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Demonstration and discussion teaching methods on attitude and retention of urban and rural students in senior school biology in Yenagoa and Ogbia local government areas of Bayelsa state

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The purpose of the study was to investigate effects of demonstration and discussion teaching methods on attitude and retention of urban and rural students in senior school biology in Yenagoa and Ogbia Local Government Areas. Quasi-experimental research design was employed. The population of the study was 6,988 Senior School Two Biology students in Bayelsa State. The sample consisted of 323 Senior School Two students from 23 Senior Secondary Schools in the above Local Government Areas of Bayelsa State. Two research questions and two hypotheses guided the study. Three validated and reliable instructional guides namely Instructional Guide on Demonstration Teaching Method (IGDTM), Discussion Teaching Method Guide (DTMG) and Guide on Lecture Teaching Method (GLTM) were used in training teachers to use the methods of teaching. Standardized Biology Achievement Test (SBAT) was used as a reliable instrument for data collection. Data were analyzed using percentage, mean, standard deviation and z-test statistics. The findings of the study showed no significant difference in retention mean scores of SS2 students in urban and rural schools when taught with demonstration and discussion methods. Also, there was slight increase in attitude of students in pretest and posttest in all the groups but when subjected to z-test analysis, it showed statistically not significant in all the groups. These implied that adequate consideration to teaching methods in biology is crucial to enhancing attitude and retention of students during lessons as school type does not affect students' attitude nor improve academic achievement.

Keywords: *Attitude, Biology, Demonstration, Discussion, Method, Retention.*

1. Introduction

Education is a means of developing the cognitive, affective and psychomotor potentials of learners in order to him or her for a responsible and profitable life after school. Education is a vital instrument needed for growth and development of any nation. This is in support of the definition of education as instrument par excellence for national development (National Policy on Education, 1977). It is a formidable tool for imparting knowledge, skills, attitude and value from one generation to another. Education aimed at assisting learners to get right knowledge, skills, attitude, values, ability, among others, required to live in, solve problems and contribute to development of society they find themselves (Federal Republic of Nigeria, 2013). No wonder (Obanya, 2023) stated that education is more than acquisition of numeracy skills, manipulative ability and memorization of facts but the inculcation of cognitive skills, life coping skills and lifelong education skills. Efe (2015) revealed that science teaching in Nigeria is more of rote learning and memorization which is based on content. This discourages active learning, participation, critical thinking, among others.

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Science education is the process of acquisition of science knowledge, skills, values and attitude with aim of positioning learners for careers in science, technology, engineering and mathematics in the future. Science provides an avenue for students to interact with their environment, appreciate scientific methods and evidence which eliminates bias and superstitious beliefs. No doubt science has taken a new trend over the years. Today's science is more dynamic, technologically oriented, innovative, creative, appealing to the senses, critical, among others.

Biology is the study of life as it relates to organisms' matter, structure, functions and behaviour. It is the study of plants and animals. Biology is one of the science subjects that is required for admission into tertiary institutions to study science related courses that contribute immensely to growth and development today. Careers like pharmacy, medicine, biochemistry, zoology, botany, chemist, science educationist, among others need credit pass in biology in order to secure a space in the higher institution of learning. Aghaduino (as cited in Igbojinwaekwu (2012) and WAEC (2018)) reported that biology students' performance is worse in biology when compared with their counterparts in physics and chemistry education. Also, Awodun, Adekunle, and Femi-Adeoye (2016) have reported poor academic performance in students in Senior Secondary Certificate Examination (SSCE) Biology. Enohuean and Jiya as cited in Ugwu, Jatau, and Gwamna (2020) revealed that in recent times, there have been an increase in trend of poor academic performance in science and biology in particular. Report also showed that from 2011-2017, only about 30% of candidates that registered for West Africa Examination Council (WAEC) had credit pass and above in science (WAEC, 2018). Also, less than 50% of candidates registered for the West Africa Examination Council (WAEC) had credit and above pass for the past six years (West African Examiner's Report, 2022). These reports showed an alarming signal of science state in Nigeria. The trend of poor academic performance in biology has been worrisome over the years due to its implication to advancement of science and national development. Moreso, less than 50% of students would secure admission into higher learning to study science related careers and on the long run, underdevelopment and under-representation of scientists nationally and internationally. The education community is so much concern about the slow rate of improvement in science and negative implication on the wellbeing of the nation generally. This trend of unsatisfactory academic performance showed that learning has not taken place effectively. The Chief Examiner's Report suggest that proper teaching approach that relates to real life situation and experiences will help improve interest, attitude and enhance academic performance of students. Reports revealed that many factors contribute to poor academic performance of students apart from methods of teaching Ogunkunle and Onwunedo (as cited in Ugwu et al. (2020)) and Arokoyu and Chukwu (2017)). These factors include low self-esteem, fear of science, difficulty in science, anxiety, lack of facilities to do science, lack of interest, inappropriate attitude to science, non-acquisition of knowledge, skills and attitude due to lack of interest is as a result of inappropriate use of teaching methods by teachers Olatoye (as cited in Olasehinde and Olatoye (2014)), Ishaku (as cited in Cleopas and Igbojinwaekwu (2023) and Uzoma and Amadi (2018). Others are of the view that use of lecture method to teach biology has not been helpful as its use in teaching is still common today in school Efe (as cited in Ugwu et al. (2020)).

