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EFFECT OF COOPERATIVE LEARNING METHOD ON THE ACHIEVEMENT OF BIOLOGY II STUDENTS IN ANIMAL NURTRITION IN JOS NORTH LOCAL GOVERNMENT AREA, PLATEAU STATE

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ABSTRACT

This study investigated the effect of cooperative learning on the achievement of students in Baptist High School Jos. The study employed a quasi-experimental design, specifically the pretest posttest nonequivalent group design. The population of the study comprised of all SSII biology students in Baptist High School Jos, while the sample comprised of 67 senior secondary (SSI) Biology students from two intact classes that were purposively and randomly selected. A class of 31 students was used as the control group while another 36 students was used as the experimental group. The instrument, Biology Achievement Test (BAT) used for data collection comprising of twenty objective questions was validated by experts. The control group was taught Animal Nutrition using lecture method while the experimental group was taught the same topic using cooperative learning method for two weeks. Pretest and Posttest were administered to the two groups before and after teaching respectively. Three research question guided the study and two hypotheses were tested at 0.05 level of significance. The data obtained were analyzed using mean, standard deviation and t-test for independent sample. The result revealed that students taught using cooperative learning method performed better than students taught using the lecture method. This was because the mean score was higher for students taught with cooperative learning method compared to lecture method with lower mean score of students achievement. The mean score gain between the pretest and posttest scores was 16.50 in the cooperative learning group and 13.20 in the lecture method. These result shows that cooperative learning method is better than the lecture method. It was therefore recommended that the use of cooperative learning method should be adopted in the teaching of Biology in Secondary Schools.

Key words: Cooperative learning, biology, animal nutrition

INTRODUCTION

Education is a means of achieving a nations objectives. Education is a process of human learning by which knowledge is imparted, faculties are trained and skills developed. Education may be viewed as involving the transmission of what is worthwhile from generation to generation. Education is a lifelong process which transforms the life of an individual from that of a helpless and independent creature to a self-reliant, rational, and skillful person who can contribute to the development of the society. The national policy on education (2016) described education in Nigeria as an instrument per excellence for social and economic reconstruction of the nation. It further stressed that education in Nigeria has witnessed participation of non-governmental agencies, communities and individuals as well as government. Thus education is an important tool in bringing about much desirable social, political, economic, cultural, scientific and technological progress of any nation.

Science is the study of nature or natural things around us. Science is an organized body of knowledge in form of concepts, laws, theories and generalization. Science is made up of two important parts, product (knowledge) and process (methods). According to Onah (2003) science is the bedrock upon which any nation can be built. This means that no country can be globally recognized without talking about its scientific advancements. Hence, knowledge of science is a pathway to a better quality of life. So, teaching science well can nurture our curiosity and having

a methodology to turn our curiosity into knowledge gives us the power and possibility of invention and finding solutions to problems. Science education on the other hand, is a field of study concerned with producing a scientifically literate society. Pember and Humbe (2009) described science education as a process of teaching science especially, in school to improve one's knowledge about the environment and to develop ones skill of systematic inquiry as well as natural attitudinal characteristics. Science education has been recognized worldwide as a pre-requisite in technological development. Science subjects in Nigeria secondary schools include biology, chemistry, physics and agriculture etc.

Biology is an important science subject and a requirement for further learning of a number of science related professional courses like medicine, agriculture, pharmacy, and nursing etc. The Encyclopedias Britannica (2015) defines biology as the scientific discipline that is concerned with structures, functions, growth, origin, evolution and distribution of living things. It classifies and describes organisms, their functions and how species comes to existence and its relationship with their natural environment. Biology has been divided into many sub disciplines, such as botany, anatomy, zoology, histology, physiology, cytology, ecology, and virology. Biology is always expanding as new discoveries are made. The usefulness of biology cannot be over emphasized. A sound theoretical and practical knowledge of biology is very necessary for the management of our natural resources, provision of good health facilities for the masses, adequate food supply and favorable life environment. The main objective of teaching biology as stated in the national policy on education includes providing students with: adequate laboratory techniques/ field skills in biology, meaning and relevant knowledge in biology, ability to apply scientific knowledge to everyday life in matters of personal and community health and agriculture, reasonable and functional scientific attitude.(Federal Republic of Nigeria, 2008)

