

Assessment of Outdoor Learning Activities in the Teaching and Learning of Chemistry

Ibiyengibo Abbey-Kalio

Department of Chemistry, Ignatius Ajuru University of Education, Port Harcourt, Rivers State, Nigeria.

Author email: ibkalio@yoo.com

ABSTRACT

The paper sought to assess outdoor learning activities for teaching of chemistry in Etche Local Government Area of Rivers State. The descriptive survey design was adopted for the study. The population of the study was all the public senior secondary schools chemistry two (SS11) and three (SS111) chemistry students and chemistry teachers in Etche Local Government Area in Rivers State. 120 chemistry students and twenty-five (25) chemistry teachers used for the study were drawn from the population to comprise the sample size of 145 using simple random sampling techniques. Three research questions were raised to guide the study. This research used two separate questionnaires, the one for students consist of 10 items and the one for the teachers equally consist of 10 items and both questionnaires were tagged as questionnaire for assessment of outdoor learning activities (QAOLA). Data collected using these questionnaires were analyzed using mean and standard deviation for the research questions. The results of the study showed low extents both for outdoor learning activities type engaged on by students and for the skills acquired by the teachers in the use of outdoor learning activities. Furthermore, it was perceived by both teachers and the students that outdoor learning activities if engage in the teaching-learning process can enhance learning in chemistry. Hence, recommendations made include that schools should occasionally embark their students on outdoor learning activities in other to enhance the quality of chemistry education.

Keywords: Outdoor, Chemistry, Nature, Environment, Learning, classroom

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INTRODUCTION

Learning in science should not be restricted to the classroom and the immediate classroom and school environment. Instead learning should extend to the natural environment of the learner. Learning in science should be done in such a way that practical sessions should come, if not immediately after every theoretical learning class period at least close to this time. Such practical sessions should include learning in the environment where the learner will come into direct contact with nature itself. According to Njoku (2007), Science is a rational and systematic study of the environment through scientific process of manipulation so

as to control it and utilize it to better the living condition of man. Science is equally a study of nature to discover the interactions among the substances found within its environment. Nature itself has the world of animals and plants and non-living substances existing in it and these are steadily interacting with one another and it is the reason which scientists have the business of regularly exploring to understand and utilize what nature has provided man for the benefit of all in the society. Nature itself is a laboratory filled with resources for every kind of useful learning at such the science learners and scientists should involve in natures resources for their

study through manipulation, observation, experimentation, collection and prediction of data, analysis of data and drawing of conclusion engaging the senses e.t.c . Since nature has provided the science learners and researchers all the resources required for good living, it should be the responsibility of the teachers to introduce the learner to his environment through science learning activities pointing to him that the first laboratory is the environment and that he should maximally utilize it.

Chemistry as one of the branches of learning in science enables the learners and scientists to learn, understand the world and the things (both living and non-living) within it. Besides that the world with all its substances is revolving and these changes are resulting from the interactions and reactions going on due to the interactions of its inhabitants including man, other lower animals, plants and things. The numerous activities of man in the universe such as burning, cultivation of the land, different farming and agricultural activities to satisfy the quest for more food and healthy living, synthetics materials of various uses and kinds, materials for construction work, such as for building of road, houses, and many more are all products and activities of science responsible for observable revolutions and for good life. Chemistry studies the natural world and utilizes the materials in their natural forms and other cases synthetics or artificial materials for the benefit of man are drawn from it. Chemistry is the study of materials and substances that occur in the universe, the study concern itself with use of the natural substances as well as creation of new artificial ones from them. To keep abreast with the changes in the universe resulting from activities of its inhabitants, more searching/learning in the science in general and of chemistry in particular is necessary, (American Chemical Society <https://www.acs.org>).

Learning is a process by which an individual acquire new knowledge, develop change in behavior, and acquire skills, values a set of attitude and preferences through actions and interactions with his environment. Learning in chemistry can be interesting and fun if it is motivated by exposing the learner to the natural world to have a real feel of it. Chemistry being an experimental science subject can be practice outside the regular classroom wall or even outside restriction of school science laboratory wall so to make it a fun and interesting to the learner. The teacher can achieve making chemistry interesting as he engages the learner's minds and hands not just on manmade/artificial learning materials found in the science laboratory but with the learners' hands in touch with nature and the minds thinking on mind blowing nature's events. Learning outside the regular classroom and school environment whereby learner has direct contact with nature resources as endowed and found within the environment for learners' discovery is referred to as an outdoor learning.

