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Effects of Cooperative Learning Instructional Strategies on Secondary School Students' Academic Achievements in Biology in Calabar South Local Government Area, Cross River State

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Abstract

The study investigates the effect of the cooperative learning instructional strategy on the academic achievement of senior secondary school students in ecology in Calabar Municipality Local Government Area, Cross River State. Two variables were identified for the study. These were used to formulate the research questions and hypotheses. The research design was a quasi-experimental design. The population of the study comprised seven hundred (700) senior secondary schools, two (SS2) in the Calabar Municipality Local Government Area, Cross River State. The sample size comprises one hundred and fifty (150) respondents. The research instrument was the Biology Achievement Test (BAT). Independent t-test analysis was used to analyze the data, and the findings revealed that there exists a significant relationship between the influence of cooperative learning instructional strategies and the academic achievements of senior secondary school students in Calabar Municipality Local Government Area. The findings recommended that the

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government should ensure that qualified teaching staff are made available to promote their teaching effectiveness and that school principals should assist in making provisions for adequate school facilities to enhance effective cooperation in schools.

Keywords: cooperative learning, academic achievement, biology, senior secondary school students, quasi-experimental design

1.0 Introduction

1.1 Background to the Study

Cooperative learning methods can be classified into two main categories; structured teamwork and informal group methods. The structured team learning involves rewards based on the learning progress of their members and is characterized by individual accountability, which means that success depends on individuals learning, not group products. Models of structured team learning are Student Teams-Achievement-Division (STAD), Teams-Games Tournament (TGT), and Cooperative Integrated Reading and Composition (CIRC). The informal group method focuses more on social dynamics of projects and discussion than on mastery of well-specified content. Examples of models of informal group learning methods are jigsaw, learning together, think-pair-share, and group discussion.

Nnorom (2016) examined the effect of cooperative learning instructional strategy on senior secondary school students' achievement in biology in Anambra State, Nigeria. The study adopted a quasi-experimental design using 111 senior secondary (SSI) students in the Nnewi Local Government Area of Anambra State as a sample and the Biology Achievement Test (BAT) as an instrument. The results of the study revealed that students taught using the cooperative learning instructional strategy performed better on the biology achievement test than those taught using the lecture method of instruction. There was no interaction between method and gender on students' biology achievement tests.

Hussian et al. (2020), in their study to determine the effect of cooperative learning on the academic achievement and self-concept of the students at the elementary school level, using 40 students in the class, discovered that the

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cooperative learning method was better than the lecture method in the development of academic achievement and academic self-concept of students. Across the genders, the self-concept of females was significantly better than that of males, while there was no difference in academic achievement across gender and class. Cooperative instructional strategy has been found, though not in Nigeria, to be effective tools for learning a variety of learning tasks and, if effectively used, can enhance achievement in such tasks (Baron, 2015). In increasing academic achievement in all ability levels, gender, and ethnic groups (O'Donnell, 2014), cooperative learning is also said to be effective in promoting higher thinking skills, problem-solving abilities, and greater metacognitive awareness and interest in an academic endeavor (Woolfolk, 2017).

1.2 Statement of the Problem

Despite the numerous applications of biology in the provision of basic human needs, poor performance of biology students in Senior School Certificate Examinations has persisted over the years. Instructional materials and other learning facilities, which constitute the school environment, blended with appropriate teaching methods, facilitate the teaching and learning process.

The use of inappropriate methods in teaching biology renders adequate facilities unproductive and promotes difficult concepts, which constitutes a problem. Numerous efforts have been made to enhance the learning of biology. Specifically, studies have considered the use of different models of cooperative learning, such as jigsaw, to establish the effect of cooperative learning on students' academic performance without looking at the Student Team-Achievement Division (STAD) model, thereby leaving a gap in knowledge. This study is therefore carried out to fill this gap in knowledge by investigating the effect of the Student Teams-Achievement Division (STAD) model of cooperative learning on students' academic performance in biology in senior secondary schools in the Calabar South Local Government Area of Cross River State.

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1.3 Purpose of the study

The study examined the effect of cooperative learning instructional strategies on secondary school students' academic achievement of biology in Calabar South Local Government Area, Cross River State. Particularly, the study investigated the influence of the following:

i. Group debate on academic achievement in biology in secondary schools in Calabar South L.G.A.
ii. Group discussion on academic achievement in biology in secondary schools in Calabar South L.G.A.

1.4 Research Questions

The following research questions were developed:

i. How does group debate influence academic achievement in biology in secondary schools in Calabar South L.G.A.?
ii. In what way does group discussion influence academic achievement in biology in secondary schools in Calabar South LGA?

