Availability and Utilization of Biology Laboratory Facilities as a Correlate of Academic Achievement among Secondary School Students in Takum Education Zone, Taraba State, Nigeria

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Abstract
The study was conducted to determine the availability and utilization of biology laboratory facilities as a correlate of academic achievement among secondary school students in Takum education zone of Taraba State, Nigeria. Three research objectives were used in the study, three research questions were answered. A descriptive survey design was adopted. The instruments used were "Availability and Utilization of Biology Laboratory Facilities Checklist" (AUBFC) and "Biology Achievement Test" (BAT). Twelve (12) senior secondary schools comprising of five senior secondary schools from Takum LGA, five schools from Ussa LGA and 2 from Yangtu SDA with a sample population of twenty four (24) biology teachers and two hundred and forty (240) senior secondary II students were used for the study. The study found out that majority of the biology laboratory facilities are available, majority of the items in the biology laboratories checklist were utilized by the students and that there is a positively strong correlation between the variables i.e. biology laboratory facility availability and utilization and student academic achievement. The study recommended among other things that government and all other stakeholders of education should as a matter of priority make available these facilities in the schools and that teachers of sciences should be encouraged to practically teach biology through the use of the available facilities in their schools to enhance understanding.
Key Words: Availability, Utilization, Laboratory, Facilities, Biology, Takum

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I. Introduction

Science is the bedrock for development in any nation of the world. Every nation of the world needs science for development, independence, sovereignty, self-reliance and growth. This is because science and technology provide the basic tools of industrialization and economic development in the areas of communication, transport, energy, information, pollution and waste control, among others. Science education are foundation for sustainable development as they protect human scientists from ignorance, illiteracy, disease and poverty

In Nigeria, the study of science is of great importance, that a lot of emphasis has been laid on the teaching and learning of science with the major aim of science education, as contained in the National Policy on Education, being to equip the students to live effectively in this modern age (FRN, 2013). This can be achieved by inculcating in the learners the necessary scientific skills and attitudes.

The major goal of science education is to develop scientifically literate individuals that are concerned with high competence for rational thoughts and actions. Some of the objectives teaching science in secondary schools in Nigeria according to Maduekwe (2006) include the preparation of students to observe and explore the environment, development of scientific attitudes in students such as curiosity, critical reflection and objectivity, also to help students apply the scientific skills and knowledge gained to solve everyday life problems in their environment, develop self-confidence and self-reliance through problem solving activities in science.

Science is a dynamic human activity concerned with understanding the workings of our world. This understanding helps man to know more about the universe (Ogunleye & Babajide, 2011).Without the application of science, it would have been difficult for man to explore the other planets of the universe. Science comprises the basic disciplines such as Physics, Chemistry, Mathematics and Biology.

Biology as a science subject is practical and experiment based. Its objectives as contained in the National policy on education (FRN, 2013) include among others to equip learners with meaningful and relevant knowledge of Biology. This objective can be achieved through availability and utilization of biology laboratory facilities.

Unfortunately, the teaching and learning of biology over years has not adequately met the expectation of the people. This is evident in the overall poor performance of students in the subject in Nigeria.

Biology is a very important science subject and a requirement for further learning of a number of science-related professional courses like medicine, agriculture, pharmacy, etc. In contemporary Nigeria, greater emphasis is placed on science and technological development. As a result, students are being encouraged to take up science-related subjects. Today, Biology pervades literally every field of human endeavour, and plays a fundamental role in educational advancement. This is seen in all the technological advancement in the world today, which is because of scientific investigations. However, the issue remains that in most secondary schools in Nigeria, there is high rate of failure in the subject.

Studies by Oludipe (2011), Igboabuchi (2010) and Olufunke (2012) have shown that secondary school students are exhibiting low interest in Biology. This low interest of students in biology has been traced to poor achievement in examinations. In our match towards scientific and technological advancement, we need nothing short of good achievement in biology at all levels of schooling. Several reasons have been adduced for the problem. Akinolu (2006) hinged it on poor pedagogical skills. Neji (2011) blamed it on learners' personal characteristics. Several other research attribute it to inadequate, inappropriate and perhaps non-utilization of the available laboratory equipment in teaching and learning biology, some authors lament that teaching the subject in secondary schools in conventional classrooms can be defective (Olufunke 2012; Igboabuchi 2010; Oludipe 2011).

