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Assessing The Impact of Cooperative and Individualistic Instructional Strategies On the Computer Science Learning Outcomes of Senior Secondary School Students

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Abstract

A thorough analysis of the current trend in classroom practices reveals that the teacher-centered approach—which favors rote learning over meaningful learning—is the most popular one. The development of a true understanding of computer science and, by extension, scientific concepts, has not been achieved through this type of education; as a result, student performance in internal and external exams continues to be subpar. The hunt for a strategy that will encourage student activity and engagement hasn't stopped. Therefore, this study evaluates how senior secondary school students learning results in computer science are affected by cooperative and individualistic instructional styles. A non-randomization pretest, posttest, and control group quasi-experimental research design was used in the study. The target audience for the study was the entire public Secondary School Computer Science One (SSS 1) student body in the Ikere Ekiti LGA, and the sample of the study consisted of 180 individuals from senior secondary school one (SSS 1) classes that were intact. The study's instrument was the 50-item Computer Achievement Test (CAT), which the researcher designed. The study was guided by four research questions and four research hypotheses. The mean and standard deviation were used to provide descriptive answers to the study's questions, and a student's t-test, Chi-Square, and Analysis of Variance (ANOVA) with an alpha-level coefficient of 0.05 were used to assess the hypotheses. The study's findings revealed that, of all the three strategies employed, the cooperative strategy was the most effective at enhancing computer science cognition. The results of this study also show that there is no discernible difference in achievement between same-gender and mixed-gender schools. Finally, this study shows a strong link between individualistic and cooperative educational approaches. It is therefore recommended that teachers and students should both get frequent training on cooperative learning ideas, processes, and guidelines in light of these findings.

Keywords: Cooperative Strategy, Individualistic Strategy, Computer Science, Learning Outcomes, Secondary School,

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Introduction

Learning about computers and how they function is essential in today's highly connected and digital society. Learning computer science equips students with the knowledge and skills essential to adapt to and make meaningful contributions to today's rapidly evolving technological landscape. Oladimeji, Yusuf, Njoku, and Owolabi (2018) argue that computer science education is necessary to provide individuals with the knowledge and ability to use, grasp, and critically evaluate technology. In a world where technological advancement is a constant, a background in computer science helps students develop skills in critical thinking and problem solving that equip them to tackle complex issues in novel ways. In addition, having a background in computer science may lead to many other career paths, such as those in software engineering, AI, data science, cyber security, and many more. The foundation of computer science education also encourages originality and imagination, which in turn benefits such areas as cross-disciplinary work, digital citizenship, student agency, and technological development. Olojo and Faboya (2023) and Aboderin and Olukayode (2014) provide supporting evidence. Based on this fundamental idea (Oladimeji, Yusuf, Njoku, & Owolabi, 2018), the Federal Government of Nigeria included computer science into the basic and secondary school curriculum.

The challenges that educational systems throughout the globe are encountering place a strain on conventional methods of solving these problems. New approaches are needed to equip today's pupils with the skills they'll need to succeed in the information-based global economy. After more than two decades of unfulfilled promises to revolutionise education, computer and communication technologies are now prepared to provide potential to dramatically enhance teaching and learning. The current trend in classroom practises, as examined in depth by Ifamuyiwa and Akinsola (2015), suggests that the teacher-centered method is the most popular, which tends to prioritise rote learning over meaningful learning. As a result, this approach to education has failed to help students develop a deep understanding of computer science and, by extension, scientific concepts. Students' chronically low achievement in CS and STEM classes seems to be linked to the conventional teaching and instructional strategy utilised by scientific professors. The WAEC Chief Examiner (2018), for instance, found that a large percentage of students in secondary schools did not pass computer science. Problems including insufficient funding for education and a general disinterest in teaching strategies have been connected to this poor performance. George (2016) claims that using effective tactics and tools in the classroom is a panacea for raising students' achievement levels. Methods and course materials serve as independent sources of motivation for students. Students' low computer science achievement may be attributed to a number of factors, including the usage of abstract ideas in education and a lack of qualified professors (Olojo & Faboya, 2023). Like way, it seems that one of the main problems hindering learning and higher achievement in the domains of science and computer science is the continuous use of conventional teaching techniques. Changing this mindset requires more effective classroom discussion. Therefore, context-specific approaches to instruction and assessment are required.

