

Science Experiences As Correlate Of Student Learning Outcome

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Abstract

Biology as the science of life is designed ultimately to educate individuals so that they can acquire knowledge about the basic essentials of living things and those of their community. Therefore, In this paper, we want to examine whether the students experiences in Biology Class will accomplish understanding and success in the learning outcome. Our sample is 500 Secondary School II students in Akinyele Local Government of Oyo state, in Biology Class. We used a survey design of the correlational type. Instruments used are Students Attitude to Biology Questionnaire ($r=0.83$), Science Experiences Inventory in Biology ($r=0.72$), and Students Achievement Test in Biology ($r=0.76$). The study reveals that the relative effect of Science experiences on attitude ($\beta=0.228$, $t = 5.128$; $p<0.05$) was significant, a negative, non-significant relationship between science experience ($r = -0.024$; $p>0.05$) and students' achievement in Biology. Therefore, the findings of the study show that Science experience was the independent variable that strongly predicts students' attitude to Biology. Students should therefore be exposed to science experiences that will enhance a better attitude to Biology.

Keywords: *Science experiences; Achievement; Attitude.*



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INTRODUCTION

The achievement of students in Biology and attitude towards Biology has been of great concern for researchers because learning outcomes over the years have not been encouraging due to many factors (Onwuakpa and Nweke, 2002). A few of the factors that different researchers have pointed out include poor funding of practical activities, the low interest of student towards Biology due to monopoly of teaching and learning method, the inadequacy of qualified teachers, inadequate use of previous student knowledge to explain a new concept, wrong usage of some learning techniques and inadequate use of instructional material Njoku, (2006), Nwagbo and Obiekwe(2010), Okafor and Okeke (2006), Umeh(2002) .

Although different instructional strategies have been suggested for improving students' learning outcome in Biology, However, very little importance has been attached to children's out-of-school experiences. Informal learning may occur at home in everyday situations like with friends, watching TV, reading books or magazines, and in various hobbies, as well as in institutions like museums and zoos, and out-of-school activities and experiences may also enhance children's interest in school subjects. Out-of-school excursions encourage pupils to engage in various nature activities and hobbies in their free time. Moreover, pupils' positive nature experiences and values are suggested to relate with positive attitudes towards responsible environmental behaviour. Uitto, Juuti, Lavonen, and Meisalo, (2004). Therefore, this study investigates science experiences, especially out-of-school science experiences as correlates of students' learning outcomes in Biology in secondary schools.

LITERATURE REVIEW

Teaching and learning experiences that take place outside of the confines of the classroom walls have a range of benefits for both students and instructors. When students are asked to put into practice “in the real world” what they have theorized about from behind a desk, the result is a student-centric learning experience that enhances learning and fosters personal and social development (Larsen, Walsh, Almond, & Myers, 2017) Moreover, field experiences early in a student’s career can be formative and can inspire students to continue in a field (e.g., Hutson, Cooper, & Talbert, 2011). In *His own Work* (Dewey, 1897), belief that Learning experiences outside the classroom are forms of experiential learning. Field trips can take a variety of forms that meet a diverse set of needs and can enhance deep, active learning. The intended educational outcomes of field trips focus on the following five areas (Behrendt & Franklin, 2014; Larsen et al., 2017; Tal & Morag, 2009): Developing social and personal skills, developing observation and perception skills, adding relevance and meaning to learning, providing first-hand real-world experiences and Enhancing intrinsic motivation and interest in the subject. Some of the Benefits for Students Who Participate in out of school Experience according to scholars: knowledge transfer and knowledge recall (Nadelson & Jordan, 2012), Increased relevance, improved perspective-taking, and increased autonomy (Lai, 1999), Increased interest in the subject and influence on one’s college major and future career (Hutson et al., 2011), Improvement in concept knowledge (Elkins & Elkins, 2007) and improvements in understanding course content, performance on course assignments, and interest in the subject (Goh & Ritchie, 2011).

