INFLUENCE OF THE OUTDOOR LEARNING ENVIRONMENT ON CHEMISTRY STUDENTS' ENGAGEMENT AMONG SENIOR SECONDARY SCHOOLS IN ONDO STATE

DR. M.O. ODUTUYI

Department of Science Education, Faculty of Education,

Adeyemi Federal University of Education, Ondo, Nigeria

odutuyimo@aceondo.edu.ng/odutuyimusili@yahoo.com

PROF. S.O. ADODO

Department of Science Education, Faculty of Education

Adekunle Ajasin University, Akungba Akoko, Ondo State, Nigeria.

so_adodo@yahoo.com/sundayadodo916@gmail.com

Abstract

This research examines the influence of the outdoor learning environment on Chemistry students' engagement in senior secondary sch ool in Akoko South-West Local Government Area of Ondo State. A descriptive research survey was used for this study. A random sampling technique was adopted to select students and teachers from fifteen secondary schools based on readiness to participate in the study. A well-structured questionnaire was used and analyzed by using frequency and percentage to determine the various factors that, influence outdoor learning in senior secondary schools. These are; career students' fear and safety of outdoor activities, shortage and lack of time, school curriculum programme and risk of time are affecting outdoor learning in senior secondary schools. Finding shows that, the teachers are of the view that, students' involvement in outdoor learning environment help them to learn better and retain what they have learnt and see physically, and students learn better in the outdoor environment compared to how they would learn in the classroom setting because outdoor learning affects students socially and enhances their academic performance. The result shows that positive environmental experiences positively influence students' knowledge, attitude, interest, and motivation, and thus, enhance their attitude towards learning. It is recommended on the basis of the study that outdoor environment learning should be integrated into the teaching programme, and that the government should make the use of outdoor environment learning teaching strategy compulsory particularly, in the teaching and learning of Chemistry.

Keywords: Chemistry, Outdoor Learning, Environment, Student's engagement, Performance,

Introduction

In everyday life, scientific phenomena

and scientific work do not necessarily happen indoors. Scientists need to go outside in order to study habitats, the effects of changing seasons on plants, or the effects of urban heat islands on human health. Paradoxically, science education at school generally happens indoors; it is only on rare occasions that, it unfolds outside (Glackin, 2016).

Chemistry is one of the core science subjects. It deals with the composition, structure and behaviour of the atoms and molecules that make up all forms of matter. Chemistry serves as the interface to other sciences and to many other areas of human endeavours such as home, agriculture, health and industry (Odutuyi, 2015). In Agriculture, Chemistry provides the fundamental basis upon which the technology for the production, processing and preservation of foods is established. Similarly, industrial and analytical Chemistry formed the basis of the various operational processes for production in the manufacturing, engineering and capital goods industries.

Despite the important potentials embedded in learning Chemistry, its importance to mankind and the efforts of researchers to improve the quality of its teaching and learning especially at the secondary school level, the performance of students in the subject in public examinations in recent times is disappointing (WAEC Chief Examiner's report, 2010). The poor performance in sciences especially Chemistry in SSCE attests to the fact that, Chemistry teaching and learning have not been effective. It depicts lack of acquisition of the required skills which may be as a result of inadequate exposure of learners to outdoor and laboratory activities. The outdoor activity plays such an important role that provides the students with a vast amount of opportunity learning experiences in which students participate outside the classroom building: environment-based education, visiting manufacturing industries and outdoor education. At this point, it is crucial that, teachers should make efforts to employ the latest instructional techniques that are capable of enhancing performance and sustaining the interest of the students in the subject (Arokoyu and Ugonwa, 2012).

There is growing concern that, opportunities for outdoor learning by school students in Nigeria have not gained much momentum in recent years. Outdoor education refers to three different kinds of learning experiences in which students participate outside the classroom building: environment-based education, place-based education, and outdoor education. It refers to integration of theoretical knowledge with practice in nature and outdoor environments (Balogun, 2012). Learning does not always occur in a classroom environment; it may be achieved in such places as museums, zoos, botanical gardens, aqua parks, playgrounds, forests and rivers (Duniya,

2009)

The term outdoor science education is used quite broadly to refer to a range of used organized activities which take place in predominantly outdoor environment for a variety of purposes (Jegstard and Sinnes, 2015).

