Effect of Cooperative Learning Strategy on Upper Basic Education II Students' Performance and Interest in Basic Science and Technology in Benue State, Nigeria

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Abstract: The study examined the effect of cooperative learning strategy on Upper Basic Education II (UBE II) students' performance and interest in Basic science and Technology in Benue State. A pretest post-test control group, non-equivalent quasi-experimental design was used for the study. The sample of 425 students was drawn from the population of 993 Upper Basic Education II students from Makurdi Local Government. Intact classes were randomly selected and assigned to experimental and control groups. Basic Science and Technology Performance Test (BSTPT) and Basic Science and Technology Interest Scale (BSTIS) researcher-design instrument were used for data collection. The two instruments BSTPT and BSTIS items were subjected to face and content validation. The reliability of the instruments was established using Kudar-Richarson formula 20 (K-R$_{20}$) and Cronbach Alpha. The reliability coefficients of the instruments were found to be 0.78 and 0.79 respectively. The research questions were answered using mean and standard deviation, while the hypotheses were tested at 0.05 alpha level of significance using Analysis of Covariance (ANCOVA). The findings of the study revealed that there was a significant difference in the mean performance and mean interest scores of students taught Basic science and Technology using cooperative learning strategy and those taught using lecture method (F $(1,422) = 640.728$, $p<0.05$) and (F$(1,422) = 1063.49$, $p<0.05$). The findings also revealed that there is significant difference in the mean performance scores of male and female students taught Basic science and Technology using cooperative learning strategy in favor of the female students (F$(1,209) = 2.517$, $p>0.05$). The study also revealed that there was a significant difference in the mean interest scores of male and female students taught Basic science and Technology using cooperative learning strategy (F$(1,209) = 15.94$, $p<0.05$). Based on the findings, it was recommended that cooperative learning strategy should be used in teaching Basic Science and Technology at Upper Basic Education and science in general.

Key words: cooperative learning strategy, Basic Science Technology, performance, Interest and Upper Basic Education

I. INTRODUCTION

Science is the study of the natural world based on observation and experimentation, which results to the understanding of what the natural world, is all about. Iwuji (2012) looked at science as intellectual activities carried out by scientists designed to discover information about the natural world in which we live and to discover ways in which this information can be organized and utilized for the benefit of human race. According to Ityokaa and Adejoh (2014) science is an attempt by human beings to organize their experience about nature into meaningful system of explaining some natural phenomena such as mirage, eclipse, rainbow, tides, which hitherto were ascribed to witchcraft activities and evil spirit, thereby liberating the society from the power of superstition. The authors further explained that understanding the natural world is based on observation and experimentation. Science therefore is very critical and imperative in shaping the way people think, explore, generate and apply knowledge about the environment.

The role of science in this modern era is wide and profound, that is why, Atoo (2018) stressed the importance of scientific knowledge in boosting national prestige, military might, national income and international rating of the country. According to him, science and technology gives birth to the production of microcomputers and their innovative applications which earned the developed countries such as United State of America and Japan unparalleled national wealth, military potential and enviable national prestige. Therefore, science and technology remain a veritable tool for national development, such that nations of the world have come to acknowledge it as a "sine qua non" for enhancing economic development, eradicating poverty and introducing social welfare for the citizenry (Ityokaa and Adejoh, 2014).

It is a basic fact that, for an individual to be well-groomed in science, and be competent enough to face the challenges of life in his or her society, he or she must have a good foundation in science and technology. This is because science and technology has contributed enormously in solving societal problems in many areas such as health, nutrition, food security, transportation, information and communication, energy, security, sports among other (Tofi, Adejoh and Ochu, 2017) .

In education, science and technology has shifted instruction to non-formal setting outside the school where

teaching and learning now take place in homes, in business premises, in factories, in the market, everywhere and at any time. It has broken the barriers to education, whether cultural, physical (distance), environmental, demographical, or economic (Atoo, 2018). Hence, nations all over the world including Nigeria are striving hard to develop technologically and scientifically (Adejoh, Amali and Omaga, 2013). According to Okwara, Adejoh and Tafi (2019) nations that are said to be developed and largely considered as, civilized, have achieved that status through purposeful and strategic science education of her citizens.