The lecture method of teaching has been the oldest form of transmission of knowledge or information to a group of persons. It is an oral and one way form of communication that gives room for little or no students involvement, questioning and clarification. Many teachers tend to use it because it helps to manage a large class in a limited time but on the long run may leave students with no or little information, lack of in-depth understanding, boredom, indifference and poor retention. Lecture method of teaching does not give room to active learning, participation, interaction, communication, independent thought which makes learning enjoyable, hence, poor retention and attitude of students to learning. Most times, teachers are in a hurry to teach the students to meet up with the term's calender not minding if students understand the lesson or not, retain and can recall what they learnt (Omwirhiren, 2015). This may be due to circumstances beyond teachers and students' control such as late resumption by the students, short school calender, public holiday, among others. However, studies Edinyang, Ubi, and Adalikwu (2012) Omwirhiren (2015) and Efe (2015) revealed that poor academic performance of students in biology is due

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to use of lecture method in schools today. This is contrary to the view of Cleopas and Igbojinwaekwu (2023) in their work. Their study revealed that students taught with lecture method had higher academic performance in biology. Also, when lecture method is properly used, it produces better results.

Demonstration method of teaching can be defined as illustration of a lesson by other means other than the use of visual aids (Basheer, Hugerat, Kortam, & Hofstein, 2016). They further put it as illustration by gesture, analogy and real experiment. Demonstration has capability to improve students' motivation, attitude and learning. Gardner in Basheer et al. (2016) opined that demonstration method of teaching has the ability to evoke the "wao" experience which leads to curiosity, interest and enhances independent thought, hence, improve academic performance in biology. Demonstration method of teaching gives room for active participation in class, arouse interest, improves attentiveness and create mental connection between new lesson and previous lesson or experiences. On the long run, demonstration method of teaching triggers other forms of methods like discussion method, cooperative learning, collaboration, discovery method, questioning, problem solving, among others. In the course of using demonstration method of teaching in the class, students are actively involved in the class, interested, with positive attitude, participating, interacting, discussing, exchanging ideas, information about the subject, getting new facts and ideas from others, asking questions, getting answers and solving problems by themselves.

Discussion method of teaching is a democratic way of teaching in which every child has same privilege of contributing to the subject matter by interaction, participation, questioning and making valid conclusion on the subject matter, Donche (as cited in Jatau, Ugwu, and Gwamna (2021)). It is a two-way communication mode that could be between the teacher and the students or between a group of students and another group of students or among students. It is a student-centered approach of learning that encourages science skills, attitude and values in students. Discussion method of teaching gives way for enhancement of thinking skill, creativity, reflective thought, critical thought, communication skill and analysis of different opinions (Efe, 2015). The capability to recollect lessons learnt when appropriate is very important as it helps to solve many problems in life. It also helps students to excel in their test or examination and after school.

Retention is the ability to keep ideas or information gathered for future use. It is the process and ability to store and recall experiences learnt in future (Cleopas & Igbojinwaekwu, 2023). The ability to remember or recollect information is a function of students' attitude to learning. Students' inability to recollect information, when necessary, shows lack of comprehension of lessons learnt which indicate that learning was not effectively done. Gambari, Yaki, Gana, and Ughovwa (2014) advocated for a more appealing and interesting methods of teaching in order to help students understand, store and recollect lessons learnt when needed.

