

EFFECT OF COMMUNITY RESOURCE MANAGEMENT AND TEACHING APPROACH ON STUDENTS' RETENTION IN SECONDARY SCHOOLS

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Abstract

The study investigated the effect of community resource management and teaching approach on students' retention in secondary school biology in Nigeria. It adopted pretest-posttest non-equivalent control group design. It was guided by two research questions and three null hypotheses. The study had a population of 5,008 SSII Science students with a sample of 160 students comprising 66 male and 94 female students drawn using multistage sampling procedure. Biology Retention Test (BRT) was used for data collection. Its content validity was determined using test-blue print. Reliability of the instrument was ascertained using Kuder Richardson (K-R20) formula for estimate of internal consistency and test-retest method for estimate of temporal stability; and the correlation coefficients of 0.62 and 0.91 were obtained respectively. Mean and standard deviation were used to answer the research questions while Analysis of Covariance (ANCOVA) was used to test the null hypotheses at a 0.05 level of significance. The results among others revealed that the use of community resources had significant effect on students' retention in Biology irrespective of gender. There was also no significant interaction effect of teaching approach and gender on students' retention in Biology. Based on the findings, the researchers recommended that, community resources should be used to improve students' learning outcomes such as retention in Biology since their application is not gender prejudiced.

Keywords: Science, biology, teaching methods, community resource management, retention

Introduction

Education is a medium through which knowledge is transmitted from the teacher to the learner for individual growth and societal development. According to Nwabueze (2011), education is the industry that produces manpower needed for socio-economic, political and cultural development of any given society. Secondary education is the education given to students in secondary schools by teachers through teaching, research and community service for global competitiveness. It is a very crucial level of education in Nigeria, where majority of adolescents, youths, future hopes and leaders are located for training and acquisition of knowledge, skills, attitudes and innovative ideas. Hence, secondary education is a system where teaching, learning, administration, research processes and community service take place through proper utilization and management of educational resources for students' positive learning outcomes as well as sustainable national development (Nwabueze & Nwokedi, 2016). This is why Federal Republic of Nigeria (2014) in the National Policy on Education emphasized its goals of preparing individuals for useful living and higher education programmes where they acquire useful skills and innovative ideas for improved global competitiveness. In secondary schools, students learn several subjects in arts, social science and science.

Science could be seen as a body of knowledge, a process learnt and carried out in classrooms and laboratories. Science is defined as the systematic study of the structure, innovative ideas, creative works as well as behaviour of the physical and natural world through observation, experimentation and testing of theories through practical actions against the evidence obtained. Science equally involves a pursuit of skills, innovative ideas and knowledge covering general truths and the operations of fundamental laws. It is a neutral, rigorous, systematic endeavour that builds and organizes knowledge in the form of testable explanations and predictions about the universe. Science, according to Nwabueze (2014) is the pursuit and application of knowledge, creative skills and innovative ideas with understanding of natural and social world following a systematic methodology based on evidence. Importantly, science is a process of discovery, which allows one to link isolated facts into coherent and comprehensive understandings of the natural world. Science

subjects studied at secondary school level include: Physics, Mathematics, Chemistry and Biology. However, the researchers focused this study on secondary school Biology.

Biology is a branch of science that studies biota, their evolution, structures, functions and interrelationships. Biota consists of living things made up of plants and animals found in different regions. In a simple term, Biology is the study of life. The knowledge of Biology is of great relevance to individual students and to the society at large hence, its introduction into the school curriculum to be studied at senior secondary level and beyond (Federal Republic of Nigeria [FRN], 2014). For instance, the knowledge of Biology enables an individual to maintain personal hygiene which helps to reduce the incidence and susceptibility to diseases. Students through knowledge of Biology, develop positive attitude and skills necessary for tackling problems encountered in the society. It enables students to shun anthropogenic activities that threaten the sustainability of the environment, and work towards preserving resources bequeathed to the environment by nature. Also, Biology encourages the advancement of science through research and publications (Lawson, 2001). In a general term, students apply knowledge of Biology to everyday life in matters of personal and community health and agriculture (National Educational Research and Development Council [NERDC], 2008). The immense relevance of Biology to individuals and to the society at large notwithstanding, students' achievement in Biology is poor (West African Examination Council [WAEC] Chief Examiner's Reports, 2015 & 2018). Also, in Obollo-Afor Education Zone of Enugu State where this study was carried out, there is a report of poor students' achievement in external examinations including Biology (The Tide Newspaper of 3rd June, 2016). Students' poor achievement in Biology is attributed to some factors among which is poor retention of concepts learnt which could be as a result of the use of poor teaching methods used by teachers at Senior Secondary School level in Nigeria (Gambari, Yaki, Gana & Ughovwa, 2014). Teaching method can be adjudged poor, when the teacher lacks the four different types of teaching methods. These teaching methods include: teacher-centered, learner-centered, content-focused, and interactive/participative methods.