Students of varying abilities work together in small groups to complete a shared task, an approach known as the "cooperative strategy" (Gokhale, 2015). The pupils are responsible for their own learning as well as that of their classmates. This means that the achievements of one student may help the achievements of another. Therefore, it is stressed that each student bring something special to the table that will help the team succeed. Students are able to generate ideas, modify them via group debate and active listening, express uncertainty, and create and implement plans as a group thanks to cooperative learning. To achieve common goals, pool available resources, and jointly generate value while preserving individual identities and institutional autonomy is the goal of a cooperative strategy. It requires the parties to coordinate their efforts and pool their resources, as well as share in any potential losses or gains. Joint ventures, partnerships, alliances, and collaborative projects are all examples of cooperative tactics that may help people get closer to their objectives than they would be if they went at it alone (Wael, 2014; Sharan, 2010). According to Johnson and Johnson (1986), a cooperative group is a learning strategy in which students work together to maximise the strengths of the whole group. In cooperative learning, students work together to complement and improve upon one another's strengths. The students are tasked with working together to help one another, discuss ideas, assess one another's knowledge, and fill in any gaps they may have.

In contrast, an individualistic approach prioritises the needs and aspirations of its individuals above those of the community as a whole. Taking an individualistic stance in the classroom means prioritising the needs of individual students above those of the class as a whole or the larger community. Focusing on one's own initiative, resources, and motivations is central to this approach (Olojo, 2011; Sunday & Elphinah, 2016). Individualistic learning thrives in settings where people's objectives are distinct from one another and when the success of one person's goal does not affect the success of another. An individualistic structure is one that only takes into account the performance of the person being rewarded and pays no attention to the performance of others. Students who are raised in a culture that places a premium on independence are more likely to see hard work as a necessary evil. There is no need for students to be self-conscious in this environment. Each student is responsible for his or her own work, thus the success or failure of one has no influence on the others. Students work at their own pace and are graded only on their own performance. In an individually organised classroom, students do their assignments without consulting one another. This stands in sharp contrast to approaches that prioritise collaboration, harmony, and health for all parties involved. Thus, due to the adaptability of the modern educational system, a teacher may tailor his or her lessons to the needs of the class as a whole or of individual students. However, the issue remains as to whether a more individualistic or collaborative strategy would be more effective in improving students' proficiency in computer science.

Statement of the Problem

The research aims to compare the efficacy of group-based versus individualised approaches to teaching computer science to high school pupils. Research has been conducted to determine what factors contribute to computer science students' persistently low performance on standardised tests. As a consequence, a great deal of research has been done with a major emphasis on how educators really go about their jobs. Fewer studies, however, have focused on the impact of classroom dynamics on students' CS performance. The bulk of the time, educators use strategies that promote students' independence and healthy competition. Individual freedom, self-determination, and self-interest are seen as primary drivers of action in such approaches. Because of this, schools, instructors, and students all strive to be the best they can be in terms of test scores, graduation rates, and other measures of success. Students develop a sense of superiority since they can only excel in areas where their contemporaries have failed, leading them to hide knowledge that might have benefited their classmates. It is now up to the educator to decide between this method and one that encourages student cooperation, one that views the success of one as the success of all and vice versa. Therefore, the purpose of this research was to evaluate the impact of collaborative vs individualistic classroom interaction patterns on the achievement of computer science students in secondary school. Students' CS performance in class was also measured against their interaction patterns in the classroom.

Purpose of the Study

The goal of this study is to ascertain how senior secondary school students' learning results in computer science differ between cooperative and individualistic instructional strategies in senior secondary schools in Ikere Local Government Area, Ekiti State. The particular goals are to:

1. After the experiment, compare the mean scores for computer science achievement between the experimental group's students (cooperative and individualistic techniques) and the control group's students (traditional teaching method).
2. Compare the achievement mean scores in computer science between male and female students who were given cooperative learning assignments.
3. Examine the disparity in computer science success mean scores between students in mixed-gender and single-gender schools who are being taught cooperatively.

