



## Effects of team-teaching on senior school students' achievement in adaptation in Ilorin, Nigeria



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### ABSTRACT

This study analyzed the effects of Team Teaching on Senior School Students' Achievement in Adaptation. A 20-item multiple-choice question entitled Adaptation Achievement Test (AAT) was validated and distributed to 99 students that participated in the study. The equivalent of the groups was determined before the commencement of the study through pretest administration. A quasi-experimental design was adopted, hypotheses one and two were tested using paired sample t-test, while three were tested using ANCOVA. The result showed no statistically significant difference in students' achievement in adaptation when exposed to team teaching. The study also discovered a non-statistically significant difference in the achievement of males and females; and in the achievement of the low, medium, and high-scoring students when exposed to the team-teaching method. Based on the findings, the study concluded that team teaching did not enhance students' learning; also, male and female students did not differ in achievement when the team-teaching learning strategy was used. One recommendation for the study is that teachers should use combined teaching methods as an effective strategy in teaching senior school students' adaptation to biology.



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### Introduction

A developing country like Nigeria needs knowledge of Science and Technology to push the economy to a higher level. This underlies the Federal Government of Nigeria to allocate a large percentage of funds to Science and Technology at the tertiary level. This motive was created to ensure a better economy for Nigerians. The achievement of these goals depends on the participation capacity of secondary education.

Secondary education as a transition stage to tertiary level is being faced with a falling standard of education. This is often reflected by the poor performance of students in external examinations, especially in science subjects, i.e., biology, chemistry, and physics. These subjects are very paramount to the Science-driven society that Nigeria is advocating for. Biology is one of the subjects offered at the senior school. It is concerned with the study of life and living organisms. It is very germane to the understanding of the

functioning of the body system as well as a functioning ecosystem.

Umar (2011) stated that Biology is a natural science that deals with the living world. It explains the structure, function, development, and existence of living things, while also providing justifications for their reactions to the environment within which they exist. The study of Biology provides an ideal preparation for a list of careers ranging from basic science to engineering (Gross & Sohl, 2021; Šorgo & Špernjak, 2020). Biology as a branch of science and a pre-requisite subject for many fields of learning contributes immensely to a nation's scientific and technological growth. The study of Biology at all educational levels can equip learners with beneficial concepts, principles, and theories that will enable them to lead a peaceful life (Ahmad et al., 2018).

Abanikannda and Oluwafemi (2018) stated that part of the objectives of Biology in the secondary school curriculum is to prepare the students to acquire meaningful and relevant knowledge in Biology, as well as acquire a reasonable and functional scientific attitude. Olagunju (2012) posited that Biology is a practical based subject that equips students with concepts and skills that are useful in solving the day-to-day problems of life. The study of Biology aims at providing the learner with the necessary knowledge with which to control or change the environment for the benefit of an individual, family, or community.

In general, the importance of learning Biology to humanity can be outlined as follows: helps to know the earth; helps to understand changes in the environment and the factors affecting these changes to know how human needs are influenced; helps mankind to find effective ways of preventing, treating and curing diseases and home management techniques such as better methods of food preservation, efficient food preparation and care of the family (Olagunju, 2012).

Adaptation is one of the contents offered at senior secondary school one (SS1) Biology. The report established the inadequacy of students concerning their understanding of adaptation concepts. The chief Examiners' report of 2014 revealed the inability of students to explain how the modified stems perform their functions. As a way of contributing the researchers' quota to alleviating the problem, this study explored the effect of team-teaching on

students' achievement in adaptation in Ilorin, Nigeria. The study also determined the influence of gender and score level on the achievement of students in adaptation when team-teaching was used.