Science education in Nigeria has become significant because it is needed to produce technologists, technicians, scientists, craftsmen and skilled artisans who are required to change the economy which would in turn lead to a rapid growth and development necessary for nations to cope with the present day-challenges (Samuel, 2018). However, science education cannot achieve the goal of producing technologists, technicians, scientists, craftsmen and skilled artisans for national development when the achievement of students in science subjects especially Basic Science and Technology which is the foundation of science education is not encouraging enough. The analysis of students' performance released by Benue State Examinations Board revealed that in 2020, 78,960 candidates took the examination 22,260 (28.19%) had distinction, 39,647 (50.21%) had credit, 9,418 (11.93%) had pass and 7,635 (9.67%) failed. (Benue State Examinations Board, 2021) The performance in the subject is not good enough to boost of as a foundation subject upon which pure science at senior secondary school and science education generally anchored on.

The status of the performance in Basic science and Technology according to Okwara et al (2019) is attributed to inadequate exposure of students to class activity, inadequate preparation by teachers, and students' inability to comprehend questions, lack of effective teaching strategies employed in teaching the subject, shortfall in the number of qualified Basic Science and Technology teachers and inability to effectively implement Basic Science and Technology curriculum. Meanwhile Adeniran, Ochu and Atoo (2017), affiliate the low performance in the subject to teachers' incompetence, inadequate infrastructure and materials for teaching and learning the subject, the use of inappropriate teaching strategies, poor student background, poor funding of science and technology education, lack of awareness by most parents, lack of motivation on both teacher and students and poor management by various heads of school among others.

The performance of students in the subject has remained the greatest concern to teacher, parents and educators. Various steps had been taken by the government and educational planners in Nigeria in an attempt to overcome the problem of low performance of students in Basic Science and Technology. For instance, the government has strengthened its policy on the school supervision to make teachers more committed to duty, encouraged science teachers through science allowance and encouraged teachers to attend conferences, seminars and in-service training (Danjuma and Nwagbo, 2015). Unfortunately, these efforts have only yielded minimal result. This condition may not be unconnected with the students' level of interest in the subject, considering the fact that students generally learn when they have certain degree of interest in what they are expected to learn (Danjuma and Nwagbo, 2015).

Interest is the feeling one has in wanting to know or learn more about something (Agogo & Achor, 2014). Interest could be defined as the energizer or learning without which meaningful learning may not take place (Abakpa, 2011). Ugwuanyi (2015), also view interest as a subjective feeling of concentration or persisting tendency to pay attention and enjoy some activity or content. Children's interest needs to be stimulated in order to learn, even though they are physically and intellectually capable of learning. Once stimulated, they continue to learn as long as the teacher is capable of sustaining their interest in the subject matter. The level of a person's interest has been found to be a powerful influence on learning. Specifically, interest has been found to influence attention, goals and levels of learning (Tofi, *et al,* 2017). Though interest has been recognized an important condition for learning Basic Science and Technology, science teachers continue to wrestle with the difficulties working with students that lack interest in the subject (Okoro 2011). Available studies have shown that students generally have weak interest towards Basic Science and Technology (Ekon, Ekwueme and Meremikwu, 2014). This may be as a result of teaching concepts in abstract instead of practical (Eriba and Samuel, 2018). In fact, teachers often think that students either have or do not have interest and might not recognize that they could make a significant contribution to the development and sustainability of student's interest (Agu & Aku, 2016). It therefore, implies that interest is important variable teachers must consider when teaching Basic Science and technology. In other words students' will learn well and achieve high in Basic Science and technology if teachers are able to utilize instructional strategy that will arouse and sustain their interests.

The teaching of Basic Science should be student-centered, activity oriented where rote learning and memorization of isolated facts is discouraged. For this purpose, the use of discovery teaching strategy; the inclusion of cooperative learning and; the involvement of students in open-ended field or laboratory exercises have ben advocated for (Ityokaa and Adejoh, 2014). All these strategies recommended are inquiry based. For an individual to be productive and functional in a changing society, he/she must acquire the right attitude and functional skills which can only be cultivated in learners through appropriate teaching of science using innovative strategies.

Cooperative learning is a teaching strategy that organizes students in small groups so that they can work together to maximize the learning of others. In particular, the cooperative learning approach to education is the place where students are organized in pairs or in small groups to help each other in learning the assigned material (Ajaja and Eravwoke, 2012). Gambari and Yusuf (2014) also defined cooperative learning as a way of learning in which students of different ability levels work together in small groups to achieve a goal. It involves the use of a variety of learning activities to improve the understanding of a topic. Students in a group interact with each other, share ideas and information, seek for additional information and make decisions about their discoveries for the whole class. There are four basic elements in the cooperative learning strategy. These basic elements include: small groups must be structured for positive interdependence; there must be face-to-face interactions, individual responsibility and use of interpersonal skills and small groups. It is known that cooperative learning actively involves students in the learning process and seeks to improve the critical thinking, reasoning and problem solving-skills of the learner (Ajaja & Mezieobi, 2018).

