



## **EFFECTS OF COOPERATIVE LEARNING STRATEGY ON STUDENTS' ACADEMIC ACHIEVEMENT IN ELASTICITY IN OBIO-AKPOR LOCAL GOVERNMENT AREA RIVERS STATE**

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### **Abstract**

The study examined “effects of cooperative learning strategy on Students’ Academic Achievement in Elasticity in Obio-Akpor Local Government Area Rivers State. The sample size of the study was 164 SS2 science students. 82 randomly assigned to the control group who were taught elasticity with lecture method and 82 assigned to the experimental group who were taught with cooperative method. Quasi-experimental design was adopted in the study. Research instrument used for the study for data collection was Elasticity Achievement Test (EAT). The instrument was developed by the researcher in order to measure the rate of students’ academic achievement in elasticity. The instrument was administered to the students before treatment to determine the level of knowledge about the subject matter (pre-test). Then, the same instrument administered again after the treatment has been given to obtain the post test scores. The questionnaire contained 50 multiple choice questions of which each of the questions carries two marks. The instrument was faced and content validated by two experts in the department of science education Rivers State University. The reliability of the instrument was done using Cronbach alpha coefficient to determine the internal consistency. The scores of the students were analyzed using mean and standard deviation. The hypotheses were tested at .05 level of significance using z-test. The study found that Cooperative learning method enhances active student participation and interaction. This quality lead to significant learning effect in Physics. It was recommended that science teachers should be encouraged to adopt cooperative teaching strategy so as to enhance active students’ participation in scientific operation.

**Keyword:** Effects, Cooperative, Learning, Students, Academic, Achievement, Elasticity

## Introduction

Cooperative learning is a successful teaching strategy in which small teams, each with students of different ability, use a variety of learning activities to improve their understanding of a particular subject. Each member of the group is responsible for not only learning what is taught but also help team mates learn. According to Adegoke (2011) cooperative learning is defined as a division of labour undertaken to solve a problem for any given task, students divides the work and come together to present their findings. Each student makes an individual contribution. Yar'adua (2008) expounded that cooperative learning is grounded in the belief that learning is most effective when students are actively involved in sharing ideas. Abdulazeez (2011) asserted that cooperative learning is a pedagogical technique that makes students work together in small and mixed groups on a structured learning task with the aim of maximizing each others' learning. The usage of cooperative learning strategy engages every member of the classroom into small groups performing specific task together. Students are force to develop social relationship skills that creates a room for innovation and problem solving. It well understood that science related subjects especially physics are occupied with problem solving tasks, cooperative learning strategy helps students to solve problems collectively which may leads to maximal academic achievement. Most students are faced with challenges of inability to confront problems individually because they may believe they do not possess required skill. But when working together collectively, the teacher will notice the positive contribution of such students. By this they gain confidence to solve similar problems independently.

Cooperative learning makes use of varied techniques which are learning together and alone constructive controversy group, investigation, jigsaw procedure, Student Team Achievement Division (STAD), complex instruction, cooperative learning structures and cooperative integrated reading and composition. Cooperative learning is one of the recent remarkable and productive areas of research; theory and practices in learning. It denotes students functioning together to attain the objectives and the instructional events that organize the students' joint effort (Gomlekzic, 2007).

There are so many benefits of cooperative learning. Cooperative learning helps to raise academic achievement of learners, build positive relationship, learners, provides experiences that develop both good learning skills and social skills. Also, Azmin (2016) in his work recommended that

cooperative learning helps to produce: higher achievement, increase retention, more positive relationship, higher self-esteem, better attitude towards the teachers.

