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

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Abstract: This study examines Self-Efficacy and Students' Achievement in Basic Science in Junior Secondary Schools in North-Central Nigeria, A correlational survey research design was adopted to examine this relationship without manipulating any variables. The population of the study comprised all Junior Secondary School II (JSS2) students offering Basic Science in public junior secondary schools in North-Central Nigeria during the 2024/2025 academic session. Using a multistage sampling technique, a sample of 383 JSS2 students was drawn from Niger State, Nasarawa State, and the Federal Capital Territory. Data were collected using the Basic Science Self-Efficacy Scale and a researcher-developed Basic Science Achievement Test based on the JSS2 Basic Science curriculum. The instruments were subjected to face, content, and construct validation by experts in Science Education and Educational Psychology, while reliability indices obtained through Cronbach's Alpha and Kuder–Richardson Formula 20 ranged from 0.82 to 0.88, indicating acceptable internal consistency. Data were collected through direct administration of the instruments with the assistance of trained research assistants and analyzed using descriptive statistics, Spearman's rho correlation, and Mann–Whitney U test at the 0.05 level of significance. One major finding of the study revealed that there was no significant difference between rural and urban students' perception of the impact of self-efficacy on their academic achievement in Basic Science. The study concluded that self-efficacy is a critical psychological factor influencing students' achievement in Basic Science, and its perceived impact is consistent across rural and urban junior secondary schools in North-Central Nigeria. It was therefore recommended that teachers and curriculum planners adopt instructional strategies that deliberately enhance students' self-efficacy in Basic Science, as strengthening students' confidence in their abilities can improve academic achievement irrespective of school location.

Keywords: Self-efficacy, Academic achievement, Basic Science, Rural–urban schools, North-Central Nigeria.

Introduction

An essential dimension of understanding academic achievement in Basic Science is recognizing how **cognitive and affective factors converge** to influence learner outcomes. Among these, academic self-efficacy has been repeatedly shown to predict a wide array of educational outcomes including persistence, choice of academic tasks, engagement, and performance (Pérez-López et al., 2026). Basic Science, taught in the first three years of secondary education, is designed to cultivate students' scientific literacy, foster inquiry skills, and prepare learners for advanced study in science and

technology disciplines. However, reports of low achievement in Basic Science persist, with many students struggling to meet proficiency standards in both formative and summative assessments The perception of one's own competence in science is not developed in isolation. Students construct self-efficacy beliefs through four primary sources: mastery experiences (personal success), vicarious experiences (observing peers), verbal persuasion (feedback from teachers and significant others), and physiological and emotional states (anxiety, confidence, motivation) (Chukwuemeka, et al., 2025).

When students perceive previous performance as successful and receive continuous reinforcement from their educational environment, they are more likely to develop higher levels of self-efficacy. Conversely, repeated failures or lack of supportive learning structures can diminish students' beliefs in their abilities, leading to reduced academic motivation and poorer outcomes. In the Nigerian, where student achievement in science subjects including Basic Science often falls below national expectations, attention to psychological variables such as self-efficacy remains limited relative to the focus on structural and instructional issues. Recent research conducted within Nigerian educational settings shows that academic self-efficacy positively mediates the relationship between intrinsic motivation and achievement in science subjects, indicating that self-efficacy can amplify the influence of motivational factors on academic outcomes (Nnadi & Onah, 2024; Ojelade 2017). This suggests that interventions aimed at enhancing students' confidence in their scientific abilities may yield substantive improvements in performance, independent of other instructional reforms.

Moreover, the issue of self-efficacy is tightly linked to **academic motivation, self-regulation, and engagement** psychological constructs that are fundamental to learning in challenging subjects like Basic Science. For example, when students possess strong belief in their scientific capabilities, they are more likely to regulate their learning, persist through complex problem sets, seek help when needed, and engage deeply with content behaviours that are all associated with higher levels of achievement (Ojelade, et al., 2023). These findings underscore that academic self-efficacy is not merely a correlate of achievement but an active psychological mechanism that shapes how students approach and negotiate learning tasks. While the psychological underpinnings of self-efficacy are universal, the **educational contexts** in which students learn can significantly influence how these beliefs are formed and enacted. In regions like North-Central Nigeria, where schools differ markedly in their resources, teacher quality, and socio-pedagogical environments, understanding the interplay between students' self-efficacy perceptions and academic achievement demands nuanced contextual analysis.

