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Effect of the Number-Head Together Strategy on Academic Learning Outcomes of Secondary School Biology Students in Bichi Education Zone, Kano State, Nigeria

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Abstract
Available records from the Chief Examiners' Report of the West African Examination Council (WAEC, 2016 – 2019) and findings of many studies have revealed that Biology students in secondary schools of Bichi Education Zone performed inadequately in the Nervous system concept. Several of such studies attributed these inadequacies to improper teaching methods employed by teachers. Consequently, therefore, this study investigated the effects of the Number-Head Together (NHT) strategy on academic achievement and attitude in Biology among secondary school students in Bichi Education Zone, Kano-Nigeria. A pre-test, post-test nonequivalent, quasi-experimental design was used in the study. The study's population was made up of 4349 SS II Biology students (3352 males and 997 females) while the sample of the study consisted of 169 subjects from four intact classes drawn through a simple random sampling technique. The nervous System Achievement Test (NSAT) with a reliability index of 0.708 and the Student's Attitude toward Biology Questionnaire (SABQ) with a reliability index of 0.632 was used to measure students' academic achievement and attitude towards Biology respectively. The result of the study revealed that there was a significant difference in the mean academic achievement and attitude of Biology students in the two groups in favour of the experimental group. It was also discovered that there was no significant gender difference in the mean achievement and attitude scores of Biology students in the two groups. It was recommended that the NHT teaching strategy should be incorporated into secondary school curricula to enhance students' academic achievement and attitudes toward biology.

Keywords: Number-Head Together, Academic Achievement, Attitude, Nervous System

Introduction

Science is a field of study that works with a set of systematic facts or truths and seeks to draw broad conclusions (Ferr & Jones, 2016). It provides a body of knowledge for use in addressing various forms of human, material and environmental problems. It can also be viewed as composed of two major complementary modes: accumulation of knowledge through exploration and discovery effects about the natural world, and materials development (Rannie & Hackling, 2014). Science is made up of different fields of study which include Biology, Physics, Chemistry, and Agriculture, which when combined with education form the concept of science Education. Science education is concerned with the sharing of science content and processes with individuals who are not considered traditional members of the scientific community; they could be students, Farmers or a whole community. Science education generally concentrates on teaching and addressing misconceptions held by learners regarding science concepts (Chin, 2015). David (2018) explains that science education is very important to the development of any nation. The major goals of science education are to create students who can think critically, logically, creatively, and with accuracy. Biology in particular is supposed to be taught in science classes as a means of helping students learn about and explore natural phenomena as well as things that happen to them personally and to use in their daily lives. Biology is one of the branches of science that deals with the study of life (both plant and Animal). According to the National Educational Research Development Council (NERDC, 2008), the major objectives of Biology curriculum include an understanding of the structure and function of living organisms as well as an appreciation of nature, acquisition of adequate laboratories and field skills to carry out and evaluate experiment and projects in Biology, acquisition of necessary scientific skills, for example observing, classifying and interpreting

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Biological data, relevant knowledge of scientific attitude for problems solving, ability to apply biological principles in the matter that affects personal, social, environmental, community health and economic problems.

To realize the above-stated objectives, teachers are considered as one of the key factors. Odusesan and Abel (2016) stated that there is no conceivable way in which curriculum implementation can be divorced from the process of teacher education. On the other hand, for teachers to discharge these responsibilities effectively, they must possess a mastery of Biological content compiled with knowledge of principles and methods of teaching, classroom management, use of instructional materials and assessment. Moreover, implementation of any curricula requires monitoring, assessment and evaluation of areas in teaching and learning to ensure that the set goals and objectives are successfully obtained. To attain these goals, teachers need to design a strategy that will improve teaching and learning in the school. According to Rusman (2010), to meet the learning objectives, a teaching strategy that increased student engagement, enjoyment, and effectiveness had to be used. Among many strategies that improve effective learning in science-based subjects is Number-head together (NHT), which is a member of the family tree of cooperative learning (Purnomo, 2013). Slavin (2011) stated that cooperative learning strategy is a process in which students work on assignments together to help each other in a group, and the role of teachers in a cooperative learning strategy is no longer dominating the learning activities. Sadker and Sadker (2005) opined that the most important goal of the cooperative learning strategy is to provide students with conceptual knowledge, skills and understanding needed to become happy members and to have contribute to the development of society. Therefore, Biology teachers have to adopt this strategy for the smoothness and effectiveness of teaching the subject. Cooperate learning strategy according to Bukunola and Idowu (2012) is a teaching strategy in which students are grouped together to learn a particular concepts or topics, each with a different status of capacity and utilize a variety of learning activities to improve their comprehension of the course of study. Ajaja and Eravwoke (2012) Said that the use of cooperative learning is found to influence students' academic achievement and performance. The Number-Head Together (NHT) Strategy is one of these cooperative strategies; it is a variation on group discussion and can guarantee that every student is fully engaged (Bartch, 2014). NHT strategy has several advantages which include, improving learning achievement, teamwork, curiosity, self-confidence, communication between students and helping students learn to use content and respect the opinions of others (Arands, 2011). Ripley (2019) said that NHT trains students indirectly to share information, listen carefully, and speak with calculation so that students become more productive in learning.

