

Students' Interest and Achievement in Basic Science in Junior Secondary Schools in North-Central Nigeria

I. A. Ojelade, A. E. B. Ubom & S. O. Olamoyegun

Department of Science & Environmental Education, University of Abuja, Nigeria

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Abstract: This study examines students' interest and academic achievement in Basic Science in junior secondary schools in North-Central Nigeria. A correlational survey research design was adopted for the study. The population comprised all Junior Secondary School II (JSS II) students offering Basic Science in public junior secondary schools in North-Central Nigeria during the 2024/2025 academic session. The study was delimited to Niger State, Nasarawa State, and the Federal Capital Territory, with a total population of 119,839 students. A sample of 383 students was selected using the Krejcie and Morgan sample size table through a multistage sampling technique to ensure proportional representation of rural and urban schools. Data were collected using the Students' Interest in Basic Science Questionnaire (SIBSQ) and the Basic Science Achievement Test (BSAT). The instruments were validated by experts and their reliability established through a pilot study. Data collection was carried out in the sampled schools with the assistance of trained research assistants. Data analysis was performed using descriptive statistics, Spearman's rho correlation, and Mann-Whitney U test at the 0.05 level of significance. Finding revealed a strong and statistically significant positive relationship between students' interest and their academic achievement in Basic Science. The study concluded that students' interest is a critical determinant of academic achievement in Basic Science regardless of school location. It was therefore recommended that Basic Science teachers should adopt learner-centred and activity-based instructional strategies that stimulate and sustain students' interest to enhance academic achievement.

Keys words: Basic Science, students' interest and academic achievement.

Introduction

Education is widely recognised as a fundamental driver of human development, social transformation, and national competitiveness in an increasingly knowledge-driven global society. Contemporary educational discourse emphasises the role of education in equipping learners with critical thinking skills, problem-solving abilities, and adaptive capacities required to navigate complex scientific and technological challenges (Ojelade, et al., 2024). Within formal education systems, science education occupies a central position because it fosters scientific literacy, inquiry skills, and evidence-based reasoning that enable individuals to engage meaningfully with societal. As such, strengthening science education at the basic and secondary school levels remains a global priority for achieving sustainable development and innovation-oriented economies (OECD, 2020 & Ubom, et al., 2024). Science education at the basic education level provides learners with their earliest structured exposure to scientific concepts, processes, and ways of thinking. At this stage, students begin to develop foundational understandings of the natural world, cultivate curiosity, and form attitudes toward science

learning that often persist into later educational stages. Research in science education consistently demonstrates that experiences during early adolescence are critical in shaping learners' long-term engagement with science and their academic trajectories in science-related subjects. Consequently, improving science learning outcomes at the junior secondary school level requires a comprehensive understanding of the factors that influence students' engagement and achievement beyond curriculum content alone (Aregbesola, et al., 2025; OECD, 2021 & UNESCO, 2022).

In the Nigerian education system, **Basic Science** serves as the core integrative science subject at the junior secondary school level. It is designed to provide students with fundamental scientific knowledge, inquiry skills, and practical experiences that prepare them for specialised science subjects at the senior secondary level. Basic Science also aims to promote scientific attitudes, problem-solving skills, and relevance of science to everyday life. Despite its strategic importance, concerns persist regarding students' academic achievement in Basic Science across different regions of Nigeria. These concerns have prompted increased scholarly attention to the psychosocial and contextual factors that shape how students engage with Basic Science learning and how such engagement translates into academic achievement (World Bank, 2021). Among the key psychosocial factors influencing achievement in Basic Science, students' interest has been identified as a powerful motivational construct that directs attention, sustains engagement, and supports deeper learning. Interest influences how students perceive scientific tasks, the effort they invest in learning activities, and their willingness to persist when faced with conceptual difficulty. Contemporary studies indicate that students who perceive science learning as interesting and meaningful are more likely to demonstrate higher levels of engagement and improved academic performance. At the junior secondary school level, where students are still forming their academic identities, interest in Basic Science plays a particularly significant role in shaping learning outcomes and future participation in science-related pathways (Renninger & Hidi, 2020; Eccles & Wigfield, 2020).