Research from a range of educational systems indicates that **rural and urban educational contexts yield different opportunities and constraints** that shape students' academic experiences. Although research specific to student self-efficacy differences across rural and urban schools remains sparse, broader educational studies suggest that disparities in educational infrastructure, teacher recruitment, parental involvement, and access to learning technology contribute to uneven academic outcomes between rural and urban students. For instance, differential access to e-learning technologies during the COVID-19 pandemic highlighted how rural students often report lower digital self-efficacy due to limited Internet connectivity and fewer learning devices compared to urban peers (Tang et al., 2021). Although such studies focus broadly on digital self-efficacy, they imply that students' perceived capabilities are highly sensitive to environmental affordances and constraints reinforcing the hypothesis that rural and urban settings might differentially influence students' self-efficacy related to Basic Science. Educational inequalities in rural areas including teacher shortages, inadequate laboratory facilities, and limited exposure to hands-on science practices may dampen students' belief in their scientific competence, thereby dampening their academic outcomes. In contrast, urban schools often benefit from more robust teaching support and diverse educational stimuli that can elevate students' confidence and academic engagement.

Empirical research also points to **rural–urban academic performance gaps** in various subjects, though the magnitude and direction of these differences vary across contexts. A study comparing secondary school achievement in rural and urban settings in Bangladesh found that socioeconomic and instructional quality factors accounted for much of the performance disparity, with parental education and financial resources being significant predictors of better achievement among urban

students (Sumi et al., 2021; Ojelade & Aregbesola, 2018). These findings echo broader educational research that highlights location-based inequalities as a persistent challenge in achieving equitable academic outcomes. However, location alone does not determine educational success; rather, it interacts with psychological constructs such as self-efficacy. The present study situates students' perceptions at the heart of this interaction, positing that students' belief in their scientific capabilities may mediate or moderate the influence of rural–urban differences on their achievement a relationship that warrants systematic investigation in the North-Central Nigerian context.

The concept of self-efficacy originates from Bandura's Social Cognitive Theory, which posits that individuals' beliefs in their capability to execute actions required for desired outcomes shape their motivation, effort, persistence, and achievement (Bandura, 1997, as discussed in Pérez-López et al., 2026). In educational psychology, **academic self-efficacy** refers to students' judgments of their abilities to successfully perform specific academic tasks and achieve goals. These beliefs are formed through mastery experiences, vicarious learning, social persuasion, and affective states, which together inform students' approach to learning challenges and influence academic outcomes. Empirical evidence from systematic reviews highlights that interventions targeting self-efficacy such as metacognitive strategies, emotional regulation, and social support contribute meaningfully to academic persistence and performance across varied learning environments (Sánchez et al., 2026).

Academic self-efficacy is conceptually distinct from, but related to, motivation and engagement. Research has documented that higher self-efficacy enhances students' capacity to self-regulate learning, embrace challenges, and utilize adaptive strategies all of which are associated with improved academic performance (Sahu & Khanna, 2025;). This theoretical and empirical grounding provides the rationale for investigating self-efficacy as a determinant of achievement in Basic Science among junior secondary students in Nigeria. A substantial body of research affirms the **positive relationship between self-efficacy and academic achievement** across levels and subjects. Descriptively, students with stronger self-efficacy beliefs tend to demonstrate higher effort, persistence in challenging tasks, and better academic outcomes than those with weaker self-efficacy beliefs (Sahu & Khanna, 2025). For example, a recent secondary-level study conducted in the post-pandemic educational context reported that academic self-efficacy significantly predicted secondary students' academic achievement, with high self-efficacy associated with enhanced effort regulation, resilience, and learning outcomes (Sahu & Khanna, 2025).

