

Effect of Ethnobiology Instructional Approach on Secondary School students' Interest in Biology Concepts in Onitsha Education Zone.

Dr Mbaegbu Chioma Stephanie¹, Nwuba, Izunna Shedrack², Dr Akachukwu Esther Ebele³.

Department of Science Education, Nnamdi Azikiwe University, Awka.

Phone: 07034855627, Email: cs.mbaegbu@unizik.edu.ng

ABSTRACT

The study determined the effect of ethnobiology instructional approach on secondary school students' interest in biology concepts in Onitsha Education Zone of Anambra state. Two research questions and three hypotheses guided the study. The study adopted the quasi experimental design. The population of the study comprised 5,846 senior secondary two (SS2) students offering biology in Onitsha Education Zone. The sample for the study was 184 students obtained using a multi-stage sampling procedure. The instruments for data collection were Biology Achievement Test (BAT) and Biology Interest Scale (BIS) validated by three experts. The reliability of the instruments were obtained using Kuder-Richardson Formula 20 to be 0.91 for BAT and Cronbach Alpha to be 0.87 for BIS. Data obtained from the study was analysed using mean, standard deviation and analysis of covariance. The result of the study showed that students taught using Ethnobiology Instructional Approach (EIA) had higher mean gain interest scores in biology than those taught using Lecture Method. The findings of the study also revealed that there was a significant difference between the mean interest scores of students in urban and rural areas taught biology using EIA and Lecture Method in favour of rural students. It was therefore recommended among others that secondary school biology teachers should adopt the use of EIA in teaching biology as a way of helping students connect what they are learning to already existing knowledge and realities around them in this period of socio-political and economic uncertainty.

KEYWORDS: *ethnobiology, interest, biology, academic, secondary*

INTRODUCTION

There is a consensus among science educators that biology is an important and useful subject for development in the socio-political and economic sector of every country. It is the key to technology along with other sciences. Despite the importance and popularity of biology among Nigerian students, it is very disappointing to note that students' performance in the subject at both internal and external examinations has remained poor (Mbaegbu, Osuafor and Akachukwu, 2020). The spate of poor achievement among students who enrol for Biology at external examination such as West African Senior School Certificate Examination (WASSCE) has continued to deter students from the subject. For the past three consecutive years (2020-2022), the academic performance of candidates in Biology in Anambra State has not appreciated as expected for Biology, being the only subject offered by both science and arts students. This is evidenced by the results released by West African Examination Council (WAEC) in 2020, 2021 and 2022 which revealed that only 49.28%, 48.82% and 48.07% respectively of the candidates in Anambra State that sat for Biology examination made credit pass in the subject (WAEC Results for Anambra State, 2020, 2021 & 2022 cited in Mbaegbu, Ikeanumba and Anazodo 2023)

The most common factor responsible for students' poor achievement in Biology as implicated by many researchers is the lecture method commonly used by Biology teachers. Lecture method of teaching is a teacher-centered, student-peripheral teaching approach in which the teacher delivers a pre-planned lesson to the students with or without the use of instructional materials (Okigbo cited in Mbaegbu 2020). Lecture method has proved effective for covering large content material characteristic with the subject of Biology. It is also good for teaching large classes of students but affords the students little opportunity to interact, get actively engaged and take responsibility for their own learning (Nwigwe and Osuafor, 2019). The lack of student-centered instruction, inherent in lecture method makes learning uninteresting for students and reduces their interest in learning.

Interest according to Nwanze and Okoli (2021) is defined as students' orientations towards activities that are intended to develop academic skills and knowledge which is considered a crucial variable contributing to various aspects of student learning and sustained attention. Interest positively influences attention, goal setting, and learning strategies for people of all ages both in and out of school (Nweke, 2021). It is a powerful motivational process that energizes learning, guides academic and career trajectories and is essential to academic success. One reliable way of enhancing students' interest in learning according to Makinde and Yusuf (2018) is to make learning material more relevant and connecting learning with realities common with the students' day to day living and their already existing knowledge such as the other activities of the society, politics, and economic happening around them. One of the commonest instructional approaches known to aid teachers link learning to reality and what the students know already is ethnobiology instructional approach.