Research Questions

To direct the investigation, the following research questions were posed:

1. Are there any differences between the pre-test and post-test mean performance scores of students who were taught computer science utilizing cooperative, individualistic and conventional instructional strategies?
2. Are there any differences between the mean performance ratings of male and female students who received cooperative, individualistic and conventional learning strategies in computer science in Pretest and Posttest?
3. Is there a difference in the computer science test scores of students in mixed-gender and single-gender schools that use a cooperative learning approach?
4. What impact do the cooperative and individualistic instructional strategies have on the post-test learning outcomes for senior secondary school students?

Research Hypotheses

The 0.05 threshold of significance was used to generate and evaluate the following null hypotheses:

1. There are no significant differences between the pre-test and post-test mean performance scores of students who were taught computer science concepts utilizing cooperative, individualistic and conventional instructional strategies.
2. There is no significant difference between the mean performance ratings of male and female students who received cooperative, individualistic and conventional learning strategies in computer science in Pretest and Posttest.
3. There is no significant difference in the computer science pretest and posttest scores of students in mixed-gender and single-gender schools that use a cooperative learning approach.
4. There is no significant impact of cooperative and individualistic instructional strategies on the post-test learning outcomes for senior secondary school students.

Literature Review

Numerous studies on the efficacy of cooperative learning have been conducted both at home and abroad. Pandian (2004), for instance, investigated the impact of collaborative computer-assisted learning strategies on the performance of male and female students in the field of biology. Students were divided at random into groups that used computers for collaborative learning and those that used more conventional teaching methods. The data analysis demonstrated that there was no statistically significant difference in biological performance based on gender. Post-test mean differences between male and female students who were taught the same biological topics by conventional means were greater in the cooperative computer-assisted education group. Christian and Pepple (2012) looked at how well students in Rivers State, Nigeria, did in chemistry after using both cooperative and individualised learning strategies. The results show that students' preferred learning methods—traditional, individual, and group—have a statistically significant effect on their performance in chemistry. Oludipe's (2012) research looked at the effect of gender on fundamental science achievement in junior high school pupils through the lens of a cooperative learning pedagogy. The results of the research showed that there was no significant difference in academic performance between male and female students on the pre-, post-, and delayed post-tests. When comparing the relative impacts of cooperative and individualistic learning techniques on secondary school students' ability in map reading and interpretation, Sunday & Elphinah (2016) found that the cooperative learning strategy was the most effective for the dependent measure. They also discovered that there was no significant difference in gender when it came to understanding maps. Students' map reading and interpretation skills improved more with the cooperative learning strategy, they found. The post-achievement mean scores of students using cooperative, competitive, individualistic, and conventional instructional strategies differed significantly, according to research by Seweje and Olojo (2011), with the cooperative strategy outperforming the treatment groups. In addition to Sharan and Slavin, other researchers have examined cooperative learning (Kagan, 2014; Slavin, 2010; Sharan and Slavin, 1989). The benefits of cooperative learning have been extensively researched by several academics, and the results have been compiled in meta-analyses (Johnson, Johnson, & Stanne, 2000; Kagan, 2014). Is there hope that this strategy will also turn around students' computer science grades?

In order to execute cooperative learning, cooperative teaching tasks must first be given to pre-existing cooperative groups. Since most learning activities are conducted in cooperative groups, proper group design and group selection are crucial for developing an engaging cooperative environment. While it's true that base groups may be read to partition the class into distinct subsets, not all of these subsets will necessarily work together. Positive interdependence is also required for group participation to lead to increased success and productivity, according to research (Johnson & Johnson, 2014). Positive interdependence exists when the success of one party is associated with the success of the whole. People feel that their own success is contingent on the success of others with whom they have formed collaborative ties (Johnson, 2009). Positive interdependence may be fostered in a number of ways, including the utilisation of shared objectives, responsibilities, and incentives. As evidence of its effectiveness in fostering student learning has accumulated, cooperative learning has gained prominence in today's college lecture halls. One of the evidence-based instructional practises, it has been the subject of extensive research (Davidson, Major, & Michaelsen, 2014). Therefore, the goal of this research is to evaluate the efficacy of both collaborative and individualistic approaches to teaching computer science to students in high school.

