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EFFECT OF METACONCEPTUAL INSTRUCTIONAL STRATEGY ON SECONDARY SCHOOL STUDENTS' INTEREST IN INFORMATION AND COMMUNICATION TECHNOLOGY IN ONITSHA EDUCATION ZONE

[1]**Nwankwo, Madeleine Chinyere**
mac.nwankwo@unizik.edu.ng
&
[2]**Okeke, Nkechi Francisca**
nkechifranciscao@gmail.com

[1,2] Department of Science Education
Nnamdi Azikiwe University, Awka

ABSTRACT

The study investigated the effect of Metaconceptual Instructional Strategy (MIS) on secondary school students' interest in Information and Communication Technology (ICT) in Onitsha Education Zone, Anambra State. The study was guided by two research questions and three hypotheses tested at 0.05 level of significance. The study adopted a quasi-experimental research design involving a pre-test, post-test, non-equivalent control group. The population comprised Junior Secondary School Two (JSS2) students offering Information and Communication Technology in public secondary schools in Onitsha Education Zone. A sample of 145 students selected through a multi-stage sampling procedure participated in the study. Data were collected using the Information and Communication Technology Interest Scale (ICTIS), which was validated by experts in Science Education and Measurement and Evaluation. The reliability coefficient of the instrument was established using Cronbach Alpha and yielded an acceptable coefficient of 0.78. Mean and standard deviation were used to answer the research questions, while Analysis of Covariance (ANCOVA) was employed to test the hypotheses at the 0.05 level of significance. The findings revealed that students taught ICT using the Metaconceptual Instructional Strategy recorded significantly higher interest than those taught using the Conventional Lecture Method. The study also found that gender had no significant influence on students' interest when exposed to the Metaconceptual Instructional Strategy. The study concluded that Metaconceptual Instructional Strategy is an effective learner-centred instructional approach for enhancing students' interest in Information and Communication Technology irrespective of gender. It was recommended, among others, that ICT teachers should adopt the Metaconceptual Instructional Strategy in classroom instruction to stimulate students' interest and promote meaningful learning in ICT.

Keywords: Metaconceptual Instructional Strategy, Information and Communication Technology, Students' Interest, Gender.

Introduction

Science education has remained one of the major drivers of scientific advancement, technological innovation, and socio-economic development across the world. It equips learners with the knowledge, skills, values, and competencies required to understand natural phenomena, solve societal problems, and adapt to emerging technological changes. In contemporary education, science education extends beyond the acquisition of scientific facts to include the development of critical thinking, creativity, problem-solving ability, and digital literacy necessary for participation in a knowledge-driven society. According to Ibeh and Okigbo (2024), science education is a systematic process of teaching and learning that develops scientific knowledge, inquiry skills, and positive attitudes needed for sustainable national development. Similarly, Đorđević (2025) described science education as an educational enterprise that prepares learners to function effectively in an increasingly technology-oriented society through the acquisition of scientific and technological competencies. Consequently, many educational systems have continued to integrate technology-related subjects into school curricula to prepare students for the demands of the twenty-first century.

One of the most important technology-oriented subjects offered at the junior secondary school level is Information and Communication Technology (ICT). Information and Communication Technology has evolved from being merely a tool for communication into a multidisciplinary field that supports learning, research, business, governance, healthcare, and industrial development. Its growing relevance in virtually every aspect of human endeavour has made ICT literacy an indispensable component of modern education. As technological innovations continue to reshape global economies, schools are increasingly expected to prepare students with the digital competencies required to participate effectively in the information society. This expectation has positioned ICT as one of the core subjects within Nigeria's Basic Education curriculum.