Outdoor education allows children to have a wide perspective about things, because there is a wide world surrounding them outside (Duniya, 2009). Interaction with nature is of great importance for child development and outdoor play spaces support this interaction..

Outdoor learning involves a unique engagement between students, teachers, and the outdoor environment (Adeyemi, 2016). Individuals that, take part in outdoor learning are advocated to use their cognizance and senses in a much different manner than within a traditional classroom setting. Experiencing nature involves engagement of all domains and senses, observation, seeing, touching, hearing, and smelling (Balogun, 2012).

Researchers are connecting time spent outside with enhanced physical health, which leads to improvements in academic learning (Child, Hayes, and O'Dwyer, 2015). Allowing activity throughout the school day will improve student health and academic performance. Deaver and Wright, (2018) observed that,, an outdoor classroom is motivating and increases enthusiasm for learning. Learning in the outdoor setting motivates students to initiate conversation with their teachers Armbruister and Witte (2022).

Teachers' initial attitudes toward instructional approaches are difficult to change. However, hands-on experiences in teaching in an outdoor setting and working directly with students did encourage interest in learning in an outdoor setting in pre-service teachers (Eric, 2011). Becker (2017) also examined how outdoor experiences impact pre-service teacher's attitudes about teaching science. Becker (2017) study found that teachers were enthusiastic about the potential for learning in an outdoor setting. Management of schools, it is clear that the provision of outdoor learning in schools and universities is affected by a wide range of barriers and opportunities. Notable barriers include:(i) fear and concern about health and safety; (ii) teachers' lack of confidence in teaching outdoors; (iii) school and university curriculum requirements limiting opportunities for outdoor learning; (iv) shortages of time, resources and support; and (v) wider changes within and beyond the education sector.

Statement of the Problem

Most science educators believe that science is not really science until it is accompanied by experimentation. The world outside the classroom is itself a nature laboratory where various naturally occurring events, phenomena, processes exist. This aim

has not been effectively implemented in various secondary schools in Ondo State. This has limited the knowledge gained within the classroom. Those limiting factors are the teachers' fear and safety, lack of confidence on the parts of the teachers. Therefore, this study intend to examine the influence of the outdoor learning environment on chemistry students' engagement in senior secondary schools

Purpose of the Study

The purpose of the research is to examine the influence of the outdoor learning environment on chemistry students' engagement in senior secondary schools in Akoko South West Local Government Area of Ondo State. The specific objectives of the study are to:

1. examine the factors Influencing the outdoor learning in senior secondary schools
2. examine the students' attitudes toward outdoor learning among the chemistry students
3. examine the factors influencing the outdoor teaching of chemistry

Research Questions:

The following research questions were raised to guide the study.

1. What are the factors influencing the outdoor learning among the senior secondary school students?
2. What are the students' attitudes toward outdoor learning among the chemistry students?
3. What are the factors influencing the outdoor teaching of chemistry?

Methodology

The study is descriptive survey design. The population of this study comprises of teachers and students of five selected senior secondary schools in Akoko South-West Local Government Area of Ondo State. There are seventeen public secondary schools and nine private secondary schools. Fifteen secondary schools were randomly selected in Akoko South West Local Government Area of Ondo State, ten students and five teachers from each school respectively. The total sample size for the study consisted of 225 respondents. The instrument used by the researcher for data collection is questionnaire. There are two instruments used for this study, one for students and the other for the teachers. Every item/statement in the questionnaire are:

Strongly Agree - SA, Agree - A, Disagree - D, Strongly Disagree - SD

The questionnaire was submitted to two experts in Chemistry for face and content validity. The researcher used the test-retest method to establish the reliability of the instrument. The test-retest were used by the researcher to administers the constructed questionnaire to the same sample group more than once with the view of discovering how consistent each element of the group is in the score at those different times. The data for this

study was personally collected by the researcher on the spot. In doing this, the researcher presented each respondent at a time with a questionnaire. This was to ensure that, none of the respondents consulted any material or person for answers to the items in the questionnaire, as this can influence their true, knowledge, idea and opinion. The researcher also clearly explained the instrument endorsed in the questionnaire to each respondent. The questionnaire was personally administered by the researcher. The data collected was analyzed through the use of descriptive statistics of frequency count, simple percentage.

Results

Research Question 1; What are the factors influencing the outdoor learning among the senior secondary school students?