Research within Nigeria shows e general positive influence of self-efficacy on achievement, including in science-related domains. In Akwa Ibom State, Babayemi, Akpan, and Abasi (2022) found that students' self-efficacy significantly influenced their performance in Basic Science and Technology examinations, reinforcing the importance of belief in one's capabilities as a determinant of academic success. Other Nigerian studies have examined related psychological constructs in science education. For instance, Bolaji, Ogunlade, and Ogunlade (2025) observed that science self-efficacy and academic motivation contributed jointly to adolescents' engagement in science subjects, with self-efficacy exerting a greater relative influence on engagement than motivation itself. Similarly, research in physics education indicated that self-efficacy and academic motivation mediated achievement outcomes, suggesting that students with higher confidence and positive academic beliefs were better positioned to succeed (Nnadi & Onah, 2024). While these studies focus on science broadly or other science subjects (e.g., physics), they collectively affirm that self-efficacy is a significant psychological factor associated with science achievement in Nigerian secondary schools.

Although the current study centers on self-efficacy, it is important to situate it within the broader spectrum of related constructs that influence academic achievement. For example, research on secondary students in Nigeria has documented that self-concept and parental involvement, alongside self-efficacy, significantly predict academic achievement, highlighting the multifaceted nature of psychological influences on learning (Umanah et al., 2025). In addition, studies in mathematics and other subjects suggest that self-efficacy interacts with self-regulation, locus of control, and motivational processes to influence academic success. For instance, research in Abia State found that self-efficacy correlated positively with academic achievement in mathematics, where components

such as self-regulation and mastery experiences were important contributors to performance (Ndubuisi, 2023). Similarly, studies indicate that self-efficacy and locus of control jointly predict achievement outcomes, suggesting that students' beliefs about their competence and control over their learning pathways are psychologically linked to academic success (Ede & Anosike, 2023; Ojelade). Collectively, these findings underscore that self-efficacy operates in synergy with other learner beliefs and motivational variables.

One important gap in the literature concerns how self-efficacy and academic achievement might vary by **educational sector**, specifically between rural and urban settings. Although direct Nigerian studies comparing rural and urban self-efficacy in science are limited, international evidence suggests that contextual factors such as access to resources, instructional support, and socio-economic conditions can shape students' self-efficacy beliefs and educational outcomes. For example, research from other educational settings reports that students in urban environments often demonstrate higher self-efficacy than their rural counterparts, likely due to differences in learning opportunities, teacher quality, and exposure to academic stimuli (Sharma, 2022). This suggests that rural–urban disparities in educational resources could lead to differential development of self-efficacy beliefs among students, which in turn may influence academic achievement in subjects like Basic Science. However, the specific mechanisms underlying these differences in the Nigerian context remain under-explored, highlighting the need for research that systematically compares students' self-efficacy perceptions and associated academic outcomes between rural and urban junior secondary schools in North-Central Nigeria. However, most existing studies examine objective measures of self-efficacy and achievement without focusing on students' *perceptions* of how their self-efficacy beliefs influence academic outcomes. Thus, the present study examines students' perceptions of self-efficacy and examining rural–urban differences in perceived impacts on academic achievement in Basic Science within the North-Central Nigerian educational sector.

Purpose of the Study

The purpose of this study is to Self-Efficacy and Students' Achievement in Basic Science in Junior Secondary Schools in North-Central Nigeria. Specifically, the study seeks to:

1. Determine the students' perception of the impact of their self-efficacy 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 self-efficacy 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 self-efficacy 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 self-efficacy 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 self-efficacy 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 self-efficacy factor on their academic achievement in basic science in junior secondary schools in North-Central Nigeria.