Ethnobiology according to International Society of Ethnobiology (ISE, 2018) is the study of the intricate interactions that exist between living beings and cultural systems in both past and present cultures. Ethnobiology instructional approach as used in the present study simply involves the employment of indigenous or traditional materials, knowledge, practices in the teaching of Biology concepts. The approach engages the students by allowing them to present indigenous perspectives to the concept, giving room for knowledge reconstruction through dismissal of misconceptions and connecting scientific knowledge to cultural practices (Mbaegbu and Osuafor, 2023). Although, Ethnobiology as an instructional approach is not commonly

explored among teachers and researchers, it bears potential benefits for students, depending on their school location.

Location is simply the geographical position where a school is sited (Konyefa and Okigbo, 2021a). Although, there is hardly any agreed indices for determining rural and urban locations, rural locations often denote areas that are open and spread out with a small population. Urban locations on the other hand as Konyefa and Okigbo puts it, are areas that consists of both living and working areas and have high population. Suburban areas are areas that are mainly residential area with a larger population than rural areas. The geographical location of school results into a number of problems including; poor attendance, resulting in low achievement, increase of dropout rate, and amplifies a host of social problems that may affect learning of Biology. The necessity arises therefore to further explore academic interest gap among students from urban and rural location given that Ethnobiology deals with indigenous knowledge common in rural settings.

Purpose of the Study

The purpose of the study was to determine the effect of Ethnobiology instructional approach on secondary school students' interest in Biology in Onitsha Education Zone of Anambra state.

Specifically, the study determined the:

1. difference between the mean interest scores of students taught Biology using Ethnobiology instructional approach (EIA) and those taught using lecture method (LM).
2. difference between the mean interest scores of urban and rural students taught Biology using EIA and LM.
3. interaction effect of instructional approaches (EIA and LM) and location on students' interest in Biology.

Research Questions

The following research questions guided the study:

1. What is the difference between the mean interest scores of students taught Biology using Ethnobiology instructional approach (EIA) and those taught using lecture method?
2. What is the difference between the mean interest scores of urban and rural students taught Biology using EIA and LM?

Hypotheses

The following null hypotheses were tested at 0.05 level of significance:

1. There is no significant difference between the mean interest scores of students taught Biology using Ethnobiology instructional approach (EIA) and those taught using lecture method.
2. There is no significant difference between the mean interest scores of urban and rural students taught Biology using EIA and LM.
3. There is no interaction effect of instructional approaches and location on students' interest in Biology.

Method

The quasi-experimental research design, specifically, the pretest-posttest non-randomized control group design was used.

The design for the study is elaborated in Figure 1.

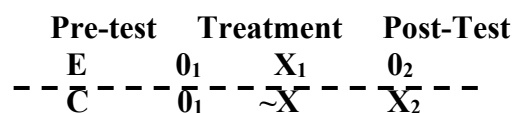


Figure 1: Design of the Experiment

Where;

- E = Experimental Group
 C = Control Group
 O_1 = Pre-test
 O_2 = Post-test
 X_1 = Treatment using Ethnobiology Instructional Approach
 $\sim X$ = No experimental treatment
 ---- = non-equivalence of the two groups

The study was carried out in Onitsha Education Zone of Anambra State. The population of the study comprised 5,846 SS2 students offering Biology in Onitsha Education Zone of Anambra state. The sample size for the study was 184 SS2 students offering Biology in Onitsha Education Zone of Anambra state. The sample was drawn using a multistage sampling procedure.

