

Correlation Between Attitude and Academic Achievement in Ecology Concepts among Science Secondary School Biology Students in Kano State, Nigeria

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Abstract

This study assessed relationship between attitude and science secondary school students' academic achievement in ecology, Kano State- Nigeria. It was a correlational research design guided by two research objectives, two questions and two null hypotheses. The population comprises of 3110, SSII students out of which a stratified proportionate random sample of 341 students selected by balloting was used for the study. Two instruments: EAT and SAEQ validated by experts for content and face validity were used for data collection. Test-re-test reliability index of EAT was 0.80 while Cronbach's Alpha reliability index for SAEQ was 0.70. Correlation coefficient, PPMCC and Multiple Regression analysis were used for data analysis. Results at $p < 0.05$ indicated an insignificant very weak positive linear relationship between attitude, and student academic achievement in ecology. Result of multiple regression analyses showed that, students attitude could not significantly predict students' academic achievement in ecology. Based on the findings, it can be concluded that, there is insignificant positive relationships between attitude and student academic achievement in ecology. It was recommended that, biology teachers be trained through seminars and inculcating in to students' positive attitude formation for efficient student academic achievement in ecology in Kano State-Nigeria.

Keywords: Attitude, Science Secondary Students academic achievement, Ecology

Introduction

Global risen trends as regards to complex modern biological phenomena specifically, to ecology over the years have continued to pose threat to inter and intra relationship between organisms and their environment academically, biologically and environmentally. This by implication might be connected to the persistence decline and fluctuations in students' attitude and academic achievement in ecology. While the state and the country as a whole are exposed to ecological challenges over decades, there is apparent need of finding solution to our daily encountered ecological problems. Ecology according to the United Nation (UN, 2018), McCallen, *et al.* (2019), Iliyasu (2025) has continued to be a topical societal issue for researchers' and educators and therefore cannot be overemphasized. Research studies have shown that, empirical data on the variables of the present study in question on the science secondary students' level in ecology in Kano State is scanty. Data only generally exist either in the field of humanities, integrated science, physics, biology, mathematics, chemistry, either at kindergarten, junior and senior secondary schools, higher institutions level of learning or particularly on teacher training students. On a contrary, despite the role of attitude in predicting students' academic achievement in ecology, studies of have shown that, students attitude to ecology has not yielded efficient positive result as there is no significant progress in the attitudinal shift towards protecting the environment. (Boiyo, 2015; Kallas *et al.*, 2015). Consequently, students hardly apply their learned ecological concept in solving real life societal and environmental problems for efficient academic achievement in ecology as a whole. Hence, hindering the rational of the inclusion of ecology in the secondary school biology curriculum as maintained by the Nigerian Educational Research and Development NERDC (2009) and National Policy of Education NPE (2014). Attitude in relation to students' academic achievement has been described by different scholars. Dagnew (2017), Ahmad *et al.* (2022) concluded and described attitude as physiological



Correlation Between Attitude and Academic Achievement in ... Iliyasu, H., Et. al. (2026)

