

**AVAILABILITY, ADEQUACY AND USAGE OF  
INSTRUCTIONAL RESOURCES: ASSESSMENT OF THE  
IMPLEMENTATION OF BIOLOGY CURRICULUM IN  
SOUTHWESTERN NIGERIA.**

**Ajibola Emmanuel AJIYO**

Department of Science and Technology Education  
Obafemi Awolowo University, Ile-Ife, Nigeria  
E-mail: aaajiyo@gmail.com

**Emmanuel Folorunsho BAMIDELE**

Department of Science and Technology Education  
Obafemi Awolowo University, Ile-Ife, Nigeria  
E-mail: bamdeleef@yahoo.com

&

**Adeyinka Oluwaseun KAREEM**

Department of Science and Technology Education  
Obafemi Awolowo University, Ile-Ife, Nigeria  
E-mail: akareem@oauife.edu.ng,

**Abstract**

*The study examined the availability, determine the level of adequacy and assess the level of usage of biology instructional resources in implementing senior secondary school biology curriculum in Southwestern Nigeria. The study adopted the descriptive survey research design. The population comprised biology teachers in Southwestern Nigeria. The samples which comprised 62 Biology teachers and 36 senior secondary schools were selected using the multistage sampling procedure. One research instrument was used for the study, namely: Biology Instructional Resources Checklist (BIRC). Data collected were analysed using frequency counts, percentage and mean. Results indicated that there is high (83.16%) level of availability, very low (22.11%) level of adequacy and low (42.11%) level of usage of biology instructional resources for*

*implementing biology curriculum in Southwestern Nigeria. The study concluded that there is low level of implementation of senior secondary school biology curriculum in southwestern Nigeria.*

**Keywords:**

**Introduction**

The role of instructional resources in the educational system cannot be overstated, particularly in the context of senior secondary schools where foundational skills are cultivated for future academic and professional pursuits. The availability and effective use of instructional resources are critical for quality Biology education in Nigerian senior secondary schools. Research consistently shows that while instructional materials significantly enhance student achievement (Oni and Adebisi, 2021; Abidoje, Abidoje and Olaide, 2023; Olatunji and Ojo, 2023), their availability and adequacy remain major challenges in senior secondary schools in Southwestern Nigeria.

The implementation of the Biology curriculum, a subject pivotal to the understanding of life sciences, necessitates the availability, adequacy, and effective usage of instructional resources. These resources, which comprises the textbooks, laboratory equipment, digital tools, and other educational materials, are essential for fostering an engaging learning environment that promotes critical thinking and practical skills acquisition necessary for students to pass their external examination, as well as having a strong foundational base on which their future learning is laid (Oladipupo and Kareem, 2023; Yoade and Babatimehin, 2025). In Nigeria, the significance of these resources is underscored by the need to equip students with the competencies required to navigate an increasingly complex world.

Studies across Southwestern Nigeria and similar regions reveal that instructional resources such as laboratory equipment, multimedia tools, and locally sourced materials are often insufficient or lacking in many schools. For example, surveys in Kwara and Ondo States

found that less than half of the required Biology equipment and laboratories were available, with multimedia and ICT tools especially scarce (Abidoye et al., 2022; Abidoye et al., 2023; Isma'il & Lukman, 2022). Even when some resources exist, they are not adequate enough and not used regularly due to factors like large class sizes, lack of funding, and insufficient teacher training to handle some or most (in some cases) of these resources. (Isma'il & Lukman, 2022; Abidoye et al., 2022).

Previous researches have predominantly focused on the availability, utilization, accessibility (Achimugu, 2016; Adebayo and Ojo, 2020; Munir and Musa, 2020) and impact (Adeyemi and Okonkwo, 2024; Ogunlowo, Ozbey and Ogunlowo, 2024) of instructional resources within single locations often yielding insights that are contextually rich yet limited in their generalizability. For instance, studies conducted in specific states or districts have illuminated the challenges faced by educators in accessing and utilizing instructional materials effectively. However, such localized studies may overlook broader systemic issues that affect the implementation of the Biology curriculum across diverse educational settings. This limitation highlights the necessity for a holistic approach that encompasses multiple locations within Southwestern Nigeria, thereby providing a more comprehensive understanding of the state of availability, adequacy, and usage of instructional resources.

