

EFFECTS OF LEARNING TOGETHER AND ABILITY LEVEL ON SENIOR SECONDARY SCHOOL STUDENTS' BIOLOGY ACHIEVEMENT IN OFFA, NIGERIA

BY

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The use of applicable learning strategies by classroom teachers has been linked to helping the students in better understanding of the difficult concepts in Biology curriculum and could solve the problem of differences in students' ability levels. This study aims to determine the effect of learning together strategy and ability level on secondary school students' Biology achievement in Offa, Nigeria. The study employs quasi-experimental design of 2x3 control group for the collection of data. The population for the study comprises SSI students from Offa Local Government Area of Kwara State. The sample consisted of 173 students that were purposely selected from four secondary schools. Biology Achievement Test on Photosynthesis (BATP) was the instrument which elicited data collected for both ability and achievement test. The result collected was analyzed using ANCOVA. The findings of the study revealed that there was a significant difference in the achievement of senior secondary school students taught photosynthesis using learning together strategy based on ability levels with $F_{(2,84)}=3.46$ in view of the findings, the study recommended among others that learning together and jigsaw be used to teach difficult concepts in Biology through workshops and seminar by curriculum planner and education stakeholders for Biology teachers on how to use these strategies to promote meaningful learning of difficult topics.

Keywords: Learning together, Ability level, Biology achievement**Introduction**

Biology is a natural science which is made up of disciplines such as anatomy, physiology, botany, biochemistry, ecology and zoology. Biology is broadly divided into two main branches each of which deals with different aspects of life, namely, Zoology and Botany. Zoology deals with the study of animals while Botany deals with the study of plants. The study of Biology improved all aspects of life on earth and helps us to understand ourselves and other organisms around us. Biology according to Soyibo, Ekpunobi, Akinade, Muhammed and Tureta (2013) is the branch of science that involves the study of life and living organisms. Wikipedia (2015) defined Biology as a science which is concerned with the study of life and living organisms including their structure, functions, growth, distribution, taxonomy and their evolutionary trends. Secondary school students had difficulties in learning some Biology concepts has identified by Asci, Ozkan and Tekkaya (2001); Capa (2000), photosynthesis is one of the listed concepts.

According to the West African Examination Council (WAEC) Chief examiners reports, students' performance in Biology in the Senior Secondary School Certificate Examinations (SSSCE) in Nigeria from 2007 to 2012 has been poor. The percentage of students passing Biology at credit level (A1 - C6) had consistently been less than 50% (West African Examination Council, WAEC, 2007, 2012). Researchers have identified over the years that poor teaching method and teacher-centered approach are major cause of poor performance of students in science subjects (Adegoke, 2011; Gambari, 2010; Jegede, 2007, Olorukooba, 2007). To overcome this problem, students must be actively involved in the teaching and

learning process. And for students to have proper understanding of concepts perceived as difficult in Biology curriculum, teachers should use appropriate learning strategies that will help inculcate these concepts efficiently. Therefore, Biology needs to be taught actively, not as a stable subject in textbooks, stressing investigative instruction and allowing students to pursue areas of personal interest.

Learning strategy includes how an individual thinks and acts when designing, performing and evaluating the performance on a task and its outcomes. Learning strategy is an individuals' approach to a task (Schumaker & Deshler, 2006). Varieties of learning strategies are used to help organize and remember both key elements of learning processes. Thus, there is wide range of different learning strategies we know in terms of number and how well we use them. Learning together is an effective learning strategy for all types of students, including academically gifted (high scoring students), medium scoring students and the low scorers because it promotes learning and cultivate respect and provide opportunity for friendships among different groups of students. The more heterogeneous the student is in a team, the higher the benefits for each student. Teammates learn better when they depend on each other in a positive way for different learning activities. Cooperative learning strategies have also been shown to increase student motivation and retention of the learning activities.

Learning together strategy was developed by David W. Johnson and Rogar T. Johnson in 1987 at the University of Minnesota. It involves students working in a group of four-five heterogeneous groups on a given material. The groups will hand in a single completed assignment and receive marks based on the group work presented. This type of learning strategy emphasizes team-building activities and enables students to work together in a group and discuss with groups members about how well they are working together. Students work in group of four so that they can break into pairs to carry out some activities, and then get back together in groups very quickly for others. Learning together allows students to contribute effectively in the class, stay on task, help each other, encourage each other, share ideas, solve problems, give and accept feedback from their teammates.