Ghulam Shabiralyani, et.al 2015, opined that using visuals aids as a teaching method stimulates thinking and improves learning environment in a classroom. Also, Effective use of visual aids substitutes monotonous learning environments. Students develop and increase personal understanding of the areas of learning when they experience a successful and pleasant learning in the classroom. The study attitude is one of the main factors that affect academic performance of learners. Academic achievement is a function of study attitude of the students (Hussain, 2006). “Learning outside the classroom activities are often authentic, hands-on, interactive and build on classroom learning.” Taking classroom learning outside can help enrich a student’s educational experience by showing them real-life applications of theories that they are learning at school. However, conventional teaching doesn’t encourage students to develop critical thinking, problem-solving and decision-making skills, which learning outside the classroom can. Not only can learning outside the classroom lead to a deeper understanding of challenging concepts, but it can also provide a context for learning in many areas. Learning outside the classroom can help teachers create enthusiasm for learning, provide a real-world context and expose students to a range of STEM careers. (www.atol.org.uk, 2020).

RESEARCH METHOD

This study employed the correlational type of survey research design. This is because all the variables are already in existence, and no variable was manipulated. This method was also employed in order to determine the extent to which the factor could predict the dependent variable.

Research Questions

The research questions were structured from the gap discovered from the literature review which was used to form the questionnaire administered to students. We formulate our research questions as follow:

1. What science experiences are students exposed to in Biology?
 - a. In-school
 - b. Out-of-school
2. What is the level of achievement of students in Biology?
3. What are the attitudes of students to Biology?
4. Is there a relationship between students' science experiences (in-school science activities and out-of-school-science experiences) and
 - a. students' achievement in Biology
 - b. students' attitude towards Biology

Variables

Independent variable: Science experiences, which includes in-school- science experiences and out-of-school science experiences.

Dependent variable: involves the attitude of students to Biology and the achievement of students in Biology.

Validity and reliability test was carried out by expert on the Instruments used which are Students Attitude to Biology Questionnaire ($r=0.83$), Science Experiences Inventory in Biology ($r=0.72$), and Students Achievement Test in Biology ($r=0.76$).

Data Analysis

Data collected were analyzed using frequency counts, percentages, and Pearson product-moment correlation.

FINDINGS AND DISCUSSION

Research question 1: What is the experience of students in science regarding in and out of school?

Table 1. Students' science experiences in in-and out-of-school

S/N	Items	Yes	No	Mean	STD.D
1	I have been to the zoological garden to view different types of animals so as to understand better the animal kingdom	293 60.8%	189 39.2%	1.61	0.489
2	I love watching channels that show documentaries about animals and their modes of habitat	419 86.9%	63 13.1%	1.87	0.337
3	I usually make use of ICT in learning science	239 49.6%	243 50.4%	1.50	0.501
4	I've gone on an excursion to the museums around me	222 46.1%	260 53.9%	1.46	0.499
5	I love watching channels that show science cartoons	370 76.8%	112 23.2%	1.77	0.423
6	I love reading newspapers and magazines relating to human health	404 83.8%	78 16.2%	1.84	0.367
7	I love listening to and watching symposiums on nutrition and various cooking methods	404 83.8%	78 16.2%	1.84	0.367