Biology laboratory facilities according to Udo (2006) refers to facilities that can be used to enhance or improve educational programmes and promote teaching and learning. Science laboratory resources/facilities can be human or material. The human resources have to do with personnel such as lecturers/teachers, laboratory technologists/assistants and students. The science laboratory material resources are those materials available to the science teacher for teaching and learning. They include textbooks, computers, thermometers, fire extinguishers, first aid kits, oven, incubators, chalkboards, model/mock-ups, television, radio and other electronic devices.

The availability of laboratory facilities is essential for effective teaching and learning of Biology and consequently a good performance by students. Ifeakor (2006) is of the opinion that learning can occur through one's immediate environment – facilities that are available to facilitate students learning outcome. Students can master better the basic concepts of Biology when they learn by doing. Utilization of laboratory facilities defines the extent or how often the available science laboratory facilities are used during classes or laboratory sessions. According to Lawal (2013), such materials promote learning by doing, make the classroom lively, real, and meaningful and have the potential to make the content permanent thereby increase students' academic achievement. Utilization of these facilities enables learners to focus their attention to important issues and acquire practical skills.

Academic achievement depicts the level of educational attainment of an individual. It differentiates one with high knowledge content from others with lower and lesser competency in academic achievement. Academic achievement refers to a successful accomplishment or Performance in a particular subject area which is indicated by grades, marks and scores of descriptive commentaries. Academic achievement also refers to how Students deal with their studies and how they cope with or accomplish different tasks given to them by their teachers in a fixed time or academic year (Fajola, 2008).

However, a study carried by Musah & Bah (2017) on the availability and utilization of laboratory facilities and academic achievement in biology found that adequacy had a significant influence on students' academic achievement in secondary school chemistry teaching.

II.   Statement Of The Problem

Previous studies have shown that the rate of failure in biology at senior secondary certificate examinations is high. A number of factors could account for this; one of such factors is inadequate/insufficient laboratory facilities in secondary schools which can affect the ways practical activities are been conducted in our schools top the list in the science education literature. This established evidence that the use of biology laboratory facilities have a significant influence on students' academic achievement. In spite of the extensive report in these areas, there was no report on biology laboratory facilities availability and utilization and students' academic achievement in the subject being documented in the Takum Education Zone of Taraba State. It is against this that this study was conducted to investigate the relationship between the availability and utilization of biology laboratory facilities and their influence on the academic achievement of senior secondary school students.

III.   Purpose Of The Study

The purpose of the study is to examine the availability and utilization of laboratory facilities in Takum education zone. Specifically, the study will:

1.	Assess the availability of biology laboratory facilities in the senior secondary schools in Takum education zone;
2.	Assess the extent of utilization of biology laboratory facilities in senior secondary schools in Takum education zone;
3.	Assess the relationship between availability, utilization of biology laboratory facilities and students' academic achievement in Takum education zone

## IV.	Research Question

The study was guided by the following research questions;
1.	Are biology laboratory facilities available in senior secondary schools in Takum education zone?
2.	What is the extent of utilization of biology laboratory facilities in senior secondary schools in Takum education zone?
3.	What is the relationship between utilization of biology laboratory facilities and students' academic achievement in Takum education zone?

## V.	Methodology

The research area was Takum Education Zone of Taraba State. Takum Education Zone consists of Takum, Ussa Local Government Areas and Yangtu Special Development Area. The study area consisted of thirty two senior secondary schools with a total population of six eight biology teachers and three thousand eight hundred and ninety one (3,891) students.

Descriptive survey design was used for the study. Twelve (12) senior secondary schools comprising of five senior secondary schools from Takum LGA, five schools from Ussa LGA and 2 from Yangtu SDA. The sample size for the study consisted of two Biology teachers from each of the senior secondary schools giving a total of twenty four (24) biology teachers and twenty Senior Secondary II (SS II) Biology students randomly chosen from each school, making a total of two hundred and forty (240) senior secondary II students.

The research instruments titled "Availability and Utilization of Biology Laboratory Facilities Checklist" (AUBFC) and "Biology Achievement Test" (BAT) were validated by experts from the Department of Science Education, Faculty of Education, Taraba State University, Jalingo. AUBFC consisted of two sections. Section A requested information on the personal data of the respondents. Section B was a 33 item checklist. The checklist was adapted from the West African Examination Council (WAEC) minimum standard for the establishment of secondary school biology laboratory with five point scale.

