



Attribution and Self-Regulation as Predictors of Junior Secondary School Students' Academic Achievements in Basic Science in Awka Education Zone

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Abstract

This study investigated the predictive roles of attribution and self-regulation on academic achievement in Basic Science among Junior Secondary School II (JSS II) students in the Awka Education Zone of Anambra State, Nigeria. The study was guided by three research questions and three null hypotheses and employed a correlational survey research design to examine how these psychological factors influence students' performance. The population comprised 5,963 JSS II students from 63 public secondary schools in the zone, from which a sample of 375 students was selected using a multistage sampling procedure. Data were collected using three instruments: the Attributional Style Questionnaire (ASQ), Self-Regulation Questionnaire (SRQ), and Basic Science Achievement Test (BSAT). All instruments were face-validated by three experts, with the BSAT undergoing content validation and the ASQ and SRQ subjected to construct validation. Reliability was determined using Cronbach's alpha for ASQ and SRQ, yielding coefficients of 0.84 and 0.81, respectively, and Kuder-Richardson-20 (KR-20) for BSAT, which produced a coefficient of 0.79. Data analysis was conducted using simple and multiple regression techniques; simple regression addressed research questions 1 and 2, while multiple regression was used for research question 3. Hypotheses were tested at a 0.05 significance level. Results indicated that attribution did not significantly predict Basic Science achievement, whereas self-regulation had a significant but weak positive predictive effect, accounting for 11.2% of the variance. The combined effect of attribution and self-regulation explained 11.4% of the variance in achievement, demonstrating significant joint predictive power. The study concluded that self-regulation is a key predictor of Basic Science achievement, while attribution alone has a limited predictive influence. It is recommended that educators prioritize strategies that enhance self-regulation to improve students' academic performance.

Keywords: Attribution Style, Self-Regulation, Academic Achievement, Basic Science, Predictors, Junior Secondary School

Introduction

Basic Science is one of the major subjects offered at the junior secondary school level, and it aims to help learners build a clear understanding of scientific ideas and how these ideas relate to their everyday experiences. The subject serves as an important foundation for further studies in science and technology, which are key drivers of national development. Despite its importance, students' achievement in Basic Science continues to fluctuate. This variation suggests that, apart from classroom instruction and school-related factors, students' internal psychological characteristics may also influence their performance. One important psychological factor is attribution style, which describes the explanations

students give for their academic successes or difficulties, whether they believe such outcomes are due to ability, effort, luck, or external influences. Another related factor is self-regulation, which involves a learner's capacity to plan, monitor, and direct their own learning processes to meet academic objectives. Students who exhibit constructive attribution patterns and strong self-regulatory habits tend to stay motivated, show persistence, and achieve better academic results. In light of this, the present study investigates the extent to which attribution style and self-regulation predict the academic achievement of junior secondary school students in Basic Science within the Awka Education Zone.

Basic Science provides the initial platform for developing scientific understanding, as it is introduced early at the primary and junior secondary school levels



to stimulate learners' curiosity about scientific ideas. This early introduction is intended to build reflective thinking and foster habits that support scientific inquiry and long-term academic success (National Science Foundation, 2023). Anderson (2023) explains that Basic Science now draws on interdisciplinary methods and incorporates technology to enrich students' learning experiences. This change reflects a transition from traditional memorization practices to more engaging and interactive approaches that help students acquire a deeper understanding of scientific concepts and their relevance across different fields.

Basic Science, formerly known as Integrated Science, assumed its current name with the introduction of the 9-3-4 educational policy. Although the policy did not alter the existing system, it reorganized the structure to ensure that the first nine years of schooling became both compulsory and free for every Nigerian child (FME, 2009). As an interdisciplinary subject, Basic Science aims to bridge the gaps between separate scientific fields by presenting science as a unified body of knowledge through an integrated instructional approach (Oguezie, Osuafor & Ekoyo, 2022). It provides the fundamental base for the various science subjects students will later study at the senior secondary level (Mbonu-Adigwe, Eya, Umate & Attah, 2021). According to the National Academies of Sciences, Engineering, and Medicine (2020), Basic Science not only equips learners for further scientific learning but also develops the foundational skills and knowledge essential for higher education and science-related careers. Bamidele (2014) adds that the subject promotes inquiry-oriented learning rather than memorization, helping students acquire science process skills and positive scientific attitudes rather than accepting information unquestioningly. Consequently, there is a strong need to create meaningful and effective teaching and learning experiences in Basic Science to ignite students' interest in the subject from an early stage.