8	Social media is one of the major means through which I learn about drugs, drug abuse, and their effects.	354 73.5%	128 26.6%	1.73	0.442
9	My family loves addressing science-related matters, which propels me to love science	95 19.7%	387 80.3%	1.20	0.398
10	My parents like discussing science issues at home	249 51.7%	233 48.3%	1.52	0.500
11	My father's garden has been of help to me in knowing about monocotyledon and dicotyledonous plants	344 71.2%	137 28.5%	1.72	0.452
12	My teacher always gives examples of related things in my area to explain new topics	105 21.8%	377 78.2%	1.78	0.413
13	I love the way my teacher usually uses local examples to explain Biology lessons, such as those of local plants and animals	322 66.8%	160 33.2%	1.71	1.039
14	My Biology teacher always makes Biology look abstract to me	312 64.7%	170 35.3%	1.65	0.478
15	My teacher likes giving us assignments to read on the next topic	222 46.1%	260 53.9%	1.54	0.499
16	Most of what I learned out of school on science were accidental learning in nature	271 56.2%	211 43.8%	1.56	0.497
17	I like visiting factories around me	363 75.5%	118 24.5%	1.76	0.431
18	I learned about techniques used for the preservation of foods from outside the school experiences	368 76.3%	114 23.7%	1.76	0.425
19	Other subjects provide me with previous knowledge useful in understanding some topics in Biology	350 72.6%	132 27.4%	1.73	0.446
20	I was taught how to measure temperature with a thermometer when I was admitted to the hospital.	363 75.3%	119 24.7%	1.75	0.432
21	I use a mobile phone to check scientific facts	375 77.8%	107 22.2%	1.78	0.416
22	I usually search the internet for information pertaining to the classes of foods and their benefits	355 73.7%	127 26.3%	1.74	0.441
23	I also use the dictionary, encyclopedia, etc. on a computer regarding science	360 74.7%	122 25.3%	1.75	0.435
24	I watch nature programs on TV or in cinemas about aquatic animals and their feeding mechanism.	347 72.0%	135 28.0%	1.72	0.450
25	I collect edible berries, fruits, mushrooms, or plants from our backyard garden.	346 71.8%	136 28.2%	1.72	0.451
26	I plant maize seeds and watch them grow to know more about plant growth	322 66.8%	160 33.2%	1.67	0.471
27	I make compost from grass, leaves, or garbage to make local manure.	322 66.8%	160 33.2%	1.67	0.471
28	I read about nature or science in books and magazines.	253 52.5%	229 47.5%	1.53	0.500

29	I participate in fishing activities	215 44.6%	267 55.4%	1.45	0.498
30	I participate in hunting activities	368 76.3%	114 23.7%	1.76	0.425
31	I administered drugs to sick relatives or friends when they were in the hospital	398 82.6%	84 17.4%	1.83	0.380
32	I am knowledgeable about how some medicines can be used for the prevention of some illnesses or infections	271 56.1%	211 43.7%	1.56	0.497
33	I bake bread, pastry, cake using yeast. Etc	346 71.9%	135 28.1%	1.72	0.450
Weighted mean = 1.67					

Table 1 show that a weighted mean of 1.67 out of the maximum obtainable score of 2.00, which is slightly higher than the standard mean of 1.50. This implies that the students had a moderate level of in-and-out-of-school science experiences. It was also observed that students are more exposed to the electronic media, which is one of the out-of-school science experiences (for instance: learning through watching a documentary is about 86.9%, watching science cartoons garner 76.8%, and learning through newspapers, novels, and magazines is 83.8%,). This explains that students' science experiences are more prominent from the sample used from electronic means, next to it is farm garden in their surroundings at 71.2%. Students are moderately exposed to field trips such as visiting a zoological garden, hunting around the house; while student's average exposure to other forms of field trips, their level of exposure to the museum is 46.1%, which is below average. Thus the level at which in-school-science activities affect the students is relatively low. This shows that the in-school-science experiences averagely affect students and, in some cases, are lower when compared with out-of-school-science experiences.

Research question 2: What is the level of students' achievement in Biology?

Table 2. Profile of Students' Achievement in Biology

Level	Categorical Score	Frequency	Percentage
1	0 – 5	329	68.3
2	6 – 10	140	29.0
3	11 – 15	13	2.7
4	16 – 20	0	100.0
Weighted mean = 13.4			