Teaching method which comprises the approaches and principles employed by the teacher to help students learn is said to be poor when it encourages rote learning and passivity during the teaching and learning process. Such teaching episode is characterized by minimal class interactions and little or no students' activities. A quick look at the teaching methods mostly used by some secondary school teachers in Nigeria, one will observe that some Biology teachers prefer the use of the conventional method which served as a control in this study to the innovative ones. Its usage has been criticized because it mostly increases one-way flow of knowledge from the teacher to the learner. Also, it enables a teacher to cover a large content in a limited time and boosts the teacher's ego as an authority figure (Agbi, 2004; Ezeudu, 2011). This is contrary to the innovative teaching methods that encourage students' active participation in teaching and learning process. However, the conventional teaching method may be improved upon by integrating innovative strategies during instructional processes (Edikpa, Nwabueze & Chukwuma, 2018). It is an onus for Biology teachers to improve on their teaching methods and/or strategies in order to improve students' poor achievement in Biology that is brought about by low retention of concepts taught. Could the use and management of community resources then, be an efficacious innovative approach to improve students' low retention in Biology?

Community resource management deals with the application, utilization and management of resources in communities that are of paramount importance in meeting the needs of the people living where such resources exist. Some of these resources are unique to the communities where they are located. Some are germane for researches and teaching. Their existence in communities made them common and cheap to harness and manage. In teaching context, community resources are resources in the community that can be wisely managed for effective instructional delivery. They are also valuable resources obtained from the community which can be of immense help in teaching and learning process through proper management (Nworgu, 2009). Community resources that must be managed to improve teaching and learning approach, and as well maintain students' retention in Biology include: individuals in different areas of specialization in such a community, natural endowments, spectacular sites, as well as services rendered by people of the community that foster the teaching and learning of concepts in Biology. Like fieldtrip, community resource management may involve excursions outside the classroom for the purpose of allowing students obtain firsthand observation of the learning experience from the resources in the community. They could enable students to obtain relevant scientific knowledge and skills from their environment.

Unlike fieldtrip however, it involves inviting resource persons in the community who are professionals in their own careers to teach some curriculum contents in Biology related to their field of endeavours. In schools, community resources that can be managed and used for instructional purposes include science centres (botanic and zoo gardens, museums, nature centres, interactive science centres), aquaria, nearby stream, pond, mountains, and forest among other places outside the classroom that are unique to the local school (Southwest Educational Development Laboratory, 2001). Also, people in the community such as palm-wine tappers, medical laboratory scientists, health workers, and herbalists among others, can be invited by Biology teachers to effectively teach some curriculum contents in Biology. The use of community resources as an approach in teaching and learning episode could contribute towards improving instructional outcomes in Biology.

For instance, the management and use of community resources by teachers in teaching and learning process tend to motivate students and sustain their interest in the content they learn. Usman (2016) asserted that they are necessary and contribute towards the attainment of the behavioural objectives of the lesson and goals of education generally.

Furthermore, they are cheap to harness and manage. Through proper management and adoption of these community resources, students could gain greater insight in their careers in life when allowed to interact with the individuals with special talents (Nwabueze, 2011). In addition, their proper usage is expected to foster the attainment of the curriculum objectives of studying Biology by students which are to prepare students to acquire: adequate laboratory and field skills in Biology; meaningful and relevant knowledge in Biology; ability to apply scientific knowledge to everyday life in matters of personal and community health and agriculture; as well as reasonable and functional scientific attitude (National Educational Research and Development Council, 2008, p.1). In addition to its expectation in helping students to achieve the above lofty objectives of studying Biology, could it be effective in enhancing students' retention of knowledge in Biology?

