teaching material and track what is being learnt. ICTAI uses pictures, sounds, text and video to help people learn. The computer has a lot of uses and benefits in the classroom, and it can be used to help a student in every facet or aspect of a subject and programme. The term "Information and Communication Technology-Assisted Instruction" (or "ICT-Assisted Instruction") describes the process/action of computer utilisation or application to enhance teaching.

To [Fakomogbon, Adetayo, Oyeboode, and Enuwa \(2014\)](#), it is a collection of information stored on a CD that may be viewed on a monitor or screen of a computer when needed by students for use. ICTAI is a new and innovative instructional technique that promotes learner-computer connection. It is an electronic kind of education that allows students to present and enjoy the planned learning activity in friendly learning with the computer ([Nwaubani, Okafor, & Onyeausi, 2014](#)). The computer assists the teacher's role in facilitating learning with the aid of ICTAI. Thus, instead of lecturing, the instructor directs and aids students in asking questions, posing difficulties, formulating hypotheses, finding information and critically assessing it ([Akinola, 2012](#)). [Ode \(2018\)](#) asserts that ICTAI has the

same problems as programmed or planned Instruction. It is often repetitious and restricts learning to discrete components, which might obfuscate the links between ideas.

ICTAI has several distinguishing characteristics, making it an intriguing area. Its flexibility in distance learning is one of its most valuable aspects. Prior to the advent and introduction of microcomputers, distant learning was primarily conducted through programmed teaching, postal systems and telephone connections/contacts. In contrast, ICTAI allows students to communicate with their teachers frequently and receive prompt feedback. Students can work independently and repeat lessons as frequently as necessary. ICTAI is useable with more students than a traditional classroom because it includes an audio-visual component that may make the instruction more engaging. ICTAI and web-based Instruction have provided individuals with disabilities with previously unavailable avenues of access (Kareem, 2015).

ICT-assisted instruction and students' performance

Fakomogbon *et al.* (2014) investigated the effects of computer-assisted instruction on mathematics students' performance. Eighty (80) students participated in the study. The findings reported that students instructed in mathematics with ICTAI did better in comparison to those instructed using the conventional method. Students' gender did not affect their performance. Ciftci *et al.* (2014) examined the effects of computer-based statistics instructional tools on achievement. The study was quasi-experimental. The result indicated that computer-based tools for statistics instruction reduce statistics anxiety, improve attitudes towards statistics and increase success.

Adeniyi and Yusuf (2016) investigated the effects of ICTAI on economics students' independent/personal learning skills. It was a two-by-two pre-test-post-test quasi-experimental study. The study result proved that students instructed with ICTAI recorded improved performance than those instructed without ICTAI. Sedega, Mishiwo, Fletcher, and Kofi (2017) investigated ICTAI's effect on students' mathematics achievement. The study established that both the ICTAI and the traditional approach enhanced students' performance, but the ICTAI approach improved students' achievement.

Suleman *et al.* (2017) examined the effect of ICTAI on Physics students' achievement. Forty-six students were selected as the study sample. The study reported that ICTAI significantly boosted students' achievement positively. Julius *et al.* (2018) examined computer-assisted teaching on chemistry students' performance in Kenya. The study sampled 174 students from four secondary schools. The study demonstrated that students in the ICTAI group increased their achievement compared to students in the Conventional Instructional Methods (CIM) group.

Gender and students performance

Cheruiyot (2019) investigated into how integrating Computer-Assisted Teaching Strategy to secondary schools in Baringo County affects how well students perform in school. The study took samples from 324 students using the stratified sampling method and *t*-test. The study discovered significant difference in how well students performed in school based on their gender. Aguillon *et al.* (2020) looked into whether or not there are differences between men and women in Science, Technology, Engineering and Mathematics (STEM) courses. The type of the study was a survey. The study found differences between men and women in men's favour. Ani *et al.* (2021) looked at how gender affects how well high school students perform in social studies. Seventy-two (72) students took part in the study, which was sort of like an experiment. The study showed no difference in performance based on students' gender.