mental disposition and neural factor or a state of readiness to respond, organize determining acquired tendency which prepares a person to behave in a certain way towards a specific object or class of objects. This is subject to dynamic influence on behavior as well as the conditions prevailing in the environment. Allport (1935) assertion in his theory of attitudinal change maintained that, attitude is stored in the long memory and characterized by three components of what we know, how we feel and how we behave. Studies by Kpolovie *et al.*(2014), Ogembo *et al.*(2015), Mbajiorgu *et al.*(2017), and Oppong *et al.*(2022) have shown and concluded that, effective and positive students attitude enhances efficient academic achievement among science secondary school students whereas negative attitude among science students lead to inefficient academic achievement in science and specifically in ecology. They further opined that science students see sciences as abstract, irrelevant and difficult and therefore resort to memorization to pass examination. Furthermore, Ogunjinmi *et al.* (2015) , Mbajiorgu *et al.* (2017), Mangal (2018) in another development supported their view and claimed that, attitudinal acquired tendencies are formed from one of the four situations of integration of experience, differentiation of expediencies, trauma or dramatic experiences as well as the adoption of the available attitude in ones environment. They further ascribed the influence of factors of within the individual itself (physical, intellectual, emotional, social and moral development as well as factors within the individuals' environment (his home, and family, social environment outside his family) to attitude the formation and development. Academic achievement describes the level of short or long term educational goal attainment of student that observes and measures aspect of a student's capacity, mastery of skills and subject contents measured with valid and reliable tests in written form (Kpolovie, *et al.*,2014; Steinmayr *et al.*, 2020). In the context of this research , Iliyasu (2025) described academic achievement as the challenging ability of science secondary school student to express, retain, apply or connect what has been learned in ecology in written or practical form, measured by valid examination. Nationally, students' academic achievement as documented by West Africa Examination Council Examination Report (WAEC, 2021) was generally low in Biology. Trends in academic achievements, in biology as shown in documented Science and Technical Schools Board, Kano Statistical Report over 5 years was declining (STSB, 2022). It shows that, out of the total number of Ten thousand and sixteen (10,016) that sat for (WAEC) examination from 2016-2020 only five thousand, two-hundred and thirty six (5236) students earned credit and above in biology Studies have ascribed the decline and fluctuations to factors of science students seeing ecology as abstract, irrelevant and difficult, poor attitude and therefore resort to memorization to pass examination (Ogembo *et al.*, 2015; Mbajiorgu *et al.*, 2017; Oyovwi, 2019; Oppong *et al.*,2022). Ecology is a branch in biology that can literally be referred to as the scientific study of inter and intra relationship between organisms and their environment. The British Ecological Society Organization (2018) and Obormanu *et al.* (2014) technically define ecology as the scientific study of the interaction among and between organisms; the processes influencing the distribution and abundance of the organisms and the transformation of energy flow and matter. Kallasa *et al.* (2015), Ogunjinmi *et al.* (2015) , Feinsinger *et al.* (2021) maintained that, ecology is one of the trends of human ecology and inter discipline that forms an interface with many sciences. Ecology studies the integration between human beings as individuals and/ or social systems and the multidimensional environment from the holistic perspectives. It is geared towards the provision of effective learning and achievement, innovation of knowledge in complimentary perspective. Hence, it is against this background that the problem of this study posed as a question as: Is there any relationship between attitude and science secondary students' academic achievement in ecology in Kano State -Nigeria?

Statement of the Problem

This study assessed the relationship between attitude and science secondary school students' academic achievement in ecology in Kano state -Nigeria. Inefficient attitude along with decline and fluctuations in students' academic achievement in biology, specifically in ecology in Kano State has continued to persist due to scanty empirical data hence hindering effective positive attitude formation towards solving real life ecological problems for efficient academic achievement in ecology.

Objectives of the study

1. Assess the relationship between attitude and academic achievement of students in ecology.
2. Predict the extent of student attitude and student academic achievement in ecology.

Research Questions

1. Can students' attitudes be related with students' academic achievement in ecology?
2. To what extent do students attitude predict student academic achievement in ecology?

Null Hypotheses

The following null hypotheses were formulated at 0.05 level of significant

Ho₁ There is no significant relationship between attitude and academic achievement of Students' in ecology.

Ho₂ There is no significant relationship between the extents of attitude in predicting students Academic achievement in ecology

Research Methodology

The study was a correlational research design comprising a population of three thousand, one hundred and ten (3110) from ten SSII science secondary school students within the three geopolitical zones of Kano North, South and Kano Central. Stratified proportionate random sample of three hundred and forty one (341) students was randomly selected by balloting from each of the respective schools and were used for the study. Two instruments : Ecology Achievement Test (EAT) and SAEQ were used for data collection The instruments consists of two sections, A and B respectively; Section A of EAT and SAEQ consist of Students Personal Data (Age, Class, name of school and Gender) while section B of EAT was 45- minutes, thirty- items WAEC/SSCE past questions, multiple –choice- test, options A-E with difficulty and discrimination Index range values of (0.21-0.67) Sections B of Student Attitude to Ecology Questionnaire (SAEQ) consist of 20 items, five point Likert scale, ordinal, closed ended questionnaire measured by the key below in the order of (a) Strongly Agree =5 (b) Agree=4(c) Uncertain=3 (d) Disagree=2 (e) Strongly disagree= 1. The instruments were validated by five experts in the field of Biology, Education and Science Education from Bayero University, Kano, Ahmadu Bello University, Zaria and Aliko Dangote University of Science and Technology, Wudil for face and content validity. Lawshe's method was used to determine the content validity index and ratio and yielded +1.00 with test - re-test reliability index of 0.81 for EAT and Crombach's alpha reliability index of 0.70 for SAEQ. Correlation Coefficient was used to answer the research question while Pearson Product Moment Correlation Coefficient and regression analysis was use to test the research null hypothesis at a probability of 0.05% level of significance.

