

Investigating the Effective Use of Instructional Materials to Enhance Teaching and Learning of Biology, The Foundation of All Medical Professions in Government Secondary School, Uburu, South East, Nigeria.

Genesis Izang

Anatomy Department, Faculty of Basic Medical Sciences, College of Medicine, David Umahi Federal University of Health Sciences, P.M.B 211 Uburu, Ebonyi State, Nigeria.

DOI: <https://dx.doi.org/10.51244/IJRSI.2026.130200149>

Received: 16 January 2026; Accepted: 21 January 2026; Published: 15 March 2026

ABSTRACT

Background: The study on investigating the effective use of instructional materials to enhance teaching and learning of Biology, the foundation of all medical professions in Government Secondary School Uburu, South East, Nigeria was aim to examine the availability and level of usage of instructional materials by teachers while teaching Biology subject to students, it will also correlate between the use of instructional materials and students academic performance in external examinations and to give recommendation to government, school management, teachers, parent- teachers association and old students union on the provision and effective usage of instructional materials. **Methodology:** Assessment of West African Senior Secondary School Examination grade record for 2020/2021 with 148 students consisting of 66 males and 82 females with overall 38.5 percent (%) pass and 61.5% fail, 2021/2022 with 154 students consisting of 68 males and 86 females with overall 42.2% pass and 57.8% fail and 2022/2023 with 159 students consisting of 70 males and 89 females with overall 37.7% pass and 62.3% fail. Interview, observation and questionnaires case study research method was also used to generate information from three Biology teachers on the availability of instructional resources, the total number of instructional materials that are supposed to be use (NIMSU), number of instructional materials that was used (NIMU), and number of instructional materials that was not used (NIMNU), for 1st, 2nd and 3rd term to senior secondary one (SS1) students, 2023/2024 session. The data was collected and analyzed using access and excel version 13, for simple mean and percentage computation. **Result:** 1st term finding shows that out of the total 90 NIMSU and 9.0 mean of 100% NIMSU only 38 NIMU with 3.8 mean of 42.22% NIMU were utilized while 52 NIMNU with 5.2 mean of 57.78% NIMNU were not utilize by a Biology teacher to students. 2nd term findings shows that out of the total 100 NIMSU and 10.0 mean of 100% NIMSU only 51 NIMU with 5.1 mean of 51% NIMU were utilized while 49 NIMNU with 4.9 mean of 49% NIMNU were not utilized by a Biology teacher to students. 3rd term findings shows that out of the total 112 NIMSU and 11.2 mean of 100% NIMSU only 38 NIMU with 3.8 mean of 34% NIMU were utilized while 74 NIMNU with 7.4 mean of 66% NIMNU were not utilize by a Biology teacher during lesson to students. **Summary result of findings for 1st, 2nd and 3rd terms** shows that out of the total 302 NIMSU and 10.06 mean of 100% NIMSU only 127 NIMU with 4.23 mean of 42% NIMU was utilized while 175 NIMNU with 5.83 mean of 58% NIMNU were not utilized by the biology teachers to students. **Conclusion:** There was no effective use of instructional materials by SS1 Biology teachers of Government Secondary School Uburu, Nigeria, the cause of poor students' performance in external examination. Government should provide adequate instructional materials and support teachers training.

Keywords: Availability and use of instructional materials, Enhance teaching and learning, Students academic performance, Teachers and government,

INTRODUCTION

Instructional materials are instrument or teaching aid use by teachers to illustrate the lesson of the topics under consideration which usually enhances students' active learning participation to teaching¹. Remillard and Bryan

see instructional materials as resources which can be organize and use to support instructions that may enhance teaching and learning ². The aim of this study was to examine the level of adequate provision of Biology instructional materials by government and to correlate the use of instructional materials by teachers with student performance in both internal and external examinations. The research is also aim to give recommendation to government, school management, parent teachers association, old student union and teachers on the provision and use of Biology instructional materials in government secondary school Uburu, Nigeria. Previous research had shown that the use of instructional materials motivate students participation to learning with good performance record in examination ³, and that was why this study wish to ascertain the reason students in government secondary school Uburu, Nigeria failed to have a good overall result in Biology subject when the West African Examination Council release the West African Senior Secondary School Certificate Examination (WASSCE) result of 2020/2021, 2021/2022 and 2022/2023 that become an outcry by the school management, teachers, students and parents. The poor result was an indication that the students do not understand what was taught to them and so the study wishes to know the level of instructional materials usage by teachers during lesson presentation to students.

