



## Perceived Adequacy and Utilization of Resources for Teaching Practical Biology in Senior Secondary Schools in Benue South, Nigeria.

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### ABSTRACT

*This research investigated the adequacy and utilization of resources for teaching practical biology in secondary schools in Benue South. Two research questions guided the study, and a null hypothesis was tested at a 0.05 significance level. The research design for this study was a descriptive survey. The population comprised 208 secondary school biology teachers in all Benue South Senatorial Zone secondary schools. Stratified random sampling was used to draw a sample of 108 teachers for the study. The Biology Laboratory Assessment Checklist (BLAC) was adapted for the study. Three experts validated the instrument, and a Cronbach's alpha reliability index of 0.83 was obtained for the BLAC. The data obtained were analyzed using mean, standard deviation, and independent t-test statistics. The findings from the study showed that resources for teaching practical biology in secondary schools in Benue South were inadequate and not well utilized. The study further revealed that there was a significant difference in the mean response scores of urban and rural teachers regarding the adequacy and utilization of resources for teaching practical biology in secondary schools in Benue South. It was recommended, among other suggestions, that principals of secondary schools ensure that biology laboratory materials that are unavailable due to breakage are replaced as soon as possible. Additionally, the government and school owners should address the lack of resources and provide training to optimize practical biology education for all teachers.*

### ARTICLE INFO

#### Article History

Received: January, 2024

Received in revised form: March, 2024

Accepted: March, 2024

Published online: June, 2024

### KEYWORDS

Practical Teaching in Biology, Adequacy,  
Material Resources, Utilization

### INTRODUCTION

Education particularly in science and Technology remains a veritable tool for individual and national development. Science education provides individuals with basic skills and knowledge which help them live successfully in the society. The objective of the Biology curriculum at the secondary level is to prepare students to acquire adequate laboratory and field skills in Biology, meaningful and relevant knowledge in Biology, and the ability to apply scientific knowledge to everyday. (Federal Ministry of Education, 2013).

According to Matazu (2022) biology is a very important subject for technological development. It helps learners to develop scientific attitude that help them to cope in their environment.

The statistics reports on West African School Certificate Examination results May/June 2018-2023 in Nigeria showed that the performance of students in Science Subjects has been poor especially in Biology. This poor performance in practical biology however leads to the general failure in biology over the years because practical biology constitutes 50 percent of the total marks in the West African

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Examination Council (WACE) in biology over the years.

The situation of fluctuating performance of Biology Students in WAEC/SSCE which never recorded an average of 50 percent pass in public examinations is not different in Benue South Senatorial zone. Based on the

SSCE results in biology obtained from the Benue State Ministry of Education, majority of the Students have been performing below credit level pass in Biology at the Senior Secondary Certificate (SSCE) Examination as shown in Table 1:

**Table1:** Percentage Distribution of Students' Performance in May/June Senior Secondary Certificate (SSCE) in Biology in Benue State; 2018-2023

Year	Total entry	Total sat	Credit passes	Percentage passes
2018	34381	35376	16758	39.82
2019	36452	35629	17442	38.18
2020	37523	35826	16222	38.12
2021	38423	36117	17773	40.03
2022	38712	36309	17401	38.52
2023	38851	36448	16682	38.31

The problem of poor performance of students in SSCE has generated several research concerns among stake-holders on the underlying forces responsible as well as possible ways to combat this trend. Several reasons have been adduced for the problem, one of which is strengthening the teaching of biology practical.

According to Salau (2012), low achievement in Biology could be attributed to many factors such as attitudinal problems, lack of mastery of subject language, spelling errors, confusion between similar and related concepts and poor instructional delivery approach. One of the advantages of laboratory method of teaching is that large numbers of students actively participate and learn at the same time. Adequate provision of material resources facilitates learning of science subjects. Yet, inappropriate, inadequate and non-utilization of laboratory facilities have been identified by some authors as some possible causes of students' poor performance. Adequate human resources according to Adeogun (2019) mean having the right quantity and quality of teachers in the school.