In Nigeria, every student is required to study basic science. However, the poor academic achievement in this subject remains a significant concern for educational stakeholders, including teachers, researchers, and educators (Mbonu & Okoli, 2019; Omiko, 2017; Obomanu & Adaramola, 2011). Academic achievement reflects the quality of knowledge students acquire through classroom experiences. Tadesse, Melesse, and Berhan (2023) define academic achievement as the extent to which a student meets their short- or long-term educational goals, typically measured through grades, standardized

test scores, and other performance metrics. Furthermore, teachers can use students' academic achievement as an indicator to assess their teaching effectiveness and methodological approaches (Mbonu et al., 2021; Samba & Ogah, 2020).

Data from the Examination Development Center (EDC) in Awka, Anambra State, on students' academic achievement covering the years 2019 to 2023, show that students' performance in Basic Science has been unstable and generally below the expected standard. The EDC results reveal that a greater proportion of students obtain credits and failures in the BECE Basic Science examination, while only a small percentage attain distinctions. This persistent pattern of low and fluctuating achievement in Basic Science highlights the need for immediate intervention

Studies have been conducted within Awka education zone to identify the underlying causes of these students' poor academic achievement in basic science. Research by Okeke and Nwachukwu (2023) highlighted factors such as large class sizes, insufficient teacher training, and inadequate laboratory facilities as contributors to students' low performance in the subject. Additionally, Ezugwu and Okoye (2022) noted that a lack of instructional materials adversely affects student achievement in the zone. Christian-Ike and Okoli (2021) noted that inadequate infrastructure also contributes to students' low performance in basic science in the Awka education zone. Enebechi (2016) further emphasized that ineffective teaching methods, such as reliance on conventional approaches, contribute to poor academic outcomes in basic science. Despite these research efforts, student achievement in basic science continues to fall short in both internal and external examinations. Vasilias (2011) noted that various factors; social, economic, and psychological can influence student success or failure. This study will focus exclusively on psychological factors, specifically investigating whether certain classroom psychological variables can predict students' academic achievement in basic science

Psychological variables are aspects of an individual's traits and mental processes that affect behavior, thoughts, and feelings. These measurable factors can be examined in relation to various psychological phenomena, including psychopathology, stress, self-esteem, and cognitive functioning (Knackfuss et al 2015). These variables include factors like motivation, self-regulation, anxiety, intelligence, attribution and personality traits, which can affect how students learn, perform academically, and interact in



educational settings (Schunk, & Greene, 2023). This study is going to focus on only attribution and self-regulation.

Attribution is the process of inferring the causes of events or behaviors. It is the process by which individuals infer the causes of events and behaviors, shaping motivation, perceptions of control, and ultimately influencing emotions and behaviors (Moskowitz & Olcaysoy, 2016). According to Weiner (2018), attribution is a cognitive process in which individuals determine the causes of their successes and failures, which affects their emotional responses and guides future actions. In real-life situations, people perform attribution almost instinctively, often without being aware of the underlying processes and biases that shape their judgments (Moskowitz & Olcaysoy, 2016). These attributions influence our interpretations of events and our subsequent thinking and behavior (The Berkeley Well-Being Institute, 2023). According to Shores and Smith (2010), attribution is the way individuals assign the reasons for their successes and failures to either internal factors (such as personal ability or effort) or external factors (like task difficulty or luck). This distinction is significant because it affects how individuals perceive control over their outcomes: those with internal attribution believe their actions directly impact their successes, boosting confidence, self-efficacy, and motivation (Martinko & Mackey, 2019). Conversely, individuals who attribute success to external factors may feel their outcomes are beyond their control, diminishing their motivation for future efforts (Houston, 2016).

In educational settings, students commonly attribute their academic successes or failures to internal or external factors, a concept well illustrated by Weiner's (2010) attribution theory. The model categorizes these explanations using three key dimensions: locus of control (whether the cause comes from within the individual or from outside), stability (whether the cause is long-lasting or temporary), and controllability (whether the individual can influence the cause or not). For instance, a student who performs poorly in a test may believe the outcome resulted from an internal cause, such as low ability, or from an external cause, like an overly difficult test. They may also view the failure as stable ("I'm always bad at math") or unstable ("I didn't prepare enough this time"). Finally, they might consider it controllable ("I could have studied harder") or uncontrollable ("I was unwell before the test").

