



Assessing the Level of Availability and Utilization of Materials for Teaching Biology in Private and Public Secondary Schools in Delta State

Grace Nwamaka Osakwe
Department of Educational Management and Foundations
Delta State University, Abraka.

ABSTRACT

The study investigated the level of availability and utilization of biology instructional materials in private and public secondary schools in Delta state. It is ex-post-facto in nature and adopted the descriptive study design. The study population was made up of 138 public and 213 private secondary schools in Delta North senatorial district of the state. A sample size of 100 secondary schools; 50 biology head teachers, each in public and private secondary schools from five local government areas in Delta North senatorial district were selected through stratified random sampling technique. The instrument for data collection was a checklist. The statistical tools for data analysis were the mean, standard deviation and t-test. The findings revealed that the level of availability and utilization of biology instructional materials was higher in private than in public secondary schools, some teachers use the classroom instead of the laboratories for practical activities and the absence of laboratory technicians in both schools. Recommendations made were, the government through the state ministry of education should equip biology laboratories to enhance effective teaching of biology and the achievement of national goals in science and technology.

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INTRODUCTION

Biology is regarded as the science of life. It is involved with the origin, structure, function, growth and evolution of man and billions of other macro and microorganisms. Biology as a core science subject has intrigued scientific minds for several centuries despite inventions in science and technology, the origin of life is still a mystery. The importance of biology is seen in cures of diseases, breakthroughs in agriculture, medicine, science and technology and as a prerequisite subject in choice professions such as; medicine, pharmacy, nursing, biochemistry, microbiology and many more. The teaching and learning of biology should

be practical, exploratory and experimental to enable students acquire and master practical skills and experience. (FGN2004). To achieve this, the availability and utilization of biology instructional materials becomes a necessity.

The adequate use of instructional materials aid learning. Ihejaimaizu and Ochui (2016) describes biology instructional facilities as part of the teaching and learning materials teachers and students use to express ideas without difficulties, this makes the lesson interesting, motivating and easy to understand. Instructional facilities refer to any device used to assist the instructor in the preparation of a lesson, teaching of



the lesson and facilitate learning of the subject matter (Uzuegbu, Mbadiwe and Anulobi 2016). Instructional materials are also teaching materials which learners can see and relate with to make learning more applicable. Commenting on this, Onyia (2013), regards instructional facilities as sight tools for the teacher at all levels of education for effective instructional delivery.

Facilities for teaching biology exist in various forms, shapes and sizes. They may be real objects that exist freely within the environment or small plants and preserved animals. They also include illustrative diagrams, charts or models. They may be purchased, produced or constructed by the teacher. Some of them are commercially produced models of human body or other vital organs such as heart, liver, kidney, eyes, among others. (Rabi, 2017). Other facilities for teaching biology include a laboratory which is usually an average room with a teacher student ratio capacity of 1:50, work stools, tables and adequate space to move around while working in groups or individually on a problem, question or hypothesis. Lazarowitz and Tamir (1994) noted that in the laboratory, activities are student centered. Students are actively involved with their hands and minds on scientific processes using various techniques to learn and discover knowledge.

The availability of instructional facilities is critical to teaching and learning, because learning becomes easier, more interesting, practicable, realistic and appealing. They enable both the teacher and learner to participate actively and give room for acquisition of skills; knowledge, development of self-confidence and self-actualization (Alabere, 2017).

When instructional materials are unavailable, students are unfamiliar with laboratory learning materials and how to apply scientific procedures in arriving at solutions. According to Onyia (2013), when they are unavailable, the result is

too much talking which hinders learners' performance without attainment of educational objectives. She further stated that the few available materials appear to be poorly designed, old fashioned, sometimes dilapidated and no longer appropriate for modern teaching in schools. Ram (2019) also observed the near absence of instructional facilities in rural schools; which drastically narrows subject options for students, denying them equal opportunity for learning and future chances. In line with this, Musah and Umar (2017) assert that biology laboratory facilities in Yobe state secondary institutions are not available enough to be used by students; of the 55 items on the check list, as stipulated by WAEC; only 23 of their items were available.