Despite these limitations, the use of available instructional materials—whether standard, improvised, or locally sourced, has a clear positive effect on student engagement, comprehension, and academic performance (Effiong & Igiri, 2015; Achimugu, 2016; Abidoye et al., 2023). Experimental studies show that students taught with instructional materials consistently outperform those taught with traditional methods alone, regardless of gender or school type (Abidoye et al., 2023; Babalola, Olumorin and Omolafe, 2025; Effiong & Igiri, 2015). Teachers' qualifications and willingness to improvise or use local resources further influence effective usage (Abidoye et al., 2022).

Studies have also indicated a concern about the trend of the provision of instructional resources in senior secondary schools across Nigeria. Despite the recognition of their importance, many schools continue to grapple with inadequate supplies, outdated materials, and insufficient training for educators on the effective usage of these resources in their teaching practices. This situation is particularly pronounced in the teaching of Biology, where teachers' experiences and practical applications are crucial for student engagement and comprehension. The lack of adequate biology instructional resources will not only hamper the learning process but also undermines the overall educational outcomes for students, thereby perpetuating a cycle of underachievement in the subject.

In light of these challenges, this research paper aims to explore the availability, adequacy, and usage of instructional resources in the implementation of the Biology curriculum in Southwestern Nigeria by adopting a holistic approach that encompasses multiple schools and educational contexts, to provide a clear understanding of the current trend of instructional resources in Biology education. Through this analysis, the research will contribute to the ongoing discourse on educational reform in Nigeria, offering insights that may inform policy decisions and resource allocation aimed at enhancing the quality of science education in the region.

### **Objectives of the study**

The specific objectives of this study are to:

- I. Examine the availability of Biology instructional resources in Senior secondary Schools in Southwestern Nigeria,
- ii. Determine the level of adequacy of Biology instructional resources in the study area, and
- iii. Assess the level of usage of biology instructional resources in implementing senior secondary school biology curriculum in Southwestern Nigeria

### **Research questions**

- I. What is the level of availability of Biology instructional

- resources in senior secondary schools in Southwestern Nigeria?
- ii. How adequate are the Biology instructional resources in the study area?
  - iii. What is the level of usage of biology instructional resources in implementing senior secondary school biology curriculum in Southwestern Nigeria?

### **Methodology**

Descriptive survey research design was used for the study. The population consisted of all the senior secondary school biology teachers in Southwestern Nigeria. The multistage sampling procedure was used to select sample for the study. A state each was selected randomly from three strata of states based on close contiguity (Ekiti/Ondo, Lagos/ogun and Osun/Oyo). Ekiti, Lagos and Osun States were selected at this stage. All the senatorial districts from each of these states were used for the study. Four senior secondary schools were randomly selected from each of the senatorial districts of each state. Only the biology teachers in the selected schools were purposively selected for the study. In all, a total of 36 senior secondary schools were selected for the study. Sixty-two biology teachers were used for the study. Biology Instructional Resources Checklist (BIRC) was the research instrument used to collect the data for the study. BIRC was developed by the researcher with its content extracted from the list of laboratory equipment required for accreditation of Senior Secondary Schools by examination bodies such as West Africa Examination Council (WAEC) and National Examination Council (NECO). The instrument was validated by curriculum experts for content validity; being an extracted content from an established document. The research questions raised were answered using descriptive statistics of frequency counts and percentage.