Kisigot *et al.* (2021) examined how students' grades differ by gender. The study found differences in performance based on gender. Eseine-Aloja (2021) explored how gender affects

the scholarly performance of students who take classes outside of school. A survey was used for the study. The number of students in the study was 180. Using ANOVA, the study showed that gender affects student performance in favour of male students. [Salihu \(2021\)](#) ascertained how well economics students did when they were taught with the help of computers. The study used a quasi-experimental research method and a sample of 140 students from two high schools who were studying economics. The study showed that the scores of male and female students on the posttest were statistically different. In an investigation by [Tsaousis and Alghamdi \(2022\)](#) on the degrees of measurement invariance across gender with 1,800 graduates, they found difference based on participants gender. In the study, the female students improved when compared to male students.

Conceptual model

This study categorised CE instructional approaches/methods into two major groups: Conventional Instructional Methods (CTM) and ICTAI. The study’s independent variables were the ICTAI and CTM, whilst the dependent variable was students’ academic performance and the intervening/moderating variable was students’ gender. Gender was inbuilt into this study to control statistically for its variation. The interactions amongst the independent, moderating and dependent variables utilised for the study are represented diagrammatically, as indicated in [Figure 1](#).

RQS.

- RQ1.* What is the difference in pretest and posttest scores of instructed with ICTAI?
- RQ2.* What is the difference in mean gain scores of CE students instructed with ICTAI by gender?

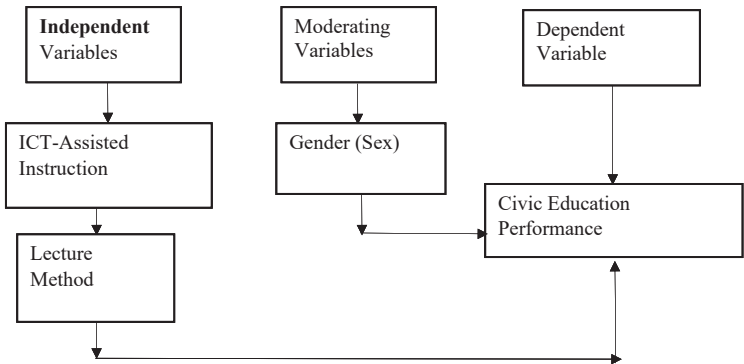
Hypotheses.

- Ho1.* The pretest and posttest mean scores of students instructed with ICTAI will not differ significantly.
- Ho2.* Students instructed with ICTAI in CE will not differ significantly by gender.

Methods

Study design/population

This study adopted the pretest, posttest, control group design. It is a quasi-experimental study. The study population comprised 72,854 students of CE.



Source(s): Figure by authors

Figure 1.
Conceptual model for
the effect of ICTAI on
performance in civic
education

Study sample/sampling technique

The study sample consisted of 170 SS II students from four (4) schools, representing 0.4% of the population. Students were selected using a multistage sampling method. The first sampling stage selected a local government area in each of the three (3) senatorial districts of Delta State. Using simple random sampling, the second stage selected one school from the three selected local government areas. The third stage of sampling selected 170 students. The sample was divided into experimental and control groups. The selected school in each local government area was assigned a treatment or control group by simple balloting.

Instrumentation

The instrument was the Civic Education Performance Test (CEPT). The test comprised 25 multiple-choice items. The items were selected based on topics in CE at the time of experimentation. Kuder-Richardson Formula 20 was utilised to determine test (instrument) reliability. The reliability was established at 0.87, signifying that the test is highly reliable. The research lasted six (6) weeks.

The CEPT was chosen because it is an objective tool to measure students' performance on the effect of ICTAI on students' scholarly performance. It helped establish the effect of treatment (ICTAI) on students' academic performance. Also, because is a more general instrument for a study of this nature (Quasi-experiment) (Korb, 2015). The study required a pretest and posttest; as such, a test of this nature is suitable for the study. It helped to ascertain whether the desired performance change occurred following the experimentation and allowed the content coverage for the study.