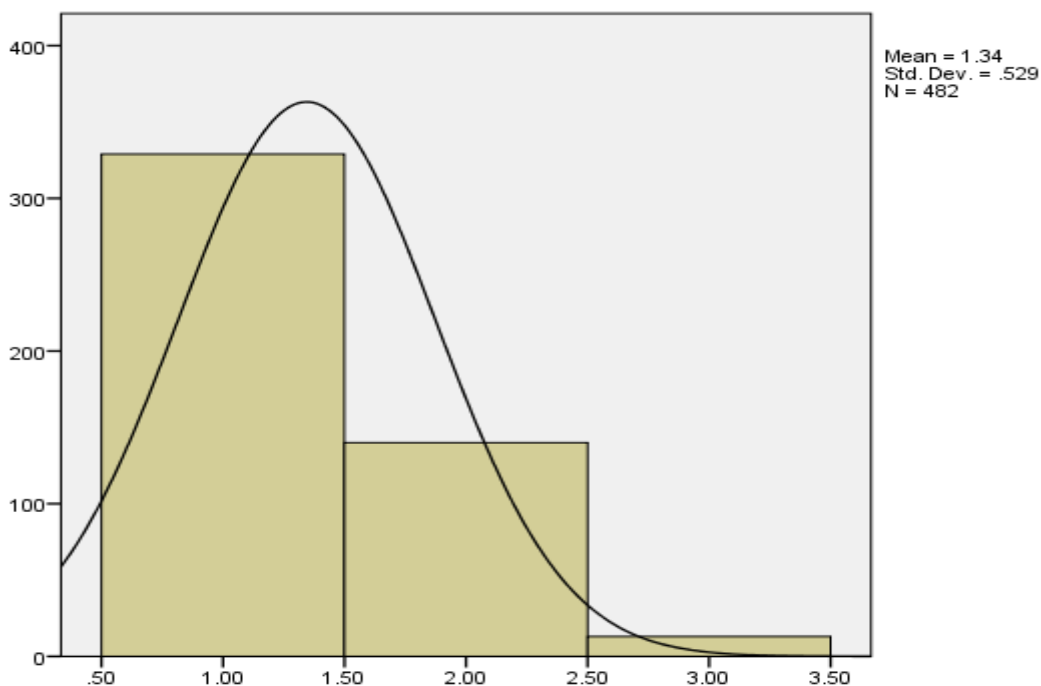


Figure 1. Distribution of Students' Achievement Test in Biology

The result above shows that students' level of performance is below average from the twenty questions; however, 68% of the students performed well in questions 1-5, 29% performed well in questions 6-10, 2.7% performed well in questions 11-15 while 0% performed well in questions 16-20.

Research question 3: What are Students' Attitudes to Biology?

Table 3. Students' Attitude to Biology

S/N	Items	SA	A	D	SD	Mean	STD.D
1	Biology is very interesting to me.	190 39.4%	224 46.5%	43 8.9%	25 5.2%	3.20	0.807
2	I don't like Biology, and it scares me to have to take it.	46 9.6%	58 12.1%	224 46.6%	153 31.8%	3.01	0.907
3	In general, I have a good feeling towards Biology	137 28.4%	263 54.6%	56 11.6%	25 5.2%	3.09	0.924
4	When I hear the word Biology, I have a feeling of dislike	32 6.7%	83 17.3%	214 44.5%	153 31.6%	3.01	0.880
5	I really like Biology	175 36.4%	197 41.0%	69 14.3%	40 8.3%	3.05	0.916
6	I have always enjoyed studying Biology in school	157 32.6%	219 45.4%	74 15.4%	32 6.6%	3.04	0.863
7	I feel at ease taking Biology, and I like it very much	129 26.8%	225 46.7%	92 19.1%	36 7.5%	2.93	0.868