The teachers were asked to tick against the option that they considered correct. The AUBFC was designed to obtain information on the availability of biology laboratory facilities. The respondents were guided by the researcher on how to fill the checklist. Five point Likert's scale was used for scoring items on AUBFC. Each item on the AUBFC had the lowest score of 1 and highest score 5.

The Biology Achievement Test (BAT) consist of 10 item objective test questions which the researcher extracted from past SSCE questions; the questions had five options with one correct answer and four distractors. The BAT was administered to Biology students and thereafter collected and marked. Each correct answer was awarded one mark and wrong answer zero. Addition of the marks indicated the academic achievement of the students. The data collected were analyzed using one-way analysis of variance (ANOVA).

## VI.	Results

Research Question One: Are biology laboratory facilities available in senior secondary schools in Takum education zone?

Table 1: Mean Responses and Standard Deviations (SD) of Respondents on Availability of Biology Laboratory Facilities in senior secondary Schools in Takum Education zone.

S/N	Biology Laboratory Facilities	Mean	SD	Decision
1.	Beakers (different size)	2.67	1.15	A
2.	Cover slips	2.89	1.13	A
3.	Evaporating dish	1.72	.57	NA
4.	Test Tube Holder	3.87	1.00	A
5.	Test tube Rack	3.72	.50	A
6.	Test tubes	3.72	.74	A
7.	Dissecting kits	2.11	.21	NA
8.	Dropper	3.40	1.01	A
9.	Petri Dishes	2.99	1.05	A
10.	Human organ Models	2.19	.89	NA
11.	Magnifying Glass	2.13	1.05	NA
12.	Measuring cylinder	4.37	.85	A
13.	Microscopes	1.06	1.19	NA
14.	Mounted Charts Showing different Human Systems	3.28	.80	A

15.	Mounted Charts Showing Transverse Section of Root, Stem and Leaf	2.40	.74	NA
16.	Projector	1.78	.94	NA
17.	Pestle & Mortar	1.98	1.07	NA
18.	PH – meter	1.92	.50	NA
19.	Thermometer	3.79	.74	A
20.	Plant Models	2.16	.55	NA
21.	Reagent bottles	3.76	.80	A
22.	Syringes	2.45	.96	NA
23.	Bunsen Burner	4.19	1.30	A
24.	Disposable Gloves	2.52	1.14	A
25.	Cotton Wool	2.78	.66	A
26.	Starch Powder	2.41	1.08	NA
27.	Common Salt	3.76	.50	A
28.	Vegetable Oil	3.52	.84	A
29.	Milk	2.35	.70	NA
30.	Yeast	2.01	.80	NA
31.	Formaldehyde	3.03	.99	A
32.	Shelves/benches	4.49	.59	A
33.	Chairs/Stools	4.61	1.46	A

Key: A = Available, NA = Not Available

From the findings in table 1 biology laboratory facilities in senior secondary schools in the study area are not available enough to be used by the students. Out of the thirty three (33) on the Biology Laboratory Facilities (BLF) Checklist, nineteen (19) items are available while the fourteen (14) items including microscopes, overhead projectors and slides among others are not available.

Research Question 2: What is the extent of utilization of biology laboratory facilities in senior secondary schools in Takum education zone?

Table 2: Mean Responses and Standard Deviations (SD) of Respondents on the Utilization of Biology Laboratory Facilities in senior secondary schools in Takum education zone

S/N	Biology Laboratory Facilities	Mean	SD	Decision
1.	Beakers (different size)	3.84	1.08	U
2.	Cover slips	3.29	1.11	U
3.	Evaporating dish	1.45	1.10	NU
4.	Test Tube Holder	2.56	1.01	U
5.	Test tube Rack	3.52	.94	U
6.	Test tubes	2.91	.97	U
7.	Dissecting kits	3.50	1.10	NU
8.	Dropper	3.52	1.00	U
9.	Petri Dishes	4.02	1.17	U
10.	Human organ Models	1.83	1.02	NU
11.	Magnifying Glass	2.20	1.14	NU
12.	Measuring cylinder	2.66	.55	U
13.	Microscopes	1.58	.80	NU
14.	Mounted Charts Showing different Human Systems	3.94	1.35	U
15.	Mounted Charts Showing Transverse Section of Root, Stem and Leaf	2.02	1.12	NU
16.	Projector	2.31	1.16	NU
17.	Pestle & Mortar	1.91	1.08	NU
18.	PH – meter	2.37	1.17	NU
19.	Thermometer	3.41	1.06	U
20.	Plant Models	1.54	.94	NU
21.	Reagent bottles	3.94	.70	U
22.	Syringes	2.12	.90	NU
23.	Bunsen Burner	3.55	.83	U
24.	Disposable Gloves	2.01	.64	NU
25.	Cotton Wool	2.05	.49	NU
26.	Starch Powder	2.44	1.09	NU
27.	Common Salt	3.57	1.11	U
28.	Vegetable Oil	3.65	.95	U
29.	Milk	2,13	1.02	NU
30.	Yeast	1.97	1.06	NU
31.	Formaldehyde	2.84	1.30	U
32.	Shelves/benches	3.78	1.08	U
33.	Chairs/Stools	4.06	1.05	U

