INFLUENCE OF INSTRUCTIONAL MATERIALS ON ACADEMIC ACHIEVEMENT OF BIOLOGY STUDENTS IN CALABAR SOUTH LOCAL GOVERNMENT AREA, NIGERIA

Ebek, Scholastica Okon,
Department of Science Education
University of Calabar - Calabar
scholasticaebek@gmail.com

Ekon, Esther Etop
Department of Science Education
University of Calabar - Calabar
estheretopy@gmail.com

John, Monica Etop,
Department of Science Education
University of Calabar - Calabar
monicajohn29@yahoo.com

Ekpenyong Effiong Ibok
Department of Science Education,
University of Calabar - Calabar.
ibokekpenyong@yahoo.com

Abstract
The study investigated the influence of instructional materials on the academic achievements of students' in biology. Two research questions were raised which were transformed into two null hypotheses to guided the study. Ex-Post facto research design was adopted. All SS1 students in the study area formed the population of the study. Three hundred (300) students were randomly selected as sample. To generate data, two instruments titled Availability and Adequacy of Instructional Material (ADIMand Students' Achievement Test in Biology (SATB) were developed by the researchers, and validated by experts. Cronbach Alpha was used to obtained the reliability index for (ADIM) which give 0.84 for availability and .86 for adequacy *and Kuder Richardson-20 (Kr-20) with an index of .85 for (SATB). Simple Linear Regression was used to test the two null hypotheses at .05 level of significance. The results obtained shows that there is a significant influence of availability and adequacy of instructional materials on academic achievements of students in biology. It was concluded that availability and adequacy of instructional materials are very important factors in teaching/learning and should be employed by teachers during instruction in order to enhance students' academic achievement in Biology. Based on this it was recommended that:* government and educational stakeholders should endeavour to provide instructional material so as to improve students' academic achievement in Biology

Key Words: Adequacy, Availability, Instructional materials and Academic achievement.

Introduction

Biology is the scientific study of life which gives insight into complexity of living organisms from the tiniest cell to the whole ecosystem. Biology is useful and plays a crucial role

in addressing the challenges of the 21st century and contributes to the diversity of modern life such as advancement in technology, medicine, food security and environmental management. In spite of its contribution to improved life in general (Kalu, 2011). Secondary school students' academic achievement in biology over the years has been a concern. Eshiet (2017) reported that poor performance of biology students' in external examination such as West Africa Secondary School Certificate Examination (WASSCE), National Examination Council (NECO) and University Tertiary Matriculation Examination (UTME) have hindered most students to gain admission into tertiary institutions, or enroll in their course of interest.

According to Olubunmi and Kolawole (2023), poor performance of junior and senior secondary school students in certificate examinations has been consistent in recent time (2010 and 2021 Examination Summits notwithstanding). Many attributed the poor performance of students to the poor teaching methods adopted by teachers, while some blamed it on teachers' inefficiency and ineffectiveness. Others blame it on teachers' low qualification and inadequate experience. Despite the attempt and efforts to enhance students' achievement by government, parents, teachers, NGOs and international body the trend still holds. Njoku and Mgbomo (2021) affirmed that despite the importance and popularity of biology among Nigeria students', performance at senior secondary level is still poor.

Academic achievement is a multifaceted construct that comprised different domains of learning. Its definition depends on the indicators used to measure it. It is the extent to which a student, teacher or institution has attained their short or long-term educational goals. Academic achievement is used in decision making such as schools' admission, level of scholarship, level of academic preparations in a particular subject or overall subjects According to John (2022) academic achievements are the positive, and demonstrable results of one's academic performance. Drew (2023) opined that academic achievement is any recognized success one may have achieved in an educational context, that might be able to present on a resume or scholarship applications as evidence of academic skills and unique academic strength.