8	I feel a definite positive reaction to Biology; it's enjoyable	139 28.8%	215 44.6%	87 18.0%	41 8.5%	2.94	0.898
9	My teacher is the reason I like Biology	112 23.2%	188 39.0%	132 27.4%	50 10.4%	2.75	0.928
10	Biology makes me feel uncomfortable, restless, irritable, and impatient	48 10.0%	82 17.0%	175 36.3%	177 36.7%	3.00	0.968
11	I find Biology as a simple subject	121 25.1%	216 44.8%	94 19.5%	51 10.6%	2.84	0.920
12	I have a better understanding of practical Physics	101 21.0%	184 38.2%	130 27.0%	67 13.9%	2.67	0.964
13	I hate my Physics lecturer's attitude	133 27.6%	183 38.0%	110 22.8%	56 11.6%	2.82	0.968
14	I have enough material on Biology	87 18.0%	201 41.7%	139 28.8%	55 11.4%	2.66	0.902
15	I read my Biology material every time	89 18.5%	215 44.6%	130 27.0%	48 10.0%	2.72	0.880
16	I don't see the relevance of Biology to everyday life and society	50 10.4%	85 17.6%	102 41.9	145 30.1%	2.92	0.942
17	It is difficult to ask our lecturers questions based on the topics taught	62 12.9%	63 13.1%	185 38.4%	172 35.7%	2.99	1.002
18	My Biology lecturers lack innovation, encouragement, and resourcefulness	44 9.1%	80 16.6%	181 37.6%	177 36.7%	3.02	0.949
19	Biology is fascinating and fun	143 29.7%	212 44.0%	78 16.2%	49 10.2%	2.93	0.929
20	Biology questions are too difficult to answer	43 8.9%	75 15.6%	214 44.5%	149 31.0%	2.96	0.908
Weighted mean = 2.93							

Table 3 shows a weighted mean of 2.93 out of the maximum obtainable score of 4.00, which is higher than the standard mean of 2.50. This implies that the students had a positive attitude towards Biology.

Research question 4: Is there a relationship between students' science-experiences (in-school science activities and out-school-science experience) and students' prior knowledge on students' achievement in Biology?

Table 4. Correlation Matrix Showing the Relationship between Independent Variables and Students' Achievement in Biology

Variables	Achievement	Prior knowledge	Out-of-school experience
Achievement	1		
Prior knowledge	0.362* 0.000	1	
Science experience	-0.024	0.032	1

	0.605	0.486	
Mean	3.85	8.42	55.15
STD.D	3.165	6.869	5.624

* denotes significance at $p < 0.05$

Table 4 shows that there is a positive, low significant relationship between students' prior knowledge ($r = 0.362$; $p < 0.05$) and students' achievement in Biology. This implies that prior knowledge is positively related to students' achievement in Biology.

There was a negative, non-significant relationship between out-of-school experience ($r = -0.024$; $p > 0.05$) and students' achievement in Biology. This implies that out-of-school experience is not related to students' achievement in Biology. This does not support the opinion of Natalie A. Tran, who is of the opinion that science experiences affect the performance in achievement tests.

Discussion

Students' Science Experiences and Students' Achievement in Biology

There was a negative, non-significant relationship between School experiences and students' achievement in Biology. This implies that School experiences are not related to students' achievement in Biology.

Students Science Experiences and Students' Attitude to Biology

There was a positive, low significant relationship between Science experience ($r = 0.229$; $p < 0.05$) and students' attitude to Biology. This implies that Science experience is related to students' attitude to Biology. The level of exposure of learners to different scientific facts and the ability to see things from different views may affect students' attitude. This supports the work of Uitto, Juuti, Lavonen and Meisalo (2004) that students' positive nature experiences and values are suggested to relate with positive attitudes towards responsible environmental behavior.

CONCLUSION

It can be concluded from the findings that science experiences (in-school science experience and out-of-school science experiences) can jointly have positive effects on students' attitude to Biology and their achievement in Biology. Although from this study, out-of-school science experience has a high significant effect on students' attitude towards Biology than on their achievement in Biology, it is important for teachers to relate natural things around the school and outside the school, such as relating the environment of zoological and botanical gardens, museums, wildlife parks into practical activities during the learning process to a classroom situation. Similarly, more still needs to be done, especially as regards the content of the curriculum so as to enhance the effective use of in-school-science experience and out-school-science experience to facilitate positive attitude from the students that will trigger positive results towards their achievement in Biology and other science subjects.

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