The active engagement of students on hands-on activities no doubt aids fast learning and easy comprehension. According to Matazu (2022) identified prints, textbooks, magazines, newspapers, slides, photos, workbooks, and

electronic media as examples of instructional resources. According to Adebisi, Tewogbade and Olajide (2017), laboratory facilities can be available, adequate but not utilized during science teaching and expressed fervent need for utilization of instructional resources in teaching and learning. Adequate provision of material resources facilitates learning of science subjects. Yet, inappropriate, inadequate provisions of laboratory facilities have been identified by some authors as some possible causes of students' poor performance. According to Matazu (2022), instructional materials played an essential part in the teaching-learning processes among which are, as follows:

1. Improving students' memory levels.
2. To make the teaching-learning process easier.
3. To increase the rate of assimilation of students.
4. Serve as instruments for teachers to utilize in correcting incorrect impressions and illustrating ideas that students cannot easily forget.

Olayinka (2016) confirmed that there is an excellent achievement for students taught with instructional resources comparing to those educated without any teaching material. The difference is because instructional materials ease the communication between teachers and students and promote active teaching and learning, thus facilitate understanding of

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concepts that become complex by words only. Sheahan (2018) stated that the gross inadequacy and underutilization of audio-visual aids explain the need to upgrade and complement for the inadequacies of sense organs and to reinforce the capacity of dominant organs.

Urban schools are institutions that are located in a densely populated area with greater infrastructure development, and increased access to various amenities and services while rural schools are typically in small towns characterized by lower density, limited infrastructure development and less access to amenities and services. According to Akubuiro (2022), urban learning environment has a greater access to social, cultural and economic facilities and services and as such produces a high performing learner while in the corresponding rural situation, a poor performing learner. Omoshola, Aliyu, Ahmed and Ogunlowo (2022) found that there is no significant influence of school type in the use of instructional resources for teaching biology.

According to Farinella (2018), availability and adequacy of instructional resources contribute in improving pupils' participation as it exposes learners to the real world of learning as well as building understanding and retention because when things are seen, they are more remembered than when they are simply heard. It is against this premise that the researcher embarked on assessing the availability and utilization of resources for teaching practical biology in Benue South.

### Statement of the Problem

The National objectives as stated in the biology curriculum cannot be achieved when there is consistent poor performance in biology Senior Secondary Certificate Examination as evidenced by Chief Examiner's reports, in WASSCE from 2018 – 2023 which showed that the performance of students' in biology were generally poor. When resources are not adequate and well utilized by implication the teaching and learning of biology becomes

theoretical instead of practical and students of biology become half-baked in the knowledge of biology which contributes to their poor performance in biology examinations. Are the resources adequate? Are the available ones well utilized? It is on this premise that the researcher has embarked on the assessment of the adequacy and utilization of resources for teaching Biology practical in Benue South Senatorial Zone.

### Purpose of the Study

The purpose of this study was to assess the adequacy and utilization of Resources for teaching secondary school biology practical in secondary schools in Benue senatorial zone. The specific objectives of the study are:

1. Determine the perception of teachers from urban and rural areas on the adequacy of material resources for teaching practical biology in secondary schools in Benue South.
2. Determine the perception of teachers from urban and rural areas on utilization of material resources for teaching practical biology in secondary schools in Benue south.

### Research Hypotheses

The following hypotheses were formulated and tested at significance level of 0.05.

1. There is no significant difference in the perception of teachers from urban and rural areas on the level of adequacy of material resources for teaching practical Biology in secondary schools in Benue South.
2. There is no significant difference in the perception of teachers from urban and rural areas on the level of utilization of material resources for teaching practical Biology in secondary schools in Benue South.

### METHODOLOGY

The study design was survey research design. Its population comprised of 218 secondary school biology teachers in all the



secondary schools in Benue South Senatorial Zone. Stratified random sampling technique was used to draw a sample of 108 for the study. Biology Laboratory Assessment Checklist (BLAC) The Biology Laboratory Assessment Checklist (BLAC) was adapted and modified by removing all the non-biology instructional resources from the West African Examination Council Guideline. A guideline for pre-inspection/Recognition of school subjects (Biology) for West African Senior School Certificate Examination (WASSCE, 2017). It consists of list of standard approved instructional resources for teaching practical Biology. The instrument was used by the researcher in schools to assess the adequacy and utilization of resources for practical biology. The instrument consists of one hundred and ninety five (195) items. BLAC has twelve columns which was used to describe the level of adequacy and extent of utilization. The scores for items that are Very Adequate, moderately Adequate, Adequate, and Inadequate are 4, 3, 2, and 1. The scores for Very Often, Often, Not often and not utilized are also 4, 3, 2, and 1 respectively. Data collected from BLAC was used to answer research questions and test hypotheses. The scoring benchmark was 2.5. This implied that, items with mean score below 2.5 were regarded as inadequate and not utilized, while items with mean score equal or greater 2.5 were regarded as adequate and utilized.