With the enormous growth in digital technology, technologies that are not originally designed for educational purpose have been in-cooperated into education by teachers' creative and innovative ability . Teachers can also improvise learning aids from locally available materials and even from waste. Ekon, Sambo, and Ashiwere (2023), defined locally made instructional materials as materials and equipment obtainable from the local environment or designed by teachers or with the help of local resource persons. While locally available materials include; forests, streams, ponds, mountain, hills, sand pits, creeks, health centers, rocks, woods, and farmlands. According to Amos, Eghan, and Oppong, (2022), learners acquisition and retention of factual information, improved attitude and increased self-motivation to learn biology, themes and concepts are enhanced by instructional materials. In the same vein, Kabesa (2019) enumerated the gains one can get when traditionally made instructional resources are used for teaching, these include; shared memory of the classroom, improved students' retention, skill acquisition, preparation for adult life, enhanced learners' creativity and teachers teaching. Lane (2022) was of the view that instructional aids help students to learn new concepts and provide opportunity for practice. Ekon et al, (2023) and Ibu et al (2019). Asserted that biology and others science teachers who adopt appropriate locally made instructional materials in teaching biology tend to be more successful in impacting the knowledge of biology to students based on the fact that these materials are found in the environment where the students live.

The ultimate goal of any teacher is to improve the ability level and prepare students for adulthood**.** A good teacher uses appropriate teaching strategies and techniques to gain students' attention, promote learning and improve their learning abilities. The choice and effective use of instructional materials can have a direct impact on how well students learn and perform in a subject. As observed by Chempkemoi (2016), instructional materials are used to facilitate and aid the teaching and learning process for better understanding of concepts in schools. Karimi (2012) affirmed that lack of learning resources led to low creativity among learners because the

learners would not be actively involved in the class while the teacher resorted to using lecture method. The choice and appropriate use of instructional materials often times result to the following: clarity of concepts, active engagement, accessibility, reinforcement, application of knowledge, assessment preparation, teacher effectiveness, feedback and self- assessment.

Odejobi (2014) observed that appropriate instructional materials are important tools that every teacher must use in the teaching and learning process. Furthermore, Odejobi asserted that it is essential to consider the quality, relevance and appropriateness of the instructional materials for specific learning outcome. Science teachers who are supportive, and passionate about their subject can inspire and motivate their students to learn and understand biology concepts easily. When teachers use a variety of instructional materials such as textbooks, visual aids, technologies like software, apps effectively, students learning experiences are enhanced. These can also promote engagement, understanding, application and motivation. Science teachers' creativity in teaching and using a variety of materials create a dynamic and effective learning environment for students. The present study seeks to determine if the use of instructional materials significantly influence students' learning experience and academic achievement in Biology. Oluwasegun, and Owolabi, (2020) examine the effects of virtual laboratory instructional strategy on secondary school students' learning outcomes and found availability of instructional material significantly influence students' achievement in schools.

Ogunbodede and Oribhabor (2022), conducted a study on digital resources usage and academic performance of undergraduate students' in University of Africa, Toru-Orua, (UAT), Bayelsa state Nigeria and found a significant relationship between availability and adequacy of digital resources usage and academic performance of students at UAT. Eraikhuemen and Omoregbe (2017) studied teachers' attitude to the use of instructional materials in teaching pre-service mathematics teachers' and found teachers' positive attitudes towards the use of available instructional materials significantly influence effective teaching and learning. Oluwaseun, et al, (2019) studied the availability and adequacy of biology education resources in the curricula of open and conventional universities in south western Nigeria and found a significant influence of availability and adequacy of biology education resources on students' performance, Inah et al (2022) also conducted a study on enhancing students' academic performance through utilization of ethno mathematic and ethno basic science in Cross River State, Nigeria, the result showed a significant influence in the academic performance of students enhance through utilization of ethno mathematic and ethno basic science approach. Waigera, et al, (2020) studied the relationship between teachers' attitude and the utilization of instructional materials in pre-primary schools in Kenya and adequacy of for classroom teaching enhancing students' academic achievement.

Purpose of the study

Specifically, the study seek to examine

- **i)** The influence of availability of instructional materials on the mean achievement score of Biology students
- **ii)** The influence of adequacy of instructional materials on the mean achievement score of Biology students?

Research questions

The following research question guided the study:

- **iii)** How does availability of instructional materials influence the mean achievement score of Biology students?
- **iv)** How does adequacy of instructional materials influence the mean achievement score of Biology students?

Hypothesis

The following null hypothesis was formulated, at 0.05 significant level, to guide the study.