Unlike the traditional teaching method which involves a one way verbal communication, unaccompanied by discussion, questioning or immediate practice (Olorukooba, 2001) cooperative learning strategy is not only verbal communication to deliver instructions but also sharing ideas and practical demonstration in the classroom. However, educators have gradually incorporated cooperative learning in the classrooms (Kolawole, 2007). They were able to understand that learners learn best when they actively participate in the subject matter. It activates learners to meaningful talk and listen, write, read contents, ideas, that concerns the subject matter. Keramati (2010) and Kolawole (2007). in their studies found that student that were taught using cooperative learning strategy obtained higher achievement than students who were taught in the using the traditional method of teaching. The student get to learn from their colleagues through consultation in cooperative learning environment (Dallmer, 2007)

Moreover, empirical evidences on the use of cooperative learning strategy shows hypothetically that cooperative learning strategy enhance learners' academic performance in Physics (Gambari 2010). Hanze and Berger (2007), Attiparmak and Nakaboglu (2009), Mattingly and Vansickle (2009) supported through their various findings that cooperative learning is result-oriented in all science subjects. It was also reported that is not considerably more effective than individualistic instructional strategy and conventional classroom instruction. In a study conducted by Alshammari (2015) revealed that students who were taught using cooperative learning strategy had a better understanding of the content as compared to the students who were taught using the lecture method. Similarly, Azmin (2016) reported that students enjoyed using cooperative learning and performed better after the intervention.

Over the years the students' poor performance in Physics is alarming and if this is not checked may jeopardize the placement chances of students in tertiary institution, not only in Physics education but also in other science related subjects. This has serious implications for national development, security, economy, and manpower for a nation with a vision of becoming professionals in science and technology (Yar'adua 2008). Various studies have hereby identified that the odds is traceable to the teaching method employed in the teaching of physics (Adegoke 2011; Gambari 2010).

### **Purpose of the study**

The general purpose of the study is to determine whether cooperative learning strategy has effect on the academic achievement of students in Physics, using the concept of elasticity. In other to achieve this, the study disintegrates the purpose of the study in specific terms as follows;

1. To determine the achievement of the students taught Elasticity with traditional method (Control Group)
2. To determine the achievement of students taught Elasticity with cooperative learning strategy (Experimental Group)
3. To determine the difference in the academic achievement of students in both experimental group and control group
4. To determine the relationship between students' pre-test and post-test scores in the experimental group

### **Research Questions**

In order to guides the study the following questions were posed.

1. What is the academic achievement of students taught Elasticity with traditional method (Control Group)?
2. What is the academic achievement of students taught Elasticity with cooperative learning strategy (Experimental Group)?
3. What is the difference in the academic achievement of students in both experimental group and control group?
4. What is the relationship that exist between students' pre-test and post-test scores in the experimental group?

## Hypotheses

- There is no significant difference in the pretest mean scores of experimental and control group
- There is no significant difference in the post test mean scores of experimental and control group.

## Methodology

The study adopted a quasi-experimental research design. This means that the study involved random selection of students to experimental and control. Below is the prototype of quasi experimental design that was undertaken in this study.

	Pre-test	Treatment	Post-test
Experimental Group	$O_1$	X	$O_2$
Control Group	$O_3$		$O_4$

The study used cluster random sampling to select four science teaching secondary schools in Obio /Akor local government. Hence, all the SS2 students in the four selected science teaching schools were used. In the four selected schools there were total of 164 SS2 science students. From the sample, the researcher randomly assigned a total of 82 science students to control groups who were taught elasticity with lecture method. Also, 82 students were randomly assigned to experimental group who were taught with cooperative learning strategy. Below is the distribution in each of the schools

Schools	Experimental Group	Control Group
1	21	20
2	17	19
3	23	24
4	21	19
<b>Total</b>	<b>82</b>	<b>82</b>

Research instrument used for the study for data collection was Elasticity Achievement Test (EAT). The instrument was developed by the researcher in order to measure the rate of students' academic achievement in elasticity. The instrument was administered to the students before

treatment to determine the level of knowledge about the subject matter (pre-test). Then, the same instrument administered again after the treatment has been given to obtain the post test scores. The questionnaire contained 50 multiple choice questions of which each of the questions carries two marks. The instrument was faced and content validated by two experts in the department of science education Rivers State University. The reliability of the instrument was done using Cronbach alpha coefficient to determine the internal consistency. The scores of the students were analyzed using mean and standard deviation. The hypotheses were tested at .05 level of significance using z-test.