Table 1: ***Factors affecting the outdoor learning in senior secondary schools (Students)***

S/N	ITEM	SA	A	D	SD
1	Students' fear and safety of outdoor activities.	42 (28.0%)	100 (66.7%)	08 (5.3%)	0 (0%)
2	Shortage and lack of time as reasons for not taking students outside during the school day.	25 (16.7%)	70 (46.7%)	41 (27.3%)	14 (9.3.0%)
3	Students' lack of confidence in teaching outdoors.	26 (17.3%)	47 (31.3%)	50 (33.3%)	27 (18%)
4	School curriculum programme limits the opportunities for outdoor learning.	43 (28.7%)	57 (38.0%)	38 (25.3%)	12 (8.0%)
5	Risk of time is another factor against outdoor learning.	38 (25.3%)	72 (48%)	26 (17.3%)	14 (9.4%)

Table 1 showed the analysis the factors affecting the outdoor learning in senior secondary schools. Item 1 proved that, 100 (66%) of the respondents agreed that, students' fear and safety of outdoor activities is one of the factors affecting the outdoor learning in senior secondary school, 42 (28%) strongly agreed, only 08 (5.3%) disagreed while none of the respondents strongly disagreed. This implies that, the majority 142(94.7%) of the respondents were of the view that, students' fear and safety of outdoor activities is one of the factors affecting the outdoor learning in senior secondary school. Item 2 unveiled that,

majority 95 (63.4%) of the respondents agreed that, shortage and lack of time as reasons for not taking students outside during the school day while minority 55 (36.6%) of the respondents disagreed. Item 3 disclosed that, 73 (48.6%) of the respondents agreed that, students' lack of confidence in teaching outdoors while the majority 77 (51.3%) of the respondents disagreed. Item 4 revealed that, 100 (66.7%) of the respondents agreed that, the school curriculum programmeme limit the opportunities for outdoor learning while minority 50 (33.3%) of the respondents disagreed. The last item on the table majority 110 (73.3%) of the respondents agreed that, risk of time is another factor against outdoor learning while minority 40 (26.7%) of the respondents disagreed. Study from table 1 shows factors such as, students' fear and safety of outdoor activities, shortage and lack of time, school curriculum programmeme and risk of time affect outdoor learning in senior secondary schools.

Research Questions 2: What are the factors influencing the outdoor teaching of chemistry?

Table 2: Factors affecting the outdoor teaching of chemistry (Teacher)

S/N	ITEM	SA	A	D	SD
1	Teachers' fear and safety of outdoor activities.	25 (33.3%)	45 (60.0%)	05 (6.7%)	0 (0%)
2	Shortage and lack of time as reasons for not taking students outside during the school day.	45 (60%)	25 (33.3%)	5 (6.7%)	0 (0%)
3	Teachers' lack of confidence in teaching outdoors.	35 (46.7%)	40 (53.3%)	0 (0%)	0 (0%)
4	School curriculum programme limit the opportunities for outdoor learning.	13 (17.3%)	34 (45.3%)	23 (30.7%)	5 (6.7%)
5	Weather is another factor against outdoor learning.	16 (21.3%)	44 (58.7%)	12 (16.0%)	3 (4%)

Table 2 showed the analysis of the factors affecting the outdoor teaching of chemistry from the teacher perspective. Item 1 proved that, 45 (60.0%) of the respondents agreed that, teachers' fear and safety of outdoor activities is one of the factors affecting the outdoor learning in senior secondary school, 25

(33.3%) strongly agreed, 25 (33.3%) agreed, only 5

(6.7%) disagreed while none of the respondents strongly disagreed. This implies that, the majority 70 (93.3%) of the respondents were of the view that, teachers' fear and safety of outdoor activities is one of the factors affecting the outdoor learning in senior secondary school. Item 2 unveiled that, majority 70 (93.3%) of the respondents agreed that, shortage and lack of time as reasons for not taking students outside during the school day while minority 5 (6.7%) of the respondents disagreed. Item 3 disclosed that, 75 (100.0%) of the respondents agreed that, teachers' lack of confidence in teaching outdoors while the minority 0 (0%) of the respondents disagreed. Item 4 revealed that, all the respondents 75 (100%) agreed that, the school curriculum programme limit the opportunities for outdoor learning. The last item 5 revealed that, majority 60 (80%) of the respondents agreed that, weather is another factor against outdoor learning while minority 15 (20%) of the respondents disagreed. Study from Table 2 shows factors such as, teachers' fear and safety of outdoor activities, shortage and lack of time, school curriculum programme and weather are factors affecting outdoor learning in senior secondary schools.