Ho_1– There is no significant influence of availability of instructional materials on the mean achievement score of Biology students.

Ho_2– There is no significant influence of availability of instructional materials on the mean achievement score of Biology students.

Methodology

The study area was Calabar South Local Government Area of Cross River State, Nigeria. The research design used was the ex-post facto design. The researchers used this design because the independent variable which is teachers' use of instructional material is an action that had occurred and the researcher had no direct control over it. The population for the study consisted of all the 1,112 senior secondary school I (SS 1) students in the study area. Simple random sampling technique was used to select 300 SS1 students representing 27% of the population for the study using the hat and draw technique. The instruments used for data collection were the questionnaire titled "Availability and adequacy Instructional Materials" (ADIM) and Students Achievement Test in Biology (SATB).

The questionnaire (ADIM) was constructed based on four point Likert Scale while the achievement test (SATB) was made up of 40 multiple choice items constructed by the researchers. The items were constructed based on topics from the SS1 Biology syllabus with four options A, B, C, D. A correct answer attracts1mark while incorrect answer attracts 0 mark. The instruments were face and content-validated by two experts in Measurement and Evaluation and two Biology Educators, all from the University of Calabar. Corrections were pointed out by the experts and adjustment made by the researchers rendering the instrument valid for experiment. The reliability for ADIM was established using Cronbach Alpha which give 0.84 for availability and .86 for adequacy while SATB was established using Kuder Richardson Formula (K-R) 20 which gives 0.85 after a trial testing with 40 SS1 students who were not part of the sample for the study. The estimates were considered high enough for the study. The hypotheses were tested using simple Linear Regression at .05 level of significance.

Results

The result of the analysis was presented on tables 1and 2. The hypotheses were tested at .05 significant level.

Hypothesis one

There is no significant influence of availability of instructional materials on the mean achievement score of Biology students. The independent variable in this hypothesis is availability of instructional material s while the dependent variable is the mean achievement score of Biology students . To test this hypothesis, simple linear regression was applied with availability of instructional materials as the independent variable and students' academic achievement in Biology as the dependent variable. The F-ratio test was used to test for the significance of the overall prediction model, while t-test was used to test for the significance of the contribution of the regression constant and coefficient (which represents the predictive power of the independent variable) in the prediction model. The results are given in Table 1.

Table 1

Regression analysis on the influence of availability of instructional materials on students' academic achievement in biology

R-value = .426	Adjusted R-squared = .178
R-squared = .181	Standard error = 3.98675

Source of variation	Sum of squares	Df	Mean square	F-value	R-value
Regression	986.765	1	986.765	66.040*	.000
Residual	4452.688	298	14.942		
Total	5439.453	299			
Predictor variable	Unstandardized coefficient B Std.error		Std coeff	t-value	p-value
Constant	54.321	1.543		35.205*	.000
Availability of instructional materials	-.342	.025	-.046	-13.680*	.000

- Significant at .05 level. P< .05

The results in table 1 show that the R-value of .426 was obtained, resulting in an R-squared value of .181 This means that the variation in availability of instructional materials accounted for about 18.1% of the total variation in students' academic achievement in Biology. The p-value (.000) associated with the computed F-value (66.040) was less than .05. As a result, the null hypothesis was rejected. This means that the availability of instructional materials significantly influence mean achievement score of Biology students , with both the regression constant (54.321) and coefficient (-.342) contributing significantly in the prediction model (t=35.205 & -13.680 respectively, p=.000 & .000< .05).

Hypothesis two

There is no significant influence of adequacy of instructional materials on the mean achievement score of Biology students. The independent variable in this hypothesis is adequacy of instructional material s while the dependent variable is the mean achievement score of Biology students . To test this hypothesis, simple linear regression was applied with adequacy of instructional materials as the independent variable and students' academic achievement in Biology as the dependent variable. The F-ratio test was used to test for the significance of the overall prediction model, while t-test was used to test for the significance of the contribution of the regression constant and coefficient (which represents the predictive power of the independent variable) in the prediction model. The results are given in Table 2.