The instrument for data collection were Biology Achievement Test (BAT) and Biology Interest Scale (BIS). BAT consist of 25 multiple choice objective test items with four response options lettered A-D on the concept of classification of plants while BIS consisted of 25 positively and negatively worded items designed on a four response options ranging from Strongly Agree (SA) to Strongly Disagree (SD). The treatment packages were prepared as lesson plans. The lesson plan for the experimental group involved the use of Ethnobiology instructional approach and lecture method for the control group. BAT, BIS and lesson plans, the purpose of the study, research questions and hypotheses were given to three experts for validation. The reliability of BAT was established using Kuder-Richardson Formula 20 (KR-20) to be 0.91 while that of BIS was established using Cronbach Alpha method to be 0.87.

The treatment involved the use of locally sourced instructional materials that are common to the traditions of the immediate communities of the students. For the topic on classification of plants, some of the plants mentioned were provided especially those found in the community of the students or that have any traditional significance and scientific connotations. . The instructional materials were provided by the students and where there is any need of financial support, the researcher provided the money for the purchase of the material. Generally, the classes began with the introduction of the topic with in-depth review of the objectives of the instruction. In each step of the lesson, the teacher briefly explained the learning material contents using the traditional materials for illustration, demonstration or explanations. The teacher then called on the students to give a presentation of any indigenous knowledge or practices that are related to the concept explained by the teacher. The presentation constituted mainly the knowledge held by students of the uses of the plants, their spiritual significant, medicinal and nutritional values and other such traditional knowledge such as traditional stories and proverbs. After the presentation, the teacher deduced the scientific relevance and connotation of their presentation, thereby relating the indigenous knowledge held by students or their traditional practices to the science being taught. Where no particular scientific relevance can be deduced from the presentation or indigenous knowledge, the teacher can dismiss them as misconceptions while presenting the proper knowledge. The teacher then summarized the important points in the lesson drawing their attention to

contents of the lesson. At the end of the lesson, the teacher used some questions to evaluate the students' learning and understanding of the learning materials. For the first lesson, the teacher after the pretest gave students the content of learning so as to study and inquire from their parents and elders any cultural practices or indigenous knowledge held by the community that are related to the concepts. They also acquired within the time given before the lesson the necessary local instructional materials that are of scientific relevance and related to the concepts or as demanded by the teacher and their local names and uses. The same process was taken for each lesson/topic until the end of the lesson. Students were grouped for the assignments and tasked to

Group	N	Pretest Mean	Pretest SD	Posttest Mean	Posttest SD	Gained Mean
EIA	91	26.24	6.47	59.73	11.54	33.49
LM	93	28.27	6.41	49.30	12.60	21.03
Mean Difference		2.03		10.43		12.46

each ensure that the group assignment is done as any student can be called to make the presentation on behalf of the group.

The lecture group was taught the same content using lecture method. It involved simple presentation using illustrations, explanations and questioning. Students were given the chance to ask questions and demand explanations to clarify their misunderstanding. Standard textbook drawing and pictures were used as instructional aids. Students were given assignments on the topic. The extraneous variables that may likely confound the outcome of the study were controlled.

BAT and BIS was administered before the commencement of the treatment as pretest. The scores of the students in the pretest were not given to them and no revisions on the test or corrections were given. After the treatment which lasted for two weeks, posttest was administered on the following week, after a revision exercise has been done. Each correctly answered question on BAT earns 4 marks while Positive statements in BIS are score as follows: Strongly Agree – 4, Agree – 3, Disagree – 2, and Strongly Disagree – 1. The generated scores were collated for analysis

The research questions were answered using mean and standard deviation while the hypotheses were tested at 0.05 level of significance using Analysis of Covariance (ANCOVA). The decision rule was to reject null hypothesis where Probability value (p-value) is less than or equals the level of significance ($P \leq 0.05$) and not to reject null hypothesis where P-value is greater than 0.05 ($P > 0.05$).