Presentation of Results

Research Question 1: Can students' attitudes be related with students' academic achievement in ecology?

Table 1: Summary of Correlation Coefficient Score of the Relationship between Students Attitude (SAEQ) and Students Academic Achievement in Ecology

S/N	Variable	N	Df	R	Remarks
1	Academic Achievement in Ecology	341	339	0.032	Very weak Positive linear relationship
2	SAEQ	341			

Source: Researcher's fieldwork, November, 2023

Result as in Table 1 indicated a very weak positively correlated coefficient value, $r(339) = 0.03$ of the relationship between science secondary school students academic achievement in ecology and students attitude to ecology. To find out if there is very weak positive relationship between the variables it was further subjected to hypothesis testing .The result implied a very weak positive linear relationship between students attitude to ecology and science secondary school students academic achievement in ecology in Kano State- Nigeria. The result further implied that, the relationship of students' attitude to ecology to some degree predisposed their academic achievement in ecology. **HO₁:** There is no significant relationship between attitude and academic achievement of students in ecology.

Table 2: Summary of Pearson Product Moment Correlation Coefficient between Student Attitude to Ecology (SAEQ) and academic achievement of students in ecology.

S/N	Variables	N	r	p-value	Decision
1	Academic Achievement in ecology	341	0.032	0.555	Null hypothesis is retained
2	SAEQ	341			

Correlation is significant at the 0.05 level (2-tailed) $\alpha = 0.05$

Source: Researcher's fieldwork November, 2023

Correlation Between Attitude and Academic Achievement in ... Iliyasu, H., Et. al. (2026)

Result as in Table 2 indicated a value of $r = 0.03$ which shows a very weak positive linear relationship, between student attitude and academic achievement of students in ecology. Result of the correlation was not significant at p , $0.555 > 0.05$; H_0 is retained. It can therefore be inferred that there is no significant relationship between student attitude to ecology and academic achievement in ecology.

Research Question 2 To what extent do students attitude predict student academic achievement in ecology?

Table 3: Summary of Multiple Regression Analyses of the relationship between attitude to ecology (SAEQ) and Students Academic achievement in Ecology

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t stat</i>	<i>p-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
Multiple R	.032 ^a					
R Square	.001					
Adjusted R Square	-.002					
Standard Error	3.51					
Observations	341					
Intercept	12.316	2.289	5.382	.000	7.815	16.818
SAEQ	.307	.520	.590	.555	-.715	1.329

Source: Researcher's fieldwork November, 2023

$\alpha = 0.05$;

Result as in Table 3 portrays from the output, the General equation Model of regression equation is $\gamma = 12.316 + .307x$ It shows a multiple correlation coefficient of ($R = 0.032$ and a multiple $R^2 = .001$). This means that, 3.2% of the variance was accounted for by the predictor variable when taken together. Hence answering research question 2: To what extent does students' student attitude predict student academic achievement in ecology? The joint contribution was tested at p -values < 0.05 was insignificant.

Hypothesis Two:

H₀₂ Students' attitude does not significantly predict students' academic achievement in ecology.

The result as in Table 3 further portrays the Summary of Regression Analyses of attitude and students' academic achievement in ecology. The p -value for the test of the regression coefficients of Attitude, p -value = .555 because the p -values $> 0.05 = \alpha$, we accept the null hypothesis in favour of the alternative hypothesis. At the 5% significance level, there is insufficient evidence to suggest that, there is a relationship between the dependent variables "Students academic achievement in ecology and the independent variable and attitude.