Theoretical Framework

Students use this method of learning when they work together in small groups towards a common goal or task. Students engage in groups of two to five in cooperative learning, with each person contributing to the group's overall goal (Sarah, 2006; Wendy, 2005). To improve their learning via interdependence and collaboration, small groups of students must work together on a same assignment while supporting and inspiring one another (Larry & Hartman, 2002). Through small-group competitive learning, students are able to explore and debate topics with their peers in a more hands-on, participatory setting (Larry & Hartman, 2002). Gillies (2004) argues that studying in small groups has positive effects on students' intellectual and social development. The approach draws from a wide range of theories and concepts that highlight the benefits of talking to others, working in groups, and being involved in one's own education. This research makes use of Johnson & Johnson's Social Interdependence Theory (2009, 2014) as its theoretical foundation. Working well with others is hypothesised to improve morale, dedication, and output in the office. It discusses many types of dependencies, such as positive interdependence (where individuals rely on one another to succeed) and individual responsibility (where each participant's contribution is valued).

The Social Interdependence Theory has important implications for pedagogical methods, especially cooperative learning. Teachers may follow the guidelines provided by this method when they organise their classrooms and develop lessons in order to foster students' healthy dependency on one another, personal accountability, and cooperative relationships. Teachers might intentionally form mixed-ability classes to promote students' exposure to new ideas and viewpoints. Students also need to be aware of how their individual contributions contribute to the success of the group and the successful completion of the learning goals. In addition, the Social Interdependence principles aid educators in fostering an atmosphere where cooperative learning is the norm by assigning specific responsibilities to each student. Students are encouraged to explain their thinking to their classmates, which benefits the group as a whole and boosts everyone's understanding. Opportunities for group processing, in which students reflect on and critically assess their collaborative experiences, are another important component of the theory's contribution. The cooperative learning strategy of "learning together" provides educators with a theoretical foundation upon which to build and tailor cooperative learning solutions to the specific demands of their students and classroom settings. (Ghazi, 2003)

Methodology

To examine the correlation between the variables, the study employed a pre-test, post-test quasi-experimental research design. The non-randomized pre-test, post-test control group design was used as the study's quasi-experimental structure, and it is shown diagrammatically below:

Experimental Group I:	O_1	X_1	O_2
Experimental Group II:	O_3	X_2	O_4
Experimental Group III:	O_5	X_3	O_6

Where O_1, O_3, O_5 = Observation (Pretest)

O_2, O_4, O_6= Observation (Posttest)

X_1 – Treatment (Cooperative Method)

X_2 – treatment (Individualistic instructional Method)

X_3- treatment (Conventional Method)

The study's participating schools were located in Ikere Local Government Area of Ekiti State. All secondary school students in Ikere Local Government Area, Ekiti State, were the target population. Both public and private secondary schools participated in the study. For the study, a total of 180 Senior Secondary School 1 (SSS 1) computer science students were used as the sample. Out of a potential 28 schools in the Ikere Local Government Area, six (6) schools were chosen using a purposive sampling technique. The intent was to only choose schools that also had the resources to teach computer science. The experimental, control and conventional groups were assigned to two schools each using a random sampling process. From each of the schools used for the study, thirty (30) students were chosen using the same method (i.e. random sampling). This suggests that each of the experimental, control and conventional groups consisted of sixty (60) students.

The study covered the teaching of four topics, which include the following:

1) Multimedia editing tools,
2) Starting with Word,
3) Starting with Excel,
4) Starting with PowerPoint.

Senior Secondary School 1 (SSS1) students from both single and mixed genders schools participated in the study. The class was chosen because it introduces the SS classes, which continue where JSS classes left off in the six-year secondary school system. Participants are expected to have had a thorough introduction to computer science in secondary school before taking this course. They are also less inclined to the subject at this point than students in SS II and SS III. Additionally, students in this class (SSS 1) are not beginners in the field of computer science, unlike their contemporaries in JSS I classes.