Methodology

The study adopted a **correlational survey research design**, which is appropriate for examining relationships among psychosocial variables specifically self-efficacy, interest, and learning environment and students' achievement in Basic Science without manipulating any variables. This non-experimental approach allows the researcher to measure the degree of association between independent variables and the dependent variable in their natural educational setting, providing insights into how psychological factors influence student performance. The design is widely used in educational research for its ability to reveal patterns and predictive relationships within naturally occurring learning environments (Creswell & Creswell, 2023). The **population of the study** comprised all Junior Secondary School II (JSS2) students offering Basic Science during the 2024/2025 academic session in public junior secondary schools across North-Central Nigeria. This geopolitical zone includes Benue, Kogi, Kwara, Nasarawa, Niger, Plateau, and the Federal Capital Territory (FCT). For practical reasons, the study was delimited to **three states**: Niger, Nasarawa, and the FCT. JSS2 students were chosen because they are midway through lower secondary education and have been sufficiently exposed to the Basic Science curriculum. The populations of JSS2 students in the selected states were 52,221 in Niger, 23,800 in Nasarawa, and 43,818 in the FCT, totaling 119,839 students. These students were distributed across 1,021 public schools, including both rural and urban schools, providing a comprehensive sampling frame for the study (Universal Basic Education Commission, 2025).

A total of **383 students** were sampled using **Krejcie and Morgan's (1970) table** for determining sample size. A **multistage sampling technique** was employed to ensure representativeness. First, North-Central Nigeria was stratified into constituent states, from which three states were randomly selected: Niger, Nasarawa, and FCT. Second, two Local Government Areas (LGAs) were randomly selected from each state. Third, within each LGA, four public junior secondary schools two rural and two urban were purposively chosen based on the availability of Basic Science teachers and functional laboratories. Finally, students were systematically selected from the schools, with the number of students drawn proportionally from urban and rural areas, ensuring a representative sample. The distribution was 167 students from Niger, 76 from Nasarawa, and 140 from the FCT, with roughly equal representation from rural and urban schools. Two instruments were used to collect data. First was the Basic Science Self-Efficacy Scale (BSSES), a 10-item instrument adapted from Bandura's guidelines, assessing students' confidence in performing Basic Science tasks. The second instrument was the **Basic Science Achievement Test (BSAT)**, a 40-item multiple-choice test developed based on the JSS2 curriculum. Items were selected according to psychometric criteria, retaining only those with Difficulty Index values between 0.30 and 0.70 and Discrimination Power values between 0.40 and 1.00. The items were distributed across six cognitive levels and five content domains to ensure alignment with the curriculum and comprehensive coverage of Basic Science concepts. Questionnaires were rated on a 4-point Likert scale, while BSAT items were scored dichotomously (1 = correct, 0 = incorrect).

The instruments were subjected to **face, content, and construct validation** by two supervisors, one other professor in Science Education, and two professors in Educational Psychology at the University of Abuja. Their input guided the refinement of ambiguous items and removal of irrelevant questions, ensuring alignment with the Nigerian educational context. A **pilot study** involving 60 students from a non-participating school within the region was conducted to test reliability. Cronbach's Alpha coefficients for the SIBSQ, BSSES, and LEI were 0.82, 0.87, and 0.84 respectively, while the BSAT yielded a KR-20 reliability index of 0.88, indicating high internal consistency and suitability for research (Taber, 2018). Data collection involved obtaining permission from the university and relevant educational authorities. Trained research assistants administered the instruments during school hours, with the support of Basic Science teachers. The process spanned four weeks and occurred in three phases: orientation of participants, administration of instruments, and immediate retrieval of completed questionnaires and tests, ensuring completeness and data integrity. Data were analyzed using **SPSS version 26**. Descriptive statistics, including mean and standard deviation,

summarized psychosocial factors and achievement scores. **Spearman's rho correlation** was employed to test the relationships between interest, self-efficacy, learning environment, and achievement. **Mann–Whitney U tests** examined rural–urban differences in students' perceptions and achievement. **Multiple linear regression analysis** determined the joint and relative contributions of the psychosocial variables to students' achievement. Additionally, **Kruskal–Wallis tests** were used to compare mean differences across selected variables. All hypotheses were tested at a **0.05 significance level**, ensuring statistical rigor and validity of the conclusions.

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 self-efficacy factor on their academic achievement in basic science in junior secondary schools in North-Central Nigeria?

To answer the research question, mean and standard deviation were used as shown in table 2 below.