The instrument was validated by three experts in the department of Science Education, Federal University, Lokoja, Kogi State, Nigeria. The logical validity index scored by the experts was 0.85. In order to obtain the internal consistency reliability of the instrument, a trial test of the instrument was carried out among teachers outside the sample in Benue State. The

data collected from the pilot testing of the instruments was used to calculate the reliability coefficient using Cronbach's alpha coefficient method. Biology Laboratory Assessment Questionnaire (BLAQ) yielded a reliability index of 0.92. A letter of introduction was obtained from the head of Department of Science Education, Federal University, Lokoja, Kogi State, and was delivered to the principals of sampled schools when secondary schools were in session. Research assistants were given an orientation/training by the researcher on how to tick the questionnaire. The researcher also gave these assistants an explanation on their roles. This enabled them get the skills for carrying out the assignment. The Instruments were administered to one biology teacher in each sampled school for data collection. The researcher and research assistants also sought the cooperation of the biology teachers in the sampled schools to help in responding to the instruments. The data collected were subjected to statistical analysis using descriptive statistics of mean and standard deviation to answer the research questions, while independent t-test statistics was used to test all the hypotheses formulated at 0.05 level of significance. Research question one and two were answered through responses with percentage range of: Highly adequate/Utilized (HA) 70-100, Adequate/Utilized (A) 50-69, Moderately Adequate/Utilized (MA) 30-49 and Not Adequate/Utilized (NA) 0-29.

## RESULTS AND DISCUSSION

**Research Question One:** What are the perception of teachers from urban and rural areas on adequacy of material resources for teaching biology practical in secondary schools in Benue south senatorial zone?

**Table 2:** Mean perception of teachers on the adequacy of Material Resources for teaching Practical Biology in Benue South

School Location	N	Mean	Std. Deviation	Std. Error Mean
Urban	82	2.0116	.33802	.03733
Rural	26	1.7404	.25078	.04918
Total	108			
Average		1.876	.2944	.4325

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From the analysis it can be observed with a response mean of 1.876 and standard deviation of 0.5888 which is lower than the benchmark mean of 2.50 that the level of material resources available for teaching practical Biology in the study area is also low.

**Hypothesis One:** There is no significant difference in the mean response scores of teachers from urban and rural areas on the level of adequacy of material resources for teaching practical Biology in secondary schools in Benue South.

**Table 3:** Independent t-test of Respondents on the adequacy of Material Resources for Teaching Practical Biology

	t-test for Equality of Means				
	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Equal variances assumed	3.770	106	.000	.27120	.07193
Equal variances not assumed	4.392	56.328	.000	.27120	.06174

Table 3 shows that the null hypothesis is rejected while the alternative hypothesis is accepted, that there is a significant difference in the mean response scores of urban and rural teachers on the level of adequacy of material resources for teaching practical biology in secondary schools in Benue south. Hence, the mean response scores of urban teachers on the level of adequacy of material resources for

teaching practical biology in secondary schools in Benue south is significantly higher than that of their rural counterparts.

**Research Question Two:** What is the perception of teachers from urban and rural areas on utilization of material resources for teaching biology practical in secondary schools in Benue south senatorial zone?

**Table 4:** Perception of Teachers on Utilization of Material Resources for Teaching Practical Biology in Benue South

Location	N	Mean	Std. Deviation	Std. Error Mean
Urban	82	1.8841	.28748	.03175
Rural	26	1.6612	.26616	.05220
Total	108			
Average		1.7726	.2768	.41970

From the analysis, it can be observed with a response mean of 1.7726 and standard deviation of 0.2768 which is lower than the benchmark mean of 2.50 that the level of utilization of material resources available for teaching practical Biology in the study area is very low.

**Hypothesis Two:** There is no significant difference in the mean response scores of teachers from urban and rural areas on the level of utilization of material resources for teaching practical Biology in secondary schools in Benue South.