Campbell (2013) worked on the use of learning together strategy on students' achievement in physical science with 38 students in grade 5. Out of the 38 students, 19 students were used as the treatment group while the remaining 19 students were used as the control group. The result showed that the experimental group outperformed the control group using Analysis of Variance (ANOVA). It was concluded that learning together can be employed as a powerful learning tool across grade levels in schools and content areas which can help in promoting positive gains in other disciplines.

Luu (2010) investigated the effects of learning together on reading competence of 77 Vietnamese tertiary institution students over a seven weeks period. The result showed that experimental group outscored the control group on the posttest scores in reading competence. Bulama (2003) and Bashir (2005) stated that, the fact that learning strategy has been linked to increase in the academic achievement of learners at various score levels is another reason for its use in teaching difficult concepts in senior secondary school Biology curriculum. To date no study has been conducted to determine senior secondary school students' difficulties in learning Biology concepts using Learning Together strategy in Offa Local Government of Kwara State. Also, there is inconclusive evidence on the effect of learning strategies on the performance of students based on ability levels.

Purpose of the Study

The main purpose of this study was to investigate the effects of learning together on ability level of senior school students in Biology achievement in Offa Local Government Area of Kwara State. Specifically, the study attempt to identify the differences in the:

1. Mean achievement scores of senior secondary school students in Offa Local Government Area of Kwara State when taught photosynthesis using learning together strategy and those taught using conventional method?

- Achievements of senior secondary school students taught photosynthesis using learning together based on score levels?

Research Question

This study was designed to answer the following research questions:

- Is there any difference in the mean achievement scores of senior secondary school students in Offa Local Government Area of Kwara State when taught photosynthesis using learning together strategy and those taught using conventional method?
- What is the difference in the achievement of senior secondary school students taught photosynthesis using learning together based on score levels?

Methodology

The study was a quasi-experiment using non-randomized, non-equivalent pretest and posttest control group involving a 2x3 design. This indicates two levels of groups; learning together strategy (experimental group) and the conventional method of teaching (control group) and the score levels at three levels (high, medium and low score levels). Learning together and conventional method of teaching were the independent variables while the academic achievement of senior secondary school students is the dependent variable. The moderating variables are the students' score levels (high, medium and low). The schematic representation of the design is shown in Table 1.

Table 1

Research Design

Groups	Pretest	Treatment	Posttest
Experimental Group	O ₁	X ₁	O ₂

Control group

O₁O₂

Where O₁ = Pre-test for experimental group

O₂ = Post-test for experimental group

O₁ = Pre-test for control group

O₂ = Post-test for control group

X₁ = Treatment for the experimental group

----- = Non-randomization of the group

The sample consists of 173 students from four intact classes of public senior secondary schools participated in the study. Purposive sampling technique was employed to select four schools. There are two groups involved in this study; the schools were assigned to two groups (two experimental groups and two control groups). A quasi-experimental design of 2 x 3 was adopted for the study. Biology Achievement Test on Photosynthesis (BATP) which consisted 35 multiple-choice items drawn based on the school curriculum and WASSCE and NECO syllabi was used for the study. The reliability and difficulty index were 0.78 and 0.51 respectively. The researcher-designed lesson modules and lesson plans were prepared for the study based on the topic.

A request letter for permission was taken to the Principals of the schools that were involved in the study. After obtaining permission from the Principals, the researcher interacted with the biology teachers. The researcher also interacted with the students on the need for the study, distributed the students and parent consent forms, which was later returned. Pre-test was administered to both the experimental and the control groups. The learning activities were done with the help of research assistant based on the selected school timetable. Post-test was administered to all the groups at the end of the lessons. The pre-test and post-test were the same in terms of questions, but the post-test items were re-shuffled before administration.

Descriptive statistics of mean and standard deviation were used to answer all the research questions while inferential statistics of Analysis of Co-variance (ANCOVA) was employed to test the hypotheses.

Results

The statistical analysis was carried out using the Statistical Product and Service Solutions, SPSS (IBM)/SPSS/24.0 window version). All the data collected were tested using descriptive statistics of mean and standard deviation and all the hypotheses were tested using Analysis of Covariance (ANCOVA).

Research Question 1: Is there any difference in the mean achievement scores of senior secondary school students in Offa Local Government Area of Kwara State when taught photosynthesis using learning together strategy and those taught using conventional method?