Retention is the ability of an individual to hold learned information in his/her memory for a fairly long period of time. Amin and Malik (2013) defined retention as the capacity to hold information. It is important in any teaching and learning process. Halpern (2003) asserted that the underlying rationale for any kind of formal instruction is the assumption that knowledge, skills, and attitudes learned in a school setting will be accurately recalled and used in some other context at some time in future. Retention from the foregoing statement is necessary to achieve the transfer of learning because if students meaningfully hold the knowledge, skill, and attitude acquired from Biology, they will be able to apply same later in future to solve problems they encounter in the society which brings about societal development. Also, if students can retain what they learnt in Biology, such retention of knowledge will improve their poor achievement in Biology. However, studies have shown that students taught with innovative teaching methods had a longer retention in Biology than those taught with the conventional teaching methods (Jiya, 2011; Duyilemi & Bolajoko, 2014; Aninweze, 2014; Awah, Inakwu & Odey, 2015; Enohuan, 2015). Whereas Gambari, Yaki, Gana and Ughovwa (2014) reported in their study that, Biology students taught with the conventional teaching method had better retention than those taught using innovative teaching method. This latter report might be possible if the conventional teaching method was done by integrating innovative strategies during the instructional processes. Further, these divergent reports perhaps suggest that conventional teaching methods may not be bad but can be improved upon by integrating useful strategies in order to ensure active learning and productive teaching in schools that promote students' retention. Also, fieldtrip as a method of teaching has been found to improve students' retention in Biology (Ahmad, 2014). This notwithstanding, there is need to explore the effect and management of community resources that are quite different from fieldtrip in some respects, on students' retention of knowledge in Biology. Gender is of concern in science teaching in order to avert pedagogical bias.

Gender is the role of male and female as perceived by the society. Gender can be seen as a social concept describing men and women, which is determined by the conception of tasks, functions and roles attributed to men and women in a given society as well as public and private lives (Madumere-Obike & Nwabueze, 2020). It is society's division of humanity based on sex into distinctive categories (Omorieg & Ihensekhien, 2009). The assignment of roles to male and female by society has introduced stereotype. Gender stereotype links certain roles to the male and others to female. Nzewi (2010) observed that right from homes, the child-rearing practice moves the female away from science and science-related disciplines. As a result, gender stereotype influences choice of subjects or courses in schools. This preference initiated by gender stereotype has also influenced students' choice of science subjects. For instance, Reddy (2017) stated that in terms of subject preference, boys were more inclined to study physics and chemistry whereas girls showed a higher preference for Biology. This disparity existing in sciences as a result of gender stereotype is a lacuna and needs to be filled. Gender is also reported to significantly influence students' retention in Biology when a teaching method and/or approach is used (Enohuan, 2015). In other words, a teaching method may favour a group of gender say female and does not favour the other group (male) vice versa. However, it is important to break gender barriers in order to ensure gender equality in the school system and in Biology classrooms. This demand encourages science teachers including Biology teachers to adopt non-biased gender approaches and instructional strategies in schools (Nwosu, 2015). Could the use of community resources be an effective teaching approach in enhancing students' retention in Biology irrespective of gender?

Theoretical Support

Theoretically, this study supports Lev Vygotsky's social cognitive theory developed in 1962 that studies how the social environment influences learning process. The theory states that learning takes place through social interaction and language (Vygotskian principles and Scaffolding). Vygotsky among other tenets upheld that a child's new knowledge is inter-psychological that is, learning through interaction with others and then intra-psychological; meaning that learning must occur within the child (individual learning). This theory relates to this study because the use of community resources in teaching and learning process actively engage students during instructional process in a social milieu that enhances student-student, student-teacher, and student-community resource interactions which is germane for students' learning.