In addition to individual motivation, the learning environment constitutes a critical contextual factor that shapes students' academic achievement in Basic Science. The learning environment encompasses physical facilities, availability of instructional resources, teacher support, classroom climate, and opportunities for inquiry-based and collaborative learning. Recent research in science and educational psychology highlights that students' perceptions of a supportive and well-organised learning environment are strongly associated with engagement, persistence, and achievement in science subjects. Conversely, unfavourable learning conditions can undermine effective learning and limit students' academic potential. Understanding students' perceptions of how the learning environment influences their achievement in Basic Science is therefore essential for improving instructional practices and school effectiveness (Wang et al., 2020; OECD, 2021). The influence of interest on academic achievement in Basic Science may further vary across rural and urban school contexts. In Nigeria, disparities in educational infrastructure, teacher quality, and access to learning resources often characterise rural and urban schools, potentially shaping students' learning experiences and outcomes. These contextual differences may affect how students develop interest in Basic Science and how learning environments support or constrain achievement. Recent global and regional education studies emphasise the need to examine such contextual variations to promote equity and quality in science education (UNESCO, 2022; World Bank, 2021). However, empirical evidence on students' perceptions of these factors within the Basic Science context in North-Central Nigeria remains limited.

Moreover, contemporary educational research increasingly adopts predictive approaches to understand how multiple factors jointly explain academic achievement. Interest does not operate independently; rather, it interacts to shape students' engagement, motivation, and learning outcomes in science. Examining the extent to which students' perceptions of this factor predicts academic achievement in Basic Science provides a more comprehensive understanding of performance patterns and supports the development of integrated, learner-centred strategies for improving science education outcomes. Against this background, the present study examines students' interest and academic achievement in Basic Science in junior secondary schools in North-Central Nigeria.

Purpose of the Study

The purpose of this study is to examine students' interest and achievement in Basic Science in Junior Secondary Schools in North-Central Nigeria. Specifically, the study seeks to:

1. Find out the students' perception of the impact of their interest factor on academic achievement in basic science in junior secondary schools in North-Central Nigeria.
2. Find out the students' perception of the impact of their interest factor on academic achievement in basic science in rural and urban junior secondary schools in North-Central Nigeria..

Research Questions

The following research questions were raised to guide the study:

1. What is the students' perception of the impact of their interest factor on their academic achievement in basic science in junior secondary schools in North-Central Nigeria?
2. What is the students' perception of the impact of their interest factor on their academic achievement in basic science in rural and urban junior secondary schools in North-Central Nigeria?

Hypotheses

The following null hypotheses are formulated and will be tested at 0.05 level of significance

1. There is no significant relationship between students' perception of the impact of their interest factor and their academic achievement in basic science in junior secondary schools in North-Central Nigeria.
2. There is no significant difference between rural and urban students' perception of the impact of their interest factor on their academic achievement in basic science in junior secondary schools in North-Central Nigeria.

Methodology

This study employed a **correlational survey research design** to examine the relationship between students' interest, learning environment, and academic achievement in Basic Science among Junior Secondary School II students in North-Central Nigeria. The design was appropriate because it enabled the investigation of naturally occurring psychosocial variables without manipulation, while also allowing for the determination of both the strength of relationships and the predictive contributions of interest and learning environment to students' achievement. The population comprised all JSS II students offering Basic Science in public junior secondary schools during the 2024/2025 academic session in North-Central Nigeria. The study was delimited to **Niger State, Nasarawa State, and the Federal Capital Territory**, with a total population of **119,839 students** drawn from **1,021 public junior secondary schools** across rural and urban areas. A sample of **383 students** was selected using the **Krejcie and Morgan sample size table**, employing a multistage sampling procedure that ensured proportional representation of rural and urban schools.

