Effects of Outdoor Activities Teaching Strategy on Students’ Gender and Retention in Secondary School Basic Science in Ekiti State, Nigeria

DR. OYENIYI, Ajoke .D.
Department of Integrated Science,
College of Education, Ikere- Ekiti, Ekiti State, Nigeria

Abstract: The study examined the effects of Outdoor activities teaching strategy on students’ gender and retention in secondary school Basic Science in Ekiti State, Nigeria. Specifically, the study examined the difference in the performance and retention of students exposed to Outdoor teaching strategy based on students’ gender. The study adopted non-equivalent pre-test post-test design. The population consisted of 12, 033 Basic Science students in Ekiti State while the sample consisted of 87 J.S.I students (intact class size) drawn from two public secondary in the state. The sample was selected using multistage sampling procedure. The research instrument ‘Basic Science Performance Test (BSPT)’ was used to collect relevant data for this study. The face and content validity of the instrument was ensured while the reliability of the instrument was determined using split-half which yielded reliability co-efficient of 0.78. The data were analyzed using inferential statistics of t-test at 0.05 level of significance. The findings of the study showed that the two groups (Outdoor activities and Conventional) were homogenous at the commencement of the experiment. The use of Outdoor activities teaching enhanced performance and retention of students in Basic Science than the Conventional strategy. However, an Outdoor activity is not gender biased in students’ academic performance and retention. Based on the findings of the study, it was recommended among others that the use of Outdoor activities teaching strategies should be encouraged in Basic Science class in Junior Secondary Schools so as to enhance academic performance and retention of students in Basic Science. It was also recommended that Basic Science teachers should update their knowledge so as to accommodate the use of Outdoor activities teaching strategy.

Keywords: Outdoor activities, gender, retention, teaching Strategy and Academic Performance

Introduction

Basic Science is considered the bedrock of all science subjects at the Senior Secondary School (SSS) level. The subject prepares students at the upper basic level for the study of core science subjects (Biology, Chemistry and Physics) at the Senior Secondary School (SSS) level (Oluinde, 2012). According to Trustee of Princeton University (2013), Basic Science is a revolutionary new introductory science curriculum developed at Princeton intended for students considering a career in science. Basic Science emphasizes scientific literacy and research oriented learning (Gunseli & Guzin, 2017). The subject encourages exploration of student’s immediate environment. As a result, Basic Science teachers continue to learn along with their students.

The teaching of Basic Science is therefore, based on the philosophy of active learner participation in the process whereby, students are encouraged to learn by constructing their own knowledge based on what they already understand as they make connection between new information and old information, guided or facilitated by the teacher (Piaget) as quoted by (Anna, 2015). Under this philosophy, students are encouraged and let to discover concepts and generalizations based on their experiments.

In the study of Akomolafe as quoted by Anna (2015), rightly pointed out that, when children learn science using the process of activity approaches, they improve their ability to apply intellectual skills to solve problems, improve their language development, become more creative, master science content better and develop positive attitude towards Science and Scientists.

Research by Aniaku (2012) has shown that the above desires are not being achieved as expected. The learning environment is expected to be democratic, the activities are interactive and student-centered and the teacher facilitates the process of learning in which students are encouraged to be responsible and autonomous. Though the curriculum of Basic Science specifies “hand-on” and “mind-on” activities and skill acquisition, most students are not exposed to these real situations in the schools (FRN, 2004). Emaikwu (2012) in his research discovered that Basic Science is generally taught using conventional strategy which does not follow the theories put forth by Kolb as quoted by Anna, (2015) and the theory of learning process.

Basic Science is a concept in science teaching in Nigeria that came to replace integrated science. A study by Chukwuneke and Chinkwenze, (2012) revealed that the scientific, vocational and technological aspects of education are not effectively implemented in the school system. Based on this, Basic Science curriculum review became a necessity. This led to the Federal Government in Nigeria to take the decision to introduce the 9-year of Basic Education. The need to attain the Millennium Development Goals by the year 2015 together with the need to meet the critical target for the National Economic Empowerment and Development Strategies (NEEDS), summarized as follows: value reorientation, poverty eradication, job creation, using education to empower the people among others (FRN 2004).