KEY: U= Utilized, NU= Not utilized

From the findings in table 2 revealed that seventeen (17) out of the 33 items in the biology laboratories checklist were utilized by the students. This will have a positive influence on the academic achievement of the secondary school students in Takum education zone.

Research Question Three: What is the relationship between availability, utilization of biology laboratory facilities and students' academic achievement in Takum education zone?

Table 3: Multiple Correlation's Analysis of Availability and Utilization of Laboratory Facilities and Student Achievement (p<0.05)

		Academic Achievement	Availability	Utilization
Correlation	Achievement Availability Utilization	1.00 .614 .590	.614 1.00 .614	.590 .590 1.00
Sig (1.tailed)	Achievement Availability Utilization	.000	.000 .000	.000
N	Achievement Availability Utilization	24 240	240 24	24 240

Correlation is Significant at 0.05 level (1-tailed)

Result presented in Table 3 shows the relationship between availability and utilization of biology laboratory facilities and students' academic achievement which was investigated using Multiple correlation, there was a positive correlation among the three variables, r=.614, n=24, p<0.05 and r=.590, n=240, p<0.05.

VII. Discussion

Findings from table 1 indicated that majority (19 out of 33 items) of the biology laboratory facilities are available. This is in line the finding of Bello (2012) who found out that laboratories facilities are available in secondary schools in Nigeria. The finding disagrees with Onipede, (2004) who in his study found out that many schools in Nigeria lack adequate laboratory facilities. The finding also disagrees with the findings of Udo (2006), Neji (2011) and Lakpini and Atadoga (2012) in their separate studies reported lack of laboratory facilities in some secondary schools in Nigeria.

In response to research question in table two the study found out that seventeen (17) out of the 33 items in the biology laboratories checklist were utilized by the students. This agrees with Lyons (2012), who stated that learning is involves interplay of physical facilities, teaching resources, skills of teaching, students' motivation and curriculum demands.

This is also in agreement with Lorton & Walley (1979) who opined that learning experiences are richest when the environments which have physical laboratory equipment around them meet their needs through its adequacy and effective utilization.

Findings related to research question 3 in table 3 revealed that there was a positively strong correlation between the variables i.e. availability and utilization of biology laboratory facility and students' academic achievement. This implied that there was a significant strong relationship between facility availability and utilization and student's academic achievement. This supports the findings of Olatunbosun (2008) who in his study found that adequacy of laboratory and laboratory facilities affect the performance of students. This is true because students tends to recall what they learn when taught in a laboratory using laboratory facilities.

Similarly, Zitoon & Al-Zaubi (1986) concluded that the laboratory teaching method is more effective compared with the traditional method of teaching. Also, Odubunmi & Balogun (1991) found that low achieving students using the laboratory method performed better than their counterparts who received the lecture method.

VIII. Conclusion

Based on the findings of this study, it was concluded that: Biology laboratory facilities are available in most of the secondary schools in Takum education zone. Biology laboratory facilities are utilized in most of the secondary schools in Takum education zone. A significantly positive relationship exist between availability and utilization of biology laboratory facilities and student's academic performance.

IX. Recommendations

Based on the result of the study, the following recommendations are made:

1.   It is evident that availability of biology laboratory facilities promote learning of the subjects. Therefore government and all other stakeholders of education should as a matter of priority make available these facilities in the schools.

2.   Teachers of sciences should be encouraged to practically teach biology through the use of the available facilities in their schools to enhance understanding.

3.   Biology teachers should also be motivated and encouraged to improvise where materials are not available in order to supplement the few available facilities in the school laboratories

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