Table 2

Regression analysis on the influence of adequacy of instructional materials on students' academic achievement in biology

R-value = .383			Adjusted R-squared = .145		
R-squared = .147			Standard error = 3.76543		
Source of variation	Sum of squares	Df	Mean square	F-value	R-value
Regression	798.982	1	798.9820	51.309*	.000
Residual	4640.471	298	15.572		
Total	5439.453	299			
Predictor variable	Unstandardized coefficient		Std coeff	t-value	p-value
	B	Std.error			
Constant	43.765	1.874		23.354*	.000
Adequacy of instructional materials	.453	.078	.092	5.808*	.000

- Significant at .05 level. P< .05

The results in table 2 show that the R-value of .383 was obtained, resulting in an R-squared value of .147 This means that the variation in adequacy of instructional materials accounted for about 14.7% of the total variation in students' academic achievement in Biology. The p-value (.000) associated with the computed F-value (51.309) was less than .05. As a result, the null hypothesis was rejected. This means that the adequacy of instructional materials significantly influence mean achievement score of Biology students , with both the regression constant (43.765) and coefficient (.453) contributing significantly in the prediction model (t=23.354 & 5.808 respectively, p=.000 & .000< .05).

Discussion of findings

The result of the first hypothesis revealed that there is no significant influence of availability of instructional materials on the mean achievement score of Biology students.. With this result, the null hypothesis was rejected and the alternative hypothesis was accepted**.** Which implies that, students' poor academic achievement in Biology is attributed to lack of instructional materials for effective teaching and learning.

The finding is in agreement with Chempkemoi (2016) who stated that instructional materials are used to facilitate and aid the teaching process for better understanding of concept in schools. The result is in consonant with Amos et al. (2022) who affirmed that learners acquisition and retention of factual information, improved attitude and increased self-motivation to learn biology themes and concepts is enhanced by instructional materials. The result is consistent with Kabesa (2019) enumeration of the gains of locally made instructional resources to include; shared memory of the classroom, improved students' retention, skill acquisition, preparation for adult life, enhanced learners' creativity and teachers teaching. The result is in accord with Ekon et al. (2023) assertion that biology teachers who adopt appropriate and locally made instructional materials in teaching biology will likely be more successful in impacting the knowledge of biology to inexperienced biologist.

The result of the record hypothesis revealed that there is no significant influence of adequacy of instructional materials on the mean achievement score of Biology students.. With this result, the null hypothesis was rejected and the alternative hypothesis was accepted**.** Which implies that, students' poor academic achievement in Biology is attributed to inadequate

instructional materials for effective teaching and learning. The finding is in agreement with Ogunbodede and Oribhabor (2022), conducted a study on digital resources usage and academic performance of undergraduate students' in University of Africa, Toru-Orua, (UAT), Bayelsa state Nigeria and found a significant relationship between adequacy of digital resources usage and academic performance of students at UAT. The finding agreed with Eraikhuemen and Omoregbe (2017) who studied teachers' attitude to the use of instructional materials in teaching pre- service mathematics teachers' and found teachers' positive attitudes towards the use of instructional materials significantly influence effective teaching and learning. Oluwaseun, Onovroghene, and Ojediran, (2019) studied the availability and adequacy of biology education resources in the curricula of open and conventional universities in south western Nigeria and found a significant influence of adequacy of biology education resources on students' performance. The finding agreed Waigera et al. (2020) who studied the relationship between teachers' attitude and the utilization of instructional materials in pre-primary schools in Kenya and adequacy of for classroom teaching enhancing students' academic achievement.

Conclusion

Availability and adequacy of instructional materials could influence students' academic achievement in biology either positively or negatively. Based on the finding of the study, it was concluded that availability and adequacy of instructional materials significantly influence students' academic achievement in Biology. Therefore, availability and adequacy instructional materials is a very important factor and should be upheld by teachers in order to enhance students' academic achievement in Biology.

Recommendations

Based on the findings of this study, the following recommendations were made:

i. Government and educational stakeholders should endeavor to provide instructional material so as to improve students' academic achievement in Biology.
ii. Government and educational stakeholders should endeavor to made available and adequate instructional materials to sufficient enough for effective teaching and learning in order to enhanced students' academic achievement in Biology.
iii. Teachers should be encouraged and be motivated to teach with adequate learning materials in order to enhance students' academic achievement in Biology.

