



Biological Garden and Academic Achievement of Senior Secondary School Students’

Folasade O. Olayinka & Abosede A. Ogundare

Department of Science Education, Faculty of Education, Federal University, Oye-Ekiti, Ekiti State, Nigeria.

Corresponding Author: folasade.olayinka@fuoye.edu.ng

Abstract

The study examined biological garden and academic achievement of senior secondary school students in Ido-Osi Local Government Area, Ekiti State. This study utilizes descriptive research of the survey type. The sample for this study comprised 100 secondary school SS II biology students and ten (10) biology teachers in Ido-Osi Local Government Area, Ekiti State. Simple random sampling was used for selecting twenty (20) students and two (2) biology teachers from each of the five schools selected. A self-designed research instruments was used to collect relevant data for the study. Biology education specialist and Test & Measurements specialist validated the instrument. The instrument's reliability was determined using Cronbach alpha to obtain a reliable coefficient of 0.76. The study revealed that biological garden activities have effect on student academic achievement in biology. Also, teacher’s experience and competence in the use of biological garden affect student’s achievement in biology. It is recommended that teachers should adopt the use of biological garden for the teaching of biology and also, teachers should be up-to-date on the effective usage of biological garden in secondary schools.

Keywords: Science, Biology, Biological Garden, Teaching and Learning

Introduction

Science was derived from a Latin word *scientia* meaning “ knowledge” (Harper, 2014). All living organisms require energy to move, grow, and reproduce, as well as to regulate their own internal environment (Modell, *et al.*, 2015). Science is a great enterprise which nations depend on, in-order to advance technologically. Science therefore, is receiving much emphasis in education because of its significance and relevance to life and society. Science is both a process (scientific method) and a product (knowledge, fact and principles) (Ezeh, 2013). Both the process and product of science are acquired through education and this is specialized type of education such as science education. Science plays important roles in the society because it relates to our daily life and career. The importance of science in our society made the Federal Government of Nigeria, through the Federal Ministry of Education to introduce science subjects in the nation’s secondary school curriculum.

Biology is the scientific study of life (Hillis *et al.*, 2020). It is a natural science with a broad scope but has several unifying themes that tie it together as a single, coherent field (Urry *et al.*, 2017). For instance, all living organism are made up of cells that process hereditary information encoded in genes, which can be transmitted to future generations. Biology is a natural science with broad scope but has several unifying themes that tie it together as a single

coherent of field (Freeman *et al.*, 2017). Biology is one of the fields in the natural sciences that studies living things. The word Biology is coined from two Greek words; *Bios* meaning life, and *logy* (*logia*) which means study (Ezemoka, 2011). Thus, the concept biology is concerned with the study of life. Miller and Levine (2010) state that Biology in addition to studying life, studies also the structures functions, growth, origin, evolutions, distributions, inter-relationships, problems such as diseases and adaptations of living things and proposes solutions where possible. Biologist use scientific method to make observations, pose questions, generate hypothesis, and perform experiments to satisfy their curiosity about the world around them (Urry *et al.*, 2017). Sequeira (2012) observe teaching as a set of events, outside the learners which are designed to support internal process of learning. Teaching is outside the learner while learning is internal to learners. The cardinal objectives of biology education 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 matter of personal and community health and agriculture and lastly reasonable and functional scientific attitudes (Federal Ministry of Education 2004). Blair and Ballard (2013) opined that biological garden is a controlled and staffed institution for the collection and maintenance of living things under scientific



management for the purpose of education research and recreation.

Guisti (2008) referred to these traditional teaching methods as teacher-centered approaches to learning in the sense that the teachers are considered as the possessors of knowledge to be transferred to the students, and as such decides how the knowledge transfer takes place. The unidirectional flow of information in the traditional teaching method makes students passive and unable to construct meaningful knowledge in the teaching and learning of Biology. Traditional method of teaching is when a teacher direct student to learn through memorization and recitation techniques thereby not developing critical thinking, problem solving, and decision-making skills (Lyumbo, 2020). Onan (2012) defined inquiry as student-learning approach that encourages students to create personal knowledge by questioning and use of investigation process.

