Abstract
This study investigates cooperative strategy on and academic performance of SS II Biology students in Zaria, Kaduna State Nigeria. 886 of Senior Secondary II Students in Zaria zone was the population size for the study. The sample size comprises of 180 students, 90 male and 90 female students. Sampling techniques involving balloting method was used to select two schools out of six co-educational Senior Secondary Schools sampled. One school is the experimental which received treatment via cooperative strategy, while the school was used as the control taught using lecture method. The instrument developed for data collection was Biology Performance Test (BPT) for pre-test and post-test, two research questions and two null hypotheses were formulated and tested at 0.05 level of significance. The data collected were analyzed using T-test, mean and standard deviation to determine the significant difference of the two groups. From the result it was observed that cooperative learning strategy has positive effect on academic performance of male and female student. The result also showed that there is a significant difference between the cooperative and lecture method favor cooperative strategy. The researchers recommended among others that, government as well as school management should allocate funds and provide adequate infrastructure and facilities such as ICT centers, E-libraries, equipped laboratories and conducive classroom to enhance students’ academic performance in biology subject.

Key words: Academic Performance, Biology, Cooperative, Lecture method.

Introduction
Education is recognized widely for great importance internationally both for the economic wellbeing of a nation and for a scientifically literate citizenry (Brown & Ciuffetell, 2009). Education is therefore seen as a requirement in all countries and all people globally to meet the many challenges that are faced in the schools. Researchers indicate four models of instruction that can lead to high student performance. These include Direct Instruction, Cooperative Learning, Mastery Learning and Project-Based Instruction. (Ajaja & Eravwoke, 2010). According to Ajaja and Eravwoke (2010) cooperative learning strategy is a strategy which involve students work together in small groups in order to achieve a common goal. It is an arrangement in which students work in mixed ability groups and are rewarded on the basis of the success of the group as a whole (Woolfolk, 2001, Sarah and Cassidy 2006, Shimazoe and Aldrich 2010).

Alebiosu and Ifamuyiwa, 2008 and Sitala 2010 stated that Cooperative learning activities are carefully structured learning activities in which students are held accountable for their contribution, participation and learning ability. Students are also provided incentives to work as a team. Science education plays a vital role in the lives of individuals and the development of nation scientifically and technologically.
Furthermore, learning by working in a team also makes it easier for students to engage in meaningful learning (Barfield 2003, Borich 2004, Macpherson, 2007 and Millis, 2010), since activities in the cooperative learning approach are designed specially to ensure a rich deep learning experience. There is broad dissemination of cooperative learning through teacher preparation programs, in-service professional development. (Gilies, 2004, Siegel 2005, Graham, 2005 and Amedu, 2015) in their different studies stated that Face-to-face interaction is the expectation that students will explain to each other how to solve problems and individual accountability is a requirement of students to complete their task. Joliffe, (2005) McPherson (2007) and Bello (2011) stressed that, Cooperative learning as an active learning strategy involves students interactively working in groups to accomplish a common goal brings about deeper understanding of learned task that is relevant to life after school. Heeden, (2003), Lakpini and Atadoga (2012) and Zakaria and Iksan (2007) pointed out that the conventional method of teaching is not for conceptual understanding, but rather for memorization and recalling of facts. This approach to teaching and learning does not enhance meaningful learning and student academic performance.

Gender is also one of the factors interacting with performance, gender issues both on the part of the teacher and the students have been documented to affect academic performance and some other learning outcomes, (Kimberly and Deborah 2003, Erinosho, 2005 and Obochi 2016).Abdulraheem (2012), has noted that gender inequalities are interwoven with social class, ethnicity, sexuality, disability and other factors identified as influencing academic attainment (Tuan, Chin, Tsai and Cheng 2005). Adebanjo (2014), linked gender and academic achievement with patterns of behavior. He noted that there are signs of boys being vulnerable to become disaffected. He further stated that boys tend to be less careful about rules and more indifferent to being reprimanded. Thus, this study investigated the effect of Cooperative strategy and Lecture Method on Academic Performance of SSII Biology Students in Zaria Kaduna State.