During the course of usage, it affords the learner the opportunity to develop manipulative skills, conduct experiment, observe, record and acquire scientific attitudes which could be applicable to other endeavors. Dangbin (2008) cited in Rabi (2017), stressed that practical activities using scientific facilities enables learners to acquire cognitive skills such as formulation of hypothesis, making assumption, designing investigations, understanding variables, observing, recording data which are necessary for engaging in fruitful scientific investigations. In addition, Alabere (2016) noted that memory retention power of visual objects in teaching and learning enables student to retain knowledge and acquire better skills. Adequate use of instructional materials is related to students' performance. To buttress this point, Lazarowitz et al (1994), affirms that there is a significant relationship between students engagement in practical class and performance. This collaborates with the view of Alabere (2017), Ihejimaizu and Ochui (2016) that, the adequate use of visual aids have positive effects on student's academic achievement. They observed that there was a significant



difference in the performance of students taught with visual and instructional materials than those taught without the use of instructional materials. When biology instructional materials are not adequately utilized, irrespective of the type of school, emphasis is usually more on theory without giving learners a practical approach to understand and appreciate the connection between the concept of theory and practice.

There are two types of secondary schools in Delta state; the public and private schools. They have been a part of secondary education system in the state. The public schools are maintained and funded by the state government for the education of children in a community. While private schools are not financially supported by the government. They both aim at the achievement of secondary school objectives as stated in the national policy of education. Over the years, the number and population of both schools have been on the increase. Recent trends indicate that there are over 758 private and 468 public secondary schools in Delta state during the 2019/2020 academic year. (Source; Ministry of Education Statistics Department, Asaba) This huge gap in number might not be unconnected with parents' preference for private schools where there are adequate learning facilities, smaller classes and a greater involvement of parents in their child's education. In consonance with this, Yoloye (2008) opines that although fees are much higher in private schools, some parents argue that facilities and the quality of teaching are better than in public schools.

A practical approach is most suited to teaching biology. To achieve effective teaching depends on the level of availability and utilization of instructional materials. The adequate use of Biology instructional materials makes learning interesting, meaningful and participatory. It affords learners the opportunities to gain scientific skills and knowledge

needed for science and technology which the country is in dire need. However, a lot of research studies suggest that the much needed materials are not readily available and utilized. It has also been observed that teachers do not seem to have enough practical classes, some biology head teachers scramble to borrow biology materials and return same immediately after an external examination; teachers complain of large size, excess work load and insufficient time on the timetable. This gap in learning affects students' performance. The problem of study is to find out the level of biology teaching materials available and its utilization in both types of schools in Delta state.

Purpose of Study

- (i) The level of biology instructional facilities available in public and private secondary schools in Delta state.
- (ii) The level of biology instructional facilities utilized in public and private secondary schools in Delta state.

Research Questions

1. What is the level of availability of biology instructional facilities in public and private secondary schools?
2. What is the level of utilization of biology instructional facilities in Delta state public and private secondary schools?

Hypotheses

1. A significant difference does not exist in the availability of biology instructional facilities in public and private secondary schools.
2. A significant difference does not exist in the utilization of biology instructional facilities in public and private secondary schools.

METHODOLOGY

The study is a descriptive survey and ex-post-facto in nature. The target



population of the study comprises all the secondary schools in Delta North senatorial district which is made up of 138 public and 213 private secondary schools. The sample size was 100 biology head teachers in 50 public and 50 private secondary schools, from five local government areas (Aniocha North, Ndokwa West, Ika North and South). They were selected through random sampling technique. Data was done with the aid of a checklist. The checklist consisted of 24 items; adapted from The West African Examination Council (WAEC) guideline used for re inspection/recognition of schools and subjects to determine the availability level of biology instructional materials in public and private schools.