### **Results**

What is the level of availability, adequacy and usage of instructional resources for implementation of Biology Curriculum in Senior

## Secondary Schools in Southwestern Nigeria

To assess the level of availability, adequacy and usage of instructional resources for implementation of Biology Instructional Resources Checklist (BIRC) was used to obtain data relating to these and the results are presented in the Table 1

**Table 1: Descriptive Statistics on Availability and Adequacy of Biology Instructional resources**

SN	Items/Equipment	Quantity required	Quantity observed Mean/%	Adequacy
1	Beaker			
	a. 100ml	100	75 (37.5%)	NA
	b. 250ml	100		
2	Bunsen Burners	10	4 (40%)	NA
3	Conical flask			
	a. 100ml	5	9 (90%)	A
	b. 250ml	5		
4	Dropper	10	2 (20)	NA
5	Measuring cylinder	Q	17 (56.6)	NA
6	Cork borer	2	0 (0%)	NA
7	Corks	A pack	1 (100%)	A
8	Clinostat	2	0 (0%)	NA
9	Cotton Wool	15	3 (20%)	NA
10	Chemical balance	2	1 (50%)	NA
11	Clamp (for retort stand)	15	14 (93.3%)	A
12	Crucibles	30	3 (10%)	NA
13	Delivery Tubes	10	2 (20%)	NA
14	Different bones	10	10 (100%)	A
15	Dissecting set	5	2 (40%)	NA
16	Dissecting Board	50	5 (10%)	NA
17	Dissecting Pins	A pack	1 (100%)	A
18	Dropping pipettes with rubber bulb	100	25 (25%)	NA
19	Evaporating dish 10ml	100	15 (15%)	NA
20	Filter funnels	100	20 (20%)	NA
21	Flasks:			
	a. Flat bottom - 250ml	5		
	b. Round bottom - 250ml	5	4 (40%)	NA
22	Filter papers -12cm, 15cm, 50cm	10 packets of each	4 (13.3%)	NA
23	Forcept	20	5 (25%)	NA
24	Funnels	50	10 (20%)	NA

SN	Items/Equipment	Quantity required	Quantity observed Mean/%	Adequacy
25	Gas Cylinder/Stove	1	1 (100%)	A
26	Glass Rods	10	2 (20%)	NA
27	Graduated pipettes	50	25 (50%)	NA
28	Hand lenses	50	22 (44%)	NA
29	Insect nets	20	5 (25%)	NA
30	Insect settings (spreading board)	50	0 (0%)	NA
31	Litmus Paper (Red and Blue)	2 packs	2 (100%)	A
32	Measuring Cylinder	20	8 (40%)	NA
33	Meter Rules	50	24 (48%)	NA
34	Microscope	5	1 (20%)	NA
35	Microscope slide and cover slide	100	23 (23%)	NA
36	Mortar and Pestle	2	2 (100%)	A
37	Petri -dishes (plastic)	100	32 (32%)	NA
38	Plant Pots	20	5 (25%)	NA
39	Plasticine	10	0 (0%)	NA
40	Preserved Specimen	100	42 (42%)	NA
41	Retort Stands	50	23 (46%)	NA
42	Scissors	20	3 (15%)	NA
43	Slides (plain and prepared)	20	13 (65%)	A
44	Spatula/plastic spoon	20	10 (50%)	NA
45	Specimen bottles	100	27 (27%)	NA
46	Test-tubes	100	70 (70%)	A
47	Test-tube rack	20	10 (50%)	NA
48	Test-tube holder (wooden)	20	12 (60%)	A
49	Thermometer (10 <sup>0</sup> C-100 <sup>0</sup> C)	20	5 (25%)	NA
50	Thermometer (Clinical/Celsius)	20	2 (10%)	NA
51	Tripod stands and wire gauze	20	13 (65%)	A
52	Troughs	20	8 (40%)	NA
<b>MODELS</b>				
53	Heart	1	1 (100%)	A
54	Eye	1	0 (0%)	NA
55	Ear	1	0 (0%)	NA
56	Skeleton	1	1 (100%)	A
57	Skin	1	1 (100%)	A
<b>REAGENTS</b>				
58	Distilled water	10L	5L (50%)	NA
59	Formaldehyde	5L	2L (40%)	NA