Information and Communication Technology refers to the collection of digital technologies, communication systems, software applications, computer hardware, and network resources used for the acquisition, processing, storage, retrieval, transmission, and dissemination of information. Onyeka, Chikendu, and Enebechi (2023) defined ICT as the organized application of computers and related technologies for processing, managing, storing, and communicating information efficiently. Similarly, Ocholla (2018) viewed ICT as the systematic manipulation and dissemination of information through electronic technologies, while Bhoi (2017) described ICT as the integration of computing and communication technologies for information processing and exchange. UNESCO (2017) further explained that ICT encompasses computers, internet facilities, multimedia technologies, mobile communication systems, digital broadcasting platforms, and other electronic resources that facilitate information sharing and knowledge construction. These definitions indicate that ICT is not limited to computers alone but comprises a wide range of technologies that support communication, learning, productivity, and innovation.

Within the Nigerian educational system, Information and Communication Technology occupies a strategic position because it provides learners with foundational digital skills required for further

education, employment, entrepreneurship, and lifelong learning. The inclusion of ICT in the Basic Education curriculum reflects the recognition that digital literacy has become an essential competency for national development. ICT exposes learners to practical experiences involving computer hardware, software applications, internet technologies, data management, communication systems, and emerging digital innovations. According to Vanderlinden (2014), ICT education prepares learners to use digital technologies confidently and responsibly while developing competencies required in contemporary workplaces. Nweke (2018) also observed that ICT enables students to acquire practical skills in word processing, spreadsheet applications, graphics design, internet navigation, programming, and other technological operations that enhance learning across school subjects.

Beyond the acquisition of technical skills, ICT contributes significantly to improving the quality of teaching and learning. The integration of ICT into classroom instruction promotes active learning, collaborative problem-solving, creativity, communication, and independent inquiry. Ghavifekr and Rosdy (2015) reported that ICT enhances classroom interaction by providing learners with access to diverse learning resources, thereby improving understanding and knowledge retention. Similarly, Priyank and Nehal (2017) maintained that ICT facilitates innovative pedagogical practices capable of increasing learners' motivation, participation, and academic performance. These benefits explain why governments, educational institutions, and international organizations continue to invest heavily in ICT infrastructure and digital education programmes.

Despite the educational significance of Information and Communication Technology, students' interest in the subject has remained a concern among educators. Although ICT is recognized as one of the most relevant subjects for preparing learners for the digital economy, many students still demonstrate low enthusiasm for learning several ICT concepts, particularly those requiring conceptual understanding and practical application. Reports from the Anambra State Education Board between 2020 and 2024 indicated persistent difficulties among students in mastering fundamental ICT concepts such as computer operations, word processing, presentation packages, internet navigation, and basic programming, suggesting declining engagement with the subject. These reports further revealed that many students either avoided ICT-related examination questions or demonstrated inadequate conceptual understanding of essential computer operations, thereby highlighting the need for more effective instructional approaches. Such evidence suggests that improving students' interest in ICT remains an important educational priority.

Interest is regarded as one of the strongest affective determinants of successful learning because it influences learners' attention, engagement, persistence, and willingness to participate in learning activities. Educational psychologists have consistently argued that students who develop genuine interest in a subject devote greater effort to learning, persist longer during challenging tasks, and demonstrate higher levels of achievement. Chikendu, Ejesi, and Abumchukwu (2021) described interest as an individual's favourable disposition toward an activity or object, resulting in sustained attention and active participation. Similarly, Onah and Anamezie (2022) asserted that students with

high interest exhibit greater curiosity, improved concentration, better retention of learned concepts, and stronger commitment to academic tasks. Hidi and Renninger (2006) further explained that interest develops progressively from situational curiosity to a well-developed individual disposition capable of sustaining long-term engagement in learning activities.

Within ICT education, students' interest plays an indispensable role because many ICT concepts require active exploration, experimentation, problem-solving, and continuous practice. Students who develop positive interest in ICT are more likely to interact with digital technologies, explore software applications independently, engage in collaborative learning, and acquire practical competencies beyond classroom instruction. Conversely, students with little interest often exhibit passive classroom behaviour, reduced motivation, and poor conceptual understanding. Okafor (2020) emphasized that one of the primary responsibilities of teachers is to stimulate learners' interest because interest serves as a prerequisite for meaningful learning and improved academic performance. Likewise, Balaraba (2016) maintained that students' interest is influenced by the value they attach to learning activities, while Ugwu (2023) observed that learners who demonstrate sustained interest generally achieve better academic outcomes than those who remain indifferent toward classroom instruction.