The instrument was considered valid by three lecturers in the Faculty of Education after corrections and suggestions were effected.

The checklist was administered to the respondents with the aid of three research assistants who were thoroughly trained on the administration and retrieval of the questionnaire and checklist. All the 100 questionnaires and checklist given out were retrieved. The answers to the Research questions were obtained using the mean and standard deviation, while the hypotheses were tested with t- test statistics at 0.05 level of significance. The midpoint of acceptance was 2.5. The mean response above 2.5 was regarded as high and below 2.5 was considered as low.

RESULTS

Research Question 1: What is the availability level of Biology Instructional Materials in Private and Public Secondary Schools.?

Table 1 Mean and Standard Deviation on the level of availability of Biology Instructional Materials in Private and Public Secondary Schools. $N=100$

S/N		Public Schools			Private Schools		
		Mean	SD	Remark	Mean	SD	Remark
1.	Biology Laboratory	3.16	0.47	High	2.81	0.71	High
2.	Laboratory Technician	0.00	0.00	0.00	0.00	0.00	Nil
3.	Beakers	2.95	0.94	High	2.82	0.99	High
4.	Photometer	1.76	0.43	Low	1.77	0.66	low
5.	Dissecting sets	3.09	0.60	High	2.82	1.44	High
6.	Hand lens	3.06	0.92	High	1.48	0.50	Low
7.	Test Tubes	2.75	0.78	High	2.65	0.97	High
8.	Insect nets	2.20	0.79	Low	1.67	0.67	Low
9.	Soil test kits	2.35	1.08	Low	2.38	0.83	Low
10.	Specimen bottles	1.62	0.69	Low	2.07	0.89	Low
11.	Specimen	3.08	0.72	High	2.05	0.91	low
12.	Reagents	3.31	0.77	High	2.07	0.67	Low
13.	Charts	3.61	0.49	High	1.77	0.75	Low
14.	Autoclave	1.48	0.92	Low	2.32	0.52	Low
15.	Test Tube Racks	3.43	0.70	High	2.92	0.99	High
16.	Watch glasses	2.11	1.11	Low	1.94	0.84	Low
17.	Chemical Balance	2.43	0.96	Low	1.78	0.81	Low
18.	Microscopes	3.46	0.70	High	3.24	0.74	High
19.	Bunsen Burner	2.19	0.83	Low	3.17	0.79	High
20.	Conical Flasks	3.51	0.73	High	2.82	1.44	High
21.	Measuring Cylinders	2.24	0.50	Low	2.68	1.03	High
22.	Filter Paper	3.09	0.60	High	2.82	0.98	High



S/N		Public Schools			Private Schools		
		Mean	SD	Remark	Mean	SD	Remark
23.	Plastic Models	2.96	0.79	High	2.32	0.97	Low
24.	Thermometer	3.09	0.84	High	2.23	1.06	Low
	Total Grand Mean	2.62	0.72		2.28	0.84	

Table 1, shows the availability level of Biology Instructional Facilities in Private and Public Secondary Schools with a total grand mean of 2.62 and standard deviation of 0.72 for private secondary schools. While public secondary schools have a total grand mean of 2.28 and standard deviation of 0.84. The result in 1

table reveals that the availability level of biology instructional materials is higher in private than in public secondary schools.

Research Question 2: What is the level of utilization of biology instructional materials in private and public secondary schools?