Purpose of the Study

The study generally investigated the effect of community resource management and teaching approach on students' retention in secondary school Biology. The study specifically determined the:

1. effect of community resource management on students' retention in Biology;
2. influence of gender on students' retention in Biology; and
3. interaction effect of teaching approach and gender on students' retention in Biology.

Research Questions

The study was guided by the following research questions:

1. What are the mean retention scores difference between students in Biology exposed to the management of community resources and students not exposed?
2. What are the mean retention score differences between male and female students in Biology?

Hypotheses

The null hypotheses formulated to guide the study and were tested at 0.05 significant level are stated hereunder.

HO₁ There is no significant difference between the mean retention scores of students in Biology exposed to the management of community resources and students not exposed.

HO₂ There is no significant difference between the mean retention scores of male and female students in Biology.

HO₃ There is no significant interaction effect of teaching approach and gender on students' retention in Biology.

MATERIALS AND METHODS

The design used for the study was Pretest-Posttest non-equivalent control group design. This type of quasi-experimental design was deemed appropriate for the study because treatment and control groups were assigned to intact classes (Nworgu, 2015). The study was conducted in Obollo-Afor Education Zone of Enugu State where there is a report of poor students' achievement in external examinations (The Tide News Online of 3rd June, 2016), which could be as a result of poor retention of concepts taught triggered by the use of poor teaching methods. The population of the study was all the five thousand and eight (5,008) Senior Secondary Two (SSII) Science students in Obollo-Afor Education Zone; consisting of two thousand, one hundred and fifty-one (2,151) male and two thousand, eight hundred and fifty-seven (2,857) female Science students. The sample size for the study was one hundred and sixty (160) SSII Biology students. The sample was drawn using a multistage sampling procedure. This is because the sampling occurred in stages that involve the use of purposive sampling, stratified random sampling and simple random sampling techniques. The researchers first, purposively used the forty-one mixed public secondary schools in the zone excluding the seven single-sex ones since gender is a moderating variable in this study. Further, the forty-one mixed secondary schools were stratified according to the three Local Government Areas in the zone. Also, the researchers used simple random sampling technique with replacement to draw four mixed secondary schools for the study based on the proportion of the mixed secondary schools in each L.G.A. Finally, the researchers randomly assigned two schools to the experimental/treatment group and the remaining two schools to the control group. In both the experimental and control groups, there were 33 male and 47 female Biology students respectively which makes the sample size to be 160. The instrument for data collection was Biology Retention Test (BRT). The BRT had two sections A and B. The section A requested the biographic information of the students while section B had fifty (50) multiple-choice items whose development was done using the test-blue print in order to ensure its content validity. Fifty questions were developed from the contents students were taught which are: classification of plants, reproductive system in vertebrates and conservation of natural resources. However, other topics that can be taught using community resources that are outside the scope of this study include micro-organisms around us, micro-organisms in action, towards a better health, different habitats, ecology, nutrition in animals, genetics and variation among others. The BRT was face-validated by four experts (two experts in Biology Education Unit and two experts in Measurement and Evaluation Unit) in the Department of Science Education, University of Nigeria, Nsukka. The validated instrument (BRT) was trial-tested using twenty (20) SS2 students in Nsukka L.G.A. which was an area different from study area but shared common characteristics in certain such as the use of the same subject curriculum, and the use of the same academic calendar. The trial-tested BRT instrument was scored and subjected to reliability measures. The estimate of temporal stability of the reshuffled BRT which was given after two weeks of the first administration of BRT was determined using test-retest method and the scores obtained were subjected to Pearson Product Moment Correlation Coefficient which yielded a correlation coefficient of 0.91 which according to Nworgu (2015) is very high. The estimate of internal consistency of BRT was ascertained using Kuder Richardson (K-R20) since BRT has multiple-choice items that are dichotomously scored. A K-R20 reliability coefficient of 0.62 was obtained which according to Nworgu (2015) is adequate.