Moreover, the study made by Nsa and his team had shows that the use of instructional materials for teaching Agricultural science subject had significantly improve the performance of students in practical Agriculture ⁴. Their study was not in agreement with this study because if instructional materials were use by Biology teachers the performance of students in government secondary school Uburu will improve positively in external examination. The study was in line with the study made by two independent researchers, Bouckaer and Hattie whose assertions implies that instructional materials are fundamental educational tools that influence students ability to learn easily and teachers ability to impact knowledge with less stress ^{5, 6}. Examples of instructional materials used by teachers to enhance teaching and learning include chart, graph, slide, microscope, projectors, computers, laptops, calculators, flashcard, photos, televisions, radios, white boards, black boards, chalks, makers, posters, text books, specimen, recording player, laboratory equipments, teachers learners guide among others ^{7, 8, 9}. While Osokoya ¹⁰, only examined the effect of videotape instructions on secondary school students achievement in History and concluded that those taught with instructional materials performed better than those that received only oral teaching from their teacher. Their research was in agreement with this study. Since Biology is a pre-requisite for studying medicine, medical laboratory science, anatomy, physiology, physiotherapy, dentistry, pharmacy among others, the need for investigating the effective use of instructional materials may help to solve the problems associated with it, to pave way for good career foundation which have link to Biology. This study was not conducted by any author at the time of submission of this research work.

METHODOLOGY

Instrument use for data collection

The instrument used for data collection includes interview, Observation of educational resources, three set of questionnaires and three writing pens.

Method of Data Collection

The data of this study was collected from the grade record score release by the West African Examination Council for West African Senior Secondary School Certificate Examination of 2020/2021 session consisting of 148 students records, 2021/2022 session consisting of 154 students records and 2022/2023 session consisting of 159 students records which the principal of the school make it available for the researcher to assessed. The data was also collected from three Biology teachers who taught senior secondary one (SS1) students at government secondary school Uburu, Ebonyi State, Nigeria. The teachers were introduce to the researcher by the principal of the school. The researcher explained to them his aim of investigating the effective use of instructional material was to help increase the performance of students in external examination and to make recommendation to government through the federal minister and state commissioner of education on the need of adequate provision of instructional materials to federal and state public schools respectively. The study will also encourage school management, parent teachers association and old students union on the need to support the government through provision of the instructional materials which the school lack.

After gaining the consent of the Biology teachers, interview was conducted on all of them on the availability of instructional materials in their school in which they responded of insufficient instructional resources and the researcher confirmed by visiting the library, biology laboratory and the information and communication technology (ICT) units. The ICT unit has few functional computers. A questionnaire was presented to each of the teachers to fill. The sampling technique in the questionnaire requires the Biology teachers who taught students in their respective 1st, 2nd and 3rd terms to answer the following questions by filling correctly with the pen provided to each of them.

(1). do you have a documented record lesson note for SS1 2023/2024 session? This question requires the Biology teacher to write yes or no. If the teachers filled yes, then they have the permission to participate in the research but any teacher that filled No, will be prevented from participating in the research since the teacher has no documented record. However all the teachers filled Yes and were allowed to participate in the research willingly.

(2). what is your highest qualification? The input of this will help the researcher to make recommendation on the need for training and retraining of teachers to government for easy use of instructional materials.

(3). which term and class of students you taught in 2023/2024 session? Teachers are expected to input 1st or 2nd or 3rd terms and the class which was SS1.

(4). what are the sources of the instructional materials you use, are they adequately provided? The input made by the biology teachers can help the researcher to make recommendation to government and nongovernmental organization for assistance.

(5). do you believe that instructional materials enhance teaching and learning? Teachers are expected to fill either yes I believe or no I don't believe.

(6). what is the total number of instructional materials suppose to be use (NIMSU) per weeks per term? Teachers are expected to fill all topics taught with the corresponding NIMSU for each term and at end sum the total.

(7). what is the total number of instructional materials used (NIMU) per weeks per term? Teachers are expected to write all the topics taught with the corresponding NIMU for each term and at end sum the total.