Studies have shown that attribution can significantly impact students' academic achievement. Susetyo and Kumara (2012) posited that students who attributed their success in mathematics to internal factors like effort and ability exhibited higher self-regulated learning compared to those who attributed success to external factors like task simplicity or luck. Similarly, Dasinger (2013) observed that students who scored highly on algorithms often attributed their success to internal, stable factors, indicating a belief in their competence. Despite the importance of attribution in explaining students' learning outcomes, many learners in Basic Science continue to record low levels of academic achievement. These patterns are likely connected to the way students perceive the reasons behind their academic achievement. In addition, students' capacity to plan, oversee, and regulate their own learning is commonly referred to as self-regulation, can significantly influence their academic achievement in Basic Science.

Self-regulation is a key psychological factor that affects learning. It refers to an individual's ability to manage their thoughts, emotions, and behaviors across different situations in order to achieve personal goals. Zimmerman and Schunk (2020) describe self-regulation as the capacity to set personal goals, regulate behavior, and use feedback to enhance performance. It involves multiple dimensions by which individuals control cognitive, emotional, and behavioral processes toward their objectives (Panadero, 2023). According to Cleary and Kitsantas (2021), in an educational context, self-regulation includes students' abilities to independently control their learning through goal-setting, self-monitoring, and reflective practices. Similarly, Gillebart (2018) differentiates self-regulation from self-control, explaining that self-regulation allows individuals to establish goals, standards, and desired outcomes and monitor any discrepancies between their current state and desired end-states, while self-control focuses on the actions needed to align behavior with those goals.

Self-regulation can be categorized into four main areas: (a) Emotional self-regulation, which involves managing emotions to maintain focus and motivation, especially under challenging conditions (Gross & Thompson, 2022); (b) Behavioral self-regulation, which pertains to controlling actions and behaviors, such as time management and task completion (Zimmerman, 2021); (c) Social self-regulation, which includes managing social interactions and communication in group settings (Boekaerts &



Corno, 2021); and (d) Cognitive self-regulation, which involves focusing cognitive processes like attention, problem-solving, and memory strategies to achieve goals (Schunk & Greene, 2020).

Research has demonstrated that self-regulation is linked to positive outcomes, including academic success, career achievement, and overall well-being (Baumeister & Vohs, 2016). Individuals who demonstrate high levels of self-regulation are generally better at achieving their objectives, coping with stress, and maintaining positive interpersonal relationships (Duckworth, 2016). Research by Obodo et al. (2015) and Utomo et al. (2020) indicates that employing self-regulated learning strategies such as setting goals, planning, and monitoring progress can significantly improve students' performance in Basic Science compared to conventional teaching approaches. For instance, Abdulkareem and Ismail (2022) found that peer collaboration improved self-regulation behaviors and positively impacted science achievement in Malaysian secondary schools. Similarly, a study by Agyeman, Adu-Boahen, and Osei-Kwarteng (2022) explored the connection between metacognitive strategies and self-regulation in science learning, while Okeke, Nwoye, and Eze (2023) reported that self-regulation strategies positively affected academic performance and study habits in mathematics and integrated science among senior secondary students. Despite the shown importance of self-regulation from the literature reviewed, research has not yet examined the combined influence of attribution and self-regulation on secondary school students' achievement in Basic Science within the Awka Education Zone. This study aims to fill that gap by exploring both attribution and self-regulation as potential predictors of academic success in Basic Science in Anambra State's Awka Education Zone.

Research Questions

The study is guided by the following research questions:

1. What is the predictive power of attribution on secondary school students' achievement in basic science?
2. What is the predictive power of self-regulation on secondary school students' achievement in basic science?
3. What is the joint predictive power of attribution and self-regulation on secondary school students' achievement in basic science?

Hypotheses

The study is guided by the following null hypotheses and tested at 0.05 level of significance.

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H₀₁: The predictive power of attribution on secondary school students' achievement in basic science is not significant.

H₀₂: The predictive power of self-regulation on secondary school students' achievement in basic science is not significant.