The NHT approach prioritizes group work over individual work so that students can collaborate with one another in a cooperative environment and have many chances to share knowledge and improve their communication skills. The Number-Head Together (NHT) strategy is a teaching strategy that holds each student accountable for learning the materials. After the students are divided into groups, each member of the group is assigned a number, which can range from one to a maximum of six. Students collaborate to find the answers to the questions the teacher sets. The instructor calls a particular group member to act as the group spokesperson. This strategy makes sure that every student in the group understands the solutions to the issues or questions posed by the teacher by having them collaborate in groups. Everyone on the team needs to be ready because nobody can predict who will be called. Some of its important include: it promotes discussion and teamwork among students; it helps in reviewing and discussing the content materials. NHT strategy was therefore used in this research to assess its effect on student's academic achievement and attitude in Biology against normal lecture teaching strategy. Academic achievement is the extent to which a student, teacher or institution has attained their short or long-term educational goals (Okoro, 2011). Completion of educational benchmarks, such as secondary schools, diplomas, and bachelor's degrees represents academic achievement. An academic performance is the measurement of a student's achievement across various academic subjects. Teachers and educational officials typically measure achievement using classroom performance; graduation roles and results from standardised tests. NHT as one of the students' centred approaches to learning will be used to see whether students' academic achievement will be enhanced in teaching the concepts of the Nervous system because the topic requires active students' participation since it deals with how body transmits signals between different parts of the body. That is why students are required to understand the concept very well for the betterment of their health because in this era people are suffering from sensory-related problems which include paralysis, stroke, poliomyelitis, and cerebral palsy among others. Most time students' academic achievement in a particular subject is influenced by their attitude toward that subjects or topics.

An attitude is a firmly held belief or emotion about something (Cambridge English Dictionary, 2013). We often use the word to interpret almost any kind of behavior that is regarded as unusual or unacceptable. Indeed, attitude may underpin many aspects of behavior that is regarded as unusual or unacceptable, and that is why the study of attitude is so important. However, in the field of social psychology, it took decades for the

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concepts of attitude to crystallize into any kind of agreed meaning. Ajzen and Fishbein (1975) offered one of the first descriptions of attitude when he spoke of "arriving at correct judgments on disputed Questions Much depends on the attitude of mind we preserve while listening to, or taking part in the controversy". Gauld and Hukins (1980) discussed many studies which tried to relate aspects of scientific attitude and various curriculum development and suggested four attitude targets areas in science education which are, the science subjects as a discipline, the learning of the science subjects, the topics and themes covered in a particular course, and the method of science (the so-called scientific attitude). Therefore, NHT strategy can be used by science teachers to arouse the student's attitude to learn the concepts of Nervous system or Biology in general.