Team-teaching may be described as collaborative teaching; it is a method of teaching whereby two, three, or more teachers teach a subject together instead of the usual teacher-to-subject. Robb (2009) described team-teaching as several variations of technique to teach a course with more than one instructor. Esomonu et al. (2015) defined team-teaching as a strategy involving two or more teachers, each with distinctive roles, responsibilities, presentations, and evaluations for the same group of students. This goes together with the neither identified characteristics provided team-teaching encourages varying manners of assessing the subject matter, different styles, and methods (Gatliff & Wendel, 1998; Grofčíková & Trníková, 2022). This implies that team-teaching affords students with qualities that are lacking in single teaching (Fuller et al., 2001).

Working collaboratively or as a team is not restricted to teachers but also students' team learning. Students learn as a team is evident from the work of (Gucciardi et al., 2017; Rafael & José, 2013). Some of the reviewed works looked at team-teaching from the descriptive point of view, while some explored it from experimental perspectives. The study of Rafael and José (2013) assessed a situation of collaborative learning and interdisciplinary that is applied to entrepreneurship. This study was conducted in Spain, and students collaborated on their potential through a wiki forum in a virtual class.

The general and special education teachers' perception of teamwork for the inclusive classroom was conducted at elementary and secondary schools (Gebhardt et al., 2015). The study focused on elementary and secondary school teachers' perceptions. The result of the study revealed that the perception varies. Gucciardi et al. (2017) similarly worked on Students-faculty team-teaching- A collaborative learning approach. The study concluded that peer tutors reduced students' anxiety, and increased engagement and availability of help inside and outside class.

From the experimental perspective, the effects of team-teaching on students' academic achievement in English Language comprehension in Awka, Nigeria was researched by [Esomonu et al. \(2015\)](#), their results showed that team-teaching significantly enhanced the students' performance in comprehension. In the like manner, [Nandwa \(2017\)](#) conducted research on the likely effects of team-teaching in mathematics in Mumias a sub-county of Kenya. The outcome revealed a significant difference in favor of the team-teaching group.

It is evident from the reviewed literature that team-teaching is a well-known method across nations. Some of which are Austria, Kenya, Nigeria, and Spain. The review often revealed that team-teaching could be used at tertiary and secondary school levels.

This study was conducted on adaptation, a concept in biology. The effectiveness of team-teaching on students' gender and score levels was also determined.

Gender is a set of characteristics distinguishing between males and females. It also refers to the socially constructed roles, behaviors, activities, and attributes that a particular society considers appropriate for men and women. Traditionally, gender stereotype has over the years continued to limit females' capabilities and constrain their ability to participate in all aspects of human endeavor. Gender issues themselves affect all aspects of society to the extent that the number of women in certain professions/competencies in higher institutions of learning is constrained by gender stereotypes. It has been argued that this long-standing gender bias reflects in performances. Gender was identified as a critical factor that affects teachers' attitudes toward computers ([King et al., 2002](#))

Also, it has been observed that the academic achievement of students has often been associated with their gender. Kanno (2008) referred to gender as an analytic concept that describes sociological roles, cultural responsibilities, and expectations of men and women in a given society or cultural setting. Gender describes the personality traits, attitudes, behaviors, values, relative power, influence, roles and expectation of (femininity and masculinity) that society

ascribes to the two sexes on a differential basis ([Hoffman, 2001](#); [Ross & Shinew, 2007](#); [West & Zimmerman, 2016](#)).

The influence of gender on learning and achievement has remained a controversial and topical issue amongst educationists and psychologists. Some research concluded that gender significantly affects academic achievement ([Eriba & Ande, 2006](#); [Hwang & Fitzpatrick, 2021](#)). However, there are also studies showing no effect between the two ([Tsai et al., 2018](#)).

Similarly, researchers had given reports over the years that there were no longer distinct differences in the cognitive, affective, and psychomotor skill achievements of students in respect of gender ([Arigbabu, 2004](#); [Bilesanmi-Awoderu, 2006](#); [Freedman, 2002](#); [Kumar & Helgeson, 2000](#); [Sungur & Tekkaya, 2003](#); [Yip et al., 2004](#)). Females were encouraged and responsive to developing positive attitudes towards science. On the other hand, researchers have stated that there is a difference in this issue. For example, in a study carried out by [Eriba and Ande \(2006\)](#); [Onekutu and Onekutu \(2002\)](#) it was found that males performed better than their female counterparts in science and mathematics achievements.