## Results and Discussion

**Research Question 1:** What is the academic achievement of students taught Elasticity with traditional method (Control Group)

**Table 1: Academic achievements of students taught Elasticity with traditional method (Control Group)**

GROUP	N	MEAN	S.D	Mean Gain	Percent gain
PRE TEST	82	36.87	9.76		
POST-TEST	82	52.98	9.37	16.11	30.4

Field Survey 2019.

Table 1 shows that in the control group, difference in the pre-test scores of students group (Mean=36.87, S.D=9.76) is lower than that of post –test scores (Mean=52.98, S.D =9.37) with a mean difference of 16.11. This implies that lecture method of teaching enhance students academic achievement in Physics to some certain extent.

**Research Question 2:** What is the academic achievement of students taught Elasticity with cooperative learning strategy (Experimental Group)

**Table 2: Academic achievements of students taught Elasticity with cooperative learning strategy (Experimental Group)**

GROUPS	N	MEAN	S.D	Mean Gain	Mean percent
<b>PRE TEST</b>	82	36.68	10.80	28.62	44.0
<b>POST-TEST</b>	82	65.30	12.19		

Table 2 presents the academic achievement of students taught Physics with cooperative teaching method. The table shows that the pre-test mean and standard deviation scores of experimental group were 36.68 and 10.80 respectively. However, after the treatment was given, the mean and standard deviation scores obtained rose to 65.30 and 12.19. The mean difference was 28.62 and mean percent gain was also 44.0.

**Research Question 3:** What is the difference in the academic achievement of students in both experimental group and control group?

**Table 3: Difference in the academic achievement of students in both experimental group and control group.**

Groups	N	Post-test	Mean difference	Percent gain
<b>Control group</b>	82	52.98	12.72	19.47
<b>Experimental group</b>	82	65.30		

**Field Survey, 2019.**

Table 3 shows the difference in the academic achievement of students in both experimental and control group. This was determined by comparing the post-test mean scores. The mean difference that existed between the post-test of both group was 12.72 favouring the experimental group side. This shows that those who were exposed to cooperative teaching achieved higher than those who were taught using lecture method.

**Research Question 4:** What is the relationship that exists between students' pre-test and post-test scores in the experimental group?

**Table 4: Relationship that exists between students' pre-test and post-test scores in the experimental group**

		Pretest	Posttest
Pretest	Pearson	1	.191
	Correlation		
	Sig. (2-tailed)		.086
	N	82	82
Posttest	Pearson	.191	1
	Correlation		
	Sig. (2-tailed)	.086	
	N	82	82

Table 4 shows the relationship that exists between the pre-test and post test scores of students in the experimental group. The r value obtained was *approx* 0.20. This means that the relationship between the pre-test and post test score of the experimental group is positively low. In other words, cooperative teaching method moderates the performances of the students. The performance of the students was not by prior knowledge and intelligence. At almost equal level cooperative teaching method provides understanding of the concept of elasticity.

### **Hypotheses.**

**H<sub>01</sub>**; There is no significant difference in the pretest mean scores of experimental and control group



**Table 4: Z-test analysis on the pretest mean scores of experimental and control group.**

Groups	Pretest (means)	S.D	N	Lev. Of sig.	Z-cal	Z-crit	Remark
Experimental group	36.68	10.80	82	0.05	0.12	1.96	Accepted
Control group	36.87	9.76	82				
Field survey 2019							

The result in Table 5 shows that students taught with cooperative teaching method(experimental group) had mean and standard deviation scores 36.68 and 10.80, while students taught with lecture method (control group) had mean and standard deviation scores of 36.87 and 9.76. The result shows that the z-cal value is less than z-crit value at 95% confidence interval. Since the z-cal value of 0.12 is less than the z-crit value of 1.96, the null hypothesis is thus accepted. This implies that there is no significant difference in the Pre-test mean scores of students taught with cooperative teaching method and lecture method. This established the fact that all the student assigned into each groups were randomly selected.