(8) What is the total number of instructional materials not use (NIMNU) per weeks per term? Teachers are expected to write all the topics taught with the corresponding NIMNU for each term and at end sum the total.

Design of the study

The design of this study was cross sectional survey.

Population of the study

The populations of the study were 461 record of students in WASSCE from 2021 to 2023 and three Biology teachers who taught senior secondary one (SS1) students in first, second and third term for 2023/2024 session. Therefore total population of study was 464 people.

Sample and sampling technique

Systematic sampling technique was adopted in this research work..

Validation of the instrument used for data collection

The instrument used for data collection was validated by three experts Prof. E.O. Ewunonu, Prof. James Ogbu and Dr. Christiana Okoronkwo who were all lecturers of Ebonyi State University, Abakaliki, Nigeria.

Reliability of the instrument used for data collection

The reliability of the instrument used for data collection was established by computing the mean and the percentage of the trial test scores of the study.

Method of data analysis

The data analysis was done using Access and Excel version 13.

Ethical approval

Ethical approval was obtained from the Faculty of Basic Medical Sciences Ebonyi State University, Abakaliki, Nigeria and was used to obtain permission from the school management before the commencement of this study

RESULT

Table 1, Shows Questionnaires Feedback Report of SS1 Biology Teacher for First Term 2023/2024 Session on the Use of Instructional Materials.

Week	Topic Taught	NIMSU	NIMU	NIMNU
2	Living and Non-Living Things	7	6	1
3	Classification of Living and Non-Living Things	22	7	15
4	Organization of Life	7	3	4
5	Cell	15	3	12
6	Diffusion and Osmosis	11	4	7
7	Nutrition	7	3	4
8	Respiratory System	6	3	3
9	Autotroph	4	3	1
10	Excretion	5	3	2
11	Growth and Cell Reaction	6	3	3

NIMSU: Number of instructional materials supposed to be used. NIMU: Number of instructional materials used. NIMNU: Number of instructional materials not used. SS1: Senior secondary one

Table 2, Shows the Summary of Result Findings for First Term SS1 2023/2024 Session on the Use of Biology Instructional Materials by a Teacher.

Weeks	Total Topics Taught	NIMSU Total	Mean	%	NIMU Total	Mean	%	NIMNU Total	Mean	%
10	10	90	9.0	100	38	3.8	42.22	52	5.2	57.78

NIMSU: Number of instructional materials supposed to be used. NIMU: Number of instructional materials used. NIMNU: Number of instructional materials not used. SS1: Senior secondary one. %: Percentage.

Table 3, Shows Questionnaires Feedback Report of SS1 Biology Teacher for Second Term 2023/2024 on the Use of Instructional Materials.

Week	Topic Taught	NIMSU	NIMU	NIMNU
2	Organelles for Movement	6	3	3
3	Forms of Reproduction	12	4	8
4	Skeletal System (Man, Rat, Cow, Snake and Bird)	5	3	2
5	Tissues and Supporting System of Vertebrate	12	10	2
6	Tissues and Supporting System of Invertebrate	13	6	7

7	Tissues and Supporting System of Vertebral Column	8	8	0
8	Tissues and Supporting System in Plants	8	3	5
9	Types of Food (Nutrition)	17	8	9
10	Mode of Feeding (Nutrition)	12	3	9
11	Dentition	7	3	4

NIMSU: Number of instructional materials supposes to be use. NIMU: Number of instructional materials used. NIMNU: Number of instructional materials not use. SS1: Senior secondary one

Table 4, Shows the Summary of Result Findings for Second Term SS1 2023/2024 Session on the Use of Biology Instructional Materials by a Teacher.

Weeks	Total Topics Taught	NIMSU Total	Mean	%	NIMU Total	Mean	%	NIMNU Total	Mean	%
10	10	100	10.0	100	51	5.1	51	49	4.9	49

NIMSU: Number of instructional materials supposes to be use. NIMU: Number of instructional materials used. NIMNU: Number of instructional materials not use. SS1: Senior secondary one. %: Percentage.

Table 5, Shows Questionnaires Feedback Report of SS1 Biology Teacher for Third Term 2023/2024 Session on the Use of Instructional Materials.