Results:

Research Question One: What is the difference between the mean interest scores of students taught Biology using EIA and those taught using lecture method?

Table 1: Mean Interest Scores of Students taught Biology using Ethnobiology Instructional

Table 1 reveals that the students taught Biology using EIA had pretest mean interest score of 26.24 and posttest mean interest score of 59.73 with gained mean interest score of 33.49, while those in the control group taught with lecture method had pretest mean interest score of 28.27 and posttest mean interest score of 49.30 with gained mean interest score of 21.03. Students taught Biology using LM had less homogeneous scores in their posttest (12.60) than those taught using EIA (11.54). The

difference between the mean gained interest scores of the students in the two groups is 12.46 in favour of EIA.

Research Question Two: What is the difference between the mean interest scores of students in urban and rural areas taught Biology using EIA and those taught using LM?

Table 2: Mean Interest Scores of Students in Urban and Rural Areas taught Biology using EIA and LM

Method	Location	N	Pretest Mean	Pretest SD	Posttest Mean	Posttest SD	Mean Gain
EIA	Urban	44	23.77	3.69	58.18	11.71	34.41
	Rural	47	28.55	7.62	61.17	11.30	32.44
LM	Urban	53	26.60	6.42	46.51	11.89	19.91
	Rural	40	30.48	5.76	53.00	12.70	22.52

Table 2 reveals that the students in urban area taught Biology using EIA had pretest mean interest score of 23.77 and posttest mean interest score of 58.18 with a gain in mean interest score of 34.41 while the students in rural area had pretest mean interest score of 28.55 and posttest mean interest score of 61.17 with a gain in mean interest score of 32.44. Table 2 also reveals that the urban students taught Biology using LM had pretest mean interest score of 26.60 and posttest mean interest score of 46.51 with a gain in mean interest score of 19.91 while the students in rural area have pretest mean interest score of 30.48 and posttest mean interest score of 53.00 with a gain in mean interest scores of 22.52.

Hypothesis One: There is no significant difference between the mean interest scores of students taught Biology using EIA and those taught using lecture method.

Table 3: ANCOVA Test of Significance of Difference between the Mean Interest

Source	SS	df	MS	F	Sig.	Decision
Corrected Model	6251.461	4	1562.865	11.046	.000	
Intercept	22649.154	1	22649.154	160.079	.000	
Pretest	90.238	1	90.238	.638	.426	
Method	4558.332	1	4558.332	32.217	.000	Sig.
Location	724.975	1	724.975	5.124	.025	Sig.
Method*Location	147.916	1	147.916	1.045	.308	Not Sig.
Error	25326.191	179	141.487			
Total	577232.000	184				
Corrected Total	31577.652	183				

Scores of Students taught Biology using EIA and LM

Table 3 shows that there is a significant main effect of the treatment on students' interest in Biology, $F(1, 179) = 32.217$, $P = 0.000 < 0.05$. Therefore, the null hypothesis is rejected meaning that there is a significant difference between the mean interest scores of students taught Biology using EIA and those taught using lecture method in favour of EIA.

Hypothesis Two: There is no significant difference between the mean interest scores of students in urban and rural areas taught Biology using EIA and LM.

Data relating to Hypothesis 2 is contained in Table 3.

Table 3 shows that there is a significant main influence of location on students' interest in Biology, $F(1, 179) = 5.124$, $P = 0.025 < 0.05$. Therefore, the null hypothesis is rejected meaning that there is a significant difference between the mean interest scores of students in urban and rural areas taught Biology using EIA and LM in favour of rural students.

Hypothesis Three: There is no significant interaction effect of instructional approaches (EIA and LM) and location on students' interest in Biology.

Data relating to Hypothesis 3 is also contained in Table 3.

Table 3 shows that there is no significant interaction effect of instructional approaches and location on students' interest in Biology $F(1, 179) = 1.045$, $P = 0.308 > 0.05$. Therefore, the null hypothesis is not rejected meaning that there is no significant interaction effect of instructional approaches (EIA and LM) and location on students' interest in Biology.