Discussion of the findings

Result of the relationship between students' attitude and academic achievement in ecology as in Table 1 and 2 yielded very weak positive and not significant linear relationships. In line with the findings, very weak positive, linear relationship between students' attitude and academic achievement in ecology implies that, effective students' academic achievement in ecology might facilitate students efficient students positive attitude to ecology. This might be ascribed to student low level of awareness on what they know, how they feel and how they behave to series of outcries emanating from the ecological consequences as well as imbalance of the inter and intra relationship between organisms and their environment. However, this according to the Economic Co-operation and Development OECD. (2018) emphasized the need to call for a dynamic shift of the needs and aspirations of the society. Efficient attitude of students might enhance the creation of new opportunities and solution that can enrich our lives towards promoting an inclusive and sustainable future of the environment and socioeconomic development of the nation as a whole. Studies have shown that efficient attitude to ecology as well as solving ecological related problem of the society might enhance efficient academic achievement. Ogembo *et al.* (2015), Oyovwi (2019) in their studies reported and concluded that, positive attitude of science students increases students academic achievement whereas negative attitude among science students lead to poor academic achievement in science, biology and ecology respectively.

On the other hand, ineffective students' attitude to ecology might hinder a significant progress in the attitudinal move of a more protective environment among students. This by implication contradicts the report of Kallas *et al.* (2015) as the burden of series of outcry as regards to ecological problems and consequences may continue to rise and pose threat and

Correlation Between Attitude and Academic Achievement in ... Iliyasu, H., Et. al. (2026)

disequilibrium to the scientific inter and intra relationship between organisms and their environment. Inefficient students' attitude might equally hamper the formation and development of positive attitude as well as lack of improvement of academic achievement towards modern biological phenomena, specifically ecology and environment among secondary school students as enshrined in the secondary school modern biology curriculum. The findings of the researcher was in line in with the findings of previous studies of Boiyo *et al.* (2015) in Kibera and Kasarani Division in Nairobi, Kenya, on environmental attitude and ecological behavior, Astalini *et al.* (2019) in Jambi Province, Indonesia on student attitude towards science. Oppong *et al.* (2022) in Ghana on college students attitude towards science and Adejimi *et al.* (2022) in Ibadan, Oyo state, Nigeria on secondary school students in biology respectively. On a contrary, on the bases of significance, the findings differs with the findings of Langat (2015) in Kiambu County, Kenya on mathematics, Omotade *et al.* (2016) in Ado, Ekiti State Nigeria, Dagneu (2017) in Gondar, Ethiopia, and Ahmad *et al.* (2022) in Islamabad, Pakistan who reported a significant relationship between secondary school students' attitude in biology. Moreover, result as in Table 3 portrays multiple regressions as there is insufficient evidence to suggest that, there is significant relationship between the dependent variables "Students academic achievement in ecology and the independent variable "attitude. This might be ascribed to inefficient attitude as regards to inefficient students' academic achievement in ecology. The findings was in a contrary with the findings Andamon and Tan (2018) that reported that Students' attitude as best predictors of student performance in mathematics, Kpolovie *et al.* (2014) in Bayelsa, Nigeria reported a positive correlation of attitude to school with students academic achievement and Dagneu (2017) in Gondar, Ethiopia on student attitude and achievement motivation as predictors of student academic achievement.

Conclusion

Based on the findings, it can be concluded that, relationship between attitude and students' academic achievement in ecology was linearly very weak positive and insignificant. More so, attitude did not predict science secondary school students' academic achievement in ecology in Kano-Nigeria.

Recommendations

1. Biology teachers should inculcate in to student the development of positive attitude by emphasizing on real world ecological related examples during ecology class for efficient students academic achievement in ecology.
2. Student should imbibe efficient positive attitude in solving real life ecological problems.
3. Government should encourage the introduction of school clubs and societies. For example, Conservation Biology Association

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Correlation Between Attitude and Academic Achievement in ... Iliyasu, H., Et. al. (2026)

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