Table 2: Mean and standard deviation on the level of utilization of biology instructional materials in private and public schools. *N=100*

S/N		Public Schools			Private Schools		
		Mean	SD	Remark	Mean	SD	Remark
1.	Biology Laboratory	3.06	0.92	High	2.81	0.71	High
2.	Laboratory Technician	0.00	0.00	Low	0.00	0.00	Low
3.	Beakers	3.08	0.72	High	1.66	0.65	Low
4.	Photometer	3.06	0.58	High	3.17	0.79	High
5.	Dissecting sets	3.79	0.41	High	2.82	1.44	High
6.	Hand lens	2.82	0.93	High	1.96	1.05	Low
7.	Test Tubes	3.25	0.68	High	3.00	0.78	High
8.	Insect nets	1.91	1.06	Low	1.66	0.57	Low
9.	Soil test kits	3.43	0.70	High	1.73	0.47	Low
10.	Specimen bottles	2.42	1.17	Low	2.72	0.67	High
11.	Specimen	3.46	0.82	High	2.32	0.97	Low
12.	Reagents	3.59	0.79	High	1.53	0.56	Low
13.	Charts	3.07	0.56	High	1.71	0.69	Low
14.	Autoclave	2.16	0.13	Low	1.54	0.50	Low
15.	Test tube Racks	1.52	0.77	Low	1.62	0.68	Low
16.	Watch glasses	2.63	0.49	High	2.76	1.36	High
17.	Chemical Balance	1.73	0.47	High	3.90	0.44	High
18.	Microscope	3.26	0.82	High	2.89	0.68	High
19.	Bunsen Burner	2.59	0.49	High	1.66	0.65	Low
20.	Conical Flasks	2.64	1.10	High	3.11	0.68	High
21.	Measuring cylinders	3.99	0.10	High	3.54	0.59	High
22.	Filter Paper	1.46	0.50	Low	1.87	0.65	Low
23.	Plastic Models	3.17	0.38	High	2.35	1.08	Low
24.	Thermometers	3.00	0.75	High	1.33	0.47	Low
	Total Grand Mean	2.80	0.64		2.31	0.74	

Table 2 shows the utilization level of biology instructional materials in private and public secondary schools with a grand mean of 2.80 and standard

deviation of 0.64 for private schools, while public schools had a mean score of 2.31 and standard deviation of 0.74. The result in the table 2 reveals that private



secondary schools use more biology instructional materials than public schools. They agreed to 19 out of 24 items; 1,3,5, 4,6,7,9,10, 11,12,13,16,17,18,19,20,21,23 and 24 with a mean range of 2.63-3.99 as high level of utilization, while items 2, 8, 14,15 and 22, with a mean range of 1.46 – 2.42 as low level of utilization. While, public secondary schools agreed to 10 items out of 24; 1, 4, 5, 7, 12, 16, 17, 18, 20 and 21 with mean range of 2.72 – 3.90 as high

level of utilization of biology instructional materials, since the mean values were above the cut-off mark of 2.50. However, items 2, 3, 6, 8, 9, 11, 13, 14, 15, 18,19, 22, 23 and 24 a range of 1.33 – 2.35 which indicates a low level of utilization

Hypothesis 1: Significant difference was not observed on the availability of biology instructional materials between public and public secondary schools.

Table 3: t-test of independent mean of private and private secondary schools on the availability of biology instructional materials.

<i>Variables</i>	<i>N</i>	<i>Mean</i>	<i>SD</i>	<i>Df</i>	<i>T</i>	<i>Sig (2 – tailed)</i>	<i>Decision</i>
Private schools	100	77.53	14.36	198	2.442	0.001	Rejected
Public Schools	100	56.88	3.33				

Table 3, shows that t-value of 0.442 and a p-value of 0.359. Testing the null hypothesis at an alpha level of 0.05, the p-value of 0.001 was less than an alpha level of 0.05. Therefore, the null hypothesis which states that a significant difference was not observed between private and public secondary schools on the availability of biology instructional materials was rejected. This implied that

there is a significant difference was observed between private and secondary schools on the availability level of biology instructional materials.

Hypothesis 2: A significant difference will not be observed between private and public secondary schools on the utilization level of biology instructional materials.

Table 4: t-test of independent mean of private and public secondary schools on the utilization of biology instructional materials.