In Nigeria today, despite the emphasis on the study of basic science subject that is, chemistry, physics and biology as a tool in improving our technological development, poor performance of students in biology posed a great threat to the nation's economy. In the light of this, the researcher examined biological garden and academic achievement of senior secondary school students in Ido-Osi Local Government Area, Ekiti State.

Statement of the problem

One of the various reasons adduced for the poor achievement of students in biology is difficulties of using some biological garden activities.

Furthermore, according to WAEC Chief Examiners' report the performance of candidates in the West African Senior School Certificate Examinations indicates that the performance of students in biology have been erratic in nature and judging from the years reviewed, there was never a year that students' performance at credit level reached the assumed fifty percent (50%) in years like 2010 (49.47%), 2011 (38.28%) and 2012 (35.67%), except for years 2013 (51.73%), 2014 (55.07%), 2015 (53.21%), 2016 (73.82%), 2017 (65.85%), 2018 (62.49%), 2019 (74.42%) and 2020 (84.65%) respectively. Also, there was never a year that students had 100% in biology. Meanwhile, a fifty percent performance could not be regarded as an excellent performance for a nation that is aspiring higher prospects in her technological advancement. A biological garden is therefore an institution holding documented collection of plants

and animals for the purpose of scientific research, conservation display and educational purpose. As a result, the study examined biological garden and academic achievement of senior secondary school students in Ido-Osi Local Government Area, Ekiti State.

Research Questions

The following research questions guided this study:

1. What are the mean scores of biology students in biological garden activities on academic achievement of senior secondary school students?
2. What are the mean scores of biology teacher's experience and competence of biological garden on academic achievement of senior secondary school students?

Method

The survey research design was adopted to gather information on biological garden and academic achievement of senior secondary school students in Ido-Osi Local Government Area, Ekiti State. The population for this study comprised all biology students in senior secondary schools in Ido-Osi Local Government Area, Ekiti State. The sample for this study comprised 100 secondary school SS II students who offered biology and ten (10) biology teachers in Ido-Osi Local Government Area, Ekiti State. Simple random sampling was used for selecting twenty (20) students and two (2) biology teachers from each of the selected five schools. The data for the study was collected through questionnaire titled 'biological garden and students' academic achievement and teachers' experience / competence on the use of biological garden. The questionnaire consisted of two sections, A and B. Section A provide information on personal data while section B was divided into two clusters of BI to B2 covering 5 and 2 items respectively structured to provide answers to the major research questions. Four-point scale rating of Strongly Agree (SA), Agree (A), Strongly Disagree (SD) and Disagree (D) with values of 4, 3, 2, and 1 respectively.

The instrument was validated by experts from measurement and evaluation and Biology Education. They made necessary corrections on the items and their input were incorporated in the final draft of the instrument. In testing for the reliability, cronbach's alpha (α) was used and a reliability coefficient of 0.76 was obtained. The data collected in the study were

analyzed using mean and standard deviation to answer the research questions.

Data analysis was carried out through frequency counts, percentages, mean and standard deviation. Discussions of the findings were presented at the end of the results.

Results

Table 1: Mean and Standard Deviation of responses to the biological garden activities and its influence on student’s academic achievement in biology

S/N	ITEMS	N	SA (%)	A (%)	D (%)	SD (%)	X	SD	Decision
1.	Biological garden activities promote social interaction among learners and their teacher.	100	58	36	2	4	3.48	0.74	Agreed
2.	Biological garden activities promote student engagement with the scientific method.	100	54	34	8	4	3.38	0.81	Agreed
3.	Biological garden activities encourage active learning and problem solving.	100	42	46	10	2	3.32	0.66	Agreed
4.	Biological garden activities develop student’s interests, attitudes and values.	100	48	40	10	2	3.34	0.75	Agreed
5.	Biological garden activities stimulate creativity, curiosity and critical thinking.	100	54	36	6	4	3.40	0.78	Agreed