Attitude can be referred to as a blend of opinion, thoughts, disposition, sensation, reaction, manner, conduct, ideologies that reflect the state of the mind as a result of observation, experience and background (Cleopas & Igbojinwaekwu, 2023). Ahmad and Soltani (2011) defined attitude as emotional state in response to situation, ideas, views, people, characters, place and happenings. They added that the concept of attitude has many definitions based on diverse opinions of people. George (as cited in Ahmad and Soltani (2011)) is of the view that disposition of students is a major factor in the learning process and development of science skills and attitude that improves interest in science courses

2. Review of Related Literature

Jatau et al. (2021) investigated impact of discussion method on performance and attitude in biology among senior secondary students in Zonkwa, Kaduna State, Nigeria. A quasi-experimental research design was used for the study. Two hundred and twenty senior secondary school students made up the sample size. Biology Performance Test and Student Attitude Questionnaire were instruments used for data collection. Three research questions and three research hypotheses guided the study. Mean, standard deviation and independent sample t-test were used for data analysis. Findings showed that there was a significant difference in academic performance of biology students taught with discussion and lecture methods. Also, students taught with discussion teaching method had a positive attitude to biology than

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those taught with lecture teaching method. This could be because discussion teaching method give room for communication, reflective thinking, democratic thought and tolerance among students.

Veselinovska (2011) investigated the effect of teaching methods on cognitive achievement, retention and attitude among biology students. Descriptive analytic research design was used for the study. Biology Achievement Test and Questionnaire were used for data collection. Results were analyzed using SPSS statistics software package version 17. Laboratory, slide demonstration and lecture teaching methods were used to teach 47 students that were grouped into 3 groups of students. Results showed that students that started lesson with experiments or slide demonstration was higher in academic performance than students that started lesson with lecture methods. Students that started lessons with experiment and slide demonstration had higher retention level than students that started lessons with lecture method. Also, attitude of the students that started lessons with experiment and slide demonstration had better attitude to biology than those that had lecture method as a starter.

Ugwu et al. (2020) investigated impact of discussion method on performance and retention in biology among senior secondary students in Kastina education zone, Katsina State, Nigeria. Quasi experimental design was used in the study. The sample size was two hundred and fourteen senior secondary school II students. Three research questions and three research hypotheses guided the study. Data collection was through Biology Performance Test (BPT). Mean, standard deviation and independent sampled t-test were used for data analysis. Findings revealed that a significant variance exist in students' academic performance in biology. Also, discussion teaching method enhanced retention level of students than lecture teaching method.

Basheer et al. (2016) investigated effectiveness of teachers' use of demonstration for enhancing students' understanding and attitude to learning oxidation-reduction concept. Quasi experimental research design was employed. The sample size was one hundred and thirty-one 8th graders of junior high school. Achievement test and questionnaire were used for data collection in the study. Result showed that experimental group was significantly higher in achievement and attitude than the control group.

Basila and Jajua (2019) research on effects of demonstration and discussion strategies on secondary school students' achievement and retention in biology in Mubi educational zone Adamawa State. Quasi-experimental research design was employed. Intact classes from two schools were used. Biology Achievement Test was used for data collection for the study. Mean, standard deviation, scheffe post hoc test and Analysis of Variance (ANOVA) were used for data analysis. Results revealed that demonstration and discussion methods of teaching enhance academic performance than lecture method of teaching. Also, demonstration and discussion methods of teaching enhance students' retention level in biology.

2.1. Purpose of the Study

The purposes of the study are to

1. Determine the difference that exists between the mean attitude scores of SS2 students in urban and rural schools taught Biology using demonstration and discussion methods.
2. Determine the difference that exists between the mean retention scores of SS2 students in urban and rural schools taught Biology using demonstration and discussion methods.

2.2. Research Questions

1. What difference exist between the mean attitude scores of SS2 students in urban and rural schools taught Biology using demonstration and discussion methods?
2. What difference exist between the mean retention scores of SS2 students in urban and rural schools taught Biology using demonstration and discussion methods?

2.3. Research Hypotheses

H_{0_1}: There is no significant difference between the mean attitude scores of SS2 students in urban and rural schools, taught Biology using demonstration and discussion methods.

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$H0_2$: There is no significant difference between the mean retention scores of SS2 students in urban and rural schools, taught Biology using demonstration and discussion methods.

3. Method

The pretest-posttest control group quasi-experimental research design was adopted for the study. The population was 6,988, Senior school Two students offering biology as a subject in the senior secondary school from purposive selection of 23 schools (14 public and 9 private) in two Local Government Areas, and random assignment to treatment and control group was done. Purposive sampling technique was used to obtain a sample size of 323 biology students. Two research questions and two research hypotheses were used. Three validated and reliable instructional guides namely instructional guide on demonstration teaching method (IGDTM), Discussion Teaching Method Guide (DTMG) and Guide on Lecture Teaching Method (GLTM) were used in training teachers to use the teaching methods. One validated and reliable instrument namely Standardized Biology Achievement Test (SBAT) was used for data collection. Standardized Biology Test has been processed for validity and reliability by WAEC. Students taught with demonstration and discussion teaching methods serve as experimental groups while students taught with lecture teaching method serve as the control group. The instrument was administered with the help of research assistants. After two weeks of teaching and learning, the Students Retention Test (SRT) was rearranged and re shuffled. The SBAT was re-administered to same students to test their retention level. The data was analyzed using percentage, mean, standard deviation and z-test statistics.