As documented by Chukwuneke & Chinkwenze (2012), it became necessary for the existing curriculum for the upper basic level to be reviewed, restructured and realigned to fit into the 9-year basic education programme. With this, the National Council on Education (NCE) therefore in her meeting of 2005 directed the NERDC to ensure the review which also approved the new curriculum. This restructuring curriculum review took effect from September 2007 (Dauda & Udofia, 2010). It was during this...
restructuring and review of curricular that Basic Science replaced Integrated Science (in Nigeria). During this time, human rights education, family life, HIV/AIDS education, entrepreneurial skills, globalization, ICT were fused into the 9-year basic education curricular (FRN, 2004) while the following themes were fused into Integrated Science curriculum to form the Basic Science curriculum:

- Environmental Education
- Drug Abuse Education
- Population and Family Life Education
- Sexually Transmitted Infection (STI) including HIV (FRN, 2004).

Basic Science is basic training in scientific skills which are required for human survival, sustainable development and societal transformation (Chukwuneke & Chinkwenze, 2012). Basic Science is expected to make Nigerians scientifically literate.

There are various objectives of Basic Science as identified by Bilesammi-Awoderu & Oludipe (2012). The reasons for which Nigeria government started Basic Science teaching in Nigerian upper basic level include:

i. Provides students at the upper basic level, a sound basis for continuing science education in single science subject.
ii. Enhancement of scientific literacy of the citizenry.
iii. It allows students to understanding of students’ environment in its totality rather than in fragments.
iv. Having a general view of the world of science.
v. The processes of science serve as unifying factors for the various science subjects.

The importance of Basic Science in everyday life can never be over emphasized. It serves as the bedrock which provides the required training in scientific skills to meet the growing needs of the society. It is the fundamental knowledge acquired through Basic Science at the upper basic level that leads to the transformation of the world through dramatic advances in almost all fields including Medicine, Engineering, Electronics and Aeronautics among others (Guyana, 2018).

The application of scientific knowledge acquired through Basic Science, as reported by Guyana (2018) has helped many countries like China and India to transform from poor feudal type economies to become economic and industrial power houses and in several ways compete effectively with developed countries. Basic Science is of great importance because early experiences in science help students to develop problem-solving skills that empower students to participate in an increasingly scientific and technological world (Guyana, 2018).

Basic Science is the type of science which provides unique training of students in observation, reasoning and experiment in the different branches of science; it also helps students to develop a logical mind (Prakash, 2012). Basic Science enables students to be systematic and enables them to form an objective judgment. Basic Science, if taught according to its philosophy, equips students with the necessary introductory scientific and technological knowledge and skills necessary to build a progressive society. This forms the bedrock on which scientific and technological studies rest, (Ochi & Haruna, 2014).

Outdoor education is an activity-based teaching strategy that enables students to learn with the same vigor that marks their natural activity. It introduces element of joy, team spirit, respect for each other’s opinions and it reduces the abstractness in science concepts. Through this method, the work is carried out in friendly manner, gladly with motivating spirit and activeness throughout the whole lesson, even to an uninteresting topic. Outdoor teaching strategy is in-line with Piaget tasks as it affords the students a variety of activities and experiences that involve the use of concrete objects. This hastens the learners’ ability to order events through application, knowledge and predict changes. Adequate and appropriate use of this method through a rich variety of stimulating experiences, progress from concrete to abstract and then a powerful conceptualization may be achieved. Thus the learner now will reason or make hypothesis with symbolic or ideas rather than needing objects, in physical world as the basis for thinking. The learner according to him can therefore use a hypothetical, deductive procedure that no longer ties his thought to existing reality but could consider all possible explanations to problem and can evaluate alternative explanations or solution to the problem. The experience a learner gets depends not only on what the learner is being taught but also on how the learner is taught.