Although several factors influence students' interest in ICT, instructional strategy remains one of the most controllable variables within the classroom. Numerous studies have attributed declining interest in science and technology subjects to the continued reliance on conventional teacher-centred instructional methods that emphasize memorization rather than active conceptual engagement. Such approaches often provide limited opportunities for students to question, reflect, collaborate, or construct their own understanding of ICT concepts. Consequently, contemporary educational research increasingly advocates learner-centred instructional strategies capable of promoting conceptual understanding, active participation, reflective thinking, and sustained interest. It is against this background that the present study examines the effectiveness of the Metaconceptual Instructional Strategy as an innovative pedagogical approach for enhancing secondary school students' interest in Information and Communication Technology in Onitsha Education Zone.

Among the learner-centred instructional approaches that have gained increasing attention in science and technology education is the Metaconceptual Instructional Strategy (MIS). The strategy emerged from the principles of metacognition and conceptual change theory and is designed to help learners become consciously aware of their existing conceptions, evaluate the adequacy of those conceptions, and reconstruct them in the light of scientifically acceptable explanations. Unlike conventional instructional approaches that emphasize the transmission of knowledge from teacher to learner, the Metaconceptual Instructional Strategy actively engages students in reflecting on their thinking, identifying misconceptions, monitoring conceptual change, and applying newly acquired knowledge to solve real-life problems. Nwankwo, Achufusi, and Offiah (2019) described MIS as a learner-centred instructional strategy that integrates metacognitive processes with conceptual learning to promote meaningful understanding. Similarly, Hartelt and

Martens (2024) explained that metaconceptual instruction encourages learners to critically examine their prior knowledge, confront conflicting ideas, and deliberately reorganize their conceptual structures through guided reflection and self-evaluation.

The Metaconceptual Instructional Strategy comprises several interrelated components that facilitate meaningful learning. These include metaconceptual knowledge, metaconceptual awareness, metaconceptual monitoring, metaconceptual evaluation, and metaconceptual application (Nwankwo, Achufusi, & Offiah, 2019). Metaconceptual knowledge enables learners to understand how concepts are formed and modified during learning. Metaconceptual awareness encourages students to reflect on their existing ideas and recognize alternative conceptions. Metaconceptual monitoring allows learners to examine their cognitive processes while learning, whereas metaconceptual evaluation provides opportunities for assessing the validity and consistency of conceptual understanding. Finally, metaconceptual application enables learners to transfer newly acquired knowledge to unfamiliar situations and practical problem-solving. Through these processes, students become active participants in learning rather than passive recipients of information.

The effectiveness of the Metaconceptual Instructional Strategy lies in its ability to promote conceptual understanding through reflective learning activities. Practical classroom activities such as concept mapping, prediction-observation-explanation exercises, reflective journals, concept cartoons, collaborative discussions, poster presentations, and guided questioning encourage learners to identify misconceptions, justify their reasoning, compare alternative viewpoints, and reconstruct their understanding (Ramdayani, Latifah, Yurniwati, & Taofik, 2023). Such activities stimulate intellectual curiosity, encourage critical thinking, and provide opportunities for learners to regulate their own learning processes. Consequently, MIS creates an interactive classroom environment in which students actively construct knowledge instead of memorizing isolated facts.