The result from Table 2 revealed the mean scores for the learning together strategy and control group. The result revealed 11.29 for the experimental groups and 8.10 for the control groups. This showed that the experimental group when taught photosynthesis using learning together strategy has the highest mean score with 3.19 differences. This further mean that there was significant difference in the Biology achievement of students taught using learning together strategy and the control group

Table 2

The Mean and Standard Deviation of Participant Taught Photosynthesis using Learning Together Strategy and the Control Group

Control	Mean	Std. Deviation	N
Control	58.21	8.10	88
Learning Together Strategy	65.29	11.29	85
Total	61.83	10.46	173

Research Question 2: Is there any difference in the achievement of senior secondary school students taught photosynthesis using learning together based on score levels?

The result from Table 4 revealed the mean scores of students taught photosynthesis using learning together based on their score levels. The result revealed 15.75 for the low scoring students, 22.69 for the medium scoring students and 26.77 for the high scoring students. This showed that the high scoring students performed better than both the medium and low scoring students in experimental group when photosynthesis was taught using learning together strategy.

Table 3

The Mean and Standard Deviation of Participant Taught using Learning Together Strategy Based on Score Levels

Score Levels	Mean	Std. Deviation	N
Low	15.75	3.96	9
Medium	22.69	2.79	55
High	26.77	1.63	22
Total	23.09	3.97	85

Research Question 3: Is there any difference in the achievement of senior secondary school students taught photosynthesis using conventional method of teaching based on score levels?

The result from Table 4 revealed the mean scores of students taught photosynthesis using learning together based on their score levels. The result revealed 16.11 for the low scoring students, 20.90 for the medium scoring students and 26.50 for the high scoring students. This showed that the high scoring students performed better than both the medium and low scoring students in the control group when photosynthesis was taught using conventional method of teaching.

Table 4

The Mean Scores of the High, Medium and Low Scoring Students Taught using Conventional Method of Teaching

Score Levels	Mean	Std. Deviation	N
Low	16.11	1.69	13
Medium	20.90	2.64	51
High	26.50	1.87	24
Total	21.90	3.97	88

Discussion

This study was conducted to investigate the effects of learning together and conventional method of teaching on senior secondary school students' achievement based on their score levels (high, medium and low). It was found out that there was a significant difference in the achievement of students taught photosynthesis using learning together and those taught using conventional method of teaching. The students' performance was enhanced using learning together strategy because students are continuously debating, discussing and clarifying concepts the way and manner they understand it with their team mate in the classroom. The students had higher self-esteem and positive feelings about themselves in the classroom. The teacher in the classroom designs learning activities, have control over the learning environment, structures group activities and empowered the students for future purposes.

This is in line with the work of Keramati (2009) and Kaul (2010) who found out that learning together strategy is more effective than traditional teaching methods. The effects of Learning together are significant on Mathematics achievement between the students' learning cooperatively and students' learning conventionally. Luu (2010) found out similar report that learning together group outscored the control group on the post-test scores in reading competence. Ghazi (2003) also found out that learning together group outperformed the conventional group in improving English as a Foreign Language reading achievement and academic self-esteem.

The findings of this study also revealed that there was a significant difference in the achievement of senior secondary school students when exposed to learning together strategy based on score levels, all the students achieved and benefited from the strategy. However, there was a difference in the achievement of the students based on score levels when exposed to this strategy. Therefore, we could then say that learning together strategy is not reduced to a particular ability level which means students can perform better with their varying abilities.

Ghazi (2003) investigated the effects of learning together strategy in improving English as a Foreign Language reading achievement and academic self-esteem. The researcher carried out an experimental design research with a pre-test-post-test control group experiment. The result showed a significant difference in favor of the experimental group. This showed that when learning together of and

constructivist learning environment are matched together in a classroom situation, the students' ability level and achievement was improved. Kuri (2013) conducted an experimental study assessing the impact of learning together strategy on senior secondary school students' academic achievement and students' ability level. Learning Together was used to teach the experimental group in geography class. Data analyzed showed the effectiveness of learning together strategy in terms of academic achievement in favour of all the ability levels which is in contrary to this present study.

Conclusions

The study showed that learning together strategy could serve as effective approach to achieving desired learning outcomes in teaching with varied abilities. The use of learning together to teach photosynthesis in Biology curriculum was effective in the improvement of students' knowledge, understanding and academic achievement. This strategy brings about active learning within the students different ability levels which enable them to learn how to help one another and also improve motivation through success.

Recommendations

1. To cater for the individual students different score levels teachers should have a mixture of strategies has each of the strategy has its own strength, weakness and usefulness.
2. Biology teachers should make effective use of appropriate learning strategy to plan their lesson so as to accommodate individual learners of different ability level.
3. Workshops and seminars should be organized by curriculum planners and education stakeholders for Biology teachers to train them on how to use learning strategies to teach difficult topics in Biology in curriculum.

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