According to Şimek, Yilar and Kucuk (2013), cooperative learning is designed at facilitate the achievement of a specific end product or objective through people working together in groups. Similarly, Gull and Shehzad (2015) see cooperative learning as a method of instruction that allows students the independence of the use of mental processes to contribute to knowledge. Naseem and Bano (2013) believe that when students of different cognitive, intellectual and physical levels are exposed to solving a given task, they have the opportunity to interact and work as a team; it improves learning attitudes, interpersonal skills and the concept of self and reduces dependence on teacher. Therefore, the teacher's role is shifted from information provider to a facilitator, an illuminator or a "torch bearer". The tasks of cooperative learning are usually intellectually demanding, creative, and open and involve higher-order thinking tasks. Cooperative learning can therefore give weak students the opportunity to learn and achieve the maximum (Ajaja, 2018). Furthermore, cooperative learning involves group work among students, resulting in positive interdependence. Typically, in cooperative learning, academic assignments are structured or divided so that everyone can participate fairly and all students are responsible (Candler, 2013). Jacobson and Baribor (2012) reiterated that group work as a result of cooperative learning arouse students' learning interest, cultivate their exploring ability and creative thinking and improve their team spirit and social communication skills. Group work can help students become more active in their learning. When working with peers in a group, students are encouraged to articulate their ideas and question the ideas of others.

Cooperative learning is hinged on Vygotsky (1978), theory of scaffolding and its zone of proximal development which emphasizes the role of active involvement in learning

in relation to the child's environment. The teacher acts as a facilitator who encourages students to discover principles for themselves and to construct knowledge by working to solve realistic problems. This implies that the students must take some responsibility for their learning. This is because they have to be actively involved in teaching and learning process. Ajaja and Mezieobi (2018) investigated the effect of cooperative learning strategy on Students' performance in Social Studies. The result of the study showed that students performed highly using cooperative learning instructional strategy irrespective of ability level. The results of the study also indicated that both the male and female students benefitted equally from the cooperative learning strategy. In another research, Gambari, Shittu, Daramola and James (2014) investigated the effects of three co-operative learning strategies on the performance of secondary students in physics. It also examined whether the performance of the students would vary with gender and achievement levels. Purposive sampling technique was used to select two senior secondary (SSS II) physics students from two intact classes in the selected four secondary schools in Minna, Niger State, Nigeria. Findings revealed that there was significant difference in the performance of the groups. In addition, students' gender had no influence on their performances. Also, achievement levels had significant influence on students' performance in cooperative settings.

Similarly, Yunusa, Abdulwahid and Adullahi (2014), examined the effect of cooperative instructional strategy on interest and achievement in Biology among low achieving senior secondary school students in Bida Educational Zone, Niger State, Nigeria. Findings indicate that cooperative instructional strategy significantly affects student interest and achievement in Biology. Eriba and Samuel (2018) investigated the effect of Student Team Achievement Division and Jigsaw IV cooperative learning strategies on interest and achievement of Basic Science students. A simple random sampling procedure was employed to select 126 JSS II students from four public, coeducational schools in Karu Local Government Area of Nasarawa State. The quasi-experimental research design was employed for the study. The findings of the study revealed significant differences in the interest and achievement of students taught using STAD and Jigsaw IV cooperative learning strategies as against the use of the conventional lecture method for teaching basic science.