References

Amos, S., Eghan, M.P.K & Oppong, E., (2022). Impact of instructional materials in and learning biology in the colleges of education in central region of Ghana. *Open Journal of Educational Research,* 2(5), 213-221.

Chempkemoi, K. F., (2016). Factor influencing the selection of instructional materials in teaching pre- schools in Kenya. *International Journal of Educational Research,* 4(11), 355-560.

Drew, C., (2023). 39 Examples of academic achievements examples. Helpful professor https:// helpful professor.com/academic-achievement-examples

Ekon, E. E., Sambo, G.I., & Ashiwere, I.O. (2023). Influence of locally available instructional materials of biology and students' academic achievement in Abak local government area of Akwa Ibom state. *Global Journal of Education Research* 22, 81-87.

Eraikhuemen, L., & Omoregbe, M.E. (2017). An investigation of teachers' attitude to the use of instructional materials in mathematics teaching. *Developing Country studies,* 7(2),23-33

Eshiet, L. (2017). Factors that influence academic achievement and attitudes toward education. *International Journal of instruction,* 1(1), 31-48.

Ibu, P. N., Adie, E. B., & Andortan, J. A. (2019) Home Environmental Variables and Mathematics Study habits among Secondary School three (JSS3) Students in Calabar Education Zone of Cross River State, Nigeria. *Prestige Journal of Education* 2(2), 189-197

Inah, L. I., Ekon. E. Ekwueme, C. O., Adie E. B., Okri J. A., & Idiege K. J. (2022) Enhancing students' academic performance through utilization of ethno mathematic and ethno basic science in Cross River State, Nigeria. *Journal of Teaching and Learning in Africa* 5(1) ISSN: 0794-1412 www.africateaching-authorities. org

John, S. (2022). 36 Examples of academic achievements. simplicable. https://Simplicable.com/edu/academic achievements.

Kabesa, S. (2019) Locally available resources as an instructional aid in secondary school science in Kenya. *International Journal of Research and Innovation in Social Science,* 3(9), 462-465.

Kalu, U.U. (2011). Review of factors which influences the attitude of students, towards Effective study of biology in senior secondary schools in Nigeria. *Unpublished PhD Thesis University of Nigeria Nsukka,*

Karimi, A. (2012). A study of instructional strategies and utilization of resources in social studies in primary teachers' colleges in Kenya. *International Journal of Education and Research,* 4(2), 405-412.

Lane, S. (2022). The role of instructional materials in teaching and learning. https://eduedify.com/role-of-instructional materials in teaching and learning.

Odejobi, C.O. (2014). A comparative studies of language instructional delivery system between nursery schools in rural and urban area in Osun state. *World Journal of Education,* 4(5), 31-39.

Ogunbodede, K.F., & Oribhabor, C. B. (2022). Digital resources usage and academic performance of undergraduate students in Nigeria: A case study. *European Journal of Interactive Multimedia and Education,* 3(2), 2213.

Olubunbi, M. G., & Kolawole, O. A. (2023). Secondary school student's academic performance self-esteem and school environment: An empirical assessment from Nigeria.*Journal of Education Method and Learning Strategy*, 1 (3), 126-135.

Oluwasegun, M, O. & Owolabi, T. (2020). Effects of virtual laboratory instructional strategy on secondary school students' learning outcomes in physics practical. *International Journal of Scientific and Research Publication*, 10 (4), 406 - 413.

Oluwaseun, K. A., Onovroghene, S. M. & Ojediran, A. I. (2019). Examination of the availability and adequacy of biology education resources in the curricula of open and conventional universities in south western Nigeria. *Asian Journal of Educational Research,* 7 (2), 1-16.

Njoku, M. I. A. & Mgbomo, T. (2021) Effects of field trip and demonstration method on The academic achievements of secondary school students in Biology. *Rivers State University Journal of Education (RSUJOE),* 24(2) 55-64

Waigera, J., Mweru, M., & Ngige, L. (2020). Relationship between teacher's attitude and the utilization of instructional materials in pre-primary schools in Kenya. *East African Journal of Education Studies,* 2(1), 92-104.