Statement of the Problem

In this era of a developed and modernized world particularly in the educational sector, there is a need to provide ways in which the students and teachers have to be creative and dynamic to make full implementation of science education curriculum. However, reports from the West African Examination Council chief examiner's report of the year 2016 through 2019 indicate that students of Biology show dwindling achievement in some topics. Reports of 2016 indicate that students spell technical terms wrongly, that of 2017 stated that students perform woefully in areas like genetics diagram construction, characteristics and features of microorganisms, that of 2018 affirmed that students do not even answer questions related to Biological drawing and variations in living organisms, and reports of 2019 confirmed that students failed to answer questions in Nervous system. As a result, there is need to review and explore certain teaching strategies to see whether the achievement and interest of the students will change. Despite the Nigerian government's decision to promote science education programs in the country, failure to answer questions in such topics affects the students and the quality of science education in general. In the particular case of Biology, most of the teachers employed conventional teaching methods (Ezenwabachili, 2021). Some teachers in senior secondary schools know the subject matter but they lack proper methodologies in inculcating it to the students. This is perhaps why some researchers such as Adejoh (2015) blamed poor teaching methods being responsible for poor performance in Biology. As such, there is need to find out means on how to adequately transfer the content from the teachers to the students, hence, the researcher sets out to investigate the effect of the Number-Head Together strategy on student academic achievement and Attitude in the Nervous system among secondary school students in Bichi education zone, Kano, Nigeria.

Research Questions

The following research questions were answered during this research work.

1. What is the difference in the mean academic achievement scores of secondary school biology students taught Nervous System using NHT and those taught with lecture teaching strategies in Bichi Education zone, Kano, Nigeria?
2. Is there any gender difference in the mean academic achievement scores of Biology secondary school students taught Nervous System using NHT teaching strategy in Bichi Education zone, Kano, Nigeria?
3. What is the difference in the mean attitude scores of Biology secondary school students taught Nervous System using NHT and those taught using lecture teaching strategies in Bichi Education zone, Kano, Nigeria?
4. Is there any gender difference in the mean attitude scores of Biology secondary school students taught Nervous System using the NHT teaching strategy in Bichi Education zone, Kano, Nigeria?

Research Hypotheses

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

$H0_1$: There is no significant difference in the mean academic achievement scores of Biology secondary school students taught Nervous system using NHT and those taught using lecture teaching strategies in Bichi Education zone, Kano, Nigeria.

$H0_2$: There is no significant gender difference in the mean academic achievement scores of Biology secondary school students taught the Nervous system using NHT teaching strategy in Bichi Education zone, Kano, Nigeria.

$H0_3$: There is no significant difference in the mean attitude scores of Biology secondary school students taught Nervous system using NHT and those taught using lecture teaching strategies in Bichi Education zone, Kano, Nigeria

$H0_4$: There is no significant gender difference in the mean attitude scores of Biology secondary school students taught the Nervous system using the NHT teaching strategy in Bichi Education zone, Kano, Nigeria.

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Methodology

This study adopted a quasi-experimental design (pre-test, post-test nonequivalent). The population of this study comprises four thousand three hundred and forty-nine (4349) subjects of which three thousand three hundred and fifty-two (3352) are males while nine hundred and ninety-seven (997) are female Biology students respectively. The sample size of the study consisted of one hundred and sixty-nine (169) Biology students which comprised of seventy-three (73) males and ninety-six (96) females selected through stratified and simple random sampling techniques. The data were collected using Nervous System Achievement Test (NSAT) and Students Interest toward Biology Questionnaire (SABQ), and were face and content validated by experts in the field. The reliability of the instruments was established through pilot testing using Pearson moment correlation for NSAT, and Cronbach alpha for SABQ. The reliability coefficients were found to be 0.908 and 0.632 respectively. Mean and standard deviation were used in answering the research questions, while analysis of covariance (ANCOVA) was used for testing the hypotheses at a 0.05 level of significance using the statistical product and services solution (SPSS).

Results

Research Question 1: What is the difference in the mean academic achievement scores of secondary school biology students taught Nervous system using NHT and those taught using lecture teaching strategies in Bichi Education zone, Kano, Nigeria?

Table 1: Mean and standard deviation of pre-test and post-test scores of experimental and control groups.

Teaching Strategies		Pre-test scores		Post-test scores		
	N	X	SD	X	SD	Mean gain
Experiment	66	11.73	2.63	77.83	1.50	66.1
Lecture	103	10.26	2.92	45.01	5.18	34.75
Mean Difference		1.47				

Table 1 shows the mean and standard deviation scores of the pre-test and post-test administered to the experimental and control groups. The results revealed that 11.73 and 2.63 as the mean and standard deviation for the pre-test in the experimental group, 10.26 and 2.92 as the mean and standard deviation for the pre-test in the control group; while from the post-test 77.83 and 1.50 as mean and standard deviation for the post-test in the experimental group, 45.01 and 5.18 as mean and standard deviation for the post-test in the control group. However, the mean gain scores between the groups are 66.1 for the experimental and 34.75 for the control group respectively. This shows that students taught Nervous system concept using NHT strategy performed better than those taught using lecture method of teaching.

