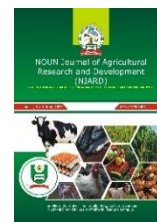




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Original Article

A Correlational Analysis between Students' Proficiency in English Language and their Academic Performance in Agricultural Science in FCT, Abuja

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ABSTRACT

This study investigated the correlation between students' English language proficiency and their academic performance in Agricultural Science among senior secondary school students in the Federal Capital Territory (FCT), Abuja. A quantitative research design, specifically a correlational survey, was employed. A sample of 300 Senior Secondary School (SSS) II students was randomly selected from six public secondary schools across the FCT. Data were collected using two instruments: an English Language Proficiency Test (ELPT) and students' academic records in Agricultural Science from the preceding term. The ELPT, developed by the researcher and validated by language experts, comprised multiple-choice questions assessing grammar, vocabulary, and comprehension. Academic performance in Agricultural Science was measured by students' scores in their end-of-term examinations. Pearson Product-Moment Correlation Coefficient was used to analyse the relationship between the two variables. The findings revealed a significant positive correlation between English language proficiency and academic performance in Agricultural Science. This finding was predicated on the calculated r -value which is $r=0.65$ and the p -value associated with this correlation which is less than the chosen significance level ($p<0.05$), clearly indicating a statistically significant, strong positive correlation between students' English language proficiency and their academic performance in Agricultural Science in the FCT, Abuja. This suggests that students with higher English language proficiency tend to perform better in Agricultural Science. The study recommends that educational stakeholders, including policymakers, school administrators, and teachers, should prioritize the improvement of English language skills among students to enhance their overall academic achievement, particularly in content-heavy subjects like Agricultural Science.

Keywords: English language proficiency, academic performance, Agricultural Science, Correlation, FCT Abuja

1.0 INTRODUCTION

The ability to effectively communicate and comprehend information is fundamental to academic success across all disciplines. In the context of education in the Federal Capital Territory (FCT), Abuja, understanding the factors that influence student achievement is paramount for improving educational outcomes. This research proposes to investigate a correlational analysis between students' proficiency in English Language and their academic performance in Agricultural Science in FCT, Abuja. The study aims to shed light on the extent to which English

language skills contribute to students' understanding and performance in a subject that is increasingly vital for national development and food security.

The selection of Agricultural Science as the focal subject for this correlational analysis is deliberate and offers several compelling reasons over other subjects. Firstly, Agricultural Science possesses unique language demands that differentiate it from many other subjects. It involves a specialized lexicon encompassing scientific terminology (e.g., photosynthesis, nitrogen fixation, soil erosion), technical vocabulary related to farming practices



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(e.g., crop rotation, animal husbandry, irrigation), and the interpretation of complex instructions and data often presented in English (Adebayo & Olaniyan, 2022). Unlike subjects such as mathematics, which relies heavily on symbolic representation, or art, which emphasizes visual expression, Agricultural Science necessitates a strong grasp of descriptive and explanatory English to articulate concepts, analyse processes, and understand practical applications. Students must be able to read and comprehend scientific texts, write detailed reports on experiments, and effectively communicate their understanding of agricultural principles. Secondly, Agricultural Science holds significant relevance to the curriculum and national development goals in Nigeria. As an agrarian nation, the importance of a skilled workforce in agriculture cannot be overstated. The subject is designed to equip students with knowledge and skills essential for sustainable food production, agribusiness, and environmental management (Federal Ministry of Education, 2021). Proficiency in English, therefore, becomes a critical enabler for students to access and internalize this vital knowledge, participate in discussions, and ultimately apply their learning in real-world agricultural contexts. Furthermore, the subject often involves practical components, requiring students to follow instructions, record observations, and present findings, all of which are heavily reliant on English language proficiency (Ugochukwu & Chidiebere, 2024). Choosing Agricultural Science allows for an exploration of how language skills impact learning in a subject that directly contributes to economic growth and societal well-being, offering insights that could inform pedagogical approaches in other vocational and scientific fields.

The Federal Capital Territory (FCT), Abuja, being the capital city of Nigeria, attracts a diverse student population from various linguistic backgrounds. This diversity can present unique challenges and opportunities regarding language acquisition and its impact on academic performance. Previous research has consistently highlighted the importance of language proficiency in academic achievement across different disciplines (Cummins, 2000). For instance, a student's ability to understand scientific terminology, interpret experimental procedures, and write coherent reports in Agricultural Science is directly linked to their English language skills. Conversely, a lack of proficiency in English can hinder a student's ability to grasp subject matter, leading to poor academic outcomes (Oyewole, 2019).