The use of cooperative learning strategy may have the same or different effect on male and female students. This brings in the issue of gender of students in relation to performance and interest. Ngwu (2015) defined gender as the psychosocial aspect of maleness and femaleness. Ishiwu (2014) contend that gender is a societal grouping of people into masculine and feminine. It does not only refer to women and men but also to the way their qualities, behaviours and identities are determined .Operationally, gender can be said to be the culturally determined traits associated with the roles played and grouping of male and female. Many scholars have

carried out researches on the influence of gender on students' performance and interest in science subjects over years and their findings were diverse. For instance, findings of Samuel and Eriba (2018) revealed that gender is a significant factor affecting performance of students in Basic science while Ajaja and Mezieoba (2018); Gambari, Shittu, Daramola and James (2014) in their separate researches revealed that gender had no influence of students performance in sciences. On the other hand, Godpower-Echie and Ihenko (2017) shared in their findings that gender had a significant influence on interest of students in science. Abakpa, Adeniran and Zam (2018); Ajayi, Agamber and Angura (2017) had a contrary view on the influence of gender on student interest in science. Seeing these diverse findings from above mentioned researches, it is therefore worthwhile to determine whether cooperative learning strategy would have effect on gender respective to performance and interest in Basic science and Technology.

1.2   Statement of the Problem

Basic Science is the foundation of Science education in Nigeria which is needed to produce technologists, technicians, scientists, craftsmen and skilled artisans who are required to change the economy that would in turn lead to a rapid growth and development necessary for nations to cope with the present day challenges. However, science education cannot achieve the goal of producing technologists, technicians, scientists, craftsmen and skilled artisans for national development when the performance of students in science subjects especially Basic Science which is the foundation of science education is not encouraging enough to boost of.

Many studies have been carried out on performance and interest of students in Basic Science and Technology. Many of those studies found, amongst others, that lack of qualified basic science teachers, teaching strategy, lack of instructional materials, and lack of practical works are logic behind students' status of performance in the subject. Despite the number of factors outlined as being responsible for the poor performance in subject, accusing fingers have been pointing at teacher's inappropriate teaching strategy as the major problem. Therefore, there is need to use strategy that will involve students' active participation such as cooperative learning strategy.

Cooperative learning strategy is a teaching strategy where students in a group interact with each other, share ideas and information, seek for additional information and make decisions about their discoveries for the whole class. The students therefore play an active role in knowledge construction, which results to meaningful learning. It is on this premise that the researcher sought to know whether cooperative learning strategy would have a positive or negative effect on students' performance and interest in Basic Science and Technology in Makurdi, Benue State.

1.3   Purpose of the Study

The purpose of this study is to determine the effect of cooperative learning strategy on students' performance and interest in Basic Science and Technology. The study specifically sought to:

1. determine the performance of students taught Basic Science and Technology using cooperative learning strategy and those taught using lecture method.
2. determine the interest of students' taught Basic Science and Technology using cooperative learning strategy and those taught using lecture method
3. determine the performance of male and female students taught Basic Science and Technology using cooperative learning strategy
4. determine the interest of male and female students taught Basic Science and Technology using cooperative learning strategy

1.4   Research Questions

The following research questions were raised to guide the study

1. What is the performance of students taught Basic Science and Technology using cooperative learning strategy and those taught using lecture method?
2. What is the interest of students taught Basic Science and Technology using cooperative learning strategy and those taught using lecture method?
3. What is the performance of male and female students' taught Basic Science and Technology using cooperative learning strategy
4. What is the interest of male and female students' taught Basic Science and Technology using cooperative learning strategy?

1.5   Hypotheses

The following research hypotheses were formulated and tested at 0.05 level of significance.

$H0_1$: There is no significant difference in the performance of students taught Basic Science and Technology using cooperative learning strategy and those taught using lecture method.

$H0_2$: There is no significant difference in the interest of students taught Basic Science and Technology using cooperative learning strategy and those taught using lecture method.

$H0_3$: There is no significant difference in the performance of male and female students taught Basic Science and Technology using cooperative learning strategy.

$H0_4$: There is no significant difference in the interest of male and female students taught Basic Science and Technology using cooperative learning strategy.