Within the past 20 years, Outdoor Education Programmes (OEPs) in general have been reported to show a number of positive effects on personal and social development, physical activity and academic achievement and leadership skills for a wide range of participants and age groups (Rickinson et al 2017). Outdoor Education is a broad research area. The focus of this work is based on curriculum-related research on outdoor teaching and learning. As a concept, structured learning activities conducted outside the classroom is often confused (Gove, 2014). Outdoor education is likely the most used concept, but out-of-school learning, out-of-classroom learning and outdoor learning have been used synonymously, or with different meanings. With its roots in social welfare, camping education and natural history, outdoor education encompasses related fields, such as wilderness, adventure, experiential as well as inter-and intra-personal education (Waitie, 2011).

Basic Science outdoor teaching is the act of taking students outside the classroom to learn some Basic Science concepts and themes as they occur in natural settings. The students usually have first-hand experience in natural and technological settings. The experiences gained during outdoor lessons are perceived to be long lasting and vivid. This may discourage rote learning. Popov (2012) had used outdoor activities and found that the use of outdoor activities in the teaching of Basic Science produced many positive effects. The teaching of science subjects, and Basic Science in particular, provides the learner with understanding skills and scientific research, fostering technological and economic advancement in the society where they live thus improving the standards of living. Although there are many methods of teaching sciences in secondary schools, but according to Popov (2012), the conceptual nature of Basic Science, lends itself preferably to outdoor classroom teaching approaches.

Teaching and learning need not to take place exclusively within classroom buildings. The outdoor environment has massive potential for learning. The outdoor environment offers motivating, exciting, different, relevant and easily accessible activities from pre-school years to college. Outdoor learning experiences are often remembered for a lifetime. Integrating learning and outdoor experiences whether through play in the immediate grounds or adventures further provides relevance and depth to the curriculum in ways that are difficult to achieve indoors.
Teaching Basic Science through outdoor activities may reduce the perceived abstract nature to a vivid reality by exposing the students to the practicality of Basic Science. In the outdoor Basic Science activities, learning objects are real material objects in the surrounding. The students will be exposed to the original/actual materials instead of bringing the dummy to the classroom to demonstrate.

Outdoor teaching activities could allow better acquisition of knowledge by students, as the activity could be experienced with different senses as a result of their physical interaction with nature within their environs, this would make them to form their personal opinion about events. The Outdoor activity strategy of teaching science encourages group interactions among pupils and if properly used, the spirit of teamwork, exchange of ideas and respect for each other’s point of view will be enhanced at early stages of learning. Another feature of Outdoor activity-based teaching strategy is that local resources can be effectively utilized in the teaching process. In typical students’ activity, costly scientific equipment is often substituted with locally available teaching aids (Iwuji, 2012).

A more qualitative approach to explore the influence of the outdoors in learning ecology was discerned in a study by Gunzeli & Guzin (2017), where they explored 13 to 14 years old students’ ability to transfer ecological knowledge between ecosystems. They found that human influence and abstract processes, such as energy flow and matter cycling, were difficult to understand in an ecosystem. They also researched tertiary students’ perspective on learning in nature. Field trips were perceived as a significant part of learning ecology because students who could explore, discuss and link theory to practice. An additional qualitative study was conducted by Gunzeli & Guzin (2017), who revealed that collaborative outdoor learning in ecology had a positive effect on student’s knowledge construction and long-term knowledge retention. Openshaw & Whittle as quoted by Fagerstam (2012) questioned the effectiveness of ecological field trips and argued that students’ problem with ecological concepts must be understood first for a field trip to have an impact, and an excessively under structured learning environment may negatively impact the learning outcome.