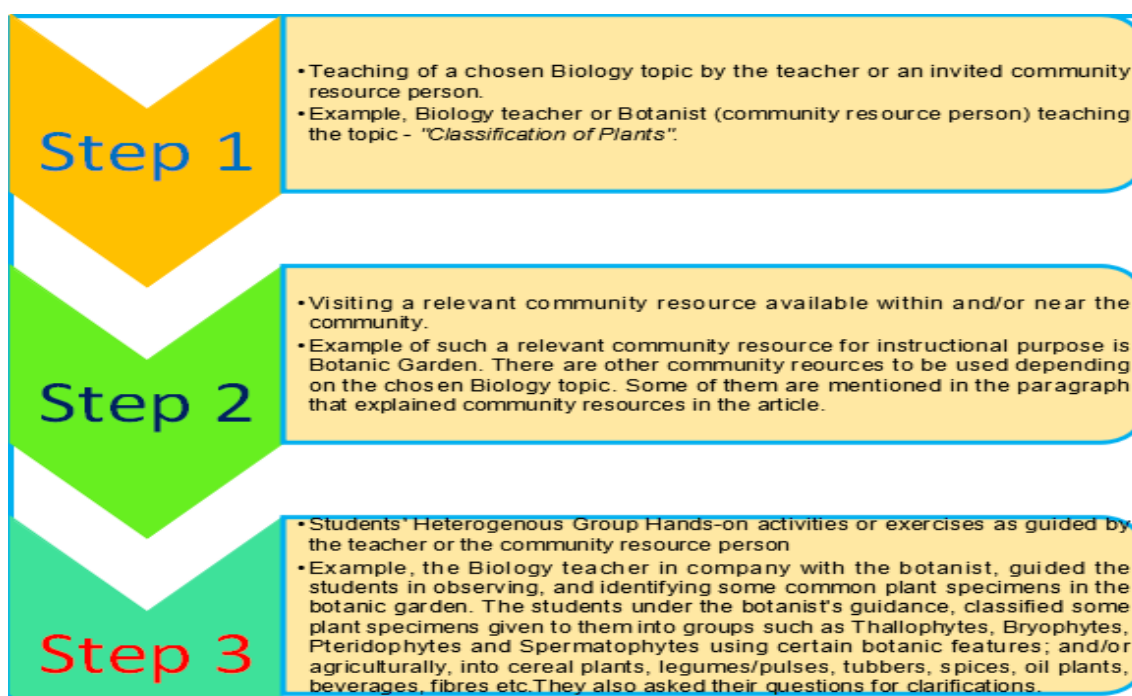


Figure One: A Flowchart on the Use of Community Resource Approach in Biology Teaching: The Experimental/Treatment Group

After a week training of the research assistants (aimed at controlling the extraneous variables that may have confounding effect on the results), the researchers with the help of the research assistants conducted the pretest of the BRT. This was followed by four weeks of teaching. Students in the treatment group were taught selected topics using community resource approach. For instance, while using community resources such as a botanist and botanic garden in teaching classification of plants in the experimental group, the research assistants (Biology teachers in the treatment group) first invited botanists who taught the concept of classification of plants by agricultural method, according to life cycle of plants, and then botanically. Thereafter, the teachers in company with the botanists took the students to a botanic garden near or within the community. At the botanic garden, the botanist asked the students to classify some plants they could identify in the garden into groups as Thallophytes, Bryophytes, Pteridophytes and/or Spermatophytes. Students were also allowed to make observations and asked questions which were guided by the teacher. The teacher also instructed them to collect some plant parts of five plants of their choices from the botanic garden for further discussions in their heterogenous groups and subsequent writing of reports. The teacher examined their output and gave them feedback as appropriate. Students in the control school were taught the same topics as those in the experimental school but were not taught using or exposed to any community resources. After the four weeks of teaching, posttest of the BRT was given. Two weeks after the posttest, the retention test which was reshuffled BRT was given to students in both experimental and control groups. The research questions were answered using mean and standard deviation for Post-test and Retention Scores in Control and Experimental Groups. Also, the mean gains were ascertained for Control and Experimental Groups. The null hypotheses were tested at a 0.05 level of significance using Analysis of Covariance (ANCOVA).

RESULTS

Research Question One: What are the mean retention differences between students in Biology exposed to the management of community resources and students not exposed?