II. METHODOLOGY

The study was a quasi-experimental design of non-randomized pretest post-test control group design. The population was 993 Upper Basic Education II (UBE II) students (Benue State Teaching Board, 2020) offering Basic Science and Technology in public school in Makurdi local government area of Benue State. Purposive sampling technique was used to select eight out of 21 Secondary Schools in Makurdi local government area on the premise that the schools are coeducational, have been presenting students for Basic Education Certificate Examination (BECE) for over five years, have at least two basic science teachers, these schools have more than one stream of UBE II classes. The sample of 425 UBE II students was randomly drawn from four schools in Makurdi local government area. Two schools were randomly assigned to experimental group while the other two were assigned to the control group. The instruments for data collection were Basic Science and Technology Performance Test (BSTPT) and Basis Science and Technology Interest Scale (BSTIS) which was developed by the researcher. The BSTPT and BSTIS are made up of two sections A and B. Section A sought information on demographic data of the students including gender and name of school. Section B of the instruments contains items designed to determine students' performance and interest in Basic Science and Technology. The BSTPT contains 30 multiple choice items drawn from Basic Science and Technology of UBE II curriculum. The BSTIS is a 30 item of four point likert scale with strongly agree (SA) =4 points, Agree (A) =3 points, Disagree (D) =2 points and Strongly Disagree (DA) = 1 point, for positive and items in the revised manner for the negative items. The instruments were validated by three experts, one from Test, Measurement and Evaluation and two from Science Education all from Federal University of Agriculture, Makurdi. The instruments were trial tested and the reliability coefficients of BSTII and BSTAT were found to be 0.79 and 0.78, using Kuder-Richardson formula 20 (K-R$_{20}$) and Cronbach Alpha respectively. The values showed a positive relationship within the test items which means the instruments were both internally consistent and reliable. Research assistants were employed in order to eliminate bias. Pre-test was administered to experimental and control groups to ascertain the level of performance and interest before the treatment. The experimental group was taught using cooperative learning strategy (that is treatment) while the control group was taught using lecture method (that is no treatment). A post-test, which was an equivalent form of the pre-test, was administered to determine the level of performance and interest after the treatment. Mean and standard deviations were used to answer the research questions while null hypotheses were tested at 0.05 alpha level of significance using Analysis of Covariance (ANCOVA).

III. RESULTS

Research Question 1

What is the performance of students taught Basic Science using cooperative learning strategy and those taught using lecture method?

Table 1: Mean Performance Scores and Standard Deviation of Students taught Basic Science and Technology in Experimental and Control Groups

Groups	N	Posttest		Posttest		Mean Gain
		Mean	SD	Mean	SD	
Experimental	212	53.86	4.61	81.48	9.75	27.62
Control	213	53.88	4.12	61.76	5.93	7.88
Mean Difference		-0.02		19.72		19.74
Total	425					

Table 1 shows that in pre-test, the experimental group had a mean performance score of 53.86 with a standard deviation of 4.61, while the control group had a mean performance score of 53.88 with a Standard deviation of 4.12. The Table also shows that in the post-test, experimental group had a mean performance score of 81.48 with a standard deviation of 9.75, while the control group had a mean performance score of 61.76 with a standard deviation of 5.93. From the pre-test and post-test scores, the mean gain for the experimental group was found to be 27.62 while the mean gain for the control group was 7.88. The mean difference between the mean performance gain scores of the experimental and control group was 19.74. This shows that the experimental group gained more in performance compared to the control group.

Research Hypothesis 1

There is no significant difference in the performance of students taught Basic Science and Technology using cooperative learning strategy and those taught using lecture method.

Table 2: Summary of Analysis of Covariance (ANCOVA) of Experimental and Control Groups' Performance Scores in Basic Science and Technology

Source of Variance	Sum of Squares	df	Mean Square	F	Sig
Corrected Model	41603.551[a]	2	20801.775	322.441	.000
Intercept	10474.000	1	10474.000	162.354	.000
Posttest	283.066	1	283.066	4.388	.037
Group	41335.532	1	41335.532	640.728	.000
Error	27224.647	422	64.513		
Total	2247473.000	425			
Corrected Total	68828.198	424			

Table 2 shows the ANCOVA analysis of the performance scores of students taught Basic Science and Technology using cooperative learning strategy and those taught using lecture method. From the analysis, F (1,422) = 640.728, p<0.05.

Hence, the null hypothesis was rejected. This means that there is statistically significant difference in mean performance scores between students taught Basic Science and Technology using cooperative learning strategy and those taught using lecture method. This further indicates that there was higher improvement in the mean performance scores of students in the experimental group than those in the control group.

Research Question 2

What is the interest of students taught Basic Science and Technology using cooperative learning strategy and those taught using lecture method?

Table 3: Mean and Standard Deviation of Interest Ratings of Students taught Basic Science and Technology in Experimental and Control Groups

Groups	N	Pre-interest		Post-interest		Mean Gain
		Mean	SD	Mean	SD	
Experimental	212	1.65	0.63	3.61	0.49	1.96
Control	213	1.52	0.58	1.92	0.57	0.40
Mean Difference		0.13		1.69		1.56
Total	425					

Table 3 shows that in the interest ratings of students before treatment, the experimental group had a mean interest ratings of 1.65 with a standard deviation of 0.63, while the control group had a mean interest ratings of 1.52 with a standard deviation of 0.58.