However, Fagerstam (2012) found that students’ long-term recollections from learning in a botanical garden were linked to other teachers’ expectations. Experience-based learning at environmental education centers seem to positively influence students learning, but the most effective learning experiences are likely those that integrate outdoor and reflexive classroom learning (Ballantyn, Anderson & Packer, 2010). According to Corina (2013) in her study on outdoor games, the outdoor offers many opportunities for learning. Tactile and kinesthetic learners are in their element, learning by doing and through direct contact with the subject matter. She stressed further that students are able to learn experientially, giving meaning to what they are learning and playing games in the outdoor engage the students making learning fun and memorable. Ayotte-Beaudet, Potvin, Lapierre & Glackin (2017) in his study on outdoor ideas asserted that students love going outside because it breaks up the monotony of staying inside and learning. He further explained that when they were outside, students have more freedom to explore, create activities that keep them engaged and build on a current unit’s objectives. Also, Gove (2014) in her study on outdoor lessons affirmed that taking your class outdoors can give both you and your students a new outlook.

There is much anecdotal evidence about benefits of outdoor education experiences. Albuquerque (2010) in a book titled: “A handbook on gardening in Albuquerque public schools” asserts that outdoor is an excellent environment to build skill, connect curriculum to concrete experiences and coach children in the exercise of stewardship of the natural world. For example, school garden provides the ideal environment for experimentation. According to Fagerstam (2012), outdoor education help instill basic element of fieldwork because participants often need to work together and rely on others.

Glackin & Jones (2012) in his study titled: “Place based education: connecting classroom on communities” affirmed that the idea of outdoor study increases students’ motivation to learn. Also, Awodun (2015) quoted Popov in a study of “developing outdoor activities and website resources to stimulate learning Physics in teacher education” asserted that “outdoor education” gives depth to the curriculum and makes an important contribution to students’ physical, personal and social education. Popov further stressed that outdoor activities could allow better acquisition of knowledge by student, as the activity could be experienced with different senses and therefore have more personal character for them.

Outdoor Education aims to construct multi-dimensional learning through an outdoor lens. The teaching method often links the cognitive, psychomotor and affective domains of learning (James, Wirtz & Tiffany, 2019). Research has shown that students of both sexes are interested in outdoor activities. The research carried out by Corina (2013) on the effects of outdoor activities on the enrolment of students by gender shows, more than half of those who attempted questions related to outdoor activities in the examination papers of teacher education during the last eight years were female and outdoor courses have higher enrolment of female students as well. However, research by Gunzeli (2017) on the effect of outdoor activities on the enrolment of students by gender shows that teenage girls have less positive expectation from outdoor activities than boys.

Research has been carried out to evaluate the impact of outdoor learning in improving students’ performance in understanding science. Commonly, it is reasoned that outdoor learning is the better platform of active and engaging learning that benefits students the most especially in understanding science rather than learning in the indoors (Fagerstam, 2012). Evidence taken by House of Common Select Committee findings strongly indicated that education outside the classroom is of significant benefit to pupils. Academic fieldwork clearly enhances the teaching of Science and Geography, but other subjects such as History, Art and Design and Citizenship can also be brought to life by high quality educational visits. Group activities, which may include adventurous expeditions, can develop social skills and give self-confidence.

Retention is the ability to store things learned. Retention is the ability to store learned concepts which can easily be recalled from the short and long term memory (Olanrewaju, 2012). The purpose of education is to learn and learning involves acquiring knowledge which should be retained. Retaining the acquired knowledge and using it to perform a task is what is most important about learning. The method of teaching a particular subject can affect the performance and retention ability of students. This is why a teacher must select good teaching strategies that will bring out the essence of the lesson. Bennet & Rebello (2012) believed that increase in knowledge lies solely on the ability to remember. He further explained that if an individual could not grasp and keep
hold of what was taught and learnt, it would seem like trying to fill a bucket without bottom with water. This implies that students’ participation in a lesson is a basis for understanding, achievement and retention.

Studies conducted across Africa countries including Nigeria have reported disparity in the education of girls and women in science and technology (Ogunleye & Babajide, 2019). Also, Ogunleye & Babajide (2019) reported that more girls are found in Biology and Chemistry than in Physics departments of higher learning. This accounted for females’ low contribution in the areas of Engineering, Medicine, and Technology and by extension the development of nations. To this end, he proposed same institutional strategies to promote gender equity. Adekolu & Asiru (2015) reported on the relationship between self-efficacy and students’ achievement in schools, finding out that there is no significant relationship between self-efficacy and academic performance however, there is a gender significant difference between boys and girls-self-efficacy is documented to be higher in boys than girls.