$H0_1$: There is no significant difference in the mean academic achievement scores of secondary school biology students taught Nervous systems using NHT and those taught using lecture teaching strategies.

Table 2: Summary of ANCOVA showing students pre-test and post-test achievements scores of experimental and control groups

Teaching Strategies		Pre-test		Post-test		DF	F-value	P-value	Decision
	N	X	SD	X	SD				
Experiment	66	11.73	2.63	77.83	1.50	1	2174.24	0.000	Rejected
Control	103	10.26	2.92	45.05	5.18				

$P \leq 0.05$

Table 2 shows the summary of the ANCOVA result for pre-test and post-test mean achievement scores of the experimental and control groups. The observed p-value of the treatment is 0.000 which is less than the significant p-value 0.05 with df = 1. The null hypothesis one is hereby rejected and the reason for the rejection of the hypothesis is because the observed p-value (0.000) is less than the significant level (0.05). Therefore, there is significant difference between the mean achievement scores of secondary school Biology students taught nervous system using the NHT teaching strategy and lecture method of teaching in favour of the experimental group (F-value = 2174.24, df = 1, p=0.000 <0.005)

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Research Question 2: Is there any gender differences in the mean academic achievement scores of Biology secondary school students taught Nervous system using the NHT teaching strategy in Bichi Education zone, Kano, Nigeria?

Table 3: Mean and standard deviation of pre-test and post-test scores of male and female students.

Gender		Pre-test scores		Post-test scores		
	N	X	SD	X	SD	Mean gain
Male	28	11.15	3.18	26.08	9.22	14.93
Female	38	10.59	2.64	25.45	10.04	14.86
Mean Diff		0.56				

Table 3 presents the mean scores and standard deviation of the pre-test and post-test administered to male and female students in the control and experimental groups. The result revealed that 11.15 and 3.18 as mean and standard deviation for the pre-test of the male, 10.59 and 2.64 as mean and standard deviation for the pre-test of the female; while from the post-test 26.08 and 9.22 as mean and standard deviation for the male, 25.45 and 10.04 as mean and standard deviation for female in the post-test. However, the mean gain scores between the genders are 14.93 for males and 14.86 is for female respectively. Based on this result, it is apparent that both male and female students taught Nervous system concepts using NHT techniques performed better.

$H0_2$: There is significant gender difference in the mean academic achievement scores of Biology secondary school students taught Nervous system using the NHT teaching strategy in Bichi Education zone, Kano, Nigeria.

Table 4: Summary of analysis of Covariance (ANCOVA) showing students' pre-test and post-test mean achievement scores of male and female Biology students.

Gender		Pre-test		Post-test		DF	F-value	P-value	Decision
	N	X	SD	X	SD				
Male	28	11.15	3.18	26.08	9.22	1	0.18	0.000	Rejected
Female	38	10.59	2.64	25.45	10.04				

$P \leq 0.05$

Table 4 result of the ANCOVA analysis for pre-test and post-test mean achievement scores of the male and female students. The observed P-value is 0.000 which is less than the significant p-value (0.05) with df = 1. The alternate hypothesis two is hereby rejected and the reason for the rejection of the hypothesis is because of the observed p-value (0.000) is less than the significant level (0.05). Therefore, there is no significant difference between the mean achievement scores of male and female secondary school students taught Nervous system using NHT and lecture teaching strategies ($F=0.18$, $df=1$, p-value$=0.000<0.05$).

Research Question 3: What are the differences in the mean attitude scores of Biology secondary school students taught nervous system using NHT and those taught using lecture teaching strategies in Bichi Education zone, Kano, Nigeria?

Table 5: Mean and Standard deviation of pre-test and post-test attitude scores of experimental and control groups.