Table 2: Students' Perception of the Impact of their Self-Efficacy 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
11	I can succeed because I can improve my study habit	132	152	53	46	2.97	0.98	Agree
12	I will be able to finish my university education because I am smart enough to do so	125	146	81	31	2.95	0.93	Agree
13	When I am called in class to give my opinion, I give the correct answer because I pay attention	118	134	62	69	2.79	1.07	Agree
14	Passing a subject depends on how well I perform.	142	120	60	61	2.90	1.07	Agree
15	The future depends on what I do now.	47	74	133	129	2.10	1.01	Disagree
16	My teachers give me high marks because I deserve them.	105	109	84	85	2.61	1.11	Agree
17	I learned more because I developed good study habits.	102	135	86	60	2.73	1.02	Agree
18	I can successfully control the outcome of my performance tasks, such as group presentations, oral works, multimedia presentations, and research projects.	113	132	61	77	2.73	1.09	Agree
19	I can successfully control the outcome of written work in my academics, either quizzes or long tests.	111	93	89	90	2.59	1.14	Agree
20	I believe that I can pass all subjects because I can do so.	97	128	81	77	2.64	1.07	Agree
	Sectional mean					**2.70**	**1.08**	**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 15 whose mean is less than 2.5. The sectional mean is 2.70 with standard deviation of 1.08. This means that majority of the respondents agreed that the listed items on self-efficacy 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 self-efficacy 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 & Table 3b below.

Table 3a: Students' Perception of the Impact of their Self-Efficacy 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
21	I can succeed because I can improve my study habit	68	82	32	22	2.96	0.96	Agree
22	I will be able to finish my university education because I am smart enough to do so	73	69	45	17	2.97	0.95	Agree
23	When I am called in class to give my opinion, I give the correct answer because I pay attention	62	70	36	36	2.77	1.07	Agree
24	Passing a subject depends on how well I perform.	84	72	27	21	3.07	0.97	Agree
25	The future depends on what I do now.	22	41	73	68	2.08	0.98	Disagree
26	My teachers give me high marks because I deserve them.	72	62	39	31	2.86	1.06	Agree
27	I learned more because I developed good study habits.	61	67	44	32	2.77	1.04	Agree
28	I can successfully control the outcome of my performance tasks, such as group presentations, oral works, multimedia presentations, and research projects.	65	53	43	43	2.69	1.13	Agree
29	I can successfully control the outcome of written work in my	66	51	46	41	2.70	1.12	Agree

	academics, either quizzes or long tests.							
30	I believe that I can pass all subjects because I can do so.	41	70	49	44	2.53	1.04	Agree
	Sectional mean					**2.74**	**1.07**	**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 15 whose mean is less than 2.5. The sectional mean is 2.74 with standard deviation of 1.07. This means that majority of the rural respondents agreed that the items on self-efficacy factor have major impact on their achievement in Basic Science in junior secondary schools in North Central Nigeria.

Table 3b: Students' Perception of the Impact of their Self-Efficacy 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
21	I can succeed because I can improve my study habit	68	82	32	22	2.96	0.96	Agree
22	I will be able to finish my university education because I am smart enough to do so	73	69	45	17	2.97	0.95	Agree
23	When I am called in class to give my opinion, I give the correct answer because I pay attention	62	70	36	36	2.77	1.07	Agree
24	Passing a subject depends on how well I perform.	84	72	27	21	3.07	0.97	Agree
25	The future depends on what I do now.	22	41	73	68	2.08	0.98	Disagree
26	My teachers give me high marks because I deserve them.	72	62	39	31	2.86	1.06	Agree
27	I learned more because I developed good study habits.	61	67	44	32	2.77	1.04	Agree
28	I can successfully control the outcome of my performance tasks, such as group presentations, oral works, multimedia presentations, and research projects.	65	53	43	43	2.69	1.13	Agree
29	I can successfully control the outcome of written work in my academics, either quizzes or long tests.	66	51	46	41	2.70	1.12	Agree
30	I believe that I can pass all subjects because I can do so.	41	70	49	44	2.53	1.04	Agree
	Sectional mean					**2.74**	**1.07**	**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 15, 16 and 19 whose means are less than 2.5. The sectional mean is 2.65 with standard deviation of 1.08. This means that majority of the respondents agreed that the items on self-efficacy factor have major impacts on their achievement in Basic Science in Junior Secondary School Students in North Central Nigeria.