Okwo & Otubor as quoted by Ogunleye & Babajide (2019) observed that gender has significant influence on science achievement while Babajide (2010) found that gender has no significant influence on achievement in science. Raimi, quoted by Ogunleye & Babajide (2019), that the effect of gender on students’ performance in chemistry practical skills acquisition was not significant. He also found out that there was no significant interaction effect of treatment and gender on students’ acquisition of practical skills in chemistry. Female students were also reported to have performed better than their male counterparts in computational skills. Also in the work of Ogunleye & Babajide, (2019), it was revealed that there was gender difference in favour of boys in relation to practical skills in science. Girls in single sex schools performed better than their male counterparts in mixed schools. The findings of the study of Taylor and Francis (2019) showed that Advance Organizer Model was also effective to teach male and female students.

However, Aguele & Agwugah, Billings, Hyde & McKinley, Kolawole, etc as quoted by Oludipe (2012), in their studies found that male students performed better than female students in the cognitive, affective and psychomotor skill achievements. There is a strong association between gender and response to science education.

Chi-chau as quoted by Oludipe (2012) investigated the effect of classroom goal structures on children’s goal orientation, mathematics achievement and intrinsic motivation. He also assessed gender effects, and the interaction effects between goal structure and gender in these learning situations on the variables related to mathematics learning. The results showed no significant gender effects on the variables of goal orientation, mathematics achievement, intrinsic motivation and beliefs about failure.

Bilesammi –Awoderu as quoted by Oludipe (2012) carried out a study on the concept-mapping, students’ locus of control, and gender as determinants of Nigerian high school students’ achievement in Biology using Analysis of Covariance to analyze the data collected, she found that there was no significant main effect of gender on students’ achievement in Biology. Adebola (2011) investigated differences and the effects of cooperative learning in mathematics classroom setting. The researcher used quasi-experimental design to compare a control section using individualized learning method with three treatment sections using cooperative learning strategy based on the learning together model. The results revealed no significant gender-related differences, but females achieve slightly higher grades than males. Aniaku (2012) investigated the effects of cooperative computer-assisted learning method on male and female students’ achievement in Biology. The students were randomly grouped into cooperative computer-assisted learning and traditional method groups. The analysis of results indicated that gender did not express any significant influence on Biology achievement. However, male and female students in the cooperative computer-assisted instruction group showed remarkable post-test mean difference over their respective counterparts who learned the same Biology concepts through traditional method.

Ajai and Imoko (2015) found that boys performed better than girls in both cooperative and competitive learning strategies when he conducted a research on the effects of competitive and cooperative learning strategies on Nigerian students’ academic performance in mathematics. Asante (2010) and Ekweeme (2013) etc found in their studies at various times, that male students achieved significantly better than female students in Science Education. Apata (2011); Dania (2014); Atovigba, Vershima, O’Kwu & Ijenkeli (2012) pointed out that there is no significant gender difference in students’ academic achievement and retention in various subjects while others found significant difference with either the boys or the girls performing better.

In Nigeria, in spite of the enormous role that Basic Science plays in providing a solid foundation for the mastering of basic concepts in science and technology for national development, and the efforts of government and other stakeholders in improving science education, results in Basic Science in most certified examination bodies like the results of examination conducted by National Examinations Council (NECO) and Ekiti State Ministry of Education, Science and Technology have not been satisfactory. The broad aim and expectations of any teaching and learning programme is productivity and positive-evaluated end-product (achievement). Hence the need for outdoor activities teaching strategy as it will enhance their performances because it encourage interaction among them, allows students to observe, think, reason, investigate and make conclusion on their own about what they see themselves.