The dependent variable is the academic achievement, and one form of instruction was one of the independent variables. The study was conducted in Ekiti State Senior Secondary Schools in the Ikere Local Government Area. The Ikere Local Government Area was home to all of the study's participating schools. Therefore, the target population consisted of all students enrolled in both public and private Secondary School Science One (SSS 1) in Ikere Local Government Area of Ekiti State. 180 participants from Senior Secondary School I (SSS I) intact classes made up the study sample. Three groups of sixty (60) students from senior secondary school level one (SSS 1) participants each received the same concepts through the use of cooperative, individualistic, and traditional learning methodologies. The topics were chosen from the computer science curriculum in Ekiti state. Six schools were chosen for the study using a purposeful selection technique. This was used to ensure that all of the participating schools had the resources necessary to teach computer science. Using an easy randomization process, the experimental groups and the control group were each given two schools. The researcher developed the Computer Achievement Test (CAT) as the study's instrument to gather information from the participants. Data collection from the pre-test and post-test used the same technology. The objective 50-item CAT assessed a student's knowledge, application, and intellectual comprehension of the topics covered during the course. For the test, a total of 100 points were given. These evaluations were given to 50 different items. Each response received two points. The allotted time for the test was 60 minutes. The study had two teaching sessions of 35 minutes each per week; throughout the four weeks. The researcher then obtained students' scores from both the pre-tests and post-tests from the schools for analysis.

The data required was gathered using the Computer Achievement Test (CAT). Data for the pre-test and post-test were gathered using the same instrument. The investigator developed the CAT; a 50-item objective test which was used to gauge how well students understood and applied the principles they had been taught. The test yielded a total score of 100 points. Each of the items received two marks.

On the CAT, there were 50 objective test questions with five potential answers, ranging from A to E. The validity of the instrument was assessed using face and content validity techniques. This was done by ensuring sure that the test questions were well-written and covered the material that was taught. The exam questions were modified from previous ones from the West African Examination Council (WAEC) and the National Examination Council (NECO) which are standardized examinations. Hence, the questions – items were reliable.

The Statistical Package for Social Sciences (SPSS) version 23 was used for analyzing the test results from the experiment's pre-test and post-test. The descriptive statistic of mean and standard deviation were used to assess the research questions while the paired t-test, Chi – Square and One-Way Analysis of Variance (ANOVA) statistics were used to assess the hypotheses. The alpha criterion of 0.05 was used to test each of the hypotheses.

The purpose of this study was to compare the learning results in computer science of senior secondary school students in Ikere Local Government Area, Ekiti State, using cooperative and individualistic instructional approaches. The four (4) research questions that were presented for this study were analyzed using mean and standard deviation as descriptive statistics, whereas the four (4) proposed study hypotheses were tested at the 0.05 level of significance and assessed using the appropriate inferential statistic using SPSS version 23 software.

Descriptive Analysis

Research Question 1: Are there any differences between the pre-test and post-test mean performance scores of students who were taught computer science utilizing cooperative, individualistic and conventional instructional strategies?

Table 1: Analysis of differences between the pre-test and post-test mean performance scores of students who were taught computer science utilizing cooperative, individualistic and conventional instructional strategies

Group	Pre-Test			Post-test		
	No (%)	**Mean**	**SD**	**No (%)**	**Mean**	**SD**
Cooperative Method	60 (33.3)	9.01	3.007	30 (33.3)	24.10	4.227
Individualistic instructional Method	60(33.3)	10.11	3.258	30 (33.3)	23.87	5.109
Conventional Method	60 (33.3)	7.54	2.891	30 (33.3)	19.32	5.022

The mean test scores for students who were taught computer science concepts using cooperative, individualistic, and traditional instructional styles are shown in Table 1. As can be observed from the table, students' pre-test mean performance scores ranged from 7.54 to 10.11, with the individualistic technique having the highest mean performance score (10.11), followed by the cooperative (9.01) and then the traditional approach (7.54). The cooperative approach has the greatest mean (24.10) at the post-test, followed by the individualistic strategy (23.87), and down below traditional methods (19.32) with the mean fluctuating between 19. 32 and 24.10 at this point. This demonstrates that the cooperative learning strategy has the greatest impact on students' performance, followed by the individualistic strategy and then the conventional strategy.

Research Question 2: Are there any differences between the mean performance ratings of male and female students who received cooperative, individualistic and conventional learning strategies in computer science in Pretest and Posttest?