Table 1: Post-test and Retention Scores of Students in Biology in the Control and Experimental group

| Group | Number of Sample | Posttest | | Retention | | Mean Gain |
|--------------|------------------|----------|--------------------|-----------|--------------------|-----------|
| | | Mean | Standard Deviation | Mean | Standard Deviation | |
| Experimental | 80 | 71.02 | 8.34 | 77.70 | 8.18 | 6.68 |
| Control | 80 | 52.47 | 6.56 | 53.90 | 6.57 | 1.43 |

Data in Table 1 showed that the experimental group exposed to the management of community resources had a posttest mean achievement score of 71.02 with a standard deviation of 8.34 and a mean retention test score of 77.70 with a standard deviation of 8.18. The difference between the mean posttest and retention test scores for the experimental

group was 6.68. The control group who were not exposed to community resource management had a posttest mean achievement score of 52.47 with a standard deviation of 6.56 and a mean retention test score of 53.90 with standard deviation of 6.57. The difference between the mean posttest and retention test scores for the control group was 1.43.

Hypothesis One: There is no significant difference between the mean retention scores of students in Biology exposed to community resources and students not exposed.

Table 2: Effect of Community Resources on the Mean Retention Scores of Students in Biology

| Source | Type III sum of squares | Degree of freedom | Mean Square | F-test | Significant Level | Decision |
|------------------------|-------------------------|-------------------|-------------|----------|-------------------|----------|
| Corrected model | 31048.041 ^a | 4 | 7762.010 | 4043.274 | 0.000 | |
| Intercept | 74.707 | 1 | 74.707 | 38.915 | 0.000 | |
| Posttest | 8178.423 | 1 | 8178.423 | 4260.186 | 0.000 | |
| Group | 493.472 | 1 | 493.472 | 257.052 | 0.000 | S |
| Gender | 0.097 | 1 | 0.097 | 0.051 | 0.822 | NS |
| Group* Gender | 0.212 | 1 | 0.212 | 0.110 | 0.740 | NS |
| Error | 297.559 | 155 | 1.920 | | | |
| Total | 724088.000 | 160 | | | | |
| Corrected Total | 31345.600 | | | | | |

LEGEND: S = Significant; NS = Not Significant

The result presented in Table 2 revealed that with respect to the effect of community resources on students' retention in Biology, an F-ratio of 257.052 was obtained with associated probability (p) value of 0.000. Since the probability (p) value of 0.000 was less than 0.05 set as benchmark, the null hypothesis (HO₁) which stated that there is no significant difference between the mean retention scores of students in Biology exposed to community resources and students not exposed is rejected.

Research Question 2: What are the mean retention scores of male and female students in Biology?

Table 3: Post-test and Retention scores of Male and Female Students in Biology

| Gender | | Number of sample | Posttest Mean | Standard Deviation | Retention Mean | Standard Deviation | Mean Gain |
|--------------|---|------------------|---------------|--------------------|----------------|--------------------|-----------|
| Control | M | 33 | 51.88 | 7.12 | 53.39 | 7.04 | 1.51 |
| | F | 47 | 52.89 | 6.20 | 54.26 | 6.26 | 1.37 |
| Experimental | M | 33 | 72.97 | 9.26 | 79.58 | 9.10 | 6.61 |
| | F | 47 | 69.66 | 7.42 | 76.38 | 7.28 | 6.72 |
| Total | M | 66 | 62.42 | 13.42 | 66.48 | 15.46 | 4.06 |
| | F | 94 | 61.28 | 10.83 | 65.32 | 13.01 | 4.04 |

Data in Table 3 revealed that the male students exposed to community resources had a posttest mean achievement score of 72.97 with a standard deviation of 9.26 and a retention mean score of 79.58 with a standard deviation of 9.10. The difference between the posttest and retention mean scores for the male students exposed to community resources was 6.61. On the other hand, the female students exposed to community resources had a posttest mean achievement score of 69.66 with a standard deviation of 7.42 and a retention mean score of 76.38 with a standard deviation of 7.28. The difference between the posttest and retention mean scores for the female students exposed to community resources was 6.72. Data in Table 3 also revealed the mean retention score of male and female students in Biology. The male students had a posttest mean achievement score of 62.42 with a standard deviation of 13.42 and a mean retention score of 66.48 with a standard deviation of 15.46. The difference between the posttest mean and mean retention scores for the male students was 4.06. On the other hand, the female students had a posttest mean achievement score of 61.28 with standard deviation of 10.83 and a mean retention score of 65.32 with a standard deviation of 13.01. The difference between the posttest mean and mean retention scores for the female students was 4.04.