Teaching Strategies		Pre-test scores		Post-test scores		
	N	X	SD	X	SD	Mean gain
Experiment	66	37.97	6.91	88.13	86.12	50.16
Lecture	103	32.30	5.49	45.16	3.38	12.86
Mean Diff		5.67				

Table 5 shows the mean attitude scores and standard deviation of the pre-test and post-test administered to both experimental and control groups. The results revealed that 37.97 and 6.91 as mean and standard deviation for

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the pre-test in the experimental group, 32.30 and 5.49 as mean and standard deviation in the control group; while from the post-test 88.13 and 86.12 as mean and standard deviation for the post-test in the control group, 45.16 and 3.38 as mean and standard deviation for post-test in the control group. However, the mean gain scores between the groups are 50.16 for the experimental and 12.86 for the control respectively. This shows that students taught Nervous system concepts using the NHT strategy have higher attitude scores than those taught using lecture teaching method.

$H0_3$: There is no significant difference in the mean attitude scores of Biology secondary school students taught Nervous system using NHT and those taught using lecture teaching strategies in Bichi Education zone, Kano, Nigeria.

Table 6: Summary of Analysis of Covariance (ANCOVA) showing students pre-test and post-test attitude scores of experimental and control groups.

Group		Pre-test		Post-test		DF	F-value	P-value	Decision
	N	X	SD	X	SD				
Experiment	66	37.97	6.91	88.14	86.12	1	15.04	0.000	Rejected
Control	103	32.30	5.49	45.16	3.38				

P= 0.05

Table 6 shows the observed p-value is 0.000 with df = 1, and the significant p-value level is 0.05. This shows that the observed P-value is less than that of the significant level p-value. Based on the comparability of the p-value, the null hypothesis three is hereby rejected. The reason for the rejection is that the observed P-value is less than that of a significant level. Therefore, there is a significant difference between the mean attitude scores of secondary school Biology students taught Nervous system using the NHT teaching strategy and lecture teaching strategy in favour of the experimental (NHT) group (F-value = 15.04, df – 1, P-value = 0.000 < 0.05).

Research Question 4: Is there any gender difference in the mean attitude scores of Biology secondary school students taught the Nervous system using the NHT teaching strategy in Bichi Education zone, Kano, Nigeria?

Table 7: Mean and standard deviation of pre-test and post-test attitude scores of male and female students.

Gender		Pre-test scores		Post-test scores		
	N	X	SD	X	SD	Mean gain
Male	28	35.59	6.35	57.56	16.09	21.5
Female	38	33.70	6.82	65.27	75.14	31.57

Table 7 presents the mean attitude scores and standard deviation of the pre-test and post-test administered to the Male and Female students. The results revealed that 35.59 and 6.35 as mean and standard deviation of Male from the pre-test, 33.70 and 6.82 as the mean and standard deviation of females from the pre-test; while from the post-test 57.56 and 16.09 as the mean and standard deviation of Male from the post-test, 65.27 and 75.14 as the mean standard deviation of Female from the post-test. However, the mean gain scores between males and females are 21.5 for the Male and 31.57 is for the Female students respectively. Attitude scores of male and female students in the experimental group exposed to NHT instructional strategy. On comparing the two means, it shows that there is a difference between the means attitude scores of male and female students in both the pre-test and post-test, but to know the exact significant difference, null hypothesis four will be used.

$H0_4$: There is no significant gender difference in the mean attitude scores of Biology secondary school students taught Nervous system using NHT teaching strategy in Bichi Education zone, Kano, Nigeria.

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Table 8: Summary of ANCOVA showing students pre-test and post-test mean attitude scores of male and female students.

Gender		Pre-test		Post-test		DF	F-value	P-value	Decision
	N	X	SD	X	SD				
Male	28	35.59	6.35	57.56	16.09	1	2.03	0.16	Accepted
Female	38	33.70	6.82	65.27	75.14				

P≤ 0.05

Table 8 shows the ANCOVA results of male and female students. The results revealed that the observed P-value is 0.16 with df – 1, and the significant p-value is 0.05. This shows that the observed P-value is more than that of the significant level p-value. Based on this the null hypothesis four is hereby accepted. The reason for the acceptance is that, the observed P-value is more than that of significant level. Therefore, there are no significant gender differences in the mean attitude scores of male and female secondary school Biology students when taught the Nervous system using the NHT teaching strategy (F- value = 2.03, df – 1, p-value=0.16> 0.05).