Conway (2016) defined outdoor learning as a teaching and learning process involving exploration and discovery using the first hand experiences in the environment Torkos (2017) referred to outdoor learning as learning carried out in a natural setting where the learner learns about the natural surroundings. The outdoor environment has a lot of learning resources and useful learning can be carried within it either in an organized formal form or in an informal but in an education process. Yildirim & Akamca (2017) opined that learning ought to be supported by both in class activities and outdoor activities for that both contribute to structuring of knowledge. According to the study of Golden et al (2024) both learning and play session within and outside the classroom give the same learning results. The outdoor learning is capable of developing in the learner science process skills since it requires direct touch with nature and its substances such as the water world, trees and vegetation, rocks, mountains and hills, animals, birds and fishes of various species etc. The learner out of these outdoor learning has the opportunity to utilizes their learning by using the sense organs. The learner in the outdoor learning plays with water, mud, insect, and things from the environment as he can touch, see, smell, learn sounds and in the process develop a lot of scientific skills such as manipulating, observing and making inference etc. Outdoor method of learning gives first-hand knowledge about the learning object and so is able to stimulate and encourage scientific skills and creative abilities therefore should be encourage in the teaching-learning process in chemistry education. Researches on outdoor learning have proven that learner can develop scientific skills and gain better knowledge on any subject matter through outdoor learning activities. Wahyuni, Indrawati, Sudarh, & Suana, (2017) study on outdoor learning found that learners developed science process skills such as observing, formulation of hypotheses, experimentation, create data, analyze data, classify make conclusion and communicate and apply same in predicting and solving of problems. Implying that in their study on outdoor learning found that learner can apply their knowledge gained in the classroom that is theoretical learning to explore the outdoor activities. Chioma & Kelechi (2016) found out that learning which explores the learner outside environment showed improvement in academic achievement. Adolphus et al (2020) carried out study to assess effect of learning chemistry outside classroom on student academics achievement and found that learning outside the classroom enhances students' academic achievement. Nastja et al (2020) in their study using an experimental learning model during nature science school lesson at the seashore through using the tablet (modern technology) shared that the model had positive effect on students' achievement in science precisely in knowledge on marine organisms and life at the shore. Fiennes et al (2015), in their study on effect of outdoor

learning revealed positive effect on the learners especially on the improvement of physical activities of the learners and that these success improves more when the activities were longer term, had good preparation and follow-up. Kuo et al (2022), on their study on outdoor learning, reported positive effects of outdoor learning across different topics, learners, pedagogies. The implication of their study is that outdoor learning is suitable for all subjects, topics, pedagogies, learners, etc. This is in contrast with the previous study of Hunt et al (2016), who suggested that disadvantaged children are less likely to visit nature site than their peer meaning that outdoor learning may have limitation especially if not planned according to certain criteria, for instance the physical and health changes, environment, age of the learners etc. However, if outdoor learning activities are planned in the way to include every group and type of learner, the so called physically disadvantaged and others like their counterparts will equally benefit from such outdoor learning. This is possible bearing in mind that every human being whether with any physical impairment or not and other conditions of life will naturally be daunted by beauty of nature and new things when first experienced or discovered and so will show enthusiasm in coming to nature in outdoor learning and be willing to learner and discover new things.

Outdoor learning activities can be created by the teacher according to the type of materials, concept or topic to be learned. There are several common outdoor activities that students are familiar with and most of them are appropriate for teaching and learning in chemistry. They include: field trip and excursion to the nature environment of the where the material for learning can be found such as water fall which can be used for generating electricity, others are industries e.g. crude oil refinery, aluminum industry and other industrials, soap and cosmetics industries both local and foreign based, palm oil, vegetable oil, starch production factories, Also nature park, zoo, forest and game revenue inclusive.

Research Questions

1. What types of outdoor learning activities are used for teaching and learning chemistry in Public Senior Secondary School Etche Local Government area?
2. What is the students' perception on the ability of outdoor learning activities in the enhancement of learning in chemistry?
3. What is teachers' perception of outdoor learning activities in enhancement of learning chemistry in Public Senior Secondary in Etche Local Government Area?
4. What is the extent of teaching skill acquired for use of outdoor learning activities in chemistry in Public Senior

Secondary School in Etche Local Government Area?