Within Information and Communication Technology education, the Metaconceptual Instructional Strategy offers considerable potential for improving students' interest. ICT contains numerous abstract concepts such as computer architecture, data processing, internet communication, operating systems, networking, and programming, which often present learning difficulties for junior secondary school students. Conventional lecture-based instruction frequently emphasizes factual knowledge without adequately addressing students' misconceptions or engaging them in meaningful conceptual activities. As a result, many learners fail to appreciate the relevance of ICT concepts or develop sustained interest in the subject. By encouraging learners to question their assumptions, reflect on their understanding, and relate ICT concepts to real-life technological experiences, MIS transforms learning into an intellectually stimulating process capable of sustaining students' curiosity and motivation.

The relationship between metaconceptual instruction and students' interest is further supported by the Interest Development Theory of Hidi and Renninger (2006), which explains that interest develops progressively from externally triggered curiosity to well-developed individual interest

through meaningful cognitive engagement. Metaconceptual instructional activities naturally stimulate this progression because learners are continuously challenged to resolve conceptual conflicts, justify their reasoning, and discover meaningful relationships among ideas. As learners experience success in resolving misconceptions and applying newly acquired knowledge, they develop confidence, autonomy, and intrinsic motivation to continue learning. Diseth (2025) observed that instructional strategies promoting reflection, self-assessment, and active engagement significantly enhance learners' motivational dispositions and sustained academic interest. Similarly, Shen et al. (2025) reported that structured metacognitive learning experiences strengthen students' persistence, self-regulation, and long-term engagement with learning tasks.

Empirical evidence has continued to demonstrate the educational value of metaconceptual instructional strategies across science and technology disciplines. Onah and Achufusi (2022) reported that students exposed to the metaconceptual teaching approach demonstrated significantly higher interest and academic achievement in Physics than those taught using the conventional method. Adenike, Ahiakwo, Adolpu, and Omeodu (2025) similarly found that the Metaconceptual Teaching Approach significantly improved Biology students' interest, retention, and academic performance. Koroka et al. (2023) also observed that metacognitive instructional techniques enhanced junior secondary school students' interest in Basic Science and Technology more effectively than the lecture method. Collectively, these studies suggest that learner-centred instructional approaches that emphasize reflection and conceptual understanding have the potential to transform students' attitudes toward learning.

Apart from instructional strategy, gender has remained one of the variables frequently examined in science and technology education. Gender refers to the socially and biologically determined characteristics that distinguish males and females and which may influence learning experiences and educational outcomes (Ibeh & Okigbo, 2024). For several decades, researchers have attempted to determine whether male and female students differ in their interest, participation, and achievement in science and technology subjects. Although increasing educational opportunities have reduced gender disparities in school enrolment, inconsistent findings continue to characterize research on gender differences in science education.

Some researchers have reported that male students demonstrate greater confidence and interest in technology-related subjects because of greater exposure to computers and digital devices outside the classroom. Others have argued that female students perform equally well when exposed to supportive learning environments and learner-centred instructional approaches. For example, Anusiuba (2018) reported significant gender differences in students' achievement in Computer Studies when animated instructional media were used, whereas Nweke (2018) found no significant gender difference among students exposed to similar learning conditions. Likewise, Nwankwo et al. (2019) observed that gender did not significantly influence students' achievement when the Metaconceptual Teaching Approach was employed in Physics instruction. These contradictory findings indicate that the influence of gender may depend largely on the instructional strategy employed, thereby justifying its inclusion as a moderating variable in the present study.

Despite the growing body of literature on metaconceptual instruction, important gaps remain. Most previous studies have concentrated on Physics, Biology, Chemistry, Mathematics, and Basic Science, with relatively few investigations focusing specifically on Information and Communication Technology at the junior secondary school level. Similarly, although numerous studies have examined the effect of metaconceptual instruction on academic achievement, comparatively limited attention has been given to students' interest as the primary outcome variable, particularly within ICT education. Furthermore, previous findings regarding gender differences remain inconsistent, making it difficult to establish whether innovative learner-centred instructional strategies benefit male and female students equally. These gaps indicate the need for additional empirical evidence within ICT classrooms, particularly in Onitsha Education Zone, where reports continue to indicate low students' engagement and declining interest in Information and Communication Technology. The present study therefore sought to investigate the effect of the Metaconceptual Instructional Strategy on secondary school students' interest in Information and Communication Technology in Onitsha Education Zone. Specifically, the study examined whether students exposed to the Metaconceptual Instructional Strategy would demonstrate higher interest than those taught using the Conventional Lecture Method and whether gender would significantly influence students' interest when taught using the strategy.