Administration procedure

After the subjects/participants' selection and assignment of methods to them, the CEPT was administered as a pretest in the intact classes selected for the study. This was followed by teaching the content/topics in the syllabus/scheme of work of the schools, using the designated instructional treatments. Mean statistics was applied to answer the research questions, whilst a paired samples *t*-test was employed for the hypotheses testing at a 0.05 significance level.

Results

RQ1: what is the difference in pretest and posttest scores of civic education students instructed with ICT-assisted instruction?

Table 1 compares the pre-test and posttest mean scores of students instructed with the ICTAI. The result shows that the pretest mean scores of the students are 24.74, whilst their posttest mean score is 54.69. The mean increase or gain is 29.95, indicating a difference between the pretest and posttest scores of students instructed with ICTAI. The observed difference in their pretest could be ascribed to extraneous variables, whereas the difference in their posttest could be credited to the effect of the teaching methods treatment.

Figure 2 and Table 1, illustrates the comparison of the pre-test and post-test mean scores of ICTAI. The graphical illustration shows ICTAI can enhance CE students' performance (figure by authors).

Ho1: the pretest and posttest mean scores of students instructed with ICT-assisted instruction will not differ significantly

Table 2 compares the variance/difference in pretest and posttest scores of students instructed with ICTAI. The outcome indicates that $t = 56.74$, $p 0.05$, thus rejecting the null hypothesis. This implies that the pretest and posttest scores of students instructed with ICTAI differ

significantly. Their posttest scores are higher than their pretest scores, which indicate that ICTAI enhanced students' performance; thus, it is an effective teaching method. The magnitude of the variance between the pretest and posttest scores is significant, as indicated in the Cohen-d value of 0.97. This connotes that the differences observed amongst students result from ICTAI.

BRQ2: what is the difference in mean gain scores of civic education students instructed with ICT-assisted instruction by gender?

Table 3 compares performance means scores of students instructed with ICTAI by gender. The result indicates that the mean performance score of male students is 55.70, whilst that of female students is 53.85. The average gain is 1.85, indicating a variation by students' gender. According to the findings, male students instructed using ICTAI outperformed female students. Figure 3 and Table 2, illustrates the comparison of the performance mean scores of

Table 1.

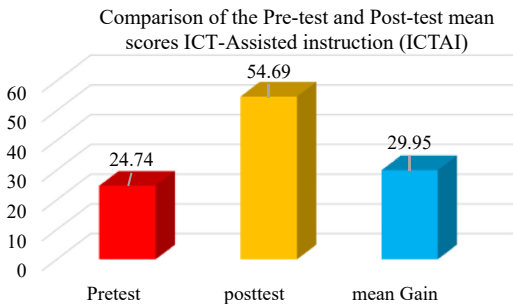
Comparison of the pre-test and post-test mean scores of secondary school students taught with ICT-Assisted instruction

Method	Test	N	Mean	SD	Mean Gain
ICT-Assisted Instruction	Pre-Test	85	24.74	3.05	29.95
	Post-Test	85	54.69	4.14	

Source(s): Table by authors

Figure 2.

Students' pre-test and post-test scores in information and communication-assisted instruction (ICTAI)



Source(s): Figure by authors

Table 2.

t-test analysis of the difference in the pre-test and post-test scores of secondary school students taught with the ICT-assisted instruction

Test	n	Mean	SD	df	t	P	d	Decision
Pre-Test	85	24.74	3.05	84	56.74	.000	0.97	Significant
Post-Test	85	54.69	4.14					

Source(s): Table by authors

Table 3.