Discussion

This study investigated the effect of the NHT strategy on the academic achievement and attitude of Biology secondary school students in the Nervous System in Bichi Education zone, Kano, Nigeria. The findings revealed that there is a significant difference in the mean academic achievement scores between Biology students taught Nervous system using NHT and those taught using lecture teaching methods in favor of those that were taught using NHT teaching method. This implies that the use of NHT technique in teaching Biology concepts enhances student's academic achievement in the subject. The findings are in agreement with the findings of many researchers such as Juweto (2015), who found that students' learning activities, participation, performance and achievements are improved while using NHT than the conventional lecture teaching method. The reasons for this finding could be a result of the processes in NHT teaching style which involves giving students equal chances and opportunity to manipulate and develop the learnt materials in the lesson. The lesson was interactive where every student was allowed to contribute or construct knowledge based on their own personal and individual differences in which the teacher guided the students to a correct and right decision. The students are given chance to undergo deep thinking and provide answers or solution to a given task and allow the teacher to judge and provide a concrete solution. It was also observed in the study that there is no significant gender difference in the mean achievement scores of Biology students when exposed to NHT teaching strategy. This implies that there is not much statistical difference in the mean achievement scores of male and female Biology students exposed to learning activities based on the NHT teaching strategy. The possible reasons behind these equal performances across the genders in this study might include the nature of NHT classes that look like play well and fashion teaching styles. This makes both genders participate rigorously, deeply and actively with all that they can as they love fashion, play and like something new all the time. This finding is in agreement with the findings of Oluwatelure (2015) and Danjuma (2015) who reported that there is no significant gender difference after students were exposed to the Number-Head Together teaching strategy.

The finding of this study also showed that there is a significant difference in the mean attitude scores of Biology students taught using NHT and those taught using lecture teaching methods in favour of the NHT teaching method. This means that when the NHT teaching method is used to teach Biology concepts, it improves students' attitudes. This is in agreement with Joel (2013). This could be as a result of the nature and manner in which the lesson was delivered to the Biology students through NHT. In this model, students become more interested in new and unique teaching styles, so that they become very attentive and participative in order to learn the concepts as they see the strategy as something new and exciting to them. It was also observed that there is no significant gender difference in the mean attitude scores of Biology students when exposed to the NHT teaching strategy. This observation pointed out clearly that both male and female Biology students developed positive attitudes to learning Biology concepts using the NHT model. This also indicated that the NHT strategy is suited to all Biology secondary school students. These findings are found to be in line with the findings of Joel (2013) whose reports showed that there is no significant gender difference in student's attitudes that were exposed to the NHT teaching strategy.

Conclusion

The study investigated the effect of the NHT strategy on the academic achievement and attitude of Biology secondary school students in the Nervous System and concluded that the use of the NHT strategy in teaching Biology concepts improves student academic achievement, also NHT teaching strategy is gender friendly as it

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improves academic achievement of both male and female Biology students. However, Number-Head Together teaching strategy improves student's attitude toward Biology more than the lecture teaching method and the NHT teaching strategy improves the attitude of female students more than male Biology students as indicated in the results.

Recommendations

1. The government through the Ministry of Education, curriculum planners and professional bodies like WAEC, NECO, and NABTEB etc. should ensure that Biology teachers teach Biology concepts in line with NHT teaching strategy which could result in creative thinking, active participation and manipulation of the learnt materials. This improves the academic achievement of Biology students as observed already in this study. So, NHT should be inculcated into mainstream teaching in secondary schools in order to improve academic achievement of the students.
2. To ensure the standard of science is achieved for all students irrespective of gender, individual differences and ethnicity Biology and other science subjects should be taught in schools in such a way that proper understanding and application of the Biology and science concepts into daily life activities. This is the basic principle of the NHT teaching strategy; hence it is used in achieving the stated objectives in the study. Therefore, the school should encourage Biology and science teachers to adopt NHT teaching strategy in teaching and learning of Biology and other science subjects in general.
3. Biology and science teachers in general should be discouraged from teaching Biology using the lecture method. Because it was found to be less effective in this study with respect to the student's academic achievement, attitude and interest in learning of Biology concepts as the performance of students taught using the lecture method is less than that taught using NHT. Therefore, Biology teachers should be shunned away from using it in teaching Biology.
4. Science students especially Biology students should be encouraged to adopt learning of Biology concepts via NHT formally because the benefits attached to it as already been ripe in this study. This will make the students to get the concepts clearly and contribute from their inner or personal thinking and experiences, as this is not be allow in the former lecture method of learning Biology and other sciences.

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