Purpose of the Study

The purpose of this study was to determine the effect of Metaconceptual Instructional Strategy (MIS) on Students' interest in Information and Communication Technology (ICT) in Onitsha Education Zone. Specifically, the study sought to determine the:

1. Difference between the mean interest scores of students taught information communication technology using Metaconceptual instructional strategy (MIS) and those taught using conventional lecture method (CLM).
2. Difference between the mean interest scores of male and female students taught information communication technology using MIS.
3. Interaction effect of teaching methods and gender on students' interest in information communication technology.

Research Question

The following questions guided the study

1. What is the difference between the mean interest scores of students taught information communication technology using Metaconceptual instructional strategy (MIS) and those taught using Conventional lecture method (CLM)?
2. What is the difference between the mean interest scores of male and female students taught information communication technology using MIS and those taught using CLM?

Hypotheses

The following null hypotheses formulated were tested at 0.05 level of significance:

1. There is no significant difference between the mean interest scores of students taught information communication technology using Metaconceptual instructional strategy and those taught using Conventional lecture method.
2. There is no significant difference between the mean interest scores of male and female students taught information communication technology using MIS and those taught using CLM.
3. There is no significant interaction effect between teaching methods and gender on students' interest in information communication technology.

Methodology

The study adopted a quasi-experimental research design, specifically the pre-test, post-test, non-equivalent control group design. The study was carried out in Onitsha Education Zone of Anambra State, Nigeria. The population of the study comprised all the 4,504 Junior Secondary School Two (JSS2) students offering Information and Communication Technology in the 32 public secondary schools in Onitsha Education Zone. The sample for the study consisted of 145 JSS2 students, comprising 75 males and 70 females, selected using a multi-stage sampling procedure. The instrument used for data collection was the Information and Communication Technology Interest Inventory (ICTII)**.** Responses were rated on a four-point Likert scale of Strongly Agree (4), Agree (3), Disagree (2), and Strongly Disagree (1). Only the interest inventory was used in this study because the focus of the article was students' interest in ICT. The instrument was subjected to face and content validation by three experts, comprising two lecturers from the Department of Science Education and one lecturer from the Department of Educational Foundations (Measurement and Evaluation Unit), Faculty of Education. The reliability of the Information and Communication Technology Interest Scale (ICTIS) was established using the Cronbach Alpha's method to yield a reliability coefficient of 0.78. Prior to the commencement of the experiment, two regular ICT teachers from the participating schools were recruited and briefed as research assistants. The teacher assigned to the experimental group received intensive briefing on the implementation of the Metaconceptual Instructional Strategy, including the use of concept mapping, reflective questioning, prediction-observation-explanation activities, collaborative discussions, concept comparison, and metaconceptual reflection. The teacher assigned to the control group was trained to ensure uniform implementation of the Conventional Lecture Method throughout the treatment period.

The experiment was conducted over a period of four weeks during the normal school timetable. Before the commencement of instruction, the Information and Communication Technology Interest Scale (ICTIS) was administered to both the experimental and control groups as a pre-interest to determine the students' initial level of interest in ICT. The experimental group was subsequently taught selected ICT concepts using the Metaconceptual Instructional Strategy, while the control group received instruction on the same content using the Conventional Lecture Method.

The topics taught included Classification of Computers**,** The Computer System**,** and Hardware Components, which were selected from the approved Junior Secondary School Information and Communication Technology curriculum because they formed part of the scheme of work for the period of the study. At the end of the treatment, the ICTIS was re-administered as a post-interest to both groups under the same testing conditions. The data collected were analyzed using mean and standard deviation to answer the research questions, while Analysis of Covariance (ANCOVA) was employed to test the null hypotheses at the 0.05 level of significance.