**Research Hypotheses**

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

1. There is no significant difference in the achievement mean scores of students in experimental and control groups after treatment.
2. There is no significant gender difference in the academic performance of students exposed to outdoor activities teaching strategy.
3. There is no significant gender difference in the retention mean score of students exposed to outdoor activities teaching strategy.
Methodology

This study adopted non-equivalent pretest, post – test design using an experimental group and a control group. The treatment (outdoor activities teaching strategy) was applied to the experimental group. The teacher uses this strategy to teach students and determine the effect on students’ performance in Basic Science subject.

The population for this study consisted of all 12,033 co-educational public junior secondary one (JSI) Basic Science students across the sixteen local government areas of Ekiti State. As at the time of this study, Ekiti State had a total of 191 public secondary schools (Ekiti State Ministry of Education, Science and Technology, Ado, 2018).

The sample for the study consisted of 87 junior secondary one (JSI) Basic Science students who were selected from two co-education public secondary schools across the sixteen LGAs of Ekiti State using multistage sampling procedure. At the first stage, two LGAs were selected from the sixteen LGAs using simple random sampling technique. The second stage involved the selection of two towns out of the two LGAs earlier selected using simple random sampling technique. The third stage is the selection of two co-educational public secondary schools in each of the town selected using simple random sampling technique. The last stage involved the selection of two intact JSI Basic Science class from each of the schools selected for the study.

The instrument titled: “Basic Science Performance Test (BSPT)” was used for this study. The research instrument was certified by professionals in Psychology, Test and Measurement and those in the field of Basic Science for face and content validities. The reliability of the validated BSPT instrument was ensured through split-half method. This was carried out on a selected secondary school which was not included in the main study. The instrument was administered on 26 JSI Basic Science students outside the experimental group. The reliability of the instrument was determined by split-half procedure with the reliability coefficient of 0.78.

The experimental procedure was in four stages namely: pre-treatment stage, treatment stage, post-treatment stage and retention stage. At pre-treatment stage, the schools were randomly selected and assigned to experimental and control groups respectively. The research instrument was administered on Basic Science students in the selected school by the researcher, with the help of the Basic Science teachers in the school, who were trained to be the research assistants. The responses from the students were scored and analyzed using One –Way Analysis of Variance (ANOVA) in order to ensure that the groups were homogenous. The pre-treatment stage lasted a period of one week.

At the treatment stage, students in the experimental group were taught outside the classroom using outdoor activities instructional package while students in the control group were taught using conventional method of teaching (i.e. within the classroom). Two separate lesson notes (one for each group) were prepared in form of packages for each of the selected topics. The topics that were taught are types of human activities that affect environmental balance; ways in which a community/school can dispose refuse; concept of biodegradable and non-biodegradable materials; classification of materials found in refuse dump site into biodegradable and non-biodegradable materials and the need for environmental sanitation. The treatment stage covered a period of four weeks.

The post-treatment stage involved the re-arrangement and administration of BSPT items on the students. This is done in order to determine the effects of teaching strategies used in the study. The study from pre-treatment stage to post-treatment stage lasted for six weeks: the first week for pre-test, followed by four weeks for treatment and the last week for post-test. The retention was measured by administering the BSPT on the students two weeks after the whole exercise thereby making a total of eight weeks altogether.

The responses of the students to the research instrument were collated and analyzed using the inferential statistics t-test. All the hypotheses were tested at 0.05 level of significance.

Results and Discussion

Hypothesis 1: There is no significant difference in the achievement mean scores of students in experimental and control groups after treatment.

<table>
<thead>
<tr>
<th>GROUP</th>
<th>N</th>
<th>X</th>
<th>SD</th>
<th>df</th>
<th>tcal</th>
<th>tab</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outdoor Teaching</td>
<td>50</td>
<td>27.72</td>
<td>1.01</td>
<td>85</td>
<td>62.26</td>
<td>1.65</td>
<td>*</td>
</tr>
<tr>
<td>Conventional Teaching</td>
<td>37</td>
<td>10.68</td>
<td>1.45</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

P < 0.05 (Result Significant at 0.05 level). * = Significant

As shown in table 1, when the mean score of students in the control and experimental groups after the treatments (posttest) were statistically compared, a t-value (tcal = 62.26) with P < 0.05 alpha level was obtained, which was significant at 0.05 level. This implies that there exists significant difference between the control and experimental groups achievement mean scores after the treatment in favour of experimental group. Consequently, the null hypothesis which states that there is no significant difference in the achievement mean scores of students in experimental and control groups after treatment was rejected. As such, the conventional
method of instruction used for control group can be said to be less effective compared with outdoor activities teaching strategy used to teach the experimental group.