Table 1.
Summary of mean scores of students' attitude in pretests and posttest in urban and rural schools when taught biology with demonstration, discussion and lecture methods.

Teaching method	School location	N	Pretest attitude $\bar{x}$	Posttest attitude $\bar{x}$
Demonstration	Urban	94	2.84	2.90
	Rural	27	3.15	3. 20
Difference			0.31	0.30
Discussion	Urban	55	2.82	2.90
	Rural	60	3.05	3.15
Difference			0.23	0.25
Demonstration		94	2.84	2.90
	Urban			
Lecture		75	2.98	2.93
Difference			0.14	0.03
Demonstration		27	3.15	3. 20
	Rural			
Lecture		12	2.99	2.93
Difference			0.16	0.27
Discussion		55	2.82	2.90
	Urban			
Lecture		75	2.98	2.93
Difference			0.16	0.03
Discussion		60	3.05	3.15
	Rural			
Lecture		12	2.99	2.93
Difference			0.06	0.22

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Answer to research question one, Table 1 shows that urban school students had a pretest mean of 2.84 and rural school students had mean of 3.15 when taught with demonstration method. When taught with demonstration method at posttest, urban school students had 2.90 mean and rural school students had mean of 3.20. Urban school students had a pretest mean of 2.82 and rural school students had mean of 3.05 when taught with discussion method. When taught with discussion method at posttest, urban school students had 2.90 mean and rural school students had mean of 3.15. In the control group, urban school students had a pretest mean of 2.98 and rural school students had mean of 2.99. When taught with lecture method at posttest, urban school students had 2.93 mean and rural school students had mean of 2.93. There was a slight variance in learning attitude in favour of rural school students. There was also a positive increase in learning attitude of rural and urban school students at posttest. In addition, this table reveals a mean variance of 0.14 in learning attitude in favour of urban school students taught with lecture teaching method and a mean difference of 0.16 in learning attitude in favour of rural school students taught with demonstration teaching method at pretest. At posttest, a mean difference of 0.03 in learning attitude in favour of urban school students taught with lecture teaching method and a mean difference of 0.27 in learning attitude in favour of rural school students taught with demonstration teaching method. Also, a mean difference of 0.16 in learning attitude in favour of urban school students taught with lecture teaching method and a mean difference of 0.06 in learning attitude in favour of rural school students taught with discussion teaching method at pretest. Also, at posttest, a mean difference of 0.03 in learning attitude in favour of urban school students taught with lecture teaching method and a mean difference of 0.22 in learning attitude in favour of rural school students taught with discussion teaching method.

Table 2.
Summary of mean scores of students' retention test and retention level in urban and rural schools when taught biology with demonstration, discussion and lecture methods.

Teaching method	Sch location	N	Retention test $\bar{x}$	Posttest $\bar{x}$	RL $\bar{x}$	Diff in RL $\bar{x}$
Demonstration	Urban	94	56.96	48.30	8.66	8.19
	Rural	27	59.70	42.85	16.85	
Difference			2.74	5.46		
Discussion	Urban	55	65.10	53.89	11.21	3.14
	Rural	60	71.63	57.28	14.35	
Difference			6.53	3.39		
Demonstration		94	56.96	48.30	8.66	0.67
	Urban					
Lecture		75	66.16	58.17	7.99	
Difference			9.20	9.87		
Demonstration		27	59.70	42.85	16.85	4.60
	Rural					
Lecture		12	57.25	45.00	12.25	
Difference			2.45	2.15		
Discussion		55	65.10	53.89	11.21	3.22
	Urban					
Lecture		75	66.16	58.17	7.99	
Difference			1.06	4.28		
Discussion		60	71.63	57.28	14.35	2.10
	Rural					
Lecture		12	57.25	45.00	12.25	
Difference			14.38	12.28		

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Answer to research question two, Table 2 shows mean retention level of urban school students (8.66) and mean retention level of rural school students (16.85) when taught with demonstration method with a variance of 8.19 in favour of students in rural schools. The Table shows mean retention level of urban school students (11.21) and mean retention level of rural school students (14.35) when taught with discussion method with a variance of 3.14 in favour of students in rural schools. Also, it shows mean retention level of urban school students (7.99) and mean retention level of rural students (12.25) when taught with lecture method with a variance of 4.26 in favour of students in rural schools. This implies that rural school students had better retention level than urban school students. In addition, this table shows a difference of 0.67 retention level mean in favour of urban school students taught with demonstration teaching method and 4.6 retention level mean in favour of rural school students taught with demonstration teaching method. Also, a difference of 3.22 retention level mean in favour of urban school students taught with discussion teaching method and 2.10 retention level mean in favour of rural school students taught with discussion teaching method.