Results

Table 1: Mean and standard deviation on interest scores of students taught information communication technology using Metaconceptual instructional strategy (MIS) and those taught using conventional lecture method (CLM)

		Pre-interest		Post-interest		
Method	**N**	**Mean**	**SD**	**Mean**	**SD**	**Mean Gain**
MIS	90	51.62	3.827	69.28	7.617	17.66
CLM	55	50.42	3.784	61.60	7.649	11.18
Mean Diff		**1.20**		**7.68**		**6.48**

Results in Table 1 reveals that the students taught Information and Communication Technology using Metaconceptual Instructional Strategy (MIS) had pre-interest mean score of 51.62 and post-interest mean score of 69.28 with gained mean interest score of 17.66, while those taught with Conventional Lecture Method (CLM) had pre-interest mean score of 50.42 and post-interest mean score of 61.60 with gained mean of 11.18. Students taught ICT using MIS had a less spread of scores in the post-interest (7.617) than those in the lecture group (7.649), indicating that students taught using MIS had a slightly more homogeneous score in their post-interest. The difference between the mean gained interest scores of the students in both groups is 6.48 in favour of Metaconceptual Instructional Strategy (MIS).

Table 2: Mean and standard deviation on interest scores of male and female students taught information and communication technology using MIS and those taught using CLM**.**

			Pre-interest		Post-interest		
Method	**Gender**	**N**	**Mean**	**SD**	**Mean**	**SD**	**Mean Gain**
MIS	Male	50	52.06	3.633	69.56	8.097	17.50
	Female	40	51.08	4.034	68.92	7.058	17.84
Mean Diff							**-0.34**
CLM	Male	25	50.32	3.237	60.80	8.406	10.48
	Female	30	50.50	8.406	62.27	7.032	11.77
Mean Diff							**-1.29**

Table 2 reveals that the male students taught Information and Communication Technology using Metaconceptual Instructional Strategy (MIS) had a post-interest mean score of 69.56 with a mean gain of 17.50, while the female students had a post-interest mean score of 68.92 with a mean gain of 17.84. There was a higher spread of scores among the male students in their post-test (8.097) than among the females (7.058), indicating that the female students had a more homogeneous score in their post-interest. The female students had a slightly higher mean gain (17.84) than the male students (17.50). The mean difference was -0.34 in favour of female students taught ICT using Metaconceptual Instructional Strategy (MIS).

Similarly, male students taught using Conventional Lecture Method (CLM) had a post-interest mean score of 60.80 with a mean gain of 10.48, while the female students had a post-interest mean score of 62.27 with a mean gain of 11.77. There was a higher spread of scores among the male students in their post-interest (8.406) than among the females (7.032), indicating that the female students had a more homogeneous score in their post-interest. The female students had a higher mean gain (11.77) than the male students (10.48). The mean difference was -1.29 in favour of female students taught ICT using Conventional Lecture Method (CLM).

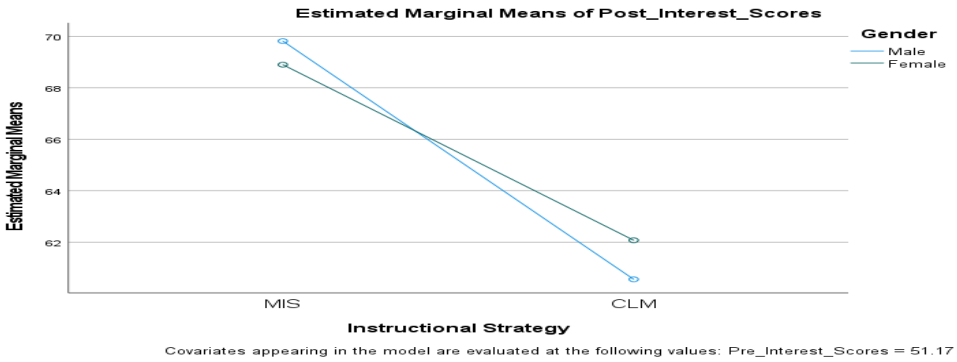
Table 3 Summary of Analysis of Covariance of Mean Interest Scores of Students taught ICT using MIS and CLM