Week	Topic Taught	NIMSU	NIMU	NIMNU
2	Food Test	10	3	7
3	Ecosystem: Component of Ecosystem	15	3	12
4	Ecosystem: Rain Forest	14	3	11
5	Southern Guinea Savanna	10	5	5
6	Functional Ecosystem: Food Chain	10	3	7
7	Functional Ecosystem: Trophic Level	11	5	6
8	Functional Ecosystem: Food Web	13	3	10
9	Laws and Application of Thermodynamics	5	3	2
10	Plant Classification Based on Life Cycle	14	7	7
11	Pest and Diseases of Crops	10	3	7

NIMSU: Number of instructional materials supposes to be use. NIMU: Number of instructional materials used. NIMNU: Number of instructional materials not use. SS1: Senior secondary one

Table 6, Shows the Summary of Result Findings for Third Term SS1 2023/2024 Session on the Use of Biology Instructional Materials by a Teacher.

Weeks	Total Topics Taught	NIMSU Total	Mean	%	NIMU Total	Mean	%	NIMNU Total	Mean	%
10	10	112	11.2	100	38	3.8	34	74	7.4	66

NIMSU: Number of instructional materials supposes to be use. NIMU: Number of instructional materials used. NIMNU: Number of instructional materials not use. SS1: Senior secondary one. %: Percentage.

Table 7, Shows the Summary of Result Findings for First, Second and Third Terms SS1 2023/2024 Session on the Use of Biology Instructional Materials by Three Teachers.

Weeks	Total Topics Taught	NIMSU Total	Mean	%	NIMU Total	Mean	%	NIMNU Total	Mean	%
30	30	302	10.06	100	127	4.23	42	175	5.83	58

NIMSU: Number of instructional materials supposed to be used. NIMU: Number of instructional materials used. NIMNU: Number of instructional materials not used. SS1: Senior secondary one. %: Percentage.

Table 8, Shows the Biology Grades of Males and Females Students OF Government Secondary School, Uburu in West African Senior Secondary School Certificate Examination (WASSCE).

Session	Males	A	B	C	D	E	F	Females	A	B	C	D	E	F
2020/2021	66	–	10	10	10	4	41	82	2	4	16	10	–	50
2021/2022	68	2	4	12	8	2	40	86	1	2	20	12	2	49
2022/2023	70	1	2	15	1	8	43	89	2	2	20	3	6	56

Table 9, Shows Biology WASSCE Percentage Pass and Fail Result of Students in Government Secondary School, Uburu.

Session	Total Students	Percentage Pass (%)	Percentage Fail (%)
2020/2021	148	38.5	61.5
2021/2022	154	42.2	57.8
2022/2023	159	37.7	60.3

WASSCE: West African Senior Secondary School Certificate Examination.

DISCUSSION

The summary result of finding for first term 2023/2024 session shows that the total instructional materials supposed to be used (NIMSU) by Biology teacher in teaching students of Government Secondary School, Uburu was 90NIMSU but the number of instructional materials used (NIMU) by the Biology teacher was 38NIMU. The analysis shows only 42.22% usage of NIMU, even though the result is not fail but a weak pass it can be correlated with the school external result obtained in West African Senior Secondary Certificate Examination (WASSCE) 2021/2022 session, showing out of total 154 students who registered for WASSCE only 65 (42.2%) of students that pass with the following grade result, 3 excellent, 6 very good, 32 credit, 20 strong pass and 4 students have fair or weak pass result while 89 (57.8%) of students fail the examination. The ineffective use of instructional materials by Biology teachers while impacting knowledge to students was the cause of students poor performance and the main reason why Ebonyi state Nigeria have inadequate medical practitioners.

The summary result of finding for second term 2023/2024 session shows that the total instructional materials supposed to be used by Biology teacher in impacting knowledge to students of Government Secondary School, Uburu was 100NIMSU. The computation shows 51% usage of NIMU and 49% of instructional materials not used (NIMNU) by the Biology teacher while teaching students. This result shows that that there was not effective use of instructional materials by the Biology teacher and that was why only 65 (42.2%) of students pass WASSCE for admission in to tertiary institutions while 89 (57.8%) fail the examination and become the reason why Uburu community and Ebonyi state, Nigeria as a whole lack sufficient medical practitioners that may help in curing, caring and managing of sick people.