However, despite the usefulness of biology there is a persistent failure of secondary school students in biology examination which has remained a major threat to the learning of the subject in schools. The report of west African Examination Council (WAEC) on students enrolment and performance in Nigeria in science subjects revealed low academic achievement in biology and other science subjects(WAEC; Chief Examiners report 2009-2015). The persistent poor academic achievement of students in biology at senior school certificate examination leaves one in doubt about the effectiveness of teaching methods popularly used by the biology teachers for the teaching and learning of the subject. This disturbing performance may be ascribed to the failure of biology teachers to use appropriate methodology in handling the teaching of biology content because methodology is very vital in any teaching-learning process. What constitutes of good teaching and learning of school subjects is the use of appropriate method of teaching. The method adopted by the teacher may promote or hinder learning. Ogunniyi (2009) asserted that one of the most persistent and compelling problems besetting academic achievement in Nigeria is poor quality of teaching. There are a number of teaching methods such as lecture, discussion, demonstration, laboratory, individualized instruction, field-trip, cooperative learning method etc. for teachers to use but the effectiveness of these methods depends on the teachers. The way a teacher presents a subject matter to learners may make them like or dislike the subject (Emaikwu, 2012).

Presently, most biology teachers prefer to use the lecture or talk chalk method because the subject is bulky or broad in nature which makes it easier and faster to cover the syllabus within the stipulated time. The lecture method is an example in which the teacher expoundslectures, hold forth and inevitably bores. The teacher instructs provides information and seek to ensure that the subject is learned. This method of teaching biology faces a lot of criticism. According to Adeyebe (2003) the interest span of the learner is very short; hence lecture method hardly achieves the purpose for which it is intended. Many researchers agree that the conventional lecture method does not help students construct their own understanding. It ends up making teaching and learning of biology uninspiring and invariably leads to not only low achievement in biology but also incapacitates students from developing required skills necessary for creative thinking. Ayodele (2006) identified the use of inappropriate /non-effective teaching methodology as a major factor

hindering students understanding and achievement in science and biology. Similarly, the number of students sitting for biology examinations at WAEC and NECO (SSCE) level is gradually declining because the new secondary school curriculum developed by the Nigerian Educational and Development council (NERDC) has made biology compulsory only for students in the field of science and mathematics but elective in other fields such as business studies, humanities, and technology. Again, most students do not offer biology as an elective. It is only students in the field of science that offer biology since it is one of their core subjects. This may have been largely attributed to the teaching method used by the teachers which makes biology unattractive to the students.

The steady and recurrent decline of student's achievement in secondary school biology in both internal and external examination is a matter of concern. The West African Examination Council (WAEC) and the National Examination Council (NECO) have consistently reported poor achievement in the subject in senior secondary school certificate examinations (SSCE). Consequently, biology teachers have been wondering what might have been responsible for the incessant failure in these examinations in spite of governments' effort towards improving success in the subject and the quality of education generally in the country.

Biology is one of the science subjects that needs to be given very paramount attention. This prompted Omote (2002) to warn against the constant poor achievement generally sciences and biology in particular observing that this is very unhealthy for the nation since the subject is a key to economic, political, social change and development as far as human existence is concerned.

Researchers over the years have cited many reasons to the poor performance of students in school subjects including biology. Some of the causes include poor school environment, poor teacher qualification, and lack of instructional material etc. Over the years experts have been seeking for potent measures to address the problem of underachievement in biology. Some efforts include incentives for outstanding performance in biology, provision of instructional material for the teaching of biology, conduction of practical's and others.

However, it is sad to see that these efforts have not necessarily addressed the problems of students' poor performance in biology. Based on the premises above and the eminent danger if nothing is done to salvage the situation, the problem of this study is to investigate how effective the use of cooperative learning method (CLM) will be in improving students' academic achievement in animal nutrition in biology in Jos North Local Government Area of Plateau State.

The way we teach and learn in modern educational environments has been transformed through the advent of cooperative learning (Johnson and Johnson, 2009). Many educators are using active learning pedagogies, such as cooperative learning or team based learning. The term cooperative learning (CL) refers to students working in teams on an assignment or project under conditions in which certain criteria are satisfied, including that the team members be held individually accountable for the complete content of the assignment or project. Also, cooperative learning is a student centered, instructor-facilitated instructional strategy in which a small group of student is responsible for its own learnings and the learning of all group members. Students interact with each other in the same group to acquire and practice the elements of a subject matter in order to solve a problem, complete a task or achieve a goal. Slavin (2011) refers to cooperative learning as "instructional method in which teachers organize students in small groups, which then work together to help each other in their academic content. Kagan (1989) contributes that in cooperative learning the teacher designs the social interaction structures as well as learning activities. There are three main types of cooperative learning groups, namely formal cooperative learning group, informal cooperative learning group and cooperative based group (Johnson and Johnson, 2008). Informal cooperative learning lasts for a few minutes to one class period, they are short-term and ad-hoc groups in which students are required to work together to achieve a shared learning goal. Cooperative based groups usually last a semester or an academic year or even several years. They are long term and heterogeneous learning groups with committed relationships in which students support one another to complete assignments and make academic