H₀₃: The joint predictive power of attribution and self-regulation on secondary school students' achievement in basic science is not significant.

Methods

This study employed a survey research design, specifically a correlational survey design. Nworgu (2015) posited that a correlational survey aims to determine the relationship between two or more variables. This design was considered appropriate because the study seeks to examine the relationship between classroom psychosocial factors, such as attribution, self-regulation, social control, and social interaction, and students' academic performance in Basic Science within the Awka Education Zone.

The research was conducted in the Awka Education Zone of Anambra State, Nigeria. Situated within the Anambra Central Senatorial District, this zone includes five Local Government Areas: Awka North, Awka South, Anaocha, Dunukofia, and Njikoka, which collectively have 63 government-owned secondary schools. The area was selected due to the researcher's familiarity and observed low academic achievement in Basic Science among students.

The study population included all 5,963 Junior Secondary Two (JSS II) students studying Basic Science in the 63 public secondary schools of the Awka Education Zone. JSS II students were selected because they have been exposed to a range of Basic Science topics and are more stable in the school system compared to JSS III students, who are engaged in external examinations.

The sample size for the study was calculated using the Taro Yamane formula, resulting in 375 JSS II students studying Basic Science. A multistage sampling technique was employed. In the first stage, three Local Government Areas (LGAs) were randomly selected from the five LGAs in the education zone through balloting without replacement. In the second stage, proportionate stratified sampling was used to select 10 schools from the three chosen LGAs: 2 schools from Dunukofia, 3 from Njikoka, and 5 from Awka South.

This approach ensured that each LGA was adequately represented in the sample. In the third stage, proportionate stratified sampling determined the number of students to be selected from each school. Finally, simple random sampling was applied to select the individual participants.

Three instruments were used for data collection, namely, the Attributional Style Questionnaire (ASQ), the Self-Regulation Questionnaire (SRQ), and the Basic Science Achievement Test (BSAT). The ASQ was adapted from the version developed by Ronnel Aldin Fernando (2019). While the original instrument contained 49 items, the adapted version used in this study consisted of 37 items. Responses were rated on a four-point scale: strongly agree (4 points), agree (3 points), disagree (2 points), and strongly disagree (1 point).

The SRQ was adapted from the instrument designed by Nelson Emilio and Georgina García-Mauriño (2012), which originally had 63 items. The adapted SRQ employed a Likert-type scale, with responses typically scored from 1 to 5 (or A to E), where 1 (or A) represented strong disagreement and 5 (or E) represented strong agreement. For the purposes of this study, the scoring was standardized to a 4–1 scale: strongly agree = 4 points, agree = 3 points, disagree = 2 points, and strongly disagree = 1 point.

The interpretation of scores for both the ASQ and SRQ followed the benchmarks suggested by Nworgu (2015): very high (0.80 and above), high (0.60–0.80), medium (0.40–0.60), low (0.20–0.40), and very low (0.00–0.20).

The Basic Science Achievement Test (BSAT) was created by the researcher and covered selected topics from the JSS II Basic Science curriculum. The test was divided into two sections: Section A and Section B. Section A collected demographic information from the respondents, such as the name of the school, while Section B consisted of 25 multiple-choice items designed to assess students’ achievement in Basic Science. The highest score achieved by a student was 50, while the lowest score was 5. Table of specification was structured also to ensure that it covers both the higher and lower levels of objectives.

To establish content validity, a table of specifications was employed to ensure that all relevant topics in the Basic Science Achievement Test were adequately covered. Construct validity for the ASQ and SRQ questionnaires was assessed through factor analysis. The instruments were pilot-tested on 50 respondents who were not part of the study population.

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The students’ responses were analyzed using factor analysis with Varimax rotation and principal axis factoring to determine construct validity. Items with a factor loading below 0.4 (Nworgu, 2020) were considered factorially impure (FI) and were discarded. Items with a loading of 0.4 on more than one component were deemed factorially complex and removed, whereas items loading 0.4 on only one component were regarded as factorially pure (FP) and accepted as valid. For the study, 37 items were retained for the Attribution Style Questionnaire, and 23 items for the Self-Regulation Questionnaire. Reliability was assessed using Cronbach’s alpha for the ASQ and SRQ, and the Kuder-Richardson-20 (KR-20) method for the BSAT, yielding reliability coefficients of 0.84, 0.81, and 0.788, respectively.