Data were collected using two instruments: a structured questionnaire consisting of the **Students' Interest in Basic Science Questionnaire (SIBSQ)** and the **Learning Environment Inventory (LEI)**, as well as a **Basic Science Achievement Test (BSAT)** developed in line with the JSS II curriculum. The instruments were validated by experts in Science Education and Educational Psychology, and their reliability was established through a pilot study, yielding acceptable reliability coefficients. Data collection was conducted over a four-week period with the assistance of trained research assistants. Data analysis was carried out using **SPSS version 26**, employing descriptive statistics to summarise students' perceptions and achievement, **Spearman's rho** to determine relationships among variables, **Mann-Whitney U test** to examine rural-urban differences, and **multiple linear regression analysis** to assess the joint and relative predictive effects of interest and learning environment on academic achievement. All hypotheses were tested at the **0.05 level of significance**.

Results

This section is mainly concerned with the analysis of data, presentation and interpretation of results as well as the discussion of findings.

Demographic Information

Table 1: Distribution of Sampled Students by States and Location

States	Population of Students	Urban Schools	Rural Schools	Sample of Students
Nasarawa	23818	89	282	76
Niger	52221	131	332	167
FCT	43818	70	117	140
Total	119839	290	731	383

Table 1 shows the distribution of sampled junior secondary school students based on state and location. From the table, seventy-six students were sampled from Nassarawa State, one hundred and sixty-seven students from Niger state and one hundred and forty students from Federal Capital Territory respectively making a total of three hundred and eighty-three sampled students.

Data Analysis

Answer to Research Questions

Research Question 1: What is the students' perception of the impact of their interest factor on their academic achievement in basic science in junior secondary schools in North-Central Nigeria N=383

Table 2: Students' Perception of the Impact of their Interest Factor on their Academic Achievement in Basic Science in Junior Secondary Schools in North-Central Nigeria N=383

S/ N	ITEMS	SA	A	D	SD	Mean	Std. Dev	Decision
1	I enjoy learning about basic science topics like plants and animals	102	129	81	71	2.68	1.06	Agree
2	I like doing science experiments	152	92	72	67	2.86	1.12	Agree
3	Science class is my favorite time of the day	88	120	101	74	2.58	1.04	Agree
4	Basic science is important for my future career	58	79	152	94	2.26	0.99	Disagree
5	Science helps solve problems in my community	174	127	76	6	3.22	0.82	Agree
6	I want to learn more about basic science	85	132	65	101	2.52	1.10	Agree
7	I'm curious about how things work	134	101	87	61	2.80	1.08	Agree
8	I feel happy when doing science experiments	104	120	75	84	2.64	1.10	Agree
9	I am good at understanding basic science concepts	127	99	81	76	2.72	1.12	Agree
10	I believe I can excel in basic science	127	105	78	73	2.75	1.11	Agree
	Sectional mean					2.70	1.09	Agree

Table 2 shows that majority of the respondents agreed to all the items (since their mean is greater than 2.50) except for item 4 whose mean is less than 2.5. The sectional mean is 2.70 with standard deviation of 1.09. This means that majority of the respondents agreed that the listed items on interest factor have major impact on their achievement in Basic Science among junior secondary students in North Central Nigeria.

Research Question 2: What is the students' perception of the impact of their interest factor on their academic achievement in basic science in rural and urban junior secondary schools in North-Central Nigeria? To answer the research question, mean and standard deviation were used as shown in the Table 3a and Table 3b below.

Table 3a: Students' Perception of the Impact of their Interest Factor on their Academic Achievement in Basic Science in Rural Junior Secondary Schools in North-Central Nigeria. N=204

S/N	ITEMS	SA	A	D	SD	Mean	Std. Dev	Decision
1	I enjoy learning about basic science topics like plants and animals	70	56	42	36	2.78	1.10	Agree
2	I like doing science experiments	83	52	38	31	2.92	1.09	Agree
3	Science class is my favorite time of the day	47	52	61	44	2.50	1.07	Agree
4	Basic science is important for my future career	34	41	67	62	2.23	1.06	Disagree
5	Science helps solve problems in my community	79	72	50	3	3.11	0.82	Agree
6	I want to learn more about basic science	51	69	41	43	2.63	1.07	Agree
7	I'm curious about how things work	71	57	42	34	2.81	1.09	Agree
8	I feel happy when doing science experiments	67	73	40	24	2.90	0.99	Agree
9	I am good at understanding basic science concepts	78	51	43	32	2.86	1.10	Agree
10	I believe I can excel in basic science	64	58	42	40	2.72	1.11	Agree
Sectional mean						2.75	1.08	Agree