progress. Formal cooperative learning groups last from one class period to several weeks, these are cooperative learning groups in which students work together to complete the learning tasks assigned and achieve shared learning goals. In cooperative learning students work in small groups to help one another master academic materials. Also cooperative learning allows students to work together to attain goals that cannot be obtained by working alone. Cooperative classroom structure allows the students discuss subjects, help each other to learn the topic and also provide encouragement for members of the group (Kala,2010)

Cooperative learning is a successful teaching strategy in which small teams each with different levels of ability use a variety of learning activities to improve their understanding of a subject. Each member of a team is not only responsible for learning what is taught but also for helping team mates learn thus creating an atmosphere of achievement. Majoka, Khan and Shah (2011) looked at the impact of cooperative learning and traditional methods of teaching in social studies and they concluded that learning in a cooperative classroom enhanced the student's ability to learn in the subject of social studies. They went on to say that cooperative learning proved to be more effective than the lecture method for students labelled as high and average students. Johnson and Johnson (1989) explained "the interactive relationship among students were more powerful than the influences of any other factors on the students learning achievement, socialization and development".

Cooperative learning has a track record of positive results in the classroom, once the proper amount of background information has been attained by the teacher an educated choice can be made as to which cooperative learning method is chosen. Teachers should monitor the dynamics of the group setting, place an emphasis on collaboration and motivation and access the mastery of learning materials by the students on a group and individual basis. Assessment can be done in a variety of ways which includes daily competitions, debate, worksheets, quizzes, tests etc. students must be empowered with the necessary environment and structure in order to reach higher levels of achievement and content literacy. Cooperative learning methods with the guidance of an informed teacher will have a positive impact on student achievement.

The social and economic development of the country's directly linked with the academic performance of students. .Cooperative learning changes the students and teachers role in classrooms. The ownership of teaching and learning is shared by group of students and is no longer the sole responsibility of the teacher. The authority of setting goals, assessing learning, and facilitating learning is shared by all. Students have more opportunities to actively participate in their learning, question and challenge each other, share and discuss their ideas and internalize their learning. Along with improving academic learning, cooperative learning helps students engage in thoughtful discourse and examine different perspectives, and it has been proven to increase students self esteem, motivation and empathy. Using cooperative groups to accomplish academic tasks not only provides opportunities for students to develop interpersonal skills but also gives them authentic experiences that will help them be successful in their future careers. Most important is that cooperative learning exploits the diversified abilities of students to increase their cognitive, psychological and social skills.

The different types of heterotrophic nutrition are as follows

1. Holozoic Nutrition: This involves organisms feeding on other organisms or solid organic substances synthesized by green plants. The organisms ingest, digest, absorb and assimilate these foods into their bodies. Holozoic organisms include;

- Herbivores: animals that feed on plants e.g. sheep, goat, rabbits etc.
- Carnivores: flesh eating animals e.g. cats, dogs, lions etc., carnivores that hunt living animals (prey) for food are known as predators while scavengers are those that feed on dead animals.
- Omnivores: animals that eat both plant and other animals e.g. man, pig etc.

2. Parasitic Nutrition: is the type of heterotrophic nutrition in which certain organisms feed on other organism in order to derive nourishment from them. The organism that feeds on another organism is called a parasite while the one that the parasites feed on is called the host. Some

parasites live on the body surface of the host and are called external or ectoparasites e.g. tick, fleas, bugs, leeches, aphids etc. an example of plant ectoparasites are mistletoes and dodders others live inside the body of the host and are known as internal parasites or endoparasites. E.g. hookworms, roundworms, liver flukes, tapeworm, guinea worm etc.

3. Saprophytic Nutrition: Is a type of nutrition in which certain organisms called saprophytes feed on dead and decaying organic material. The saprophytes generally secretes enzymes into the substrate of dead and decaying material in which they grow. The enzymes digest some portions of the substrate outside the body of the saprophyte (extracellular digestion) the digested food materials is then absorbed into the body through the rhizoids. Examples of saprophytes are rhizopus, mushroom, mucor, penicillium, yeast etc.