Statement of the Problem

The inappropriate teaching strategies and lack of good teaching method in science has brought about poor academic performance and negative attitude towards science subjects and biology in particular among senior secondary school students in Zaria Kaduna State. The poor performance of students in the subject has been a major concern to many stakeholders in the subject. The challenge of teaching science is to teach it in a way that enables pupils to learn scientific concepts while acquiring process skills and positive scientific attitudes (Sonnenwald and Li 2003). One of the effective ways of accomplishing these objectives is through involving students in activities in the context of cooperative learning. Researchers such as Lakpini (2006) and Lawal (2009) have reported that teachers shy away from activities-based teaching but rather rely on traditional lecture method. It is therefore on this note that the study sort to employ the use of Cooperative Learning strategy to see if the academic performance of SS2 students will be enhanced in Zaria Kaduna State.

Objective of the Study

The aims of the study are as follow:

1. To determine effect of cooperative strategy on academic performance of SS2 biology students and those taught using lecture methods.
2. To determine the difference between the academic performance of male and female students taught using cooperative strategy and those taught using lecture methods.
Research Questions
To achieve the objectives, the following research questions were used to guide the study.

1. What is the difference in the mean performance score of students taught biology using cooperative strategy and those taught using lecture method?
2. Is there any difference in the academic performance of male and female students taught using cooperative strategy and those taught using lecture methods?

Null Hypothesis
The following null hypothesis were tested in the course of the study

\( H_0 \): There is no significant difference in the mean academic performance of students taught biology using cooperative strategy and those taught using lecture methods.

\( H_0 \): There is no significant difference in mean academic performance scores of male and female students taught biology using cooperative strategy and their counterpart taught same concept using lecture method.

Methodology
In this study the researchers employ a quasi-experimental design using pretest and post-test in which two intact classes were assigned to two different treatments. The experimental Group (EG) received six weeks of biology lessons using cooperative learning strategy while the control group was taught the same topics using traditional lecture method. Post-test 01 was used to determine the equivalence of the two groups before the experiment, while the post-test 02 was used to find out whether or not the Cooperative learning strategy (CLS) have impact on academic performance of the students. The targeted population of the study comprises of all SSII Biology in Public Secondary Schools in Zaria Local Government Area. This study was limited to the SSII student of the selected schools which random sampling procedure were used to select a sample of one hundred and eighty students (180) out of the total population 886 student from the six public schools in the area. The choice for government owned schools is because they have common socio-economic background, admission procedure, staffing and promotion policy etc. Simple randomize technique in balloting method was employed to select the two (2) schools used for the study. Two instruments were developed for the study, ie Biology Performance Test (BPT) and students’ attitude questionnaire (SAQ). The questionnaires distributed were collected from the sample area of study and sorted out accordingly.

Results and Discussion

Answering Research Questions and Testing the Null Hypotheses

Research Question 1: What is the difference in the mean performance score of students taught biology using cooperative learning strategy and those taught using lecture method? To answer research question one, post test data generated via (BPT) were subjected to descriptive statistics to calculate mean and standard deviation.
Table 1: Means and Standard Deviation of Post-test Scores of students in cooperative learning group.

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>$\bar{X}$</th>
<th>SD</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooperative learning</td>
<td>90</td>
<td>23.16</td>
<td>5.292</td>
<td>.557</td>
</tr>
<tr>
<td>Lecture method</td>
<td>90</td>
<td>21.60</td>
<td>6.127</td>
<td>.676</td>
</tr>
</tbody>
</table>

* Significant

Table 1 above shows that there is a significant difference in the mean scores academic performance of students in cooperative strategy when compared with those in lecture method groups. It then implies that cooperative learning is effective to increased academic performance of the students than lecture method.

Research Question 2: Is there any difference in the performance of male and female students taught biology using cooperative learning strategy and those taught same topic using lecture method?

Table 2: Mean and Standard Deviation of Post-test Scores of male and female students taught biology using Cooperative Learning Strategy.