Source	Sum of Squares	Df	Mean Square	F	Sig.	Decision
Corrected Model	2219.439[a]	4	554.860	9.571	.000	
Intercept	5028.457	1	5028.457	86.738	.000	
Pre_Interest Scores	168.773	1	168.773	2.911	.090	
Instructional Strategy	2138.430	1	2138.430	36.887	.000	Sig.
Gender	3.044	1	3.044	.053	.819	Not Sig.
Instructional Strategy * Gender	49.851	1	49.851	.860	.355	Not Sig.
Error	8116.189	140	57.973			
Total	648971.000	145				
Corrected Total	10335.628	144				

Table 3 reveals that there is a significant main effect of instructional strategy on students' interest in Information and Communication Technology, $F(1, 140) = 36.887$, $p = .000 < .05$. Therefore, the null hypothesis is rejected, indicating that there is a significant difference between the mean interest scores of students taught ICT using the Metaconceptual Instructional Strategy (MIS) and those taught using the Conventional Lecture Method (CLM), in favour of MIS.

Table 3 also shows that there is no significant main effect of gender on students' interest in Information and Communication Technology, $F(1, 140) = 0.053$, $p = .819 > .05$. Therefore, the null hypothesis is not rejected, indicating that there is no significant difference between the mean interest scores of male and female students taught ICT using the Metaconceptual Instructional Strategy (MIS) and those taught using the Conventional Lecture Method (CLM).

Furthermore, Table 3 reveals that the interaction effect of instructional strategy and gender was not significant, F(1, 140) = 0.860, p = .355 > .05, indicating that the effect of instructional strategy on students' interest in ICT does not depend on gender.



Plot of interaction effect of instructional strategy and gender on students' mean interest scores in ICT.

The plot of the interaction effect of instructional strategy and gender on students' interest in Information and Communication Technology indicates that the interaction effect is not statistically significant, although the lines representing male and female students intersect slightly. Both male and female students recorded higher estimated marginal mean interest scores when taught using the Metaconceptual Instructional Strategy (MIS) than when taught using the Conventional Lecture Method (CLM). The slight crossover of the lines suggests a minor variation in the pattern of interest between male and female students across the two instructional strategies. However, since the interaction effect was not statistically significant, this variation is insufficient to conclude that gender influenced the effectiveness of the instructional strategies. This implies that the effect of the Metaconceptual Instructional Strategy on students' interest in Information and Communication Technology was comparable for both male and female students, indicating that the instructional strategy is not gender-biased with respect to students' interest.

Discussion of Findings

The finding of this study showed that students taught ICT using the Metaconceptual Instructional Strategy (MIS) recorded higher mean gain interest scores than those taught using the conventional lecture method. This suggests that instructional strategies that engage students in reflecting on their prior knowledge, confronting misconceptions, and reconstructing understanding significantly enhance learners' interest in ICT compared to passive instructional approaches. The reason for this outcome may be that MIS encourages active participation, self-monitoring of learning, and conceptual restructuring, which make ICT lessons more meaningful and engaging. By involving students in dialogue, conceptual change discussions, and reflective thinking, MIS likely stimulates curiosity and sustained interest in ICT concepts. This finding aligns with that of Onah and Achufusi (2022) whose reported that that students in the meta-conceptual teaching approach group achieved

better than their counterparts. Similarly, this finding aligns with that of Koroka, Bawa, Mohammed, Abdulrahim, Kashi and Fatima (2023), in their study, it was found that Metacognitive instructional techniques promote students' interest in Basic science and technology in junior secondary schools more than the lecture method among others. The similarity in findings may be because metaconceptual instructional approache actively engage students in reflective thinking process, which consistently make learning more meaningful, interactive, and interest-stimulating than the conventional lecture method.