Table 2: Analysis of differences between the mean performance ratings of male and female students who received cooperative, individualistic and conventional learning strategies in computer science in Pretest and Posttest

Group	Pre-test					Post-test			
	Gender	**N**	**Mean**	**Std. Dev**	**Std. Error Mean**	**N**	**Mean**	**Std. Deviation**	**Std. Error Mean**
Cooperative Method	Male	20	6.32	1.002	.487	20	17.32	2.779	.029
	Female	40	7.08	3.874	.711	40	19.22	1.348	.634
Individualistic instructional Method	Male	30	9.30	3.008	.410	30	18.02	5.221	.587
	Female	30	7.71	2.743	.403	30	17.86	1.975	.617
Conventional Method	Male	30	6.44	2.741	.479	30	15.78	3.412	.421
	Female	30	7.09	2.007	.511	30	16.09	2.116	.570

Table 2 displays the pre- and post-test mean performance ratings for male and female students who received training in computer science utilizing cooperative, individualistic, and traditional instructional styles. The table shows that in pre-test results, female students performed better on the average than their male counterparts in the cooperative and traditional strategy categories, whereas male students performed better on average in the individualistic category. The table also showed that, for the post-test, male students had higher mean ratings for individualistic strategy than their female counterparts while female students received higher mean ratings for cooperative and traditional strategies. This suggests that, when a cooperative technique is employed, female students can compete favorably with their male counterparts.

Research Question 3: Is there a difference in the computer science test scores of students in mixed-gender and single-gender schools that use a cooperative learning approach?

Table 3: Analysis of difference in the computer science test scores of students in mixed-gender and single-gender schools that use a cooperative learning approach

Group	Pretest				Posttest			
	N	**Mean**	**Std. Deviation**	**Std. Error Mean**	**N**	**Mean**	**Std. Deviation**	**Std. Error Mean**
Mixed gender	120	6.211	2.901	.501	120	17.32	3.801	.017
Single gender	60	5.887	2.060	.411	60	17.86	2.550	.224

The mean performance ratings for both mixed-gender and single-gender schools were shown in Table 3. For mixed-gender students, the pretest revealed a mean score of 6.211 and a score of 5.887 with a mean difference of 0.324. Similar to this, the table displayed mean scores of

17.32 for mixed-gender participants and 17.86 for single-gender participants with a mean difference of 0.54. This implies that when cooperative instructional procedure was employed, the mean performance scores which was originally in favor of the mixed – gender schools in pre – test has been adjusted to favor the singled – school in post – test.

Research Question 4: What impact do the cooperative, individualistic and conventional instructional strategies have on the post-test learning outcomes for senior secondary school students?

Table 4: Analysis of impact of the cooperative, individualistic and conventional instructional strategies on the post-test learning outcomes for senior secondary school students

	Group	No (%)	Mean	SD
Post-test	Cooperative method	60 (33.3)	24.10	4.227
	Individualistic instructional Method	60 (33.3)	23.87	5.109
	Conventional Method	60 (33.3)	19.32	5.022

In the post-test, students in computer science classes who were taught using cooperative, individualistic, and traditional instructional styles had mean performance scores that are shown in Table 4. According to the table, the conventional technique scored 19.32, the individualistic method 23.87, and the cooperative way 24.10. According to this, conventional approach has the lowest mean score, followed by individualistic strategy, and cooperative strategy has the greatest mean score. This suggests that the cooperative technique had the greatest effect on the students, followed by individualistic and traditional strategies.

Hypotheses Testing

Hypothesis 1: There are no significant differences between the pre-test and post-test mean performance scores of students who were taught computer science utilizing cooperative, individualistic and conventional instructional strategies.

Table 5: One-way Analysis of Variance (ANOVA) of differences between the pre-test and post-test mean performance scores of students who were taught computer science utilizing cooperative, individualistic and conventional instructional strategies.

Source	SS	df	MS	F	P
Between Groups	3892.014	2	711.902	26.008	0.001
Within Groups	5683.227	88	19.37		
Total	9575.241	90			

Table 5 displays the results of a one-way Analysis of Variance (ANOVA) to compare the mean performance scores of students who received computer science instruction using cooperative, individualistic, and traditional methods on the learning outcomes for senior secondary school students. The significance level (0.05) is greater than the significant value (.001), according to the table. This suggests that there is a substantial difference among the group's mean scores for the dependent variables. Consequently, the null hypothesis is rejected. This suggests that between students who were taught computer science using cooperative ways and those who were taught using individualistic instructional and conventional methods, there was a substantial difference in their pre-test and post-test mean performance scores.