Table 3.
Summary of z- test analysis of students' attitude in urban and rural schools when taught with demonstration, discussion and lecture methods.

Teaching method	Sch location	N	Post attitude $\bar{x}$	SD	df	z_{cal}	z_{crit}	Type of test	P
	Urban	94	2.90	0.69					
Demonstration					119	1.2	1.96	2-tailed	<0.05
	Rural	27	3.20	1.28					
	Urban	55	2.90	0.87					
Discussion					113	1.5	1.96	2-tailed	<0.05
	Rural	60	3.15	0.91					
Demonstration		94	2.90	0.69					
	Urban				167	0.27	1.96	2-tailed	<0.05
Lecture		75	2.93	0.78					
Demonstration		27	3.20	1.28					
	Rural				37	0.51	2.02	2-tailed	<0.05
Lecture		12	2.93	1.65					
Discussion		55	2.90	0.87					
	Urban				128	0.21	1.96	2-tailed	<0.05
Lecture		75	2.93	0.78					
Discussion		60	3.15	0.91					
	Rural				70	0.46	1.98	2-tailed	<0.05
Lecture		12	2.93	1.65					

When hypothesis 1, $H0_1$, was subjected to z-test analysis, Table 3, it was revealed that the calculated z-value is 1.2 and the z-critical value is 1.96 when taught with demonstration teaching method. The null hypothesis is therefore accepted while the alternate hypothesis is rejected since the calculated z-value is smaller than the z-critical value. This implies that there is no substantial variance in the mean scores of urban and rural schools' students in learning attitude enhancement in Biology when taught with demonstration teaching method. Also, it was discovered that the calculated z-value is 1.5 and the z-critical value is 1.96 when taught with discussion teaching method. The null hypothesis is therefore accepted while the alternate hypothesis is rejected since the calculated z-value is smaller than the z-critical value. This implies that there is no substantial variance in the mean scores of urban and rural schools' students in learning attitude enhancement in Biology when taught with discussion teaching method.

It was noted in the above table that calculated z value was 0.27 and critical z value was 1.96 when demonstration and lecture teaching methods were employed. The null hypothesis was therefore regarded

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while the alternate hypothesis was disregarded since the calculated z value was smaller than critical z value. This showed no substantial variance in attitude mean scores of students in urban schools when demonstration and lecture teaching methods were employed. It was also noted that the calculated z value was 0.51 and the critical z value was 2.02 when demonstration and lecture teaching methods were employed. The null hypothesis was therefore regarded while the alternate hypothesis was disregarded since calculated z value was smaller than critical z value. This showed no substantial variance in attitude mean scores of students in rural schools when demonstration and lecture teaching methods were employed.

It was also noted that the calculated z value was 0.21 and critical z value was 1.96 when discussion and lecture teaching methods were used. The null hypothesis was therefore regarded while the alternate hypothesis was disregarded since the calculated z value was smaller than critical z value. This showed no substantial variance in the attitude mean scores of students in urban schools when discussion and lecture teaching methods were employed. It also revealed that calculated z value was 0.46 and critical z value was 1.98 when discussion and lecture teaching methods were used. The null hypothesis was therefore regarded while the alternate hypothesis was disregarded since the calculated z value is smaller than critical z value. This showed no substantial variance in attitude mean scores of students in rural schools when discussion and lecture teaching methods were used.

Table 4.
Summary of z- test analysis of students' retention level in urban and rural schools when taught with demonstration, discussion and lecture methods.