Table 1 shows the Percentage, Mean and Standard Deviation of responses to biological garden activities influencing student academic achievement in biology. In term of item 1, 58 (58%) of the respondents strongly agree, 36 (36%) agree, 2 (2%) disagree while 4 (4%) of the respondents strongly disagree. To item 2, it was revealed that 54 (54%) of the respondents strongly agree, 34 (34%) agree, 8 (8%) disagree, while 4 (4%) strongly disagree. It was also reported that 42 (42%) strongly agree, 46 (46%) agree, 10 (10%) disagree, while 2 (2%) of the respondents strongly disagree to item 3. Also, the analysis shows that 48 (48%) strongly agree, 40 (40%) agree, 10

(10%) disagree, while 2 representing 2% of the respondents strongly disagreed with item 4. It was reported that 54(54%) of the respondents strongly agree, 36 (36%) agree, 6 (6%) disagree while 4 (4%) of the respondents strongly disagree with the item 5. The decision indicated that the respondents agreed to all the items, subject to a mean cut-off mark of 2.50. This implies that most of the respondents agreed item 1 ($\bar{x} = 3.48$, S.D = 0.74). item 2 ($\bar{x} = 3.38$, S.D = 0.81), item 3 ($\bar{x} = 3.32$, S.D = 0.66), item 4 ($\bar{x} = 3.34$, S.D = 0.75) and item 5 ($\bar{x} = 3.40$, S.D = 0.78), This is an indication that biological garden activities would influence student academic achievement in biology.

Table 2: Mean and Standard Deviation of perceived responses to the teacher’s experience and competence in the use of biological garden affect student’s achievement in biology

S/N	ITEMS	N	SA (%)	A (%)	D (%)	SD (%)	X	S.D	Decision
1.	Teachers experience in the use of biological garden for teaching and learning guides and encourages students to think critically and understand the concept taught	10	4(40)	4 (40)	1 (10)	1 (10)	3.10	0.93	Agreed
.2.	High competence of teachers in the use of Biological garden for teaching and learning impacts high level of achievement on student.	10	4 (40)	3 (30)	2 (20)	1 (10)	3.00	0.84	Agreed

Table 2 shows the number, percentage, mean scores, and standard deviation of the responses to teacher’s experience and competence in the use of biological garden affects student’s achievement in biology. It was shown that the number of respondents who

strongly agreed, agreed, disagreed and strongly disagreed: to item 1, 4 (40%), 4 (40%), 1 (10%), and 1 (10%), respectively; item 2 had 4 (40%), 3 (30%), 2 (20%), and 1 (10%), respectively. It also indicated that the mean of items 1, and 2 are 3.10 and



3.00 respectively while the standard deviations are 0.93 and 0.84 respectively. All the items were agreed on. This is an indication that teacher's experience and competence in the use of biological garden could influence the student's achievement in biology.

Discussion

The study examined the effect of biological garden on teaching and learning of biology in senior secondary schools in Ekiti State, Nigeria. The study revealed that biological garden activities have effect on student academic achievement in biology. This could own to the fact that students will be opportune to see and touch some of the things that are taught. Also, it helps learners to inquire about concept or organism introduced as biological gardens provide a rare, nurturing space for the free exploration of nature that should result in the learning about and connection with the natural world. This finding is in support of the findings of Blair & Ballard (2013) who revealed that biological garden as a controlled and staffed institution for the collection and maintenance of living things under scientific management for the purpose of education research and recreation is capable of enhance the academic performance and attitude of students to the learning of Biology. Furthermore, this study also revealed that teacher's experience and competence in the use of biological garden affect student's achievement in biology. This could imply that when the teacher is familiar and well experienced in the use of biological garden, they tend to make the learning of biology fascinating to the students when utilizing the garden and this invariably will contribute to the learning and performance of the students in biology. This concurs with the opinion of Onan (2012) who concluded that the inquiry nature of the biology garden makes experienced teachers to always want to engage their students in learning activities and thus make them perform efficiently in their academic endeavor.

Conclusion

The study concluded based on its findings that biological garden activities have effect on student achievement in biology. It was further concluded that the teacher's experience and competence in the use of biological garden would strongly have effect on the student's knowledge, skills and achievement in biology.

Recommendations

The following suggestions were given on the basis of the results of this study.

1. Teachers should adopt the use of biological garden for the teaching of biology.
2. Teachers should be up-to-date on the effective usage of biological garden in secondary schools.
3. Government and school administrators should make biological garden available in school for instructional purposes in secondary schools.

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