SN	Items/Equipment	Quantity required	Quantity observed Mean/%	Adequacy
60	Fehling's solution A&B (Foord test)	2.5L	1L (40%)	NA
61	Million's Reagent	1L	1L (100%)	A
62	Benedict's Solution	1L	1L (100%)	A
63	Disinfectant	500ml	0 (0%)	NA
64	Iodine Solution	100ml	50ml (50%)	NA
65	Hydrochloric Acid (HCL) (conc & diluted)	4L	1L (25%)	NA
66	Conc. Nitric acid	4L	1L (25%)	NA
67	Sudan III	1L	0.4L (40%)	NA
68	Copper (II) Sulphate	100g	45g (45%)	NA
69	Starch Powder	250g	100g (40%)	NA
70	Glucose	500g	100g (20%)	NA
71	Alcohol 70% & 98%	5L	1L (20%)	NA
72	Methylated Spirit	5L	1L (20%)	NA
<b>CHART</b>				
73	Human (General body)	2	2 (100%)	A
74	Respiratory organ	2	1 (50%)	NA
75	Excretory organ	2	1 (50%)	NA
76	Digestive system	2	1 (50%)	NA
77	Circulatory system in man	2	1 (50%)	NA
78	Different types of mammalian bones (skeleton)	2	1 (50%)	NA
79	Chalkboard	1	1 (100%)	A
80	Audio instructional materials e.g. microphone, tape recorder	1	0 (0%)	NA
81	Electronic interactive instructional material e.g. computer, calculator	5	3 (60%)	A
<b>INSTRUMENTS FOR ECOLOGICAL FIELD STUDIES</b>				
82	Quadrat	2	1 (50%)	NA
83	Rain gauge	1	1 (100%)	A
84	Wet and dry bulb thermometer (hygrometer)	5	1 (20%)	NA
85	Windvane	1	1 (100%)	A
86	Anemometer	2	0 (0%)	NA
87	Light meter (photometer)	2	0 (0%)	NA
88	Barometer	2	1 (50%)	NA
89	Pooter disc	2	0 (0%)	NA
90	White disc/ Secchi disc	2	0 (0%)	NA
91	Sweep net/ Insect net	2	0 (0%)	NA

Table 1, shows the items of instructional resources needed for implementation of biology curriculum, expected quantity of each item, observed quantities and their level of adequacy. The table shows the average number of each item observed from the schools and determine their adequacy based on the percentage of their availability as stated on the table2

**Table 2: Rating Scale of Adequacy of Biology Instructional Resources**

Level of Availability (%)	Decision Rule
0 - 59%	Not Adequate
60 - 100%	Adequate

Based on the decision rule stated in the table 2, the level of Availability and Adequacy of the Biology Instructional resources are described in the table 3

**Table 3: Descriptive Statistics of the level of Availability and Adequacy of Biology Instructional resources**

Indicates	No	%
Available	79	83.16
Not available	16	16.84
Adequate	21	22.11
Not Adequate	74	77.89

Table 3 shows that 83.16% (79) of the Biology Instructional resources are available, while 16.84% (16) of the resources are not Available. This shows a high level of availability of these resources in the study area. The Table further reveals that 22.11% (21) of these resources are within the level of adequacy, while 77.89% (74) of the resources are not adequately available; these shows a very low level of adequacy of Biology instructional resources in the Study area.