Research Questions 3: What are the students' attitudes toward outdoor learning among the chemistry students?

Table 3: Students' attitudes toward outdoor learning spaces

	Outdoor learning spaces motivate students towards learning				
S/N	**ITEM**	**SA**	**A**	**D**	**SD**
6	I am highly motivated by the outdoor learning space	57 (38.0%)	60 (40.0%)	25 (16.7%)	8 (5.3%)
7	I feel distracted when we go outdoors	57 (38.0 %)	54 (36.0%)	29 (19.3%)	10 (6.7%)
8	Outdoor learning space engages me in learning	47 (31.3%)	34 (22.7%)	54 (36%)	15 (10.0%)
9	Going outside help me to appreciate nature and the environment	58 (38.7%)	52 (34.7%)	32 (21.3%)	8 (5.3%)
10	The learning environment is fascinating and educative	59 (39.4%)	72 (48.0%)	14 (9.3%)	5 (3.3%)

Table 3 showed the analysis of students' attitude toward outdoor spaces. Item 6 proved that, majority 117(78.0%) of the respondents agreed that, they are highly motivated by the outdoor learning space while minority 33 (22.0%) of the respondents disagreed. Item 7 unveiled that, majority of the respondents 111 (74.0%) were of the view that, they felt distracted when we go outdoors while minority 39 (26.0%) of the respondents disagreed. Item 8 disclosed that, majority 81 (54.0%) of the respondents agreed that, outdoor learning space engage me in learning while minority 69 (47.0%) of the respondents disagreed. Item 9 revealed that, 110 (73.4%) of the respondents agreed that, going outside help me to appreciate nature and the environment while minority 40 (26.6%) of the respondents disagreed. The last item on the table 131 (87.4%) of the respondents agreed that, the learning environment is fascinating and educative while majority 19 (12.6%) of the respondents disagreed that, the learning environment is fascinating and educative.

It is therefore concluded that,, outdoor learning spaces motivate students and attitude towards outdoor learning spaces is positive. Hence, the students have positive attitude to outdoor learning.

Discussion

In the light of statistical analysis and findings of the study, From Table 1, the result clearly showed that, largest percentage of the students are in year range of 15-19 with about 100 (66.0%), finding revealed that,, the majority of the respondents 50 (34.0%) were female student and for the teachers, 59 (59%) were male with 41(41%) female teachers. Study showed the years of experiences respondents (teachers), the majority of the teachers 45(45%) were in range 11-15 years of experience with only 12 (12%) had 21 above years of experience.

Finding from Table 1 presents the views of respondents about the factors affecting the outdoor learning in senior secondary schools. Study shows there are various factors that, influence outdoor learning in senior secondary schools. These are; career students' fear and safety of outdoor activities, shortage and lack of time, school curriculum programme and risk of time are affecting outdoor learning in senior secondary schools. This finding is in agreement with Maynard and Waters (2007) who pointed identified weather and safety as one of the reason affecting outdoor learning. According to Becker (2017) school and university curriculum requirements limiting opportunities for outdoor learning and shortages of time and resources. In the same

vein, Odutuyi (2015)) and Balogun (2012) opined that, lack of time as reasons for not taking students outside during the school day. Findings from Table 2 showed the factors affecting the outdoor teaching of chemistry from the teacher perspective. The entire respondents (100%) responded that, school curriculum programme limit the opportunities for outdoor learning. Study from the above Table 2 showed factors such as, teachers' fear and safety of outdoor activities, shortage and lack of time, lack of confidence in teaching outdoors and weather are factors affecting outdoor teaching in senior secondary schools. This finding agreed with Erick (2011) sought to find out how an outdoor-based curriculum changed teacher practice. Participating teachers felt that, outdoor learning was valuable, however, teachers expressed concerns regarding shortage and lack of time as reasons for not taking students outside during the school day, teachers' lack of confidence in teaching outdoors and weather is another factor against outdoor learning