METHODOLOGY

The study is a descriptive survey that utilized questionnaires for both teachers and students who are the subject of this study. The population comprised of all Public Senior Secondary School Chemistry students and teachers in Etche Local Government Area in Rivers State of Nigeria. The sample size is 120 for the students and 25 chemistry teachers totally 145 respondents. The students were randomly selected but all the available chemistry teachers were subjected to the questionnaire because this number for the teacher is small. Reliability index 0.81 was achieved using Cronbach's alpha coefficient. The two questionnaires tagged questionnaire for assessment of outdoor learning activities (QAOLA) were used separately. The teachers' questionnaire contained 10 items and the students' 10 items as well. Information on the teachers' perception and skills acquired for teaching and learning of outdoor activities in chemistry and that of the students contained 10 items covering for the outdoor learning activities types utilized and perception on outdoor learning activities in enhancement of learning. Three hundred and sixty-six (366) questionnaires were actually distributed out of which the fully completed ones were one hundred and twenty (120) copies for students and teachers which were used for this study. The questionnaires were divided into two sections:

Section A: consists of demographic data e.g. gender, educational qualification, (for teachers only) and students level (SS2 & SS3).

Section B: consists of questions directed to different outdoor learning activities that are possible in chemistry learning activities effectiveness and their level of utilization for teacher and learning in chemistry while the aspect of the teachers' questions for the assessment of their skillfulness in the use of outdoor learning activities data was considered.

The questionnaires were constructed and responded to, based on four likert scale of high extent (HE) = 4, moderate extent (ME) = 3, low extent (LE) = 2 and very low extent (VLE) = 1, based on an average level of 2.5, while based on the overall, the extent was based on the following:

- 4-above = high extent
- 2.5 – 3.9 = moderate extent
- 2.00 - 2.4 = low extent
- 0 – 1.9 = very low extents

The data collected was analyzed using mean and standard deviation statistical tools and decision was taken accordingly.

RESULTS

Research questions 1: What types of outdoor learning activities are used for teaching and learning chemistry in Public Senior Secondary School Etche Local Government area?

Table 1: Mean and standard deviation on types of outdoor learning activities.

S/N	Item statement	N	mean	SD
1	Field trips & Excursion visits	120	2.46	1.129
2	Science club	120	1.96	.903
3	Conducting experiment outdoor	120	1.80	.728
4	Touring/outing to site of local material production	120	1.28	.454
5	Outdoor water experiment	120	1.38	.530
	Grand mean		1.72	

Table 1 revealed that mean and standard deviation on types of outdoor activities used for learning in the study area as 2.46 ± 1.129 , 1.96 ± 0.903 , 1.80 ± 0.728 , 1.28 ± 0.454 and 1.38 ± 0.530 . Furthermore, a grand mean 1.72 showing low level in the types of outdoor learning activities used decided upon based on 2.50 average mean level taken.

Research question 2: What is the students' perception on the ability of outdoor learning activities in the enhancement of learning?

Table 2: Mean and standard deviation on types of outdoor learning activities

S/N	Item statement	N	mean	SD
6	Outdoor learning is a means of applying prior knowledge.	120	2.93	0.88
7	Classroom learning can be enhanced by outside class activities	120	3.17	0.81
8	Conducting experiment outdoor gives real nature touch.	120	3.07	0.83
9	Touring to site of local material production makes learning real.	120	3.07	0.82
10	Outdoor experiments create better understanding on any topic in science.	120	2.40	0.89
	Grand mean		2.86	

Table 2 revealed that mean and standard deviation on perception on outdoor activities learning in the enhancement of chemistry in the study area as 2.93 ± 0.88 , 3.17 ± 0.81 , 3.07 ± 0.83 , 3.07 ± 0.82 and 2.40 ± 0.89 . Furthermore, a grand mean 2.86 indicating moderate level of acceptance based on the average mean 2.50.

Research question 3: What is teachers' perception of

outdoor learning activities in enhancement of learning chemistry in Public Senior Secondary in Etche Local Government Area?