The Table also shows that after treatment, experimental group had a mean interest ratings of 3.61 with a standard deviation of 0.49, while the control group had a mean interest ratings of 1.92 with a standard deviation of 0.57. From the pre-interest and post-interest ratings, the mean gain for the experimental group was found to be 1.96 while the mean gain for the control group was 0.40. The mean difference between the mean interest gain ratings of the experimental and control group was 1.56. This shows that the experimental group gained more in interest compared to the control group.

Research Hypothesis 2

There is no significant difference in the interest of students taught Basic Science and Technology using cooperative learning strategy and those taught using lecture method.

Table 4: Summary of Analysis of Covariance (ANCOVA) of Experimental and Control Groups' Interest Ratings in Basic Science and Technology

Source of Variance	Sum of Squares	DF	Mean Square	F	Sig
Corrected Model	301.492[a]	2	150.746	534.672	.000
Intercept	437.566	1	437.566	1551.980	.000
Posttest	.324	1	.324	1.149	.284
Group	299.842	1	299.842	1063.492	.000
Error	118.979	422	.282		
Total	3669.000	425			
Corrected Total	420.471	424			

Table 4 shows the ANCOVA analysis of the interest ratings of students taught Basic Science and Technology using cooperative learning strategy and those taught using lecture method. From the analysis, $F(1,422) = 1063.49$, $p<0.05$. Hence, the null hypothesis was rejected. This means that there is statistically significant difference in mean interest ratings between students taught Basic Science and Technology using cooperative learning strategy and those taught using lecture method. This further indicates that there was higher improvement in the mean interest ratings of students in the experimental group than students in the control group.

Research Question 3

What is the performance of male and female students' taught Basic Science and Technology using cooperative learning strategy?

TABLE 5: Mean Performance Scores of Male and Female Students taught Basic Science and with Cooperative Learning Strategy.

Gender	N	Pretest		Posttest		Mean Gain
		Mean	SD	Mean	SD	
Male	103	54.14	4.21	80.48	10.56	26.34
Female	109	53.60	4.96	82.43	8.86	28.83
Mean Difference		0.54		-1.95		-2.49
Total	212					

Table 5 shows that in pre-test, the males had a mean performance score of 54.14 with a standard deviation of 4.21, while the females had a mean performance score of 53.60 with a standard deviation of 4.96. The Table also shows that in the post-test, the males had a mean performance score of 80.48 with a standard deviation of 10.56, while the females had a mean performance score of 82.43 with a standard deviation of 8.86. From the pre-test and post-test scores, the mean gain for the males was found to be 26.34 while the mean gain for the females was 28.83. The mean difference between the performance gain scores of males and females was -2.49. This shows that the females gained slightly higher in performance scores compared to the males.

Research Hypothesis 3

There is no significant difference in the performance of male and female students taught Basic Science and Technology using cooperative learning strategy.

Table 6: Summary of Analysis of Covariance (ANCOVA) of the Performance Scores of Male and Female Students in Experimental Group in Basic Science and Technology

Source of Variance	Sum of Squares	df	Mean Square	F	Sig
Corrected Model	564.210[a]	2	282.105	3.025	.051
Intercept	6685.520	1	6685.520	71.697	.000
Pretest	361.708	1	361.708	3.879	.050
Sex	234.736	1	234.736	2.517	.114
Error	19488.715	209	93.247		
Total	1427558.000	212			
Corrected Total	20052.925	211			

Table 6 shows the ANCOVA analysis of the performance scores of male and female students taught Basic Science and Technology using cooperative learning strategy. From the analysis, $F_{(1,209)} = 2.517$, $p>0.05$. Hence, the null hypothesis was accepted. This means that there is no statistically significant difference in mean achievement scores of male and female students taught Basic Science and Technology using cooperative learning strategy. This further indicates that male and female students had almost equal improvement in their performance scores when taught Basic Science and Technology using cooperative learning strategy.

Research Question 4

What is the interest of male and female students' taught Basic Science and Technology using cooperative learning strategy?

TABLE 7: Mean and Standard Deviation of Interest Ratings of Male and Female Students taught Basic Science and Technology with Cooperative Learning Strategy.