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>$\bar{X}$</th>
<th>SD</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>46</td>
<td>26.16</td>
<td>9.25</td>
<td>.975</td>
</tr>
<tr>
<td>Female</td>
<td>44</td>
<td>24.60</td>
<td>9.27</td>
<td>.978</td>
</tr>
</tbody>
</table>

* Not significant

In Table 2, it was observed that the mean scores of the male students (26.16) is higher than that of the female (24.60) but not statistically significant. Thus the strategy is gender friendly.

Test of Hypothesis

HO: There is no significant difference in the mean academic performance scores of students taught biology using cooperative learning strategy and those involved with lecture method.

Table 3. t-test of mean academic performance scores of students taught biology using cooperative learning strategy and those involved with lecture method.

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>$\bar{X}$</th>
<th>SD</th>
<th>df</th>
<th>t-cal</th>
<th>t-crit</th>
<th>p-value</th>
<th>remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coop learning</td>
<td>90</td>
<td>1.88</td>
<td>1.09</td>
<td>88</td>
<td>2.78</td>
<td>1.97</td>
<td>0.004</td>
<td>*</td>
</tr>
<tr>
<td>Lecture method</td>
<td>90</td>
<td>1.48</td>
<td>0.73</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* significant (p ≤ 0.05)

Result from Table 3 above indicates that there is statistical difference between students taught biology using cooperative learning strategy performed better than their counterparts taught same topic using lecture method. The observed probability level (0.004) is less than p ≤ 0.05. Therefore, the null hypothesis, which states that there is no significant difference in the academic performance between students involve in cooperative learning and those involve in lecture method, is thus rejected. This imply that cooperative learning has a positive effect on the academic performance of students.
**H0:** There is no significant difference in academic performance of male and female students involved using cooperative learning.

**Table 4: t-test of difference in academic performance of male and female students involved using cooperative learning**

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>X</th>
<th>SD</th>
<th>df</th>
<th>t-cal</th>
<th>t-crit</th>
<th>p-value</th>
<th>remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>46</td>
<td>2.91</td>
<td>1.158</td>
<td>88</td>
<td>0.216</td>
<td>1.98</td>
<td>0.55</td>
<td>NS</td>
</tr>
<tr>
<td>Female</td>
<td>44</td>
<td>2.86</td>
<td>1.050</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The t-value of 0.548 obtained in the test at the 88 degree of freedom compared with the critical value of 1.98, the variability between the mean could be considered not statistically significant. The observed probability level of obtained for the test is 0.55 (P > 0.05). With these observations, there is no sufficient evidence to reject the null hypothesis. Therefore, the null hypothesis which stated that, there is no significant difference in academic performance of male and female students taught using cooperative learning style is thus retained. The result imply that gender has no effect on their academic performance in relation to cooperative learning.

**Discussion of the Findings**

This study investigated Cooperative Learning Strategy and Lecture method on Academic Performance of SS II Students in Zaria, Kaduna State, Nigeria. The instrument used to carry out the research work was students’ biology performance test. The data collected were analyzed using T-test, mean and Standard deviation. Research question one was stated to identify the difference in the mean performance score of students taught biology cooperative learning strategy and those taught using lecture method?

The result of testing hypothesis one shows that there is significant difference in the performance of students taught using cooperative learning strategy when compare with their counterparts taught the same concept using lecture method. This observation is in line with the study conducted by Ajaja and Eravwoke (2010) who reaffirmed the ability of cooperative learning when used as an instructional strategy to bring about academic improvement in students’ performance in school science subjects. The findings of this study therefore, indicated that students in cooperative learning group outscored those in the lecture group, which make them develop positive attitude toward biology. The findings are also in agreement with that of Samuel and John (2004) who also confirm the effectiveness of cooperative learning methods when they investigated the effects of cooperative learning strategy on students’ achievement in chemistry, using a non-equivalent control group design, the study found that cooperative learning strategy facilitated students’ in chemistry learning more than regular methods.