In order to determine the sources of significant difference, Scheffe Post-Hoc test was applied. The result is shown in Table 6;

Table 6: Scheffe Post-Hoc Analysis of post-test Mean Scores of Experimental and Control Groups

Group	Control	Cooperative	Individualistic Instructional	Mean	N
Control	0.684	-5.633*	-6.867*	27.78	30
Cooperative	5.633*	0.684	-1.233*	33.42	30
Individualistic Instructional	6.867*	1.233	0.684	34.65	30

According to Table 6, there was a significant difference in favor of cooperative between the post-test mean scores of students exposed to the cooperative method and those in the control group. The post-test mean scores of students exposed to individualistic instructional method and those in the control group also differed significantly from one another, favoring individualistic instructional strategy. Additionally, there is a substantial difference in favor of cooperative learning between the mean scores of students exposed to individualistic and cooperative instructional strategies. As a result, it is important to note that there was a significant difference between the post-test mean scores of students in the experimental and control groups, with the cooperative instructional strategy having a greater impact than individualistic instructional strategy on the mean performance scores of students who were taught computer science concepts. The conventional instructional strategy had the least significant impact.

Hypothesis 2: There is no significant difference between the mean performance ratings of male and female students who received cooperative, individualistic and conventional learning strategies in computer science in Pretest and Posttest.

Table 7: t-test analysis of differences between the mean performance ratings of male and female students who received cooperative, individualistic, and conventional learning strategies in computer science in Pretest and Posttest

Method	Gender	N	Pretest						Posttest					
			$\bar{x}$	SD	df	t_{cal}	t_{tab}	Sig	$\bar{x}$	SD	df	t_{cal}	t_{tab}	Sig
Cooperative	Male	20	6.32	1.00	58	0.83	1.98	NS	17.32	2.78	58	3.76	1.98	S
	Female	40	7.08	3.87					19.22	1.35				
Individualistic	Male	30	9.30	3.00	58	1.52	1.98	NS	18.02	5.22	58	1.37	1.98	NS
	Female	30	7.71	2.74					17.86	1.98				
Conventional	Male	30	6.44	2.74	58	0.97	1.98	NS	15.78	3.41	58	1.71	1.98	NS
	Female	30	7.09	2.00					16.09	2.12				

Table 7 summarizes the findings of the student's - t analysis of the differences between the mean performance scores on the pre- and post-tests for male and female students who were taught computer science concepts using cooperative, individualistic instructional, and conventional methods on the learning outcomes for senior secondary school students. The table showed that there were no appreciable variations between male and female students' mean pre-test performance scores for any of the experiment's three different strategy types (cooperative, individualistic, and conventional). However, only when a cooperative instructional technique was applied did post-test performance mean scores reveal a significant difference in the performance of male and female students. Female students fared better than their male counterparts, who received mean performance scores of 17.32 as opposed to 19.22 for female students. This demonstrates that when the cooperative instructional technique is used, gender has no bearing on performance.

Hypothesis 3: There is no significant difference in the computer science pretest and posttest scores of students in mixed-gender and single-gender schools that use a cooperative learning approach.

Table 8: t-test analysis of difference in the computer science pretest and posttest scores of students in mixed-gender and single-gender schools that use a cooperative learning approach

Group	Pretest							Posttest						
	N	$\bar{x}$	SD	Df	t_{cal}	t_{tab}	Sig	N	$\bar{x}$	SD	df	t_{cal}	t_{tab}	Sig
Mixed gender	20	6.211	2.901	28	2.72	1.98	S	20	17.32	3.801	28	1.37	1.98	NS
Single gender	10	5.887	2.060					10	17.86	2.550				

The summary result of the student's - t analysis of the differences between the pre-test and post-test mean performance scores between the mixed-gender and single-gender schools that were taught computer science concepts using the cooperative method was shown in Table 8. This analysis focused on the learning outcomes for senior secondary school students. The table displays a considerable mean pre-test score advantage for the mixed-gender population. The table does not, however, display any noteworthy mean post-test results. This implies that the cooperative method's use helped turn the performance tide from being significant in the pre-test to not significant in the post-test.

Hypothesis 4: There is no significant impact of cooperative and individualistic instructional strategies on the post-test learning outcomes for senior secondary school students.