[Emmanuel \(2013\)](#) investigated the difference in the achievement of students in difficult chemistry concepts. It was found that a significant difference exists between them in favor of females. On the contrary, [Omiola et al. \(2017\)](#) researched the effect of hypermedia-assisted instruction on the achievement of students in photosynthesis concepts of biology. The study reported a non-significant difference in the achievement of male and female students taught photosynthesis using hypermedia-assisted instruction.

The score level and effectiveness of the problem-solving approach of physics students in Kwara state were examined ([Adeniran, 2011](#)). The study found that low-score level students performed best with a mean score of 20.68, followed by an average of 18.16 and a high 14.25 score level. In all the literature examined, no conclusion was reached on gender and score levels of students, hence, the need for this study.

### **Purpose of the Study**

The main purpose of this study was to investigate the effects of team-teaching on

senior secondary school students' achievement in the adaptation concept of biology. Specifically, the study examined the:

1. Effect of team-teaching on the achievement of students taught adaptation using team-teaching strategy
2. Influence of gender on the achievement of students taught adaptation using team-teaching strategy
3. Influence of score level on the achievement of students taught adaptation using team-teaching strategy.

### Research Questions

The following questions were raised in the study.

1. Do students achieve differently when taught adaptation with team-teaching and when taught without team-teaching?
2. Is there any difference in the achievement of male and female students when taught adaptation using the team-teaching method?
3. What differences exist among low, medium, and high-level students when taught adaptation using the team-teaching method?

### Research Hypotheses

1. There is no statistically significant difference in the achievement of students taught adaptation using team-teaching and those taught without the team-teaching method.
2. There is no statistically significant difference in the achievement of male and female students taught adaptation using the team-teaching method
3. There is no statistically significant difference in the achievement of the high, medium, and low-scoring students taught adaptation using the team-teaching method.

### Method

The research is a quasi-experiment of the pretest, posttest, non-randomized, control group design. The design was a 2 x 2 x 3 factorial design. The factors are instructional strategies, gender, and score levels at 2, 2, and 3 levels, respectively. The population for the research was all Senior Secondary School students offering Biology in Ilorin, Nigeria, while Senior Secondary

School one (SSS I) students offering Biology were the target population because adaptation is topic students are expected to be taught at SS I level. A purposive sampling technique was used to select two co-educational public secondary schools in Ilorin since gender was one of the moderator variables.

The research instrument was the Adaptation Achievement Test (AAT) which contains 20 multiple-choice items on adaptation based on the school curriculum. Face and content validity of the instrument was carried out with the assistance of Biology education experts from the Department of Science Education, University of Ilorin, and three secondary school Biology teachers. The lesson lasted for a period of two weeks for the administration of both the pretest and posttest and delivery of the lesson as contained in the scheme of work. The instrument was trial tested on students from another school, who did not part take in the study of the schools that were engaged in the research to determine its reliability using Pearson product-moment correlation statistics. A reliability value of 0.87 was obtained after undergoing the reliability test.

The researchers also ensured that all ethical issues guiding the use of human subjects were strictly adhered to and also ensured that the lessons were delivered by the teachers at the specific time allotted to it on the cooperating schools' timetable. Data generated from the research were analyzed using Paired sampled *t-test* and one-way ANCOVA.

### Results and Discussion

**Research Question One:** What effect does the team-teaching method have on students' achievement when taught adaptation? This research question translated to research **Hypothesis One** which states that: There is no statistically significant difference in the achievement of students taught adaptation using team-teaching and those taught without team-teaching.

**Table 1** presents the result of the differences in the achievement of the two groups. The table revealed that  $t = 0.62$  at  $p > 0.05$ , since the p-value is greater than 0.05, the hypothesis is thereby not rejected. This shows that there is no statistically significant difference in the

achievement of students taught adaptation using team-teaching and those taught without team-teaching.