Testing of Hypotheses

H_{01}: There is no significant relationship between students' perception of the impact of their self-efficacy 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 11.

Table 4: Relationship Between Students' Perception of the Impact of their Self-Efficacy Factor and their Academic Achievement in Basic Science in Junior Secondary Schools in North-Central Nigeria

Variables	N	Mean	S.D	r	Sig @ 0.05	Decision
Self-Efficacy	383	2.70	1.08	0.979	0.000	Significant
Achievement	383	2.67	1.06			

Table 4 shows that there was a significant relationship between students' perception of the impact of their self-efficacy factor and their academic achievement in Basic Science in North Central Nigeria (p = 0.000, which is less than 0.05 level of significance). As a result, hypothesis 2 was rejected. Hence, there was a very strong positive correlation (r=0.979) between students' self-efficacy factor and achievement in Basic Science among junior secondary school students in North Central Nigeria.

H_{05}: There is no significant difference between rural and urban students' perception of the impact of their self-efficacy 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 5

Table 5: Summary of Mann Whitney U-test Results on difference between Students' Perception of the Impact of their Self- Efficacy Factor on 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	195.71	39924.00	17502.00	-0.726	0.468	Not Significant
Urban	179	187.78	33612.00				

From Table 5, the result of the Mann Whitney non parametric test, the computed mean ranks of perception of impact of self-efficacy factor were 195.71 and 187.78 by rural and urban schools respectively. The sum of ranks scores were 39924.00 and 33612.00 respectively. The Mann Whitney U value was 17502.00 and the Z score was -0.727. The calculated P-value was 0.468 and 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 on their academic achievement in basic science in junior secondary schools in North-Central Nigeria.

Discussion

Hypothesis 5 stated that there is no significant difference between rural and urban students' perception of the impact of their self-efficacy factor on academic achievement in Basic Science in junior secondary schools in North-Central Nigeria. To test this hypothesis, the Mann–Whitney U-test, a nonparametric statistical technique suitable for comparing two independent groups, was employed. The results, as presented in Table 5, indicate that rural students had a mean rank of 195.71, while urban students had a mean rank of 187.78. The sum of ranks for the rural and urban groups were

39,924.00 and 33,612.00, respectively. The computed Mann–Whitney U value was 17,502.00, with a Z score of -0.727 and an associated p-value of 0.468, which is greater than the 0.05 level of significance. Based on this outcome, the hypothesis was **accepted**, indicating that there is no statistically significant difference between rural and urban students regarding their perception of the impact of self-efficacy on their academic achievement in Basic Science.

This finding suggests that, regardless of the geographical location of the school, students perceive their self-efficacy beliefs as having a similar influence on their learning outcomes in Basic Science. In other words, students' confidence in their ability to perform Basic Science tasks appears to be relatively uniform across rural and urban contexts. This is notable given the documented disparities in educational infrastructure, teacher quality, and access to learning resources between rural and urban schools in Nigeria (World Bank et al., 2021; Tang et al., 2021). Despite these structural differences, the perception of self-efficacy among students seems to be more strongly shaped by individual cognitive and affective factors than by contextual variables such as school location. The result aligns with social cognitive theory, which emphasizes that self-efficacy is largely a function of **mastery experiences, vicarious learning, verbal persuasion, and emotional states** (Bandura, 1997; Pérez-López et al., 2026). Students across both rural and urban settings may have had comparable mastery experiences in Basic Science, such as classroom experiments, teacher feedback, and assessment outcomes, which contribute to their belief in their academic capabilities. Additionally, exposure to similar instructional methods, peer interactions, and reinforcement strategies may help standardize students' self-efficacy perceptions irrespective of location.