Table 9: Chi square analysis of the impact of cooperative and individualistic instructional strategies on the post-test learning outcomes for senior secondary school students

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	22.578[a]	3	.000	.000		
Likelihood Ratio	22.846	3	.000	.000		
Fisher's Exact Test	22.069			.000	457	.099
Linear-by-Linear Association	.054[b]	1	.817	.898		
N of Valid Cases	60					

a. 2 cells (25.0%) have expected count less than 5. The minimum expected count is 3.28.
b. The standardized statistic is .231.

The analysis's findings are presented in Table 8, which demonstrates how cooperative and individualistic instructional styles affected senior secondary school students' post-test learning outcomes in computer science. The estimated $\chi 2$ (0.000) was less than the significant level at 0.05, according to the Chi-square test. This suggests that both cooperative and individualistic methods of instruction had a significant impact on the post-test learning results; as a result, the null hypothesis was not supported. However, the alternative hypotheses that claimed that cooperative and individualistic instructional styles had a substantial influence on the post-test learning results for senior secondary school students were supported.

Discussion of Results

The purpose of this study is to compare the learning outcomes of senior secondary school students in computer science in senior secondary schools in Ikere Local Government Area, Ekiti State, using cooperative and individualistic instructional styles. Four research questions and four research hypotheses were proposed in order to accomplish this. The outcome reveals a substantial difference between the three groups' mean scores for the dependent variables. The outcomes further show that the cooperative instructional strategy had the most significant impact, followed by the individualistic instructional strategy, and the conventional instructional strategy; which had the least significant effects on the mean performance scores of students who were taught computer science concepts. The findings of Christian and Pepple (2012), Sunday and Elphinah (2016), Seweje and Olojo (2011), Slavin (2010), and Kagan (2014), where cooperative learning was found to be the most successful in the student learning outcomes, are in agreement with this one. When a cooperative educational technique was adopted, the results similarly revealed a substantial difference between the performance of male and female students.

The findings of Sunday and Elphinah (2016), Pandian (2004) and Oludipe (2012), who reported no appreciable distinction between male and female students' academic performance when the cooperative technique was adopted, are at odds with those of this study. This outcome, however, is consistent with Seweje and Olojo's (2011) research, which demonstrated that female students could compete favorably with their male counterparts when a cooperative educational technique was employed. The outcome of this study further demonstrates that there is no appreciable difference between the performance of same-gender and mixed-gender schools. This indicates that gender imbalance is lessened by the cooperative approach. Finally, this study demonstrates a substantial correlation between cooperative and individualistic instructional styles and post-test learning outcomes for computer science students in senior secondary schools.

Conclusion

An expansion of the research on reception learning is presented in the study, with a focus on the use of individualistic and cooperative methods of instruction as an alternative to the conventional lecture method for teaching computer science topics. The teacher-dominated aspect of the old approach has drawn harsh criticism for making students passive. The traditional approach, according to some, is defined by giving pupils rules, definitions, and processes to memorize rather than involving them in active learning. Because it pushes learners to receive a lot of information quickly, this strategy is still being used in our schools even though it consistently leads to low student performance in both internal and external exams. In order to improve learning and students' performance in computer science, this study aims at identifying an educational strategy that can supplement and strengthen the conventional old approach. The two experimental groups used cooperative and individualistic instructional strategies, and together with the third group (the traditional technique) were used to see which of the methods promoted meaningful learning in computer science. The study's conclusions showed that, of the three ways, the cooperative strategy was the most successful in improving cognitive performance in computer science.

Recommendations

Cooperative learning principles, procedures, and guidelines must be taught to both the teacher and the student for it to be successful. Therefore, it is recommended that teachers and students both receive regular training so that they may grasp their roles and expectations and be active participants in cooperative learning classes. Cooperative learning implementation training should be encouraged and supported at all school levels by ministry officials, curriculum designers, and school administrators. Additionally, teachers should be given access to specialized workshops and refresher courses. To evaluate the implementation procedures and accomplishment results, evaluation mechanisms should also be implemented. The cooperative approach is advantageous because it encourages cooperation among students who have different strengths and weaknesses in different aspects of the learning materials. As they interact with one another through resource materials, questions, and the like, they develop social skills that ultimately result in successful inquiry and better achievement. It is therefore recommended that teachers include the method in their lessons on a regular basis.

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