<i>Variables</i>	<i>N</i>	<i>Mean</i>	<i>SD</i>	<i>Df</i>	<i>t</i>	<i>Sig (2 – failed)</i>	<i>Decision</i>
Private schools	100	73.62	6.19	198	3.744	0.003	Rejected
Public Schools	100	59.11	2.96				

The result in table 4, indicated that t-value of 3.744 and a p-value of 0.003. Testing the null hypothesis at an alpha level of 0.05, the p-value of 0.003 was less than the alpha value of 0.05. Hence, the null hypothesis was rejected. This implied that a significant difference was observed between private and public secondary schools on the utilization level of biology instructional materials.

Findings of the study on research question one in table I revealed that out of 24 items, Private secondary schools had 19 items which include; biology laboratory, beakers, dissecting sets, hand lens, test tubes, specimen, reagents, charts, test tubes, test tube racks, microscope, conical flasks, filter paper, plastic models and thermometers. While public secondary schools had 10 out of 24 items and they include biology laboratory, beakers, dissecting sets, test tubes, test tube racks, Bunsen burner, microscopes,

DISCUSSION OF FINDINGS



conical flasks, measuring cylinders and filter papers. This shows that the level of availability of biology instructional materials is higher in private schools. The difference could not be unconnected to the stringent scrutiny that private schools undergo before they are duly certified for accreditation and license to operate by WAEC and the State ministry of education. These rules are less stringent in public schools. In addition, the availability of biology instructional materials in private schools are provided to justify parents' expectations that private schools are better options for their children. In support of this finding, Bukoye (2019) and Bonsu (2016) emphasized that private schools are better resourced with learning materials and there is effective monitoring of students learning facilities by proprietors. Adebayo (2009) adds that the availability of instructional facilities in private schools is among the critical factors that stand out as a preference over public schools. The observation in some public secondary school shows that some of the instructional materials were old, torn and in a state of disuse. This corroborates the view of Onyia (2013) that the level of instructional materials was low in public schools and the ones available were poorly designed, old fashioned, sometimes dilapidated and no longer appropriate for modern teaching in schools.

Findings from research question two in table II shows that 19 out of 24 items were above the utilization benchmark of 2.5 in private schools. While 10 items out of 24 were above the 2.5 benchmark in public schools. It reveals a higher utilization level of biology instructional in private than in public schools. This finding supports Bukoye (2019) who states that the level of utilization of biology instructional materials is higher in private schools. Low utilization of biology instructional materials results in poor academic performance and inadequate

development of scientific skills and confidence. This finding is in line with Ufiemu and Kolawole (2017) who report that when learners are not involved in laboratory activities, they cannot confidently manipulate equipment, conduct experiments and record scientific observations. The effect is the inadequate acquisition of basic scientific skills and attitudes. The finding also revealed that as a result in clashes in timetable, some teachers made more use of the classroom as an alternative to the laboratory. This practice excludes some students from full participation as they may not see clearly what the teacher is demonstrating. This finding is in line with Ram (2019) who in a study reported that some teachers conduct science activities in the classrooms. He emphasized further that 65% of the students cannot see clearly what the teacher was demonstrating and 75% of the students were of the opinion that teachers did not involve them in the demonstration. Additionally, there were no biology technicians in both types of schools. This practice puts a lot of pressure on the already busy schedule of teacher.

CONCLUSION

The availability and utilization level of biology instructional materials is higher in private secondary schools than in public schools in Delta State. The insufficiency of availability and utilization of biology instructional materials in public secondary schools affects teaching and learning which translates to poor performance and ultimately defeating the aim of science education, national growth and development.

RECOMMENDATIONS

Based on the findings of the study, the following recommendations were made.

- 1 The Government through the state Ministry of Education should provide adequate biology instructional materials to schools



- 2 Public school principals should regularly supervise their schools to ensure adequate availability and effective utilization of biology instructional materials.
- 3 Government should employ laboratory technicians to assist teachers in the preparation and organization of biology practical in schools.

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