Table 3 revealed the students' attitudes toward outdoor learning spaces. Findings showed that, 117 (78.0%) of the respondents agreed that, going outside help me to appreciate nature and the environment, 111 (74.0%) of the respondents agreed that, they are highly motivated by the outdoor learning space, 81 (54.0%) of the respondents agreed that, the learning environment is fascinating and educative. It is therefore concluded that, outdoor learning spaces motivate students and attitude towards outdoor learning spaces is positive. Hence the students have positive attitude to outdoor learning. However, about 131 (87.4%) respondents were of the view that, they felt distracted when we go outdoors. Finding concord with Arokoyu and Ugonwa, (2012) claimed that, the outdoor laboratory is more effective than the indoor in the teaching of chemistry concepts due to the facts that, outdoor demands the students to handle, observe and collect on the spot information of a particular concept unlike the indoor in which the materials are brought to the classroom for students to observe and make investigation within the limited classroom environment. Also, Adeyemi, (2016) and Duniya, (2009) claimed that, both indoor and outdoor laboratory strategies enhance students' performance at senior secondary chemistry and junior secondary integrated science respectively.

Conclusion

The study of outdoor learning environment on chemistry students' engagement in senior secondary showed

exposure to outdoor learning environment is important to cognitive functioning. Study indicated that, students' involvement in outdoor learning environment help the students to learn better and retain what they see physically, students learn better in the outdoor environment compared to how they would learn in the classroom, outdoor learning affects student socially and outdoor learning affects student academic performance. Outdoor education also concluded that, such learning environments could positively influence students' knowledge, attitude, interest, or motivation and thus enhance learning.

Recommendations

Based on the findings of the study, the following recommendations are made;

1. Outdoor environment learning should be integrated into the teaching programme; it is not being used. Therefore, the government should make the use of outdoor environment learning teaching strategy compulsory particularly in the teaching and learning of sciences
2. The government and management of secondary schools should give permission, and provide professional development, as this will increase the likelihood that, teachers engage their students in the outdoor environment.
3. Outdoor environment learning/Field trip experiences when used should be relevant to contents in the curriculum, if they are to make the necessary impact.

References

Adeyemi, T. O. (2016). Science laboratories and the quality of output from secondary schools in Ondo State, Nigeria. *Asian Journal of Information Management*. 2, 23-30.

Arokoyu, A. A., & Ugonwa, R.C. (2012). Assessment of resource availability for chemistry instruction in the secondary schools in River State. *Journal of Emerging Trends in Educational Research and Policy Studies (JETERAPS)*

Armbruister, C. & Witte, M. D. (2022). Outdoor school in Germany. Theoretical correlation and empirical findings. In R. jocker & J. V Av (eds). *International Journal of Public health,* (335-347)

Balogun M. O. (2012). Student, teacher and school environment factors as determ inants of achievement in senior secondary school chemistry in Ondo State, Nigeria

The Journal of International Social

Research

Becker, C. (2017). Effect of regular classes i n outdoor education setting. *Internat ional Journal of Environmental Research and Public Health*, 14(5), 485

Childs, P. E., Hayes, S. M & O'Dwyer, A. (2015). Chemistry and everyday life relating secondary school chemistry to the current and future lives of students. In I. Eilks & Hofstein (eds), relevant chemistry education from theory to practice (pp. 334). Rotterdam. Sense Publishers.

Deaver, A. W. & Wright, L. E. (2018). A word of learning YC Young Children, 7(3), 22-27

Duniya, J.N. (2009). Efficacy of indoor and outdoor laboratory approaches on acquisition of science process skills and performance among biology, polytechnics students' seminar paper presented in science education Department of Education, A.B.U. Zaria, Nigeria

Eric, C. J. (2011). Use of the outdoor classroom and nature study to support science teacher education 23(7), 789-803

Fägerstam, E., & Blom, J. (2013). Learning biology and mathematics outdoors; effects and attitudes in a Swedish high school context. Published online 18 Jan. 2012, pg. 56-75

Glackin, M. (2016). 'Risky fun' or 'Authentic science'? How teachers' beliefs influence their practice during a professional development programme on outdoor learning. *International Journal of Science Education, 38(3), 409-433.*

Odutuyi, M. O. (2015). Effects of laborato ry learning on students' outcomes in secondary school Chemistry. *Intern ational Journal of Arts and Social S cience*, 8 (2), 507-525