Data collection involved visiting the selected schools with permission letters and the assistance of Basic Science teachers. The BSAT and ASQ were administered first, followed by a break, and then the SRQ. All instruments were collected immediately after completion.

Data analysis was conducted using SPSS. Simple linear regression was employed to address research questions 1 and 2, while multiple regression was applied to answer research question 3. The null hypotheses were tested through regression ANOVA, with all results interpreted at a 0.05 level of significance. The benchmark interpretations followed the guidelines of Nworgu (2015): very high (0.80 and above), high (0.60–0.80), medium (0.40–0.60), low (0.20–0.40), and very low (0.00–0.20).

Results

Table 1: Regression analysis of the predictive power of attribution on secondary school students’ achievement in Basic Science

Model	R	R Square	Adjusted R Square
1	.010	.000	-.003

Table 1 shows that the correlation between attribution and secondary school students’ achievement in Basic Science is very low ($R = .010$), with a coefficient of determination of $R^2 = .000$. This indicates a very weak positive predictive relationship. The R^2 value of .000 suggests that attribution accounts for 0.0% of the variation in students’ achievement in Basic Science. In other words, the predictive influence of attribution on students’ performance is negligible, and the remaining 100% of variation is due to factors other than attribution.

Table 2: t-test analysis of the predictive power of attribution on secondary school students’ achievement in Basic Science

Model		Unstandardized Coefficients		Standardized	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	27.809	5.742		4.843	.000
	AS	.040	.204	.010	.198	.843

a. Dependent Variable: BSA

Table 2 indicates that attribution does not have a significant predictive effect on secondary school students’ achievement in Basic Science ($t = .198$, $p = .843$). Since the p-value (.843) exceeds the 0.05 significance level, the null hypothesis is not rejected. This suggests that attribution is not a primary predictor of students’ performance in Basic Science.

Table 3: Regression analysis of the predictive power of self-regulation on secondary school students’ achievement in Basic Science

Model	R	R Square	Adjusted R Square
1	.335	.112	.110

Table 3 shows that the correlation between self-regulation and secondary school students’ achievement in Basic Science is $R = .335$, with a coefficient of determination of $R^2 = .112$. This indicates a weak positive predictive relationship. The R^2 value of .112 suggests that 11.2% of the variation in students’ achievement can be attributed to self-regulation, while the remaining 88.8% of the variation is due to other factors. This unexplained portion of variation is referred to as the coefficient of alienation.

Table 4: t-test analysis of the predictive power of self-regulation on secondary school students’ achievement in Basic Science

Model		Unstandardized Coefficients		Standardized	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	20.074	1.427		14.064	.000
	SR	.270	.039	.335	6.875	.000

a. Dependent Variable: BSA

Table 4 indicates that self-regulation has a significant predictive effect on secondary school students’ achievement in Basic Science ($t = 6.875$, $p = .000$). Since the p-value (.000) is below the 0.05 significance level, the null hypothesis is rejected. This finding suggests that self-regulation is an important predictor of students’ performance in Basic Science.

Table 5: Regression analysis of the joint predictive power of self-regulation and attribution on secondary school students’ achievement in Basic Science

Model	R	R Square	Adjusted R Square
1	.338	.114	.109

Table 5 shows that the correlation among self-regulation, attribution, and secondary school students’ achievement in Basic Science is $R = .338$, with a coefficient of determination of $R^2 = .114$. This indicates a weak positive predictive relationship. The R^2 value

of .114 suggests that 11.4% of the variation in students’ achievement is explained by the combined influence of self-regulation and attribution, while the remaining 88.6% of variation is due to other factors not included in this model.

Table 6: Analysis of variance of the joint predictive power of self-regulation and attribution on secondary school students’ achievement in Basic Science

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6749.791	2	3374.895	23.912	.000
	Residual	52502.673	372	141.136		
	Total	59252.464	374			

- a. Dependent Variable: BSA
- b. Predictors: (Constant), SR, AS

Table 6 indicates that the combined effect of self-regulation and attribution significantly predicts secondary school students’ achievement in Basic Science, $F(1, 372) = 23.912, p = .000$. Since the p-value (.000) is below the 0.05 significance level, the null hypothesis is rejected. This result suggests that the linear combination of self-regulation and attribution is a significant predictor of students’ performance in Basic Science.