Teaching method	Sch location	N	Retention level $\bar{x}$	SD	df	z_{cal}	z_{crit}	Type of test	P
	Urban	94	8.66	11.89					
Demonstration					119	3.28	1.96	2-tailed	<0.05
	Rural	27	16.85	11.35					
	Urban	55	11.21	12.52					
Discussion					113	1.59	1.96	2-tailed	<0.05
	Rural	60	14.35	8.06					
Demonstration		94	8.66	11.89					
	Urban				167	0.33	1.96	2-tailed	<0.05
Lecture		75	7.99	13.88					
Demonstration		27	16.85	11.35					
	Rural				37	1.09	2.02	2-tailed	<0.05
Lecture		12	12.25	12.49					
Discussion		55	11.21	12.52					
	Urban				128	1.38	1.96	2-tailed	<0.05
Lecture		75	7.99	13.88					
Discussion		60	14.35	8.06					
	Rural				70	0.56	1.98	2-tailed	<0.05
Lecture		12	12.25	12.49					

$H0_2$, was subjected to z-test analysis, in Table 4 above, it showed 3.28 calculated z and 1.96 critical z value when demonstration method of teaching was used. The null hypothesis was disregarded while the alternate hypothesis was regarded since calculated z value is bigger than critical z value. This showed a substantial variance in retention level mean scores of students in rural and urban schools taught with demonstration teaching method. It also showed 1.59 calculated z value and 1.96 critical z value when discussion teaching method was employed. The null hypothesis was regarded while the alternate hypothesis was disregarded, since calculated z value was smaller than critical z value. The result showed

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no substantial variance in retention level mean scores of students in urban and rural schools taught with discussion teaching method.

It was also revealed in Table 4 that the z-calculated value is 0.33 and the z-critical value is 1.96 when taught with demonstration and lecture teaching methods. The null hypothesis is accepted while the alternate hypothesis is rejected, since the z-calculated value is smaller than the z-critical value. This means that there is no substantial variance in the mean scores of students in urban schools taught with demonstration and lecture teaching methods in retention level enhancement in Biology. It was also revealed in Table 4 that the z-calculated value is 1.09 and the z-critical value is 2.02 when taught with demonstration and lecture teaching methods. The null hypothesis is accepted while the alternate hypothesis is rejected, since the z-calculated value is smaller than the z-critical value. This means that there is no substantial variance in the mean scores of students in rural schools taught with demonstration and lecture teaching methods in retention level enhancement in Biology.

It was also revealed in Table 4 that the z-calculated value is 1.38 and the z-critical value is 1.96 when taught with discussion and lecture teaching methods. The null hypothesis is accepted while the alternate hypothesis is rejected, since the z-calculated value is smaller than the z-critical value. This means that there is no substantial variance in the mean scores of students in urban schools taught with discussion and lecture teaching methods in retention level enhancement in Biology. It was also revealed in Table 4 that the z-calculated value is 0.56 and the z-critical value is 1.98 when taught with discussion and lecture teaching methods. The null hypothesis is accepted while the alternate hypothesis is rejected, since the z-calculated value is smaller than the z-critical value. This means that there is no substantial variance in the mean scores of students in rural schools taught with discussion and lecture teaching methods in retention level enhancement in Biology.

4. Discussion of the Findings

From research question one, urban and rural school students taught with demonstration, discussion and lecture teaching methods had slight increase in learning attitude in all the groups but when subjected to z-test analysis, result showed non-substantial. There is no significant difference in the mean scores of SS2 students in urban and rural schools in learning attitude enhancement when taught with demonstration, discussion and lecture teaching methods in Biology. This implies that environment where a school is located does not affect students learning attitude. Academic attainment and retaining level of students are not function of school location. This agrees with Yousuf and Bhutta (2012) and Adebule and Aborisade (2013). This could be probably because teachers of the same qualification and experience with uniform topics and lesson notes taught them in urban and rural schools.

From research question two, rural school students taught with demonstration teaching method had remarkable retention level than urban school students taught with demonstration teaching method and when subjected to z-test analysis, result showed substantial. There is a significant difference in the mean scores of SS2 students in urban and rural schools taught with demonstration method in retention level enhancement in Biology. High academic achievement is as a result of high retention level. Also, there is a connection between students' academic performance and attitude (Awodun et al., 2016; Gbore & Daramola, 2013). Since urban school students achieved more than rural school students, it is assumed or expected that, they had higher retention level than rural school students but result shows that rural school students had higher retention level. This result could be probably because of students' attitude towards learning. This finding agrees with the work of Ahmad and Soltani (2011) and Awodun et al. (2016) and disagrees with the study of Alordiah, Akpadaka, and Oviogbodu (2015).

From research question two, rural school students taught with discussion teaching method had better retention level than urban school students taught with discussion teaching method but when subjected to z-test analysis, result showed non-substantial. There is no significant difference in the mean scores of SS2 students in urban and rural schools taught with discussion method in retention level in Biology. This means that retention level of students is not influenced by school location rather students' learning

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attitude influence students' retention and academic achievement. This study is in agreement with Yousuf and Bhutta (2012) and Adebule and Aborisade (2013).