Table 3a shows that majority of the respondents agreed to all the items (since their mean is greater than 2.50) except for item 4 whose means is less than 2.5. The sectional mean is 2.75 with standard deviation of 1.08. This means that majority of the rural respondents agreed that the items on interest factor have major impact on their achievement in Basic Science among rural junior secondary schools in North Central Nigeria.

Table 3b: Students' Perception of the Impact of their Interest Factor on their Academic Achievement in Basic Science in Urban Junior Secondary Schools in North-Central Nigeria. N=179

S/N	ITEMS	SA	A	D	SD	Mean	Std. Dev	Decision
1	I enjoy learning about basic science topics like plants and animals	32	73	39	35	2.57	1.00	Agree
2	I like doing science experiments	69	40	34	36	2.79	1.16	Agree
3	Science class is my favorite time of the day	41	68	40	30	2.67	1.01	Agree
4	Basic science is important for my future career	24	38	85	32	2.30	0.91	Disagree
5	Science helps solve problems in my community	95	55	26	3	3.35	0.79	Agree
6	I want to learn more about basic science	34	63	24	58	2.41	1.13	Disagree
7	I'm curious about how things work	63	44	45	27	2.80	1.08	Agree
8	I feel happy when doing science experiments	37	47	35	60	2.34	1.14	Disagree
9	I am good at understanding basic science concepts	49	48	38	44	2.57	1.13	Agree
10	I believe I can excel in basic science	63	47	36	33	2.78	1.11	Agree
	Sectional mean					2.66	1.09	Agree

Table 3b shows that majority of the respondents agreed to all the items (since their mean is greater than 2.50) except for item 4, 6 and 8 whose means are less than 2.5. The sectional mean is 2.66 with standard deviation of 1.09. This means that majority of the urban respondents agreed that the items on interest factor have major impact on their achievement in Basic Science in junior secondary schools in North Central Nigeria

Testing of Hypotheses

H₀₁: There is no significant relationship between students' perception of the impact of their interest factor and their academic achievement in basic science in junior secondary schools in North-Central Nigeria.

To test this hypothesis, Spearman rho non-parametric statistical tool was used and the result is as shown in Table 4

Table 4: Relationship Between Students' Perception of the Impact of Interest and their Basic Science Achievement in Junior Secondary Schools in North Central Nigeria

Variables	N	Mean	S.D	r	Sig @ 0.05	Decision
Interest	383	2.70	1.09	0.982	0.000	Significant
Achievement	383	2.67	1.06			

Table 4 shows that there was a significant relationship between students' perception of interest factor and their academic achievement in Basic Science in North Central Nigeria ($p = 0.000$, which was less than 0.05 level of significance). As a result, hypothesis 1 was rejected. Hence, there was a very strong

positive correlation ($\rho=0.982$) between students' perception of the impact of their interest factor and achievement in Basic Science among junior secondary school students in North Central Nigeria.

H₀₂: There is no significant difference between rural and urban students' perception of the impact of their interest factor on their academic achievement in basic science in junior secondary schools in North-Central Nigeria.