**Table 5:** Independent t-test of Respondents on the Utilization of Material Resources for Teaching Practical Biology

	t-test for Equality of Means				
	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Equal variances assumed	3.506	106	.001	.22299	.09689
Equal variances not assumed	3.650	45.015	.001	.22299	.09994

Table 5 shows that the null hypothesis is rejected while the alternative hypothesis is accepted, that there is a significant difference in the mean response scores of urban and rural teachers on the level of utilization of material resources for teaching practical biology in secondary schools in Benue south. Hence, the mean response scores of urban teachers on the level of utilization of material resources for teaching practical biology in secondary schools in Benue south is significantly higher than that of their rural counterparts.

## DISCUSSION

The findings with respect to research question one showed that the level of adequacy of material resources for teaching practical biology in the study area is lower than the benchmark. This result therefore shows that laboratories facilities are inadequate. The study corroborates with the study of Ngozi and Cliff (2022) who found that instructional materials relating to audio-visuals (multimedia) are mostly not available in most secondary schools, but where they are found available they are inadequate and not being utilized by teachers.

Hypothesis one stated that, there is no significant difference in the mean response scores of urban and rural teachers on the level of adequacy of material resources for teaching practical biology in secondary schools in Benue South. The analysis of this hypothesis showed that there is a significant difference in the mean response scores of urban and rural teachers on the level of adequacy of material resources. This study agrees with the study of Otamba (2013), who found out that school location has serious effect on the provision of facilities for effective teaching and learning. The result also disagree

with that of Omoshola, Aliyu, Ahmed and Ogunlowo (2022) which found that there is no significant influence of school type in the use of instructional resources for teaching biology.

The findings with respect to research question two showed that the level of utilization of resources for teaching biology practical in secondary schools in Benue South is very low, the result therefore can be generalised that secondary schools in Benue south do not utilize their laboratory material resources properly. The result correlates with that of Ajiboye (2022) who revealed a strong positive relationship between resource adequacy and student academic performance, although resource utilization showed a lower positive correlation. The finding is also supported by the study of Rabi (2017), who stated that teachers indicated reluctance and inability in conducting practical work using the few available facilities. This finding therefore buttressed the previous findings of Akisanya (2010), who stated that educational resources are important because the goal of any school depends on adequate supply and utilization of material resources as they enhance proper teaching and learning. Students should be encouraged by teachers on the benefit of active participation or engagement on hands-on activities which aids fast learning and easy comprehension.

Hypothesis two stated that, there is no significant difference in the mean response scores of urban and rural teachers on the level of utilization of material resources for teaching practical biology in secondary schools in Benue south. The test of this hypothesis however showed that there is a significant difference in the mean response scores of urban and rural teachers on the level of utilization of material

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resources for teaching practical biology in secondary schools in Benue south. Hence, the mean response scores of urban teachers on the level of utilization of material resources for teaching practical biology in secondary schools in Benue south is significantly higher than that of their rural counterparts. Hence material resources are more utilized in urban secondary schools in Benue South than the rural schools. This study therefore agrees with the work of Kanya, Kiweewa, Sylvia, Matiko, John, Janet and Lembuka, (2018) who found a significant difference in the utilization of resources in the rural and urban secondary schools. We concluded that urban secondary schools are more effective than rural secondary schools in resource utilization.

### CONCLUSION

It can be concluded that the findings with respect to research question three showed that resources for teaching practical biology in Benue south are also adequate at a low extent; result with respect to research question four also found that resources for teaching biology practical in Benue south are not well utilized. The study also shows that among the 195 resources considered for adequacy and utilization parameters in the study, only 11 resources were considered adequate and utilized. Based on the WAEC basic requirements for secondary schools, the extent of provision of biology practical resources in secondary schools in Benue South is inadequate and not well utilized; only (11) resources are provided at a high extent while majority of the resources considered are provided at low or moderate extent. The present state of the provided resources to secondary schools invariably affects its utilization in biology laboratories in secondary schools in Benue South

### RECOMMENDATIONS

1. Principals of secondary schools should ensure those biology laboratory materials that are not available as a result of breakage are replaced as soon as possible.

2. The Government and school owners should address the lack of resources and provide training to optimize practical biology education for all teachers.

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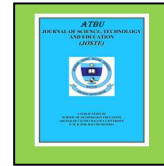
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