Also, urban school students taught with demonstration teaching method had better retention level than urban school students taught with lecture teaching method but when subjected to z-test analysis, result showed non-substantial. There is no substantial variance in the mean scores of students in urban schools taught with demonstration and lecture teaching methods in retention level enhancement in Biology. Rural school students taught with demonstration teaching method had better retention level than rural school students taught with lecture teaching method but when subjected to z-test analysis, result showed non-substantial. The high retention level in the experimental group is in support with the work of Gambari et al. (2014) but in contrast with the work of Cleopas and Igbojinwaekwu (2023). There is no substantial variance in the mean scores of students in rural schools taught with demonstration and lecture teaching methods in retention level enhancement in Biology. Perhaps, other factors other than teaching methods affect retention of lessons in biology students (Oghenevwede, 2012). This is in support with the works of Olatoye as cited in Olasehinde and Olatoye (2014) Ishaku as cited in Cleopas and Igbojinwaekwu (2023) and Uzoma and Amadi (2018).

Also, urban school students taught with discussion teaching method had higher retention level than urban school students taught with lecture teaching method but when subjected to z-test analysis, result showed non-substantial. There is no substantial variance in the mean scores of students in urban schools taught with discussion and lecture teaching methods in retention level enhancement in Biology. Higher retention level in urban students taught with discussion methods in line with the studies of Ugwu et al. (2020) and Agu and Aku (2016). Rural school students taught with discussion teaching method had higher retention level than rural school students taught with lecture teaching method but when subjected to z-test analysis, result showed non-substantial. This implies that irrespective of teaching methods employed by teachers, other factors contribute to retention of knowledge in biology students. These factors include These factors include low self-esteem, fear of science, difficulty in science, anxiety, lack of facilities to do science, lack of interest, inappropriate attitude to science (Olatoye as cited in Olasehinde and Olatoye (2014); Ishaku as cited in Cleopas and Igbojinwaekwu (2023) and Uzoma and Amadi (2018).

5. Conclusion

Based on the findings, it has been revealed that there are other factors that contribute to students' poor academic performance, retention and attitude in biology other than methods of teaching. When students' attitude is properly managed, retention level will be enhanced, hence, brilliant academic performance in biology.

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The Ethical Committee of the Federal University, Otuoke, Nigeria has granted approval for this study (Ref. No. FUO/SC.EDU/ETH/24/02).

Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

Competing Interests:

The authors declare that they have no competing interests.

Authors' Contributions:

Both authors contributed equally to the conception and design of the study. Both authors have read and agreed to the published version of the manuscript.

References

Adebule, S., & Aborisade, O. (2013). Influence of study interest and school location on the attitude of secondary school students towards Mathematics in Ekiti State, Nigeria. *Greener Journal of Educational Research*, *3*(6), 229-232. https://doi.org/10.15580/gjer.2013.6.051113604

Agu, P. A., & Aku, P. E. (2016). Comparative effects of guided discovery and discussion teaching methods on basic science and technology students' achievement and retention in Keffi educational zone, Nigeria. *American Based Research*, *5*(1), 102-109.

Ahmad, N. R., & Soltani, A. K. (2011). Attitude towards biology and its effects on student's achievement. *International Journal of Biology*, *3*(4), 100-104.

Alordiah, C. O., Akpadaka, G., & Oviogbodu, C. O. (2015). The influence of gender, school location and socio-economic status on students' academic achievement in mathematics. *Journal of Education and Practice*, *6*(17), 130-136.

Arokoyu, A., & Chukwu, J. (2017). Biology teachers methods of teaching and academic performance of secondary school students in Abia State, Nigeria. *Journal of Emerging Trends in Educational Research and Policy Studies*, *8*(4), 228-231.

Awodun, A. O., Adekunle, R., & Femi-Adeoye, K. (2016). Students' attitude and interest as correlates of students' academic performance in biology in senior secondary school. *International Journal for Innovation Education and Research*, *4*(3), 1-6.

Basheer, A., Hugerat, M., Kortam, N., & Hofstein, A. (2016). The effectiveness of teachers' use of demonstrations for enhancing students' understanding of and attitudes to learning the oxidation-reduction concept. *Eurasia Journal of Mathematics, Science and Technology Education*, *13*(3), 555-570. https://doi.org/10.12973/eurasia.2017.00632a

Basila, D., & Jajua, M. A. (2019). Effects of demonstration and discussion strategies on secondary school students' achievement and retention in biology in Mubi Educational Zone, Adamawa State. *International Journal of Research and Scientific Innovation*, *6*(12), 234-246.