**Table4: Descriptive Statistics on the usage of Instructional resources**

SN	Items/Equipment	Usage	
		Used	Not used
1	Beaker		
	a. 100ml	36	0
	b. 250ml		
2	Bunsen Burners	32	4
3	Conical flask	20	16
	a. 100ml		
	b. 250ml		
4	Dropper	12	24
5	Measuring cylinder	28	8
6	Cork borer	14	22
7	Corks	18	18
8	Clinostat (Clock work)	0	36
9	Cotton Wool	22	14
10	Chemical balance	28	8
11	Clamp (for retort stand)	32	4
12	Crucibles	4	32
13	Delivery Tubes	0	36
14	Different bones	36	0
15	Dissecting set	16	20
16	Dissecting Board	16	20
17	Dissecting Pins	16	20
18	Dropping pipettes with rubber bulb	10	26
19	Evaporating dish 10ml	18	18
20	Filter funnels	10	26
21	Flasks:	22	14
	a. Flat bottom- 250ml		
	b. Round bottom- 250ml		
22	Filter papers-12cm, 15cm, 50cm	8	28
23	Forceps	24	12
24	Funnels	36	0
25	Gas Cylinder/Stove	28	8
26	Glass Rods	30	6
27	Graduated pipettes	6	30
28	Hand lenses	10	26
29	Insect nets	4	32
30	Insect settings (spreading board)	22	14

SN	Items/Equipment	Usage	
		Used	Not used
31	Litmus Paper (Red and Blue)	12	24
32	Measuring Cylinder	16	20
33	Meter Rules	20	16
34	Microscope	10	26
35	Microscope slide and cover slide	10	26
36	Mortal and Pestle	14	22
37	Petri-dishes (plastic)	8	28
38	Plant Pots	12	24
39	Plasticine	4	32
40	Preserved Specimen	36	0
41	Retort Stands	26	10
42	Scissors	36	0
43	Slides (plain and prepared)	30	6
44	Spatula/plastic spoon	20	16
45	Specimen bottles	32	4
46	Test-tubes	28	8
47	Test-tube rack	36	0
48	Test-tube holder (wooden)	26	10
49	Thermometer (10 <sup>0</sup> C-100 <sup>0</sup> C)	24	12
50	Thermometer (Clinical/Celsius)	20	16
51	Tripod stands and wire gauze	12	24
52	Troughs	8	28
	<b>MODELS</b>		
53	Heart	24	12
54	Eye	20	16
55	Ear	26	10
56	Skeleton	30	6
57	Skin	20	16
	<b>REAGENTS</b>		
58	Distilled water	36	0
59	Formaldehyde	36	0
60	Fehling's solution A&B (Food test)	24	12
61	Million's Reagent	20	16
62	Benedict's Solution	28	8
63	Disinfectant	22	14
64	Iodine Solution	36	0
65	Hydrochloric Acid (HCL) (conc & diluted)	0	36
66	Conc. Nitric acid	0	36
67	Sudan III	0	36
68	Copper (II) Sulphate	0	36
69	Starch Powder	30	6

<b>CHART</b>		
Human (General body)	26	10
Respiratory organ	20	16
Excretory organ	28	8
Digestive system	36	0
Circulatory system in man	32	4
Different types of mammalian bones (skeleton)	34	2
Chalkboard	36	0
Audio instructional materials e.g. microphone, tape-recorder	6	30
Electronic interactive instructional material e.g. computer, calculator	20	16
<b>INSTRUMENTS FOR ECOLOGICAL FIELD STUDIES</b>		
Quadrat	8	28
Rain gauge	6	30
Wet and dry bulb thermometer (hygrometer)	0	36
Wind vane	10	26
Anemometer	0	36
Light meter (photometer)	0	36
Barometer	0	36
Pooter disc	0	36
White disc/ Secchi disc	0	36
Sweep net/ Insect net	4	32
Drag net	0	36
Ph meter	0	36
Hydromter	0	36
Plankton net	0	36

Table 4 shows the frequency of usage of the biology instructional resources in the study area which revealed various degrees of usage of these resources in the teaching and learning process. When some of these resources are well used among schools, some are fairly used and some are not used at all by all the schools in the study area. This called for decision rule to be made to decide on the level of usage based on 60% benchmark, and this was obtained:

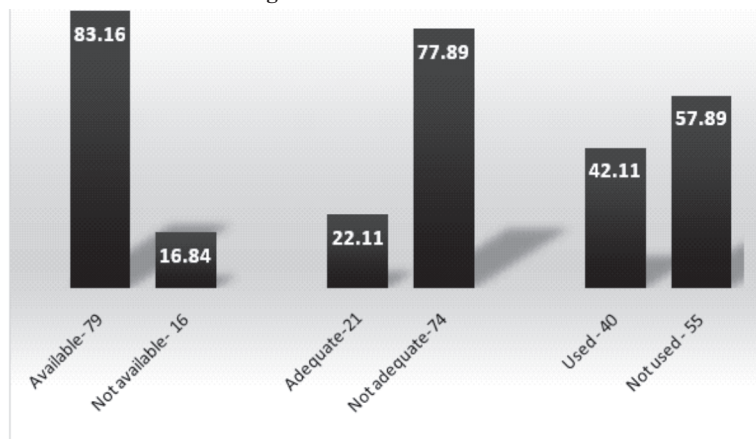
**Table 5: Descriptive Statistics of Usability of Biology Instructional Resources**

Indicates	No	%
Used	40	42.11
Not used	55	57.89

The results from Table 5 show that the level of usage of the instructional resources revealed that 42.11% (40) of the resources are used in the process of teaching and learning of Biology in the study area while 57.89% (55) were not used. This shows a low level of usage of instructional resources in implementing the biology curriculum in the study area.

Finally, the results of the Availability, adequacy and usage of instructional resources in the implementation of the biology curriculum in senior secondary schools in the study area are shown on the chart in Fig. 1

**Chart Showing the level of Availability, Adequacy and Usage of Instructional resources**



From the Figure 1, it can be inferred that, there is high level of availability, low level of adequacy and low level of usage of biology instructional resources for implementing biology curriculum in Southwestern Nigeria.

### **Discussion**

The result from the study shows that the instructional resources required for the implementation of Biology curriculum have high level(83.16%) of availability, while 16.84% of the required resources were unavailable in the studied schools. Among the unavailable resources in the studied area are the Clinostat, Cork borer, Insect settings, Plasticine, Models (Ear and Eye), Disinfectant, Audio instructional materials, Ecological instruments such as; Anemometer, Photometer, Pooter disc, Secchi disc, Sweep net, Drag net, Ph meter. It was also shown that, most the unavailable materials were resources needed for ecological study.

The result also showed that only 22.11% of the resources were available at the required quantity, which shows that 77.89% of the resources were not adequately provided. This is in tune with the study carried out by Ogunyemi and Ogunyemi (2022) on the adequacy of the instructional resources in Southwestern Nigeria. The study also showed a low level (42.11%) of usage of the instructional resources in the study area. This result conforms with the outcome of the research carried out in Lagos state by Arum (2015), in which the availability and utilization of biology instructional resources was assessed, it was found out that there was low availability and low level of utilization of the resources for the teaching of Biology in senior secondary schools.

### **Conclusion**

This study concludes that, there is much provisions but not enough in terms of adequacy and utilization of instructional resources for the senior secondary school biology in southwestern Nigeria, and this might affect the level of implementation of Biology curriculum and subsequently the students' learning outcome.

### **Recommendation**

Based on the results obtained from this study, the following recommendations were made;

- 1) Government should make availability of instructional

resources for the implementation of biology curriculum to be adequate;

- 2) Teachers should be encouraged to use the instructional resources in teaching process to enhance academic performance of the learners.
- 3) The use of improvised instructional resources should be encouraged among the Biology teachers, where the real equipment is unavailable.
- 4) Biology teachers should be trained on adapted strategies for augmenting Biology practical in resource-constrained Senior Secondary Schools in Southwestern Nigeria.
- 5) This study should be carried out to involved all the geopolitical zones of Nigeria, for proper generalization of the concepts under study.

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