Gender	N	Pre-interest		Post-interest		Mean Gain
		Mean	SD	Mean	SD	
Male	103	1.62	0.64	3.48	0.50	1.86
Female	109	1.67	0.62	3.73	0.44	2.06
Mean Difference		-0.05		-0.25		-0.20
Total	212					

Table 7 show that before the treatment was carried out, the males had a mean interest ratings of 1.62 with a standard deviation of 0.64, while the females had a mean interest ratings of 1.67 with a Standard deviation of 0.62. The Table also shows that after the treatment was administered, the males had a mean interest ratings of 3.48 with a standard deviation of 0.50, while the females had a mean interest ratings of 3.73 with a standard deviation of 0.44. From the pre-interest and post-interest ratings, the mean interest gain for the males was found to be 1.86 while the mean interest gain for the females was 2.06. The mean difference between the interest gain ratings of males and females was -1.20. This shows that the females gained slightly higher in interest ratings compared to the males.

Research Hypothesis 4

There is no significant difference in the interest of male and female students taught Basic Science and Technology using cooperative learning strategy.

Table 8: Summary of Analysis of Covariance (ANCOVA) of the Interest Ratings of Male and Female Students in Experimental Group in Basic Science and Technology

Source of Variance	Sum of Squares	df	Mean Square	F	Sig
Corrected Model	3.639[a]	2	1.820	8.115	.000
Intercept	364.524	1	364.524	1625.630	.000
Pretest	.108	1	.108	.484	.488
Gender	3.573	1	3.573	15.936	.000
Error	46.865	209	.224		
Total	2811.000	212			
Corrected Total	50.505	211			

Table 8 shows the ANCOVA analysis of the interest ratings of male and female students taught Basic Science and Technology using cooperative learning strategy. From the analysis, $F_{(1,209)} = 15.94$, $p<0.05$. Hence, the null hypothesis was rejected. This indicates that there is a statistically significant difference in mean interest ratings of male and female students taught Basic Science and Technology using cooperative learning strategy.

IV. DISCUSSION

The result from the study revealed a significant difference between the performances and interest of students taught Basic Science and Technology with cooperative learning strategies and lecture method in favour of the cooperative learning strategies. This result also indicates that there is no significant difference between the performance of male and female students taught Basic Science and Technology with cooperative learning strategies but the study however, revealed a significant difference in the interest of male and female students taught Basic Science and Technology with cooperative learning strategies.

The findings of the study are consistent with the findings of Gambari and Yusuf, 2014; Ajaja and Mezieobi, 2018, who in their separate researches reported that, students taught using cooperative learning strategies achieve better academically than those taught using lecture method while the findings of the study also conform with the findings of Gambari, Shittu, Daramola and James (2014); Ajaja and Mezieobi, 2018, who revealed that there is no significant difference in the performance of male and female students taught using cooperative learning strategy. Similarly, the study agreed with Simek, Byilar and Kucuk (2013) who revealed that cooperative learning strategy facilitates achievement of objectives through people working together in a group. In relation to interest, the findings from the result indicate that cooperative learning strategies had greater ability

to increase the interest of students compared to the lecture method. This is in line with the findings of Yanusa, Abdulwahid and Abdullahi, (2014) and Eriba and Samuel (2018) who found that cooperative learning strategies have a positive effect on students' interest in Basic Science. The study is also in consonant with Jacobson and Baribor (2012) who argued that group work as a result of cooperative learning arouse students learning interest. In the same vein, the findings of the study is also in agreement with Godpower-Echie and Ihenko (2017) shared in their findings that gender had a significant influence on interest of students in science while the study is in contrast with Abakpa, Adeniran and Zam (2018); Ajay, Agamber and Angura (2017) had a contrary view on the influence of gender on student interest in science.

V. CONCLUSION

The results of the study revealed that cooperative learning strategy can be used to improve student performance and interest of Upper Basic Education students in Basic Science and Technology in Nigeria. The results of the study also showed that cooperative learning strategy improved female students' performance and interest in Basic Science and Technology more than their male counterpart.

VI. RECOMMENDATIONS

1. Basic Science and Technology teachers should use cooperative learning strategy as an effective learning strategy in order to improve students' performance and interest, social interaction skills and foster meta-cognition in students.
2. Cooperative learning strategy can be used as an effective learning strategy in singles school to improve students' interest in Basic Science and Technology and science generally.
3. The school management should organize workshops and seminars to expose teachers and students constantly to the use of the cooperative learning strategy for maximum school output.

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