1.5 Hypotheses

i. There is no significant influence of group debate on academic achievement in biology in secondary schools in Calabar South L.G.A.
ii. There is no significant influence of group discussion on students' academic achievement in biology in secondary schools in Calabar South L.G.A.

1.6 Significance of the study

The study may be beneficial to the government, stakeholders in education, policymakers, administrators, teachers, counselors, parents, and the general public. To the Government, the government would benefit from this work by discovering the need to organize programs like workshops, seminars, and conferences to educate teachers on cooperative learning instructional strategies and ways of managing students that could arouse their interest in learning. To Researchers, this study may help researchers identify existing gaps in knowledge and guide future research efforts aimed at addressing these deficiencies. To Teachers, the study may

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assist in running their schools smoothly. Teachers who are assigned to classrooms are not exempted, as this work will equip them with effective cooperative learning instructional strategies. The study may also assist the students in understanding the concept of cooperative learning instructional strategies and also motivate them during their academic achievements in school.

2.0 Research Methodology

This chapter presents the procedure adopted in carrying out this study. The chapter is presented under the following subheadings: Research design, sampling technique, population of the study, the sample, instrumentation, validity of the instrument, reliability of the instrument, procedure for data collection, and procedure for data analysis are all important.

2.1 Research Design

The research design adopted for the study was a quasi-experimental design. A quasi-experiment is an empirical interventional study used to estimate the causal impact of an intervention on a target population without random assignment. Quasi-experimental research shares similarities with the traditional experimental design or randomized controlled trial, but it specifically lacks the element of random assignment to treatment or control. Instead, quasi-experimental designs typically allow the researcher to control the assignment to the treatment condition, but using some criterion other than random assignment (e.g., an eligibility cutoff mark):

2.2 Research Area

The study was carried out in Calabar South Local Government Area. There are a total of sixteen (16) secondary schools in Calabar South Local Government. Areas of Cross River State The inhabitants of the area are mainly traders and farmers. Calabar South Local Government Area is bounded in the north by Akamkpa, in the west by Odukpani, in the east by Akpabuyo Local Government Area, and in the south by Calabar Municipality Local Government Area. In terms of landmarks, Calabar Municipality headquarters are in the town of the Quas in Calabar. It has a population of 162,383 at the 2006 census. In the educational sector, Calabar South

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has various secondary and primary schools as well as the University of Calabar, Calabar, and the University of Cross River State. The people of Calabar South are predominantly Christians, while only a small percent are traditional worshippers.

2.3 Population of the study

The population of the study was 700 and consisted of all biology students in secondary schools in the Calabar South Local Government Area of Cross River State.

2.4. Sampling Technique/Procedure

The sampling technique adopted for this study was the simple random sampling technique. This is a means by which a researcher gives every member of his or her population equal and independent opportunity of being selected or represented. The main purpose of using the simple random sampling technique was to compose a sample that would yield research data that could be generalized to a large population. In selecting the secondary schools, the technique employed by the researcher was the hat and draw method. The researcher wrote the number of all the secondary schools on slips of paper, rolled each slip into a paper ball, mixed the paper balls well in a container (hat), and blindly drew 8 secondary school students. In selecting the students, the random sampling technique was adopted to select 150 respondents from eight schools.

2.5 The sample

A total of one hundred and fifty (150) respondents were selected from seven (8) public secondary schools in Calabar South Local Government Area. The 150 respondents were randomly selected for the study. It consisted of both the female and the male counterparts.

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Table 1: Distribution of Sample by School and Gender

S/N	TOTAL SAMPLE SIZE OF STUDENTS IN CALABAR SOUTH L.G.A	MALE	FEMALE	TOTAL
1	Pinn Margaret secondary school	7	8	15
2	Government secondary school, atu	10	10	10
3	Government secondary school, idang	8	7	15
4	Government secondary school, anantigha	7	8	15
5	Government technical collage mayne avenue	8	8	16
6	Government secondary school, uwanse	11	9	20
7	Henshaw town secondary school, edibe-edibe	9	6	15
8	Government secondary school mbukpa	9	11	20
	TOTAL			150

2.6 Instrumentation

The instruments used for this study were a structured questionnaire and the Biology Achievement Test (BAT). It was designed by the researcher and validated by the supervisor. The questionnaire had two parts; part one was concerned with demographic characteristics of the respondents such as age, sex, and class of the respondents. While part two contained context questions on cooperative learning instructional strategies and students' academic achievement in biology in secondary schools in Calabar South LGA. The options were structured in a four-point Likert scale type as follows:

Strongly Agree (SA) - - 4points
Agree (A) - - 3points
Disagree (D) - - 2points
Strongly Disagree (SD) - 1 point

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2.7. Validity of the instrument

Validity refers to the degree to which an instrument measures what it is intended to measure. Two kinds of validity were established for the instrument of the study: face and content validity.