Comparison of the performance mean scores of secondary school male and female students exposed to ICT-assisted instruction

Method	Gender	n	Mean	SD	Mean gain
ICT-Assisted Instruction	Male	40	55.70	3.96	1.85
	Female	45	53.85	3.88	

Source(s): Table by authors

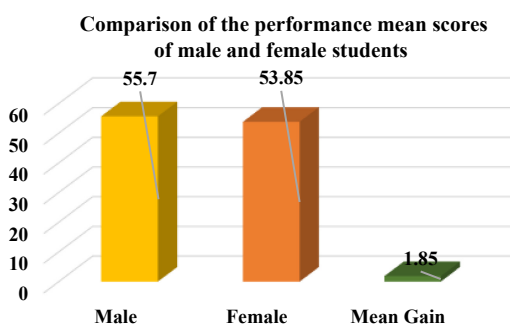
male and female students instructed with ICTAI. The graphical illustration shows male students instructed using ICTAI outperformed female students (Figure by authors).

Ho2: students instructed with ICT-assisted instruction in civic education will not differ significantly by gender

Table 4 shows a significant difference or variation in mean gain scores of students instructed using ICTAI by gender, $F(2, 85) = 5.353$, $P 0.05$. Male students tutored using ICTAI outperformed the female students, indicating that ICTAI favours male students over female students. This finding demonstrates that male students tutored using ICTAI outperformed female students.

Discussion

The result of hypothesis 1 showed a significant variation or difference in the pretest and posttest scores of students tutored with ICTAI. The students' posttest scores are higher than their pre-test scores, indicating that ICTAI boosted or enhanced students' performance, therefore, an effective teaching method. This infers students will benefit from deploying information and communication technology in the teaching/Instruction of CE in secondary schools. This is because ICTAI involves multi-media that use video and sound, engaging and stimulating students' interest. It creates a more interactive learning environment. It also concretises abstract content, making the learning experience participatory, natural and interesting to the students. This finding is in agreement with Nwaubani *et al.* (2014), Adedamola (2015), Alasoluyi (2015), Ozomadu (2020), Eze *et al.* (2020), Samuel and Okonkwo (2020), Eze and



Source(s): Figure by authors

Figure 3.
Performance mean
scores of male and
female students
exposed to ICT-
assisted
instruction (ICTAI)

Source	Type III sum of squares	df	Mean square	F	Sig	Partial eta squared
Corrected Model	103.673 ^a	2	51.837	3.190	0.046	0.072
Intercept	3292.782	1	3292.782	202.652	0.000	0.712
Pre	16.029	1	16.029	0.987	0.324	0.012
Sex	86.982	1	86.982	5.353	0.023	0.061
Error	1332.374	82	16.248			
Total	255709.000	85				
Corrected Total	1436.047	84				

Note(s): a. R Squared = 0.072 (Adjusted R Squared = 0.050)

Source(s): Table by authors

Table 4.
ANCOVA analysis of
the difference in the
mean gain scores of
civic education
secondary school male
and female students
exposed to ICT-
assisted instruction

Onwusa (2020), Salihu (2021), Rogayan *et al.* (2021) and Obro (2022), who found that ICTAI is more effective and boosts student achievement. The finding concurs with Onuigbo (2012), Ukaigwe and Goi-tanen (2022), Obro and Enayemo (2022) and Ude and Onah (2022), who established that students instructed or tutored with ICTAI outperformed students instructed or tutored with the traditional/conventional method. However, this finding is in discrepancy with the studies of Mill (2001), Rosali (2020), Yeşilbağ *et al.* (2020) and Ekundayo (2022) that revealed that ICTAI was useful as a fact-based or factual classroom learning tool but less useful for mathematical problem-solving or critical thinking topics.