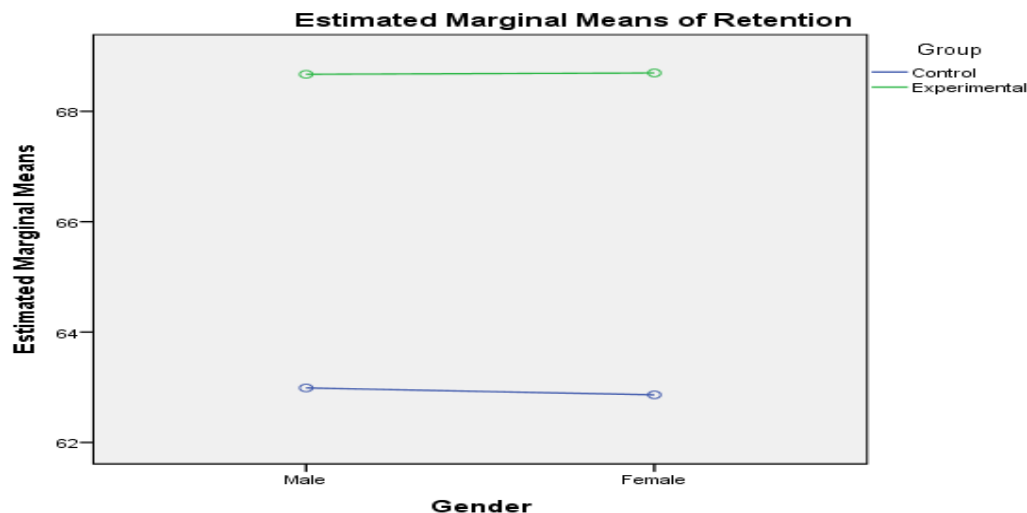
Hypothesis 2: There is no significant difference between the mean retention scores of male and female students in Biology.

The result summarized in Table 2 showed that with respect to influence of gender on students' retention in Biology, an F-ratio of 0.051 was gotten with associated probability (p) value of 0.822. Since the probability (p) value of 0.822 was greater than 0.05 set as benchmark, the null hypothesis (HO₂) which stated that there is no significant difference between the mean retention score of male and female students in Biology is not rejected.

Hypothesis 3: There is no significant interaction effect of teaching approach and gender on students' retention in Biology.

The result presented in Table 2 showed that with respect to the interaction effect of teaching approach/treatment and gender on students' retention in Biology, an F-ratio of 0.110 was obtained with associated probability (p) value of 0.740. Since the probability (p) value of 0.740 is greater than 0.05 set as benchmark, the null hypothesis (H₀₃) which stated that there is no significant interaction effect of teaching approach and gender on students' retention in Biology is not rejected. The interaction graph below showed that gender (male and female) plots against teaching approach did not intercept at any point.

Figure Two: Graph showing the interaction effect of teaching approach and gender on students' Retention in Biology



Covariates appearing in the model are evaluated at the following values: Posttest = 61.75

DISCUSSIONS

The results of data analysis summarized in Table 1 showed that students who were exposed to the management of community resources had a higher mean retention scores in Biology than students in the control group who were not exposed to community resources. This was further revealed in Table 2 which showed a significant difference between the mean retention score of students in Biology exposed to community resources and students in the control group who were not exposed. Since there is a significant difference between the mean retention score of students in Biology exposed to the management of community resources and students in the control group who were not exposed, the inference is that the use of community resource is an effective approach in enhancing students' retention in Biology.