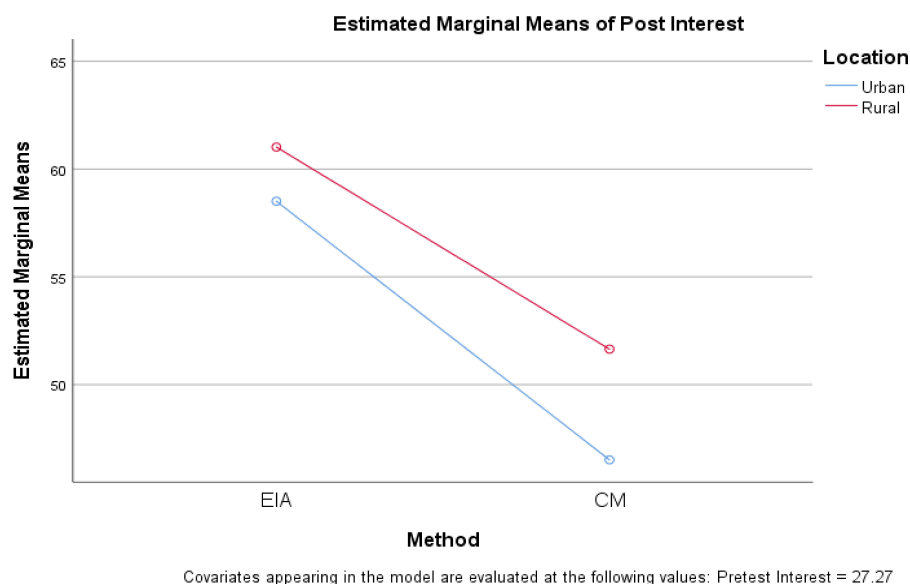


Figure 1: Plot of interaction effect of approaches (EIA and LM) and location on students' interest in Biology.

The plot of interaction effect of instructional approaches and location on students' interest in Biology is not significant but ordinal. This shows that the instructional approaches had the same effects on the interest of students relative to location. Thus, the instructional approaches are location biased. Rural students taught Biology using EIA had higher mean interest score than urban students, also rural students taught Biology using LM had higher mean interest score than urban students.

Discussion of Findings

The findings of the study revealed that there is a significant difference in the mean interest scores of students in biology in favour of those taught using ethnobiology instructional approach. The findings of the study also revealed that there is a significant difference between the mean interest scores of students in urban and

rural areas taught biology using Ethnobiology Instructional Approach and lecture method in favour of rural students. Ethnobiology instruction made it possible for learners to engage in critical comparison between the two knowledge systems. Such exercise develops the cognitive structure and understanding of the learner. It is a better approach that clearly removes the assumption or pretence that indigenous knowledge has nothing to offer in the teaching and learning of science thereby making the lesson all the more interesting for the students. There is no doubt that psychological and sociological approaches are useful in education but the inclusion of the elements of indigenous knowledge in classroom activities through ethnoscience instruction has provided fresh insight into and solutions to problems associated with students learning of science.

Again, since rural students are already familiar with the cultural materials that were used as instructional materials, their understanding of Biology concepts improved greatly. The impression of science being perceived as foreign knowledge, changing to the perception that can be achieved also enhanced their interest as ethnobiology instruction reduces that impression. They probably saw the science concept as no longer strange. The method also promoted discourse in science among learners since it gave them the opportunity to be actively involved in discussing both the science concept being learnt and the related common cultural beliefs and ideas. Further discussion over issues raised in the science classroom is all engaging and enhanced the students' interest in learning.