Similarly, Lawrence (2006) examined achievement in individually competitive and cooperatively reward-structured environments in two high-school biology classrooms. He found out that the two groups were not significantly different from each other on the pretest. While both cooperative and competitive techniques obtained significantly higher posttest scores, neither treatment was superior over the other in producing academic achievement. The study of Martin and Roland (2007) also confirmed the finding of Lawrence (2006).
They compared the effects of cooperative learning method of jigsaw and traditional direct instruction method on the cognitive achievement in physics. Analysis of the result revealed no significant differences between the two groups of instruction in students’ cognitive achievement in physics. Similarly, the finding is in agreement with the study conducted by Ghazi (2003) who recorded a significant difference among English students when he investigated the effects of Learning Together Strategy (LTS) of cooperative learning in improving English as a foreign language (EFL) reading achievement and academic self-esteem.

The Researcher employed pretest – posttest control group experimental design. The results indicated a statistically significant difference in favor of the Learning Together Strategy on the variable of EFL reading achievement. The finding is also in line with the work of Brad (2000) who investigated the effectiveness of cooperative learning on students’ academic performance in computer under cooperative and teacher-centered learning environments. He found out that students in cooperative learning group exhibited higher level of academic performance in computer class. The result of the finding is also in line with that of Pandian (2004) who investigated the effects of cooperative computer-assisted learning and traditional (teacher-centered) learning methods on students’ learning achievement in biology. Results of the analysis of covariance revealed that students in the cooperative computer-assisted group achieved better in biology test than their colleagues in the traditional group. In the same vein, the results presented in Table 2 indicated that there was a difference in the retention strength of male and female students taught using cooperative learning strategy in favor of the female, when compare with their colleagues taught using lecture method.

The finding agrees with the work of Wang (2010) who explored the interactive network to develop a cooperative learning model in which a mathematical-learning experiment and an empirical study could be based. The teacher set up websites as problem-situations for the students to solve through cooperative team work. The result of the study also showed that cooperative learning strategy improved the students’ grade in mathematics and motivated them towards learning mathematics. Similarly, Burcinand Leman (2007) examined the effect of cooperative learning on ninth grade students’ understanding of metallic bonding, the results of the students’ test indicated that the mean score of the students in cooperative learning group was significantly higher than the mean score of their colleagues in control group. The finding of this study is in line with that of Chiu (2002) who observed a teacher who implemented three cooperative learning methods (STAD, TGT, and LT) to solve the instructional problems she encountered when she taught junior school students. This revealed that cooperative learning strategy, used generally, had positive effect on the students in junior school. The result presented in Table 4 shows that insignificant difference exists in the mean scores of male and female students taught biology using cooperative learning strategy. Result from the finding indicates that gender and treatments are not statistically significant, thus the treatment is gender friendly.

**Conclusion**

Based on the findings of the study the following conclusions were made: Cooperative learning techniques has the potentials of enhancing and improving the student attitude and academic performance in biology subject. The attitude of low performing student improved when exposed to cooperative learning style, thus, the strategy removes teacher as a dictator and sole owner of knowledge which renders students’ passive as in the case of traditional teaching method, rather students are actively involved in the
process of learning which is not so in conventional lecture method. Students in cooperative learning strategy group had better retention of the concept taught through student to student interaction. Thus, there is need to include cooperative learning strategies into the school curriculum to improve the students’ positive thinking, individual accountability, face-to-face interaction and acquisition of science skills in biology subject. The fact that cooperative learning is such a dynamic practice means that it can be used effectively in many situations. Cooperative learning techniques if used in schools in Zaria zone will play vital role in changing the negative attitude and improving academic performance of student in the area.

**Recommendations.**

Based on the findings of this study, the following recommendations are made:

1. Biology teachers in secondary schools should be sponsored by the school administration for training and retraining through attending seminars, conferences, and workshops on regular basis so as to acquaint them with new trends and innovations in science teaching.

2. Government agencies such as Federal and State Ministry of Education as well as school counselors should encourage the use of Cooperative learning strategy among students to enhance meaningful learning.

3. Government as well as school management should allocate funds and provide adequate infrastructure and facilities such as ICT centers, E-libraries, equipped laboratories, conducive classroom among others which will improve students studying skills and also enhance learning among biology students.

**References**