To test the hypothesis, Mann Whitney U-test nonparametric statistics was used and the result is shown in the table 13 below:

Table 5: Summary of Mann Whitney U-test Results on difference between Students Perception of the Impact of their Interest Factor on their Achievement in Basic Science in Rural and Urban Schools in North Central Nigeria

Location	N	Mean Rank	Sum of Ranks	Mann Whitney U	Z	Sig @0.05	Remark
Rural	204	195.65	39912.00	17514.00	-0.713	0.476	Not Significant
Urban	179	187.84	33624.00				

From Table 5, the result of the Mann Whitney U-test, the computed mean ranks of perception of impact of interest factor were 195.65 and 187.84 by rural and urban schools respectively. The sum of ranks scores were 39912.00 and 33624.00 respectively. The Mann Whitney U value was 17514.00 and the Z score was -0.713. The calculated P-value was 0.476 which was greater than 0.05 level of significance. Hence hypothesis 4 was accepted and it was concluded that there was no significant difference between rural and urban students' perception of the impact of their interest factor and their academic achievement in Basic Science in junior secondary schools in North-Central Nigeria.

Discussion of Findings

The findings of this study provide empirical insight into the role of students' interest in shaping academic achievement in Basic Science at the junior secondary school level in North-Central Nigeria. Anchored within contemporary perspectives on science education and learner motivation, the results affirm that students' affective engagement with science learning remains a critical determinant of achievement outcomes, particularly during early adolescence when academic attitudes and identities are still forming. The analysis of students' perceptions revealed that **interest in Basic Science was generally high among the respondents**, as reflected in the overall sectional mean. Students reported enjoyment in learning science topics, curiosity about how things work, positive emotions during practical activities, and confidence in their ability to excel in Basic Science. These findings suggest that many junior secondary school students perceive science as engaging and relevant to problem-solving within their communities. This aligns with motivation theories which posit that interest directs attention, sustains cognitive engagement, and enhances persistence in learning tasks (Renninger & Hidi, 2020; Eccles & Wigfield, 2020).

However, an important nuance emerged from the findings: students showed relatively lower agreement with the item linking Basic Science to future career aspirations. This suggests that while students enjoy and engage with Basic Science at a classroom level, they may lack adequate exposure to science-related career pathways or role models that help them connect classroom learning with long-term vocational possibilities. This finding corroborates earlier studies in developing contexts which indicate that limited career guidance and weak school–industry linkages often constrain students' perception of science as a viable future pathway (OECD, 2021; UNESCO, 2022). It underscores the need for deliberate integration of career awareness into Basic Science instruction. The inferential analysis further revealed a **very strong and statistically significant positive relationship between students' interest and academic achievement in Basic Science**. The strength of this relationship suggests that interest is not merely a peripheral motivational factor but a central driver of achievement in science learning. Students who

reported higher levels of interest also demonstrated higher achievement scores, supporting the view that affective engagement enhances cognitive processing, conceptual understanding, and retention of scientific knowledge. This finding is consistent with contemporary empirical evidence indicating that interest-based engagement leads to deeper learning and improved performance in science subjects (Wang et al., 2020; OECD, 2021).

From a pedagogical standpoint, this result reinforces the argument that improving students' achievement in Basic Science requires more than curriculum coverage and assessment reforms. Rather, instructional strategies must deliberately stimulate and sustain student interest through inquiry-based learning, hands-on experiments, real-life applications, and supportive teacher–student interactions. The finding also aligns with learner-centred approaches advocated in modern science education reforms, which emphasise engagement, relevance, and motivation as prerequisites for meaningful learning outcomes. The comparison of rural and urban students' perceptions yielded another important insight. Although descriptive results showed slight variations in mean scores particularly with rural students reporting marginally higher overall interest the **difference between rural and urban students' perceptions was not statistically significant**. This suggests that, within the sampled states, students' interest in Basic Science operates as a relatively stable motivational construct across school locations. Despite known disparities in infrastructure and resource availability between rural and urban schools in Nigeria, students' affective engagement with science learning appears to be influenced more by classroom-level experiences than by geographical location alone.