Cleopas, B. C., & Igbojinwaekwu, P. C. (2023). Demonstration and discussion teaching methods in the enhancement of students in senior school biology in Yenagoa and Ogbia Local Government Areas, Bayelsa State. *International Journal of Advanced and Educational Research*, *14*(9), 1-12.

Cleopas, B. C., & Igbojinwaekwu, P. C. (2023). The effects of demonstration and discussion teaching methods on retention of students in senior school biology in Yenagoa and Ogbia Local Government Areas of Bayelsa State. *International Journal of Advanced and Educational Research*, *14*(9), 13-21.

Edinyang, S., Ubi, I., & Adalikwu, R. (2012). Relative effectiveness of inquiry and expository methods of teaching social studies on academic performance of secondary students in Akwa Ibom State, Nigeria. *British Journal of Arts and Social Sciences*, *8*(1), 95-102.

Efe, O. M. (2015). Enhancing academic achievement and retention in senior secondary school chemistry through discussion and lecture methods: A case study of some selected secondary schools in Gboko, Benue State, Nigeria. *Journal of Education and Practice*, *6*(21), 155-161.

Federal Republic of Nigeria. (2013). *National policy on education* (6th ed.). Lagos: NERDC Press.

Gambari, A. I., Yaki, A. A., Gana, E. S., & Ughovwa, Q. E. (2014). Improving secondary school student s' achievement and retention in biology through video-based multimedia instruction. *InSight: A Journal of Scholarly Teaching*, *9*, 78-91.

Gbore, L., & Daramola, C. (2013). Relative contributions of selected teachers' variables and students' attitudes toward academic achievement in biology among senior secondary school students in Ondo State, Nigeria. *Current issues in Education*, *16*(1), 1-9.

Igbojinwaekwu, P. (2012). Prior knowledge of study questions and students' biology academic achievement at senior secondary level. *A Multidisplinary Journal*, *23*(1), 9-15.

Jatau, A., Ugwu, L., & Gwamna, S. K. (2021). Impact of discussion method on performance and attitude in biology among senior secondary students in Zinkwa, Kaduna State, Nigeria. *International Journal of Research in Education, Humanities and Commerce*, *2*(2), 1-12.

National Policy on Education. (1977). *Revised 1981*. Lagos: Federal Government Press.

Obanya, P. A. (2023). *From EFA to EFABAWA: Education for all, by all and with all.* Paper presented at the A Keynote Address Presented at the 7th International Conference of the Faculty of Education, Niger Delta University, Bayelsa state from 6th- 10th February 2023 at the University Auditorium.

Oghenevwede, O. E. (2012). Enhancing the retention level of biology students through the guided discovery instructional method. *Nigerian Journal of Curriculum and Instruction, 19*(1), 7-12.
Olasehinde, K. J., & Olatoye, R. A. (2014). A comparative study of public and private senior secondary school students' science achievement in Katsina State, Nigeria. *Journal of Educational and Social Research, 4*(3), 203-207.
Omwirhiren, E. M. (2015). Enhancing academic achievement and retention in senior secondary school chemistry through discussion and lecture methods: A case study of some selected secondary schools in Gboko, Benue State, Nigeria. *Journal of Education and Practice, 6*(21), 155-161.
Ugwu, L., Jatau, A., & Gwamna, S. K. (2020). Impact of discussion method on performance and retention in biology among senior secondary students in Katsina Education Zone, Katsina State, Nigeria. *International Journal of Multidisciplinary and Current Educational Research, 2*(6), 76-83.
Uzoma, O., & Amadi, G. (2018). Differential effects of project based, group discussion and self-regulated learning techniques on students' achievement in biology. *International Journal of Education, Learning and Development, 5*(4), 96-108.
Veselinovska, S. S. (2011). The effect of teaching methods on cognitive achievement, retention, and attitude among in biology studying. *Cypriot Journal of Educational Sciences, 4*(1), 175-185.
WAEC. (2018). *Chief examiner's report senior school certificate examinations. May/June WASSCE. Statistics Section Report.* Yaba Lagos: WAEC Publishers.
West African Examiner's Report. (2022). General comment, weakness and stregth Retrieved from http://waeconline.org.ng/e-learning/Biology/Bio227mc.html
Yousuf, A., & Bhutta, S. (2012). Secondary school students'' attitude towards environmental issues in Karachi Pakistan. *Journal of Educational and Social Research, 2*(10), 154-165.

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