**Research Question Two:** Is there a difference in the achievement of male and female students when taught with a team-teaching method? This research translated to **Hypothesis Two** which states that: There is no statistically significant difference in the achievement of male and female students taught adaptation using the team-teaching method.

The analysis in [Table 2](#) presents the result of the differences in the achievement of the two groups. The table revealed a  $t$ -value of 2.62, at  $p > 0.05$ , since the  $p$ -value is greater than 0.05, the hypothesis is thereby not rejected. This shows that there is no statistically significant difference in the achievement of male and female students taught adaptation using team-teaching and those taught without team-teaching.

**Research Question Three:** Do students with different score levels achieve differently when taught adaptation using the team-teaching method? This research question translated to **Hypothesis Three** which states that: There is no statistically significant difference in the achievement of the high, medium, and low-scoring students taught adaptation using the team-teaching method.

[Table 3](#) indicates the result of the differences in the achievement of students based on score level. The table revealed that  $F_{(2,32)} = 0.29$  at  $p > 0.05$ , hence score levels had no significant influence when exposed to the team-teaching method, and the hypothesis is thereby not rejected. This shows that there is no statistically significant difference among the achievement of the low, medium, and high score-level students' taught adaptation using team-teaching.

There was no statistically significant difference in the achievement of students taught adaptation using team-teaching and those taught without team-teaching. This result might be because the sample is skewed towards the control. The non-significance could also be a result of the unpopularity of the method at the secondary school level. The result agrees with [Esomonu et al. \(2015\)](#); [Nandwa \(2017\)](#).

Similarly, a statistically significant difference does not exist in the achievement of male and female students taught adaptation using team-teaching. This may be because the two genders feel indifferent to the method. This is in line with the study of [Omiola et al. \(2017\)](#). The result of the study disagrees with the finding of [Emmanuel \(2013\)](#) which revealed that gender does not influence students' achievement.

Table 1. The t-test analysis of the differences in the achievement of team-teaching and control group

Group	N	X	SD	T	Df	Sig. (2-tailed)	Remarks
Team-teaching	36	9.03	3.19	0.62	97	.054	Not Rejected
Control	63	8.61	3.15				

Table 2. The t-test analysis of the differences in the achievement of male and female taught using team-teaching

Group	N	X	SD	T	Df	Sig. (2-tailed)	Remarks
Male	22	8.00	3.16	2.62	34	0.44	Not Rejected
Female	14	10.84	2.56				

Table 3. The ANCOVA of the differences in the achievement of high, medium and low students exposed to team-teaching

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	97.19	3	32.40	4.02	0.01
Intercept	129.12	1	129.12	16.03	0.00
Pretest2	29.84	1	29.84	3.70	0.06
Score levels	4.71	2	2.36	0.29	0.75
Error	257.79	32	8.06		
Total	3289.00	36			
Corrected Total	354.97	35			

R Squared = .274 (Adjusted R Squared = .274)

There was no statistically significant difference in the achievement of the high, medium, and low students taught adaptation using team-teaching. This is to say that team-teaching does not have a leveling effect on score levels. This supported the finding of [Mulkah Adebisi and Khadijat Biola \(2020\)](#) which revealed that scoring ability does not influence students' performance in photosynthesis but differs from the result of [Adeniran \(2011\)](#) which revealed that low-scoring students benefitted most though not significantly.

## Conclusion

The study concluded that team-teaching does not enhance the performance of students in adaptation; gender is not a determinant of students' achievement in adaptation when exposed to team-teaching strategy, and team-teaching is not a suitable method for reducing the gap existing among high, medium, and low scoring students for teaching adaptation in biology. The following recommendations are made in line with the findings. Although team teaching does not affect students' adaptation performance in learning biology, greater awareness has yet to be created about why team teaching should be used at the secondary school level. Teachers need to pay more attention to adapting all students to different forms of learning.

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