The findings of the study are in support of the findings of Okwara and Upu (2017) that ethnoscience instructional approach enhanced achievement more than lecture method. The finding of the study is related to the findings of the Nweke (2021) that students had significantly higher interest in separation techniques when taught with ethno-science instructional method. The findings of Konyefa and Okigbo (2021) that there was a significant difference between mean interest scores of students taught chemistry using EIA and lecture instructional approach in favour of EIA is also supported by this study.

Conclusion

The findings of this study showed that students taught Biology using EIA had significantly higher interest scores than those taught using LM. It is concluded that EIA is an effective instructional approach for enhancing students' interest in Biology.

Recommendations

The following recommendations are made based on the findings of the study:

15. Secondary school Biology teachers should adopt the use of EIA in teaching biology as a way of helping students connect what they are learning to already existing knowledge and realities around them in this period of socio-political and economic uncertainty.
16. Government should work in collaboration with school administrators to bridge the gap between rural and urban locations by providing urban schools with science nature corners. Such corners can be used for references purpose when teaching and its contents can be used to spark up discussions that could help students make connections to previous knowledge and reach meaningful learning.

References

- International Society of Ethnobiology (ISE). (2018). *Who we are*. Retrieved from: <http://www.Ethnobiology.net/about>.
- Konyefa, B.I. and Okigbo, E.C. (2021a). Effect of ethnochemistry instructional approach on secondary school students' achievement in Chemistry in Bayelsa state. *International Journal of Education and Evaluation*, 7(5), 1-11.
- Makinde, S.O. and Yusuf, M.O. (2018). The flipped classroom: its effects on students' performance and retention in secondary school mathematics classroom. *International Journal for Innovative Technology Integration in Education*, 2(2), 117-126
- Mbaegbu, C.S., Ikeanumba, C.B. and Anazodo, O.S. (2023) Emotional intelligence as a predictor of academic achievement of secondary school students in Biology in Awka Education Zone, Anambra State. *African Journal of Science, Technology and Mathematics Education, (AJSTME)*, 9(3), 130-135. https://www.ajstme.com.ng/admin/img/paper/20_130-135-AJSTME9_3-038..pdf
- Mbaegbu, C.S., Osuafor, A.M. and Akachukwu, E.E. (2020) Effects of sequential usage of three teaching methods on academic achievement of secondary school students in biology in Onitsha Education Zone. *IOSR Journal of Research & Method in Education (IOSR-JRME)* 10(2), 49-56. Retrieved from https://scholar.google.com/citations?view_op=view_citation&hl=en&user=JcxzbXAAAAAJ&citation_for_view=JcxzbXAAAAAJ:u5HHmVD_uO8C
- Mbaegbu, C.S., Osuafor, A.M. (2023) Effect of ethnobiology instructional approach on academic achievement of secondary school students in Biology in Onitsha Education Zone. *International Journal of Innovative Research and Advanced Studies (IJIRAS)* 10(3), 39-44. <https://www.ijiras.com/march-issue-2023/>
- Nwanze, A. C. and Okoli, J.N. (2021). Path analysis of factors affecting academic achievement of tertiary education students in Chemistry in Delta state. *African Journal of Science, Technology and Mathematics Education*, 6(1), 75-88.
- Nweke, P. I (2021). Effects of ethno-science instructional method on secondary school students' interest in separation techniques in Nasarawa state. Retrieved from <https://file.currentschoolnews.com/product/effects-of-ethnoscience-based-instructional-model-on-students-academic-achievement-and-interest-in-senior-secondary-school-Biology/>
- Nwigwe, E. C. and Osuafor, A. M. (2019). Effects of constructivist-based instructional model on secondary school students' academic achievement in mathematics in Enugu Education Zone. *UNIZIK Journal of STM Education*, 3(1), 76-90.
- Okwara, O. K., and Upu, F. T. (2017). Effects of ethnoscience instructional approach on students' achievement and interest in upper Basic Science and Technology in Benue State, Nigeria. *International Journal of Scientific Research in Education*, 10(1), 69-78.