**Hypothesis 2:** There is no significant gender difference in the academic performance of students exposed to outdoor activities teaching strategy.

**Table 2:** t-test analysis of gender difference in the academic performance of students exposed to outdoor activities teaching strategy.

<table>
<thead>
<tr>
<th>Variations</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>df</th>
<th>t_cal</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>19</td>
<td>27.84</td>
<td>1.07</td>
<td>48</td>
<td>0.67</td>
<td>0.51</td>
</tr>
<tr>
<td>Female</td>
<td>31</td>
<td>27.65</td>
<td>0.98</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

P > 0.05

Table 2 shows that the t-cal value of 0.67 is not significant because the P value (0.51) > 0.05. This implies that null hypothesis is not rejected. Hence, there is no significant gender difference in the academic performance of students exposed to outdoor activities teaching strategy.

**Hypothesis 3:** There is no significant gender difference in the retention mean score of students exposed to outdoor activities teaching strategy.

**Table 3:** t-test analysis of gender difference in the retention mean score of students exposed to outdoor activities teaching strategy.

<table>
<thead>
<tr>
<th>Variations</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>df</th>
<th>t_cal</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>19</td>
<td>21.47</td>
<td>1.71</td>
<td>48</td>
<td>0.21</td>
<td>0.83</td>
</tr>
<tr>
<td>Female</td>
<td>31</td>
<td>21.58</td>
<td>1.75</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

P > 0.05

Table 3 shows that the t-cal value of 0.21 is not significant because the P value (0.83) > 0.05. This implies that null hypothesis is not rejected. Hence, there is no significant gender difference in the retention mean score of students exposed to outdoor activities teaching strategy.

**Discussion**

The first finding of this study revealed that the achievement means scores of students in experimental and control groups were statistically different after the treatment in favour of experimental group. By implication, therefore, the outdoor activities teaching strategy was more effective in improving students’ performance and retention in basic science than the conventional mode of teaching. This finding is consistent with the qualitative study conducted by Gunzeli & Guzin (2017), who revealed that collaborative outdoor learning in ecology had a positive effect on student’s knowledge construction and long-term knowledge retention.

The findings from this study further revealed that there is no significant gender difference in the academic performance of students exposed to outdoor activities teaching strategy; and that gender has no significant effect on retention mean scores of students in Basic Science. This implies that male students are found to be as good as their female counterparts in retention in the two groups in this study. This is in agreement with the findings of Bilesanmi –Awoderu as quoted by Oludipe (2012) carried out a study on the concept-mapping, students’ locus of control, and gender as determinants of Nigerian high school students’ achievement in Biology, she found that there was no significant main effect of gender on students’ achievement in Biology. This is at variance with the findings of Aguie & Agwugah, Billings, Hyde & McKinley, Kolawole, etc as quoted by Oludipe (2012), in their studies found that male students performed better than female students in the cognitive, affective and psychomotor skill achievements. There is a strong association between gender and response to science education.

**Conclusion**

Based on the findings of this study, it was concluded that, the two groups (outdoor activities and conventional) were homogeneous at the commencement of the experiment. The use of outdoor activities teaching strategy enhanced better performance of students in Basic Science than conventional strategy. Outdoor activities teaching strategy is not gender biased.

**Recommendations**

Based on the findings of this study, the following recommendations were made.

- The use of outdoor activities teaching strategy should be encouraged in Basic Science class in secondary schools so as to enhance better academic performance of students in Basic Science.
- During Basic Science classes, there should be no discrimination between male and female students.
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