The corresponding hypothesis revealed that there was a significant difference between the mean interest scores of students taught ICT using MIS and those taught using the lecture method, in favour of MIS. This indicates that the instructional strategy significantly influenced students' interest in ICT. This finding aligns with that of Adenike Ahiakwo, Adolpu and Omeodu (2025), whose study revealed that there is a significant statistical difference in interest of students taught photosynthesis using MTA and those taught using Lecture Method. This indicates that students exposed to MIS developed significantly higher interest than those exposed to conventional teaching methods, confirming the effectiveness of MIS in stimulating students' affective engagement in ICT learning.

The finding of this study showed that MIS was effective in increasing interest in ICT among both male and female students, however, male students had a higher mean interest scores than their female counterparts. This means the instructional strategy was generally engaging and beneficial across gender. However, this difference may be attributed to factors such as prior exposure to technology, higher self-efficacy in ICT-related tasks, societal perceptions of ICT as a male-dominated field, and differences in participation patterns. This finding aligns with that of Onah and Achufusi (2022), who found that male students demonstrated a higher mean interest scores than their female counterparts.

The corresponding hypothesis revealed that there was no significant difference between the mean interest scores of male and female students taught ICT using MIS. This implies that gender did not significantly influence students' interest when exposed to MIS, thereby confirming that the strategy is effective for both male and female learners. This finding agrees with that of Onah and Achufusi (2022) who revealed that there is no significant difference between the mean interest scores of male and female students taught Physics using MIS.

The finding of this study showed that there was no significant interaction effect of instructional strategies and gender on students' interest scores in ICT. This implies that the effectiveness of MIS in enhancing students' interest does not depend on gender. In other words, both male and female students benefited equally from the strategy. This finding supports the work of Nkok and Anietie (2022), which reported that there is no significant interaction effect of instructional Strategies and gender on students' interest. This finding is in consonance with that of Onah and Achufusi (2022), whose finding revealed that there was no significant interaction effect of gender and the teaching method on students' interest in Physics. The similarity in findings may be attributed to the balanced

and participatory structure of learner-centred strategies, which create inclusive classroom environments. The similarity in findings may be because the Metaconceptual Instructional Strategy (MIS), with its reflective and participatory structure, creates an inclusive learning environment that stimulates interest equally among male and female students, thereby reducing gender-based differences in interest outcomes.

Conclusion

The study concluded that the Metaconceptual Instructional Strategy is more effective than the Conventional Lecture Method in enhancing secondary school students' interest in Information and Communication Technology. The strategy promotes meaningful learning by actively engaging students in reflecting on their prior conceptions, resolving misconceptions, and constructing new knowledge through learner-centred activities. Furthermore, the effectiveness of the strategy was found to be independent of gender, indicating that both male and female students benefited comparably from its implementation. The study therefore establishes the Metaconceptual Instructional Strategy as an effective and gender-inclusive instructional approach capable of improving students' interest in Information and Communication Technology in secondary schools.

Recommendations

1. Information and Communication Technology teachers should adopt the Metaconceptual Instructional Strategy in teaching ICT because it has been found to significantly improve students' interest and promote meaningful engagement in classroom learning.

2. School administrators and curriculum implementers should encourage and support the use of learner-centred instructional strategies such as the Metaconceptual Instructional Strategy by providing the necessary instructional resources and creating opportunities for teachers to implement innovative classroom practices.

3. Teacher education institutions and educational authorities should incorporate the Metaconceptual Instructional Strategy into pre-service and in-service teacher training programmes to equip ICT teachers with the pedagogical competencies required to foster students' interest and improve the quality of ICT instruction.

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