Table 3: Mean and standard deviation on level of teachers' perception of outdoor learning activities in enhancement of learning in chemistry

S/N	Item statement	N	mean	SD
11	Regular integration of outdoor learning activities is essential to understanding of chemistry.	120	2.45	1.02
12	Outdoor learning is a better way to help students retain what they learn in the classroom.	120	2.68	1.06
13	If teacher makes outdoor teaching and learning a major aspect of learning less difficulty in abstract concepts will be achieved.	120	2.67	0.97
14	Touring/outing to site of local material production is our teaching and learning style.	120	2.61	1.00
15	Outdoor experiment can be conducted for clarification of lesson.	120	2.63	0.91
	Grand mean		2.61	

Table 3 revealed that mean and standard deviation on perception on outdoor activities learning in the enhancement of chemistry in the study area as 2.45 ± 1.02 , 2.68 ± 1.06 , 2.67 ± 0.97 , 2.61 ± 1.00 and 2.63 ± 0.91 . Furthermore, a grand mean 2.61 indicating moderate level of acceptance based on the average mean 2.50.

Research question 4: What is the extent of teaching skill acquired for use of outdoor learning activities in chemistry in Public Senior Secondary School in Etche Local Government Area?

Table 4: Mean and standard deviation on extent of skills acquired for use on outdoor learning activities of learning in chemistry

S/N	Item statement	N	mean	SD
16	Outdoor learning is a means of applying prior knowledge.	120	2.45	0.94
17	Classroom learning can be enhanced by outside class. Activities	120	2.50	0.86
18	Conducting experiment outdoor gives real nature touch.	120	2.77	0.81
19	Touring to site of local material production makes learning real.	120	2.32	0.91
20	Outdoor experiments create better understanding on any topic in science.	120	2.30	0.86
	Grand mean		2.43	

Table 4 revealed that mean and standard deviation for teaching skills acquired for use on outdoor activities learning of chemistry in the study area as 2.45 ± 0.94 , 2.50 ± 0.86 , 2.77 ± 0.81 , 2.32 ± 0.91 and 2.30 ± 0.86 . Furthermore, a grand mean 2.43 indicating low level of acceptance based on the average mean 2.50.

DISCUSSION

Table 1 is on the types of outdoor activities used for teaching and learning of chemistry in Public Secondary Schools in Etche Local Government Area. It was indicated that there is very low level (1.72) of acceptance

on use of outdoor learning activities, meaning that there is none or insignificant recognition of outdoor learning activities further implication is that outdoor learning is absent in the teaching and learning of chemistry in this study area. Following immediately, on (Tables 2 and 3) both teachers and students perceived outdoor learning activities as an important aspect in the enhancement of learning in chemistry. Meanwhile, Karri et al (2020) have in their study identified outdoor learning activities as essential aspect of teaching-learning process that support learning.

In this study both teachers and students perceived that outdoor learning activities can be beneficiary to academic achievement and lead to retention in the learner though in the previous responses of the students, the report had it that the opportunity of having outdoor learning activities was not part of their learning activities at such they could not identify any type of outdoor activities they actually engage in during learning of chemistry. This is supported by the separate studies of Starvianos and Pratt-Adams (2022) and Kiviranta et al (2023) who revealed that learners retained better what they learned in outdoor learning. Also Chioma and Kelechi (2016), showed that learning outdoor improves students' academic achievement and in standardize test scores. Furthermore, Palavan et al (2016) in their study revealed that outdoor learning improves students learning and retention of knowledge.

Conclusion

Outdoor learning is a method of learning that takes the learner outside his regular classroom learning environment and that is capable of exposing the learner to exploring nature using his senses. The outdoor learning removes difficulties attached to learning of abstract context in science as the learner is exposed to nature through this means. This method of learning is capable of enhancing students learning and retention of knowledge. More so, this method of learning creates vast opportunities for quick gain of content knowledge, acquisition of various different skills across all subjects and ages for learner. The learning also focuses on social relationship with peers and others to gain from one another as well as establishes friendship and cooperation among learners.

Recommendations

Science teachers should occasionally take their students out of classroom and school environment to nature sites for learning about things in their environment for the purpose of clarity and better understanding of science concepts. Out of class and school assignment should be given to students from time to time during school sessions to enable students engage their learning

with what they have and known from their home experiences. Funding for school from onset should cover for trips out of school environment learning so as to overcome financial constraint that could hinder such adventures at the time when such outing is slated.

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