4. Symbiotic Nutrition: Is the type of nutrition in which the organisms of different species called symbionts live together and derive nourishment from each other. Apart from nutritional benefits, the symbionts can derive benefits like protection, shelter, and reproduction during association. Example are nitrogen fixing bacteria and root nodules of leguminous plants. The rhizobium is able to fix atmospheric nitrogen into the plant while the plant in turn provides shelter and food for the bacteria.

5. Carnivorous/Insectivorous Nutrition in plants: insectivorous plants usually grow in places with little nitrogenous salt and then use insects of smaller animals as their source of nitrogen. The plants are equipped with devices for trapping, digesting and absorbing nutritive compounds from the bodies of insects and small organisms. They have green leaves to help them carry out photosynthetic nutrition. Example of insectivorous plants are pitcher plants, bladderworts, sundew and Venus fly trap.

The aim of this study is to investigate the effects of cooperative learning method on biology (2) students' achievement in Animal Nutrition in Jos North Local Government Area of Plateau state. The study is aimed at achieving the following specific objectives:

1. Determine the level of significance of the mean score of students taught animal nutrition using cooperative learning method and those taught using lecture method.
2. Compare the level of significance of the gain scores of students taught animal nutrition using cooperative learning method and those taught using lecture method

RESEARCH QUESTIONS

The following research questions are highlighted to guide the researcher in the study

1. What is the level of biology students' achievement in animal nutrition before treatment?
2. What is the level of biology students achievement in animal nutrition taught using lecture method and those taught using cooperative learning method?

HYPOTHESES

The following hypotheses are suggested to guide the researcher and were tested at 0.5 level of significance:-

1. There is no significant difference between the pretest mean score of the experimental and that of the control group
2. There is no significant difference between the posttest achievement mean score of cooperative learning method (CLM) and that of lecture method (LM)

METHOD

This research adopted a quasi-experimental design. This design was adopted to find out the effect of cooperative learning method on the Achievement of SS2 Biology students on Animal Nutrition in Jos North Local Government Area of Plateau State. The design was appropriate for the research because a pretest and posttest control and experimental groups were used, the design was suitable for the research because scores of experimental and control group in the pretest and

posttest were compared to ascertain whether the experimental group taught with cooperative learning performed better than the control group taught with lecture method.The population for the study comprises of all SS2 biology students of Baptist high school Jos. They include Science, Arts and Commercial Students. The population includes both male and female and the student have an age range of 14-17. The senior secondary two biology students were sixty seven, they are boarders and the choice of one school for the study was due to the purposive sampling technique employed by the researcher in order to get a reliable and desired result.The sample size for the study comprised of 67 SS2 biology students from two intact classes of SS2A and SS2B in Baptist High School Jos. Intact classes were used because the research took place in a normal school term. The number of students in SS2A was 36 while SS2B had 31 students. The students from SS2A were used as the Experimental group while those from SS2B were used as the control group.

The sampling technique used for this study is purposeful random sampling technique. This is a process of identifying a sample of interest and developing a systematic way of selecting cases so that are not based on advanced or prior knowledge of how the outcomes would appear. In picking the type of method that a class would be taught with the researcher made a choice paper containing either experimental or control group the content of the paper were not known to the students because the papers were rolled and each class captain was asked to make a choice, whatever group the class captain picked was where they belonged, this was done to avoid bias in selection

One instrument was developed by the researcher and used for collection of data. The instrument is the Biology Achievement Test (BAT) which is made up of objective or multiple choice questions. It was developed by the researcher on the topic content Animal Nutrition as stipulated in the Biology syllabus.