Content validity refers to the extent to which the instrument represents the content of interest, or how well the items on the instrument represent or sample the content to be measured. While face validity refers to the way the questionnaire items appear at face value, the instrument was validated by the supervisor as well as the experts in measurement and evaluation in the faculty of education (UNICROSS) and approved its content and face validity. Therefore, it was passed to be used for generating data for the study.

2.8. Reliability of the instrument

Reliability refers to the degree to which an instrument consistently measures what it is designed to measure. The method that the researcher employed was test-retest reliability. In this method, the same instrument was administered twice to the same respondents at different intervals, and the Kuder-Richardson reliability coefficient formula was applied, and results obtained showed the instrument was reliable. The reliability co-efficient was 0.761.

2.9. Procedure for data collection

The questionnaire was the main instrument used for data collection. The questionnaire was administered in each of the sampled schools by the researcher. Permission was first gotten from the authorities of each sampled school, who then instructed one teacher to assist the researcher in her mission. The teacher then helped in encouraging other teachers to be addressed by the researcher.

The respondents were instructed to be honest in their responses to the items, as the information obtained would be treated with the utmost confidentiality and used for an academic exercise only. One hundred and fifty (150) copies of the questionnaires were administered personally by the researcher with the help of head teachers. At the end of the exercise, questionnaires given out were successfully

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completed and retrieved from the sample schools. The BAT consisted of 20 questions, while the questionnaire had 10 questions, respectively.

2.10 Procedure for data analysis

The method of data analysis was an independent t-test analysis for each hypothesis. Each hypothesis of the study was restated, the variables in it were identified, and appropriate statistical analysis techniques for testing them were stated. All the hypotheses were tested at the 0.5 level of significance.

3.0 Result and Discussion

3.1 Hypothesis-by-hypothesis presentation of results

In this section, each null hypothesis is restated, and the results of data analyses are also presented. The independent t-test statistical analysis was used for testing the hypotheses.

3.1.1 Hypothesis One

i. There is no significant impact of group debate on students' academic achievement in biology in secondary schools in Calabar South L.G.A.

ii. There is no significant impact of group discussion on students' academic achievement in biology in secondary schools in Calabar South L.G.A.

To test this hypothesis, the independent t-test statistical analysis was used. The result is presented in Table 2

Table 2: Independent t-test analysis of the impact of group debate and students' academic achievement in ecology in secondary schools in Calabar Municipality L.G.A.

Variables	N	X	SD	t-cal	t.cri
Group debate	**150**	**4.43**	**2.03**		
				2.56	**1.96**
Academic achievement of students in biology	**150**	**5.32**	**2.98**		

Not Significant at p<05, df =148 crit-t=1.96

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The result from Table 2 above shows that the calculated t-value of 2.56 is greater than the critical or table t-value of 1.96 at a 0.5 alpha level and 148 degrees of freedom. Following this result, the null hypothesis was rejected, meaning that there is a significant impact of group debate and academic achievement in ecology in secondary schools in Calabar South L.G.A.

3.1.2. Hypothesis Two

There is no significant relationship between discussion and students' academic achievement in biology in secondary schools in Calabar South L.G.A., Nigeria. To test this hypothesis, the independent T-test statistical analysis was used. The result is presented in the table below.

Table 3: Independent t-test analysis of the impact of group discussion on students' academic achievement in biology in secondary schools in Calabar South L.G.A.

Variables	N	X	SD	t-cal	t.cri
Group discussion	**150**	**6.45**	**4.69**		
				3.09	**1.96**
Academic achievement of students in biology	**150**	**413**	**2.47**		

Not significant at p<0.05, df=148 crit-t=1.96

The result from Table 3 above shows that the calculated t-value of 3.09 is greater than the critical or table t-value of 1.96 at a 0.05 alpha level and 148 degrees of freedom. Following this result, the null hypothesis was rejected, meaning that there is a significant impact of group discussion on students' academic achievement in biology in secondary schools in Calabar South L.G.A., Nigeria.

4.1 Summary

The researcher aimed at finding out the effect of cooperative learning instructional strategies on secondary school students' academic achievement in biology in the Calabar South Local Government Area, Cross River State. Two variables were

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generated and used for data analysis. Two hypotheses were formulated for the study, and some available related literature was reviewed for evidence to show the effect of cooperative learning instructional strategies on secondary school students' academic achievement in biology in the Calabar South Local Government Area, Cross River State. The instrument for data collection was a four-point Likert-type questionnaire. It was developed, validated, and administered to one hundred and twenty (150) respondents who were selected for study. The information obtained based on the questionnaire was statistically analyzed using independent t-test analysis, and each hypothesis was tested at a 0.05 level of significance.