Discussion

The findings of this study indicate a very weak positive relationship between attribution and secondary school students’ achievement in Basic Science. Further analysis revealed that attribution does not significantly predict students’ performance in the subject. This weak and non-significant effect may be since students’ academic outcomes are influenced by numerous factors, including cognitive abilities, motivation, teaching quality, family background, socio-economic status, and other variables. Attribution, which reflects how students interpret their successes and failures, represents only a small component of this complex set

of influences. Variability in individual attribution styles may also contribute to the observed weak relationship.

The results of this study are consistent with those of Sambo and Mohammed (2015), Mok et al. (2011), and Holcombe (2010), which found that students’ internal attributional styles were not significantly related to their academic performance. However, these findings contrast with the studies by Anyanwu and Emesi (2023) and Mohamad and Ghada (2014), which reported a significant relationship between internal success attributions and students’ academic achievement. This indicates that, although attribution may not always play a major role, its influence can vary depending on context and other moderating factors.

The analysis indicated a weak positive relationship between self-regulation and secondary school students’ achievement in Basic Science. Additionally, self-regulation was found to significantly predict students’ performance in the subject. These findings suggest that, although self-regulation plays a meaningful role, other factors such as prior knowledge, teaching quality, and students’ interest in Basic Science may also significantly influence academic achievement. These



factors could have a stronger impact, leading to a weaker overall positive association with self-regulation. Despite a weak positive relationship, self-regulation skills may still serve as a foundational factor for achievement. For instance, students who excel at planning, goal setting, and monitoring their learning might be more likely to succeed, regardless of other influencing factors. This foundational role of self-regulation could result in significant predictive power even with a weak correlation.

The findings of this study align with previous research by Marquez, Alvarez, and Valle (2018) and Okeke and Okoro (2017), which also demonstrated that self-regulation has a significant predictive effect on secondary school students' academic achievement.

The results of this study indicate a weak positive relationship among attribution, self-regulation, and secondary school students' achievement in Basic Science. Further analysis revealed that the combined effect of self-regulation and attribution significantly predicts students' performance in the subject. The observed weak positive joint relationship suggests that enhancements in either attribution or self-regulation may lead to only modest improvements in achievement. While other factors may have a stronger influence on students' performance, the combination of self-regulation and attribution provides a more substantial predictive effect on achievement in Basic Science. This doesn't necessarily mean each factor has a strong individual effect, but rather that they work together in a complementary way. Example, strong self-regulation allows students to effectively plan and execute their learning strategies, while Positive attribution helps them maintain motivation and effort even when encountering difficulties. Also, strong self-regulation skills can help students develop positive attributions for their success in Basic Science, leading to increased motivation and effort. Conversely, positive attributions about their abilities in science can motivate students to develop self-regulation strategies for effective learning. Considering both factors together, students are more likely to achieve better in Basic Science.

The findings of this study are consistent with Zimmerman and Kitsantas (2022) and Wolters and Hussain (2015), who reported that self-regulation strategies, such as goal setting and self-monitoring, mediate the relationship between attributions and academic achievement. Similarly, the results align with Sambo and Mohammed (2015), who found that students who effectively manage their learning and

attribute their successes to controllable factors, such as effort, tend to achieve higher.

Conclusion

Based on the findings of this study, it can be concluded that self-regulation is the strongest individual predictor of academic achievement in Basic Science. In contrast, attribution alone does not significantly predict students' performance in the subject. Furthermore, the combined effect of attribution and self-regulation demonstrates greater predictive power for students' achievement than either variable independently. This implies that considering multiple psychological factors together has a more pronounced influence on academic outcomes in Basic Science than focusing on a single factor alone.

Recommendations

Based on the findings of this study, the following recommendations are proposed:

1. Teachers should foster strong relationships with their students through one-on-one interactions, as each student has different ability levels. They should tailor interventions to the specific needs of their student population and continuously monitor and evaluate the effectiveness of the implemented programs.
2. Students should build their relationship with other students by relating well with each other during basic science lessons.
3. Professional and research organizations, such as the Science Teachers Association of Nigeria (STAN) and the Nigerian Educational Research and Development Council (NERDC), should organize seminars, workshops, and conferences to integrate psychosocial learning strategies into science curricula.

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