This finding aligns with recent studies indicating that while contextual inequalities exist, effective teaching practices and supportive learning climates can mitigate location-based disadvantages in students' motivational orientations (UNESCO, 2022; World Bank, 2021). It also implies that interventions aimed at enhancing student interest in Basic Science can be applied broadly across rural and urban schools without necessarily requiring location-specific motivational frameworks, although resource equity remains a critical concern. Taken together, the findings of this study highlight **students' interest as a powerful and consistent predictor of academic achievement in Basic Science**, irrespective of school location. The results affirm theoretical and empirical positions within science education literature that regard interest as a key mechanism through which learners engage with scientific content, persist through conceptual challenges, and achieve academic success. At the junior secondary school level, where foundational attitudes toward science are formed, fostering interest is particularly crucial for sustaining participation in science-related learning pathways. In the North-Central Nigeria, these findings carry important implications for science educators, curriculum developers, and policymakers. Strengthening Basic Science achievement requires instructional environments that prioritise student engagement, curiosity, and relevance, alongside content mastery. By systematically nurturing interest through pedagogical innovation and contextualised learning experiences, schools can enhance both immediate academic outcomes and long-term participation in science and technology fields.

Conclusion

This study examined students' interest and academic achievement in Basic Science in junior secondary schools in North-Central Nigeria, with specific focus on students' perceptions of the impact of interest on achievement and possible rural–urban differences. In relation to the first objective, the study found that students generally perceived their interest as having a positive influence on their academic achievement in Basic Science. The high sectional mean scores across most interest-related items indicate that students enjoy learning Basic Science, are curious about scientific phenomena, and feel confident in their ability to understand science concepts. These perceptions align with the empirical result showing a statistically significant and very strong positive relationship between students' interest and their academic achievement. This finding confirms that interest is not merely an affective disposition but a powerful motivational factor that translates directly into improved academic performance in Basic Science.

Regarding the second objective, which examined students' perceptions across rural and urban school contexts, the findings revealed that both rural and urban students similarly perceived interest as an important contributor to their achievement in Basic Science. Although minor variations were observed in responses to some items, the overall pattern remained consistent across locations. The Mann–Whitney U-test further established that the observed differences were not statistically significant. This suggests that interest operates as a common and influential factor in shaping academic achievement regardless of school location, indicating that students' internal motivation may mitigate some contextual disparities associated with rural–urban schooling. Taken together, the findings demonstrate that students' interest is a critical and consistent predictor of academic achievement in Basic Science in junior secondary schools in North-Central Nigeria. The absence of significant rural–urban differences further implies that efforts to improve achievement in Basic Science should prioritise strategies that stimulate and sustain students' interest across all school contexts. Strengthening interest at this foundational stage of science education is therefore essential for improving learning outcomes and fostering long-term engagement with science.

Recommendations

The following recommendations are derived directly from the objectives and findings of the study:

- i. Since students' interest was found to have a strong and significant relationship with academic achievement in Basic Science, teachers should consistently employ instructional strategies that stimulate curiosity and enjoyment. Practical activities, experiments, demonstrations, and inquiry-based learning should be prioritised to sustain students' interest and translate engagement into improved achievement.
- ii. Given that some students expressed weaker perceptions of the relevance of Basic Science to future careers, curriculum implementation should emphasise real-life applications of Basic Science concepts. Teachers should explicitly link classroom content to everyday experiences, societal challenges, and potential career pathways to strengthen students' perceived value of the subject.
- iii. As no significant difference was found between rural and urban students' perceptions, policymakers and school administrators should adopt uniform strategies aimed at enhancing students' interest in Basic Science across all locations. Interventions should focus on motivational teaching practices rather than being limited by geographical classifications.
- iv. Education authorities should organise regular professional development programmes for Basic Science teachers on strategies for fostering students' interest and positive attitudes toward science. Such training should focus on learner-centred pedagogy, classroom engagement techniques, and effective use of instructional materials.
- v. Schools should provide structured opportunities that further stimulate interest in Basic Science, such as science clubs, exhibitions, project-based learning activities, and inter-school science competitions. These initiatives can reinforce classroom learning and sustain students' enthusiasm for science.
- vi. Future research should extend this study by incorporating additional variables such as self-efficacy, teacher support, and learning environment, as well as exploring longitudinal effects of interest on science achievement over time to build a more comprehensive understanding of achievement dynamics in Basic Science.

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