4.2 Conclusion

Based on the major findings of the study, the researcher concluded that for a teacher to perceive students as per their academic achievement, some qualities such as cooperative learning methods are classified into two main categories: structured teamwork and informal group methods.

4.3 Recommendations

The study recommended certain measures that could be used by teaching staff and other top personnel in fostering effective cooperative learning among students in schools.

i. The government should ensure the implementation of cooperative learning methods to enhance students' communication skills in schools.
ii. School administrators should assist the teacher to ensure that students are active. Participate in school activities to promote their achievement academically.

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APPENDIX

EFFECT OF COOPERATIVE LEARNING INSTRUCTIONAL STRATEGIES QUESTIONNAIRE

Please read the following statements and kindly provide the information required.

SECTION A: RESPONDENTS PERSONAL/DEMOGRAPHIC DATA

1. School name.
2. Sex: Male( ), Female ( )
3. Year of working experience: 1-5 ( ) 6-10 () 11-15 () 16 and above () 4. Age: 12-15 (), 16-17 () 18 and above ( )

Key: SA- Strongly Agree
A- Agree
D- Disagree
SD-Strongly Disagree

SECTION B

INSTRUCTION: please tick (✓) according to your honest opinion and agreement with the rating scale; SA strongly agree, A= agree, D- Disagree, SD= strongly disagree

S/N	STATEMENT	SA	A	D	SD
A	**Group debate**				
1	Group debate can promote students achievement in school				
2	Students perform better through competition in class debate				
3	Class debate cannot contribute to learners behaviour in class				
4	Debating cannot contribute to learners behavior in class				

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5	Group debate assist the learner to understand the concept of school curriculum				
B	**Group discussion**				
1	Group discussion enables teachers to make right judgment to the students				
2	Group discussion assist the students to understand the lesson				
3	Group discussion can be achieved through evaluation				
4	Group discussion enable students perform effectively when the evaluate teaching/learning processes.				
5	Group debate assist the teacher to inculcate appropriate note of lesson to students.				

ACHIEVEMENT TEST ON BIOLOGY

1. Phonic is vertebrate is found in (a) Leg (b) bead (c) chest (d) neck

2. The bone covering the brain is known as (a) cranium (b) upper column (c) spinal cord (d) the tail bone

3. The part on which activity protein is absorbed is known as (a) bile (b) stomach (c) small intestine (d) large intestine

4. Digestion of food start from (a) alimentary canal (b) oesophagus (c) mouth (d) the stomach

5. The first enzyme which act on carbohydrate is (a) peptone (b) lipid (c) salivary amylase (d) maltose

6. Growth curve always look like (a) I-shaped (b) t-shape (c) g-shape (d) s-shape

7. The process of obtaining food substances for nourishment is known as (a) digestion (b) nutrition (c) respiration (d) growth

8. _____ is the combination of closely related pigment (a) carbon (b) enzymes (c) chlorophyll (d) ATP

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9. Recycling in nature help to bring about (a) deforestation (b) balance in the eco-system (c) urbanization (d) new habitat

10. The process of converting non-carbohydrate food substances in the is called (a) gluconeogenesis (b) carbohydrate conversion (c) organic conversion (d) inorganic conversion

11. Purring cellular respiration, the first food substances to the broken down in the absent of carbohydrate is (a) protein (b) mineral element (c) vitamin (d) fat

12. The opening containing (a) fat and oil (b) bucket cavity

13. The body framework which gives shape and support is called (a) muscles (b) p tissue (e) skeleton (d) cell

14. _____ is one of the characteristics of living organism (a) protein (b) DNA (c) algae (d) virus

15. _____ is close relations of the fungi and has a similar structure (a) bacteria (b) oomycotes (c) phylum (d) kingdom

16. The largest and successful group of organisms of about BO-OOO named species is (a) fungi (b) algae (c) virus (d) parasites

17. Typhus is caused by (a) bacteria (b) virus (c) protozoa (d) rickettsia

18. The mammalian skin is made up of _____and_____ (a) epithelium and dermis (b) dermis and epidermis (c) the hair sac and epithelium (d) fair and dark complexion

19. The largest organ in the body is known as (a) skin (b) skill (c) kidney (d) heart

20. The point where two bones are joint together is called (a) joint (b) synapses (c) attachment (d) cranium

Answers

1. **D**
2. **C**
3. **A**
4. **B**

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5. **D**
6. **A**
7. **B**
8. **B**
9. **C**
10. **D**
11. **A**
12. **D**
13. **B**
14. **D**
15. **C**
16. **A**
17. **D**
18. **B**
19. **A**
20. **A**