The Biology Achievement Test (BAT) was constructed in line with the objectives stated by the researcher to have been achieved at the end of the teaching period and also with the use of WAEC and NECO past questions. It consist of two sections (A and B). Section A contains the student's personal information while section B contains twenty objectives questions. The objectives questions were drawn bearing in mind the blooms taxonomy of educational objectives covering the cognitive, affective and psychomotor domains. The students were asked to underline the correct option to each question. The test lasted for 20 minutes and the question covered aspects of Animal Nutrition. Each question carried five marks giving a total of 100 percent

The validity of the instrument is the ability of the instrument to measure what it is meant to measure to ascertain the extent to which the instrument has measured what it claims to measure and to see the appropriateness and usefulness of the instrument. The Biology Achievement Test (BAT) was developed in line with the objectives of the lesson and also from WAEC and NECO past questions and was submitted for construct and content validity. The content was validated by a biology lecturer in university of Jos and also by an expert from test and measurement. The expert scrutinized it in terms of clarity of instruction, structure, adequate timing and adequacy of items (content and construct validity). All corrections were carefully carried out before it was administered for data collection. The data were analyzed using the mean, standard deviation and t-test for independent sample. The mean score and standard deviation were used to answer the research questions while the t-test was used to test the hypotheses at 0.05 level of significance. The mean and standard and standard deviation were used because it has a greatest reliability coupled with other measures of central tendency while standard deviation was used because it measures the spread or dispersion of scores distribution. The t- test for independent or unrelated sample was used because the researcher wants to determine whether any difference exists between two different samples on a given dependent variable.

Hypothesis one:
There is no significant difference between the pretest mean score of the experimental and that of the control group

Data for testing this research hypothesis were collated by administering BAT. After which t-test for independent samples was used to test the hypothesis at 0.05 level of significance. Summary of the analysis was presented in table four with details in appendix B5

Table 1
Summary of t-test values of students mean score in pretest in cooperative learning and lecture method groups.

Groups	N	$\bar{X}$	SD	df	t-cal	t-crit	result
Coop. learning	36	63.75	17.25	65	1.22	1.98	no significant
Lecture method	31	58.40	18.3				

The results in Table 1 show a calculated t-value of 1.22 and critical t-value is 1.98 at 0.05 level of significance and degree of freedom of 65. The calculated t-value is less than the critical t-value. Therefore, the hypothesis was accepted. These results show that the students had the same baseline level of achievement before the treatment or before they were taught using the two methods.

Hypothesis two:
There is no significant difference between the posttest achievement mean score of cooperative learning method and that of lecture method

Table 2

Groups	N	$\bar{X}$	SD	df	t-cal	t-crit	Results
Coop. learning	36	80.85	12.4	65	2.48	1.98	significant
Lecture method	31	71.60	17.3				

Data for testing this research hypothesis were collated after administering BAT. After which t-test for independent samples was used to test the hypothesis at 0.05 level of significance. Summary of the analysis was presented in Table 2.
At 0.05 level of significance and degree of freedom of 65, the critical t-value of 1.98 is less than the calculated t-value of 2.48. Therefore, the hypothesis is rejected this means that there is a significant difference in the mean score between cooperative group and lecture group. This result indicates that the students taught with cooperative learning method performed better than students taught with lecture method.

DISCUSSION

The objective of the study was to investigate the effect of cooperative learning method on Biology two students achievement in Animal Nutrition at Baptist High School Jos, Plateau state. The data used in this study were analyzed based on the research questions and hypotheses. The mean scores and standard deviation were used to answer the research questions while the t-test was used to test the hypothesis. The pretest scores of the students showed that there was no significance difference in the mean score of the student's achievement before they were exposed to the treatment; therefore the null hypothesis was accepted. This result implied that the level of the students was the same before they were exposed to the treatment .However, after exposing

the students' to the cooperative learning method of instruction (method), the post test scores showed that there was a significant difference in the mean score of students achievement between students taught with cooperative learning method and lecture method in the learning of animal nutrition at Baptist High School Jos, Plateau state. The mean score of students taught with cooperative learning method was higher than that of students taught with lecture method so the null hypothesis was rejected. This implied that cooperative learning method is a better method of instruction than the lecture method because it enhances student's level of achievement. This result agrees with the various findings which stated that students taught with cooperative learning method achieved significantly higher scores on the achievement and knowledge retention than students who were instructed using lecture method of teaching. Therefore, cooperative learning method of teaching is recommended as an effective method of instruction for teachers in senior secondary schools in Nigeria.

CONCLUSION

Based on the findings of this study it can be concluded that cooperative learning method could effectively enhance learning of Biology concepts by students and also enhances cooperation and also share information

RECOMMENDATIONS

1. Biology teachers should adopt the use of cooperative learning method
2. Curriculum planners should incorporate cooperative learning method in the curriculum
3. Authors of Biology textbooks should include cooperative learning method in their books.
4. Government, private institutions and other policy makers should recruit more competent biology teachers to foster the teaching and learning of the subject.
5. Teachers should be trained and retained on how to effectively use cooperative learning method.

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