**H<sub>02</sub>**; There is no significant difference in the post test mean scores of experimental and control group

**Table 4: Z-test analysis on the post test mean scores of experimental and control group.**

Groups	Post test ( means)	S.D	N	Lev. of sig	Z-cal	Z-crit	Remark
Experimental group	65.30	12.19	82	0.05	7.26	1.96	Rejected
Control group	52.98	9.37	82				

The result in Table 6 shows that students taught with cooperative teaching method(experimental group) had mean and standard deviation scores 65.30 and 12..19, while students taught with lecture method (control group) had mean and standard deviation scores of 52.98 and 9.37. The result shows that the z-cal value obtained (7.26) is greater than z-crit value (1.96) at 95% confidence interval. Since the z-cal value (7.26) is greater than the z-crit value of 1.96, the null hypothesis is therefore rejected. This means that there is significant

difference in the Post-test mean scores of students taught with cooperative teaching method and lecture method. The implication of this is that cooperative teaching method enhances students' academic achievement and understanding of concepts in Physics.

### **Discussion of Findings**

In the study, pre-test and post-test of the students in the control group were obtained; it was found that students increased in their academic performance by 30.4 percent. This means that students performed a bit better when they were taught Physics with lecture teaching style. The implication of this finding is that students earn achievement in physics no matter how miniature it may be, when they are taught with traditional teaching method (Lecture method). This finding is supported by Ezeugwu (2009) who noted that teachers' teaching methods to an extent have facilitative effects on students' academic achievement. Akpan (1999), and Ameh and Dantani (2012) in their separate findings have stated that traditional lecture method of teaching which is the prevailing method of teaching in Nigeria has failed in enhancing participation especially in science lessons thereby leading to students poor in science subjects.

Also, testing the effect of the treatment on students in the experimental groups. The study found that students in the experiment group had a mean gain of 28.62. The performance of those in the experimental group increased by 44.0 percent. This is evident that students exposed to cooperative learning or teaching strategy performed at a greater extent than those who were taught with lecture method. The result is expected because Abdullah, Abubakar and Mahbob (2012), Keramati (2010) noted that teaching strategies which promote active students' participation and interaction highly help students to learn more effectively. Students learn more when they are involved in the learning process in groups or individually. Cooperative teaching strategies condition students to group interactive learning that will eradicate senses of inferiority among students.

Unlike the traditional teaching method which involves a one-way verbal communication, unaccompanied by discussion, questioning or immediate practice (Olorukooba, 2001), cooperative learning strategy is not only verbal communication to deliver instructions but also sharing ideas and practical demonstration in the classroom. The findings of this study confirm the assertion by comparing the post-test mean scores of students in the both groups. Students

who were exposed to learning through cooperative means performed significantly better than those who were in the control group. The scientific assumption made on this, proved that the difference that existed between the mean scores of both groups were statistically significant

## **Conclusion**

Based on the findings, the researcher concludes that

- Cooperative learning method enhances active student participation and interaction. This qualities leads to significant learning effect in Physics.
- Students taught Physics with cooperative teaching method has higher academic achievement than those taught with lecture method of teaching.
- Cooperative learning also enhances the understanding of the concept of elasticity as the learners demonstrated high level of competence in the concept through oral questions and test

## **Recommendation**

Based on the findings of the study the researcher recommends accordingly:

- In general terms, science teachers should be trained in the usage varying methods of teaching science so as to boost students learning interest in science subjects.
- Physics teachers are encouraged to adopt cooperative teaching strategy so as to enhance active students' participation in scientific operation.
- Science is the heart of sustainable development in the society. Therefore government should improve their support for secondary school science teaching through the provision of basic facilities that facilitates learning, this lays a good foundation for future science and technological development in the society.

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