Moreover, this finding corroborates previous empirical research indicating that self-efficacy can operate independently of environmental constraints in shaping students' learning perceptions and motivation. For instance, Nnadi and Onah (2024) observed that students' self-efficacy in science subjects significantly influenced their engagement and achievement, regardless of differences in school resources or urban–rural disparities. Similarly, Bolaji, Ogunlade, and Ogunlade (2025) reported that adolescents' science self-efficacy was a robust predictor of academic engagement across diverse school settings in Nigeria. These studies support the present finding that self-efficacy may be a more psychologically-driven construct than an environmentally determined one, highlighting its role as a key determinant of academic behavior in Basic Science. The practical implication of this finding is that interventions aimed at enhancing students' self-efficacy in Basic Science do not necessarily need to be location-specific. Strategies such as guided mastery experiences, structured feedback, peer modeling, and motivational reinforcement can be applied effectively across both rural and urban schools.

Educators and policymakers can, therefore, design programs that focus on strengthening students' self-belief and confidence in performing science tasks, which may yield similar benefits in both contexts. However, while the perception of self-efficacy did not differ significantly between rural and urban students, it remains important to recognize that other factors such as actual resource availability, teacher quality, and classroom environment may still contribute to differences in actual academic performance. Future research could explore the relationship between perceived self-efficacy and actual performance outcomes in rural and urban schools, as well as investigate potential mediators such as instructional support, parental involvement, and access to laboratory resources. In summary, the findings of this study indicate that students' perceptions of the impact of self-efficacy on their Basic Science achievement are **consistently similar across rural and urban schools in North-Central Nigeria**. This highlights the universal relevance of self-efficacy as a psychological construct in influencing student outcomes and underscores the potential for broad-based educational interventions to enhance academic confidence and achievement in Basic Science.

Coclusion

The study has provided empirical insights into the relationship between self-efficacy and students' achievement in Basic Science in junior secondary schools within North-Central Nigeria. Findings reveal that students generally perceive self-efficacy as an important factor influencing their academic performance. Specifically, students who reported higher levels of confidence in their ability to perform

Basic Science tasks also tended to achieve higher scores in the Basic Science Achievement Test, confirming that self-efficacy is a key determinant of academic success. Furthermore, the study examined whether rural and urban students differed in their perception of the impact of self-efficacy on achievement. Results from the Mann–Whitney U test indicated **no significant difference** between rural and urban students. This suggests that students' self-belief in their scientific abilities is relatively consistent across different geographical and educational contexts, despite potential disparities in resources, teacher quality, and learning environments. The findings underscore that **psychological factors such as self-efficacy operate independently of school location**, reinforcing its central role in academic engagement, persistence, and problem-solving in Basic Science. Overall, the study highlights the critical importance of fostering students' self-efficacy to enhance academic outcomes. Students' beliefs about their capabilities appear to influence their effort, perseverance, and approach to learning in Basic Science, making self-efficacy a fundamental target for educational interventions in both rural and urban junior secondary schools in North-Central Nigeria.

Recommendations

Based on the study's findings and objectives, the following recommendations are made:

i. Schools should implement programs and classroom strategies that explicitly aim to build students' confidence in performing Basic Science tasks. Activities such as structured laboratory exercises, problem-solving challenges, and incremental mastery experiences can strengthen students' beliefs in their ability to succeed.

Ii. Teachers should be trained to recognize and nurture students' self-efficacy. Professional development programs should equip teachers with techniques for providing constructive feedback, modeling effective problem-solving behaviors, and encouraging self-directed learning in Basic Science.

ii. Since no significant difference was found between rural and urban students' perceptions, interventions aimed at enhancing self-efficacy can be **uniformly implemented across all schools**, ensuring equitable access to programs that build confidence and motivation in learning Basic Science.

iii. The Basic Science curriculum should include activities that challenge students in ways that are achievable and rewarding, promoting confidence and engagement. Inquiry-based learning, project-based tasks, and group collaborations are recommended to reinforce self-efficacy while deepening conceptual understanding.

iv. Schools should encourage parents and community members to support students' learning experiences, provide positive reinforcement, and celebrate academic successes, which can further enhance students' self-efficacy and motivation to excel in Basic Science.

v. Research could also explore potential mediating or moderating variables such as classroom environment, teacher effectiveness, and access to learning resources, to better understand how self-efficacy translates into academic achievement.

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