The summary result of finding for third term 2023/2024 session shows that the total instructional materials that was supposed to be used by Biology teacher to enhance students participatory learning was 112NIMSU out of this

the actual number of instructional materials used was 38NIMU and number of instructional materials not used was 74NIMNU. This result is very poor showing that instructional materials are not effectively use by the Biology teacher handling senior secondary one students of Government Secondary School, Uburu. This deficiency may be correlated to the reason why students had 61.5% and 62.3% fail grade result in 2020/2021 and 2021/2022 WASSCE respectively. The Biology subject taught in secondary school is the basic foundation of all medical profession, therefore the ability of a teacher to teach the subject using instrucional materials will motivate students to learn with good performance in internal and external examination for admission into tertiary institution where they will build on what they learn in Biology as they study medicine and surgery, nursing, radiography, optometry, medical laboratory science, pharmacy, anatomy, physiology, physiotherapy, public health, biochemistry, medical biological science, pathology, dentistry, microbiology and parasitology among others. After successful graduation from their course of study the society (Uburu) and Ebonyi state, Nigeria as a whole may have more medical practitionals who will help in research, diagnosis and treatment of diseases to alleviate the sufering of people and to reduce the number of people seeking for treatment out side Nigeria.

CONCLUSION

There was no effective use of instructional materials due to inadequate provision of educational resources by government and lack of teachers training and interest to locally provide educational materials, the cause of external examination poor academic performance of students in government secondary school, Uburu, Ohaozara Local Government, Ebonyi State, Nigeria.

RECOMMENDATON

- (ii). Government should establish resource centers to facilitate borrowing by teaching staff.
- (ii). Government should allocate sufficient budged to education that will ensure adequate supply of instructional materials to all public schools in rural and urban areas.
- (iii). Government should occasionally organize workshops, conferences and meetings with teaching staff on effective use of instructional materials.
- (iv). Government should encourage and support teachers to further their education.
- (v). School management, teachers, parent teachers association and old students should assist the government in the provision of instructional materials.
- (vi).The principal should ensure proper monitoring of effective usage of available instructional materials by all teachers.

Source of fund

The author did not obtain financial support from any group or individual body but finance the research work from his remuneration.

Conflict of interest

The author reported no conflict of interest in the course of this research work.

Author contributions

Research design, Data collection, Data analysis, Literature review and Typing of manuscript.

ACKNOWLEDGEMENT

The support of the principal and the willingness of Biology teachers to participate in this study is highly appreciated and worth acknowledgement.

REFERENCES

1. Kibirige R, Lutalo B, Christopher S. Effective use of learning materials and its impact on students' academic performance in secondary schools of Mpigi district, Uganda. *African Quarterly Social Science Review* 2(1), 123-132. <https://doi.org/10.51867/QSSR2.1.10>
2. Remillard JT, Bryans MB. Teachers' orientation toward mathematics curriculum materials: implications for teachers' learning. *Journal of Research in Mathematics Education*. 2004, 35(5), 352-388. CrossRef, Web science, Google scholar.
3. Alabare RA. The importance of instructional materials in teaching English as a second language. *International Journal of Humanities and Social Science Invention*. 2017, 6(9), 36-44.
4. Nsa OS, Ikot SA, Udo FM. Instructional materials utilization and students' performance in practical Agriculture. *Journal of Educational Research and Review*. 2013, 1(4), 49-54.
5. Bouckaert M. Current perspectives on teachers as materials developers. Why, what and How? *RELC Journal*. 2018, 49, 238-257.
6. Hattie J. Visible learning using materials. *The Sequel of London Routledge*, 2023, 4(4) 3-20. Google scholar.
Arop BA, Umanah FI, Effiong OJIE. Effect of instructional materials on teaching and learning of basic science in junior secondary schools of Cross River State, Nigeria. *Global Journal of Educational Research*. 2015, 14, 67-73.
7. Barry G. Social system theory. *Britannica*. <https://www.britannica.com/topic/systems-theory>.
8. Effiong EO, Igiri C. Impact of instructional materials in teaching and learning of Biology in senior secondary school Yakurr, Nigeria. *International Letters of Social and Humanities Sciences*. 2015, 62, 8. <https://doi.org/10.18052/www.scipress.com/ILSHS.62.27>.
9. Osokoya IO. Effect of videotape instruction on secondary school students' achievement in History. *Int. J. Afr. Am. Stud.* 2007, 6(1) 27-34.