The result of hypothesis two revealed that students instructed with ICTAI in CE differ significantly based on gender. Male students tutored with ICTAI improved or increased their performance compared to the female students, indicating that ICTAI favours male students over female students. This finding could be explained by the fact that male students are more plausible to have a positive attitude towards ICT use. This is owing to the fact that male students are more plausible to use computers. One factor that could explain why boys are more likely to use computers is that they use their time watching television, playing or using video games, computers and other media than girls, who are typically expected to help their mothers prepare food and help with other house chores. This finding agrees with Kay (2006), which showed that male students report more computer usage, higher self-efficacy and more positive affective attitudes when compared to female students. Furthermore, the finding is consistent with Alakpodia (2014), Aguillon *et al.* (2020), Ani *et al.* (2020), Mwihiia (2020), Eseine-Aloja (2021), Salihu (2021) and Kisigot *et al.* (2021) who established that male students had higher skills and a more advanced level of computer software use than female students, but contradicts Julius (2018), Julius *et al.* (2018) and Obro and Enayemo (2022) who found females achieved better than males.

Conclusions

The study ascertained the use of ICTAI in enhancing students' performance in CE. Prior to the application of ICTAI, the students' performance was at a low level. After the intervention/treatment, students' performance in CE improved. Students' performance differs significantly after their exposure to ICTAI. The results indicated that ICTAI could improve students' performance in CE.

Based on the study results, ICTAI is an effective instructional tool and method for CE instruction in schools. In comparison, ICTAI proved more effective than the lecture method in CE instruction. Both genders responded to the teaching method differently. ICTAI tends to favour male students more than female students. ICTAI proved to enhance students' performance in CE. Thus, the study confirmed that gender affected the improvement of students' CE performance when exposed to ICTAI.

Recommendations

- (1) Secondary school teachers should apply ICTAI to teach CE.
- (2) The government should train teachers on using or applying ICTAI through seminars and workshops.
- (3) Education authorities should review CE teaching methods to include ICTAI.
- (4) Innovative teaching methods, such as ICTAI, should be incorporated into teacher education programmes' curricula.
- (5) ICTAIs should be used in teaching CE; however, special attention should be paid to students' gender, specifically female students.

Practical implications

On the instructor side, the study findings demonstrated the significant effect of ICTAI on the scholarly performance of CE students. Consequently, this study contends that CE instructors/teachers can benefit from the implications of these findings by comprehensively understanding that ICTIA usage enhances student performance and, thus, improves their performance.

Additionally, the study's findings proved that gender affected students' performance when exposed to ICTAI, as evidenced by the $F(2, 85) = 5.353$, $P 0.05$, implying that CE instructors/teachers should pay special attention to students' gender, specifically female students, as gender affected the improvement of students' CE performance when exposed to ICTAI.

Theoretical implications

According to the study findings, ICTAI boosted students' academic performance, as indicated by a Cohen-d value of 0.97. Therefore, for academics working in the field of instructional/teaching strategies utilisation, this finding advances their understanding of the effectiveness of ICTAI on students' scholarly performance and it adds to the existing literature on these two (ICTAI and performance) variables.

Scholars and instructors can develop or advance better instructional approaches and strategies to improve CE students' performance via instructional approaches based on ICTAI usage and enhanced theoretical understanding of the various effects on students' academic or scholarly achievement. Theoretically, the present study advances a research model by ascertaining the efficiency of ICTAI as a tool for enhancing students' performance and gender as a moderator. The results prove that ICTAI efficiently improves students' performance and gender affects students' performance, which is necessary for supporting the ideology computer-mediated instructional approach via Information and Communication Technology-Assisted Instruction (ICTAI) is an alternative instructional approach to improving students' performance.

Study limitations

First, not the whole students in intact classes were used for conducting the study, and the research assistants engaged in the research/study were the regular CE teachers. Their background characteristics, such as personality, experience, attitude and gender, were not well-thought-out and could have affected the study outcome. The treatment period was six weeks and was essentially restricted to the teaching period as spelled out in the school schedule and timetable. All of this was done to ensure that the study did not disrupt the school's regular activities. The content utilised was also limited to what was on the scheme of work for the term during the experimentation; to ensure non-disruption of the smooth running and administration of the sampled schools.

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Further reading

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