The finding agrees with Ahmad (2014) who found that fieldtrip enhances students' retention in Ecology. It also supports Enohuan (2015) who noted that the use of innovative strategy like the use of instructional materials had positive effect on students' learning in Biology. Retention is important in students' learning because it enhances transfer of what have been learnt in the classrooms to life experiences. Learning transfer is the hallmark of teaching and learning in schools. It is only when students can transfer what they have learnt in Biology classrooms to life experiences that they can be productive and meaningfully contribute towards societal development. Nwabueze (2011) was of the opinion that proper management and adoption of community resources assist the students to gain greater insight in their careers in life when allowed to interact with the individuals with special talents. This therefore calls for the persistent use of approaches that enhanced students' retention in Biology like the use of community resources in teaching and learning process.

The result of data analysis on the influence of gender on students' retention in Biology contained in Table 3 showed that for each group of the gender, the mean retention score was greater than their corresponding posttest mean achievement score; with the female students having mean gain slightly higher than the mean gain of the male students. Further analysis in Table 2 revealed no significant difference between the mean retention score of male and female students in Biology. This is an indication that the use of community resources enhanced students' retention in Biology irrespective of gender since there is no significant difference between the mean retention score of male and female students in Biology. The finding is consistent with Chukwu (2011) whose study revealed no significant difference in the mean retention scores of male and female students in Biology when taught with an innovative teaching approach. This shows that the use of community resources enabled students to retain what they have learnt in Biology irrespective of whether they are male or female. This explains that the approach ensures gender equality during Biology teaching/learning processes. The finding is however not in support of Enohuan (2015) who found a significant difference in the retention ability of male and female students in favour of the male students in Biology when taught with instructional materials. The source of this divergence may be attributed to the teaching approach or strategy used. The Biology teachers are therefore expected to be groomed on pedagogies for them to make their teaching interactive, gender-friendly and conducive for both male and female students to maximally benefit in any learning episode. Such practice of applying community resources will help to engender gender equality during teaching/learning processes.

The result presented in Table 2 shows no significant interaction effect of teaching approach/treatment and gender on students' retention in Biology. This was further illustrated in an interaction graph shown in figure 1 where gender (male and female) plots against teaching method did not intercept at any point. This indicates that the use of community resources enhances students' retention in Biology. The finding of this study on the interaction effect of teaching approach/treatment and gender on students' retention in Biology is in line with Chukwu (2011) that found that there was no significant interaction effect of teaching method and gender on students' retention in Biology. This calls for the effective use of community resources in Biology teaching since it enhances students' retention without being gender prejudiced.

Conclusion

Based on the findings and discussions, it was concluded that the use of community resources enhanced students' retention in Biology irrespective of gender and as such, the use of community resources is not a gender biased approach of teaching Biology.

Educational Implications of the Findings

The findings of this study have some educational implications to students. For instance, the use of community resources, fosters critical thinking among students, encourages keen observation, enhances acquisition of scientific skills, knowledge and desirable attitudes, and enable students to ask pertinent questions which answers as will be provided by the community resource persons will robustly boost their knowledge of the concepts learnt. There is active student-student, student-teacher and student-community resources interactions that will foster activity-oriented teaching and learning episodes that upscale retention of knowledge.

Recommendations

Based on the results of this study, it is recommended that:

1. Community resources should be used to improve students' learning outcomes such as retention in Biology since their application is not gender prejudiced.
2. The community resources in different communities should be preserved and maintained as they serve veritable learning resort.
3. Curriculum experts should state in the curriculum those topics that can be effectively taught using community resources and community resource persons for effective implementation.
4. Community resource persons such as health workers, medical experts, herbalists, and palm-wine tappers among others should make themselves available when invited since students through interacting with them can develop interest towards such careers and retain knowledge thereof which they apply later in life to become profitable members of the society.

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LIST OF ABBREVIATIONS AND MEANINGS

| | | |
|---------------|---|---|
| ANCOVA | = | Analysis of Covariance |
| BRT | = | Biology Retention Test |
| FRN | = | Federal Republic of Nigeria |
| K-R20 | = | Kuder Richardson formula for estimate of internal consistency |
| L.G.A. | = | Local Government Area |
| NERDC | = | Nigerian Educational Research and Development Council |
| SSII | = | Senior Secondary Two |
| WAEC | = | West African Examination Council |