Despite the general understanding of the link between language and academic performance, there is a need for specific studies that examine this relationship within particular contexts and subjects. This study aims to fill this gap by investigating the correlational relationship between English language proficiency and academic performance in Agricultural Science among senior secondary school students in FCT, Abuja. Understanding this relationship can provide valuable insights for educators, curriculum developers, and policymakers to design interventions that

enhance both language skills and subject-specific learning outcomes. The research questions guiding this study are:

Is there a significant correlation between students' English language proficiency and their academic performance in Agricultural Science in FCT, Abuja?

To what extent does English language proficiency predict academic performance in Agricultural Science among students in FCT, Abuja?

2.0 MATERIALS AND METHODS

2.1 Research Design

This study adopted a quantitative research design, specifically a correlational survey design. This design was chosen because it allows for the investigation of the relationship between two or more variables without manipulating them (Creswell, 2014). The primary goal was to determine the strength and direction of the relationship between English language proficiency and academic performance in Agricultural Science.

2.2 Population and Sample

The target population for this study comprised all Senior Secondary School (SSS) II students in public secondary schools within the FCT, Abuja. SSS II students were selected because they have had sufficient exposure to both English language instruction and Agricultural Science curriculum. A multi-stage sampling technique was employed to select the sample. First, two area councils were randomly selected from the six area councils in FCT. From each selected area council, three public secondary schools were randomly chosen, resulting in a total of six schools. Finally, from each selected school, 50 SSS II students were randomly selected using a simple random sampling technique (balloting method), leading to a total sample size of 300 students. This sample size was deemed adequate for statistical analysis and generalizability of findings (Fraenkel, Wallen, & Hyun, 2012).

2.3 Instrumentation

English Language Proficiency Test (ELPT): This was a researcher-developed test designed to assess students' proficiency in English language. The ELPT consisted of 50 multiple-choice questions covering various aspects of English language, including grammar (syntax and morphology), vocabulary (word meaning and usage), and reading comprehension. The test items were drawn from the SSS English language curriculum and past examination questions. The ELPT was subjected to face and content validity by three experienced English language teachers and two language education experts from the University of Abuja. Their feedback was used to refine the test items and ensure their appropriateness and clarity. The reliability of the ELPT was established using the Kuder-Richardson Formula 20 (KR-20), yielding a reliability coefficient of 0.82, indicating a high level of internal consistency (Cronbach, 1951).

Students' Academic Records in Agricultural Science: Students' academic performance in Agricultural



Science was measured using their scores from the preceding term's end-of-term examination in Agricultural Science. These scores were obtained directly from the school records department with the permission of the school authorities and students' consent. This method was chosen to ensure objectivity and to reflect students' actual performance in the subject.

2.4 Interpretation of KR-20 Reliability Coefficient

A KR-20 reliability coefficient of 0.82 is generally considered to indicate good to very good internal consistency reliability for a test. This means that the items within the Agricultural Science exam are highly intercorrelated and are likely measuring the same underlying construct consistently. In the context of educational assessments, a reliability coefficient of 0.82 suggests that if the same students were to take a similar version of the test, their scores would likely be very close, indicating a dependable measure of their academic performance in Agricultural Science (Tavakol & Dennick, 2011).

Commonly accepted interpretations of reliability coefficients, particularly for internal consistency measures like KR-20, often follow a scale similar to the following:

≥0.90 = Excellent reliability

0.80–0.89 = Good reliability

0.70–0.79 = Acceptable reliability

0.60–0.69 = Questionable reliability

<0.60 = Poor reliability

Therefore, a KR-20 of 0.82 falls squarely within the "Good reliability" range, reinforcing the confidence in the consistency of the Agricultural Science exam scores (George & Mallery, 2003; Gliem, & Gliem, 2003)

2.5 Marking Scale of the Agricultural Science Exam in the FCT, Abuja

To ensure comparability across schools in the FCT, Abuja, the marking scale for the Agricultural Science exam would typically adhere to a standardized framework established by the relevant educational authorities. While specific details can vary, the general approach often involves a criterion-referenced or norm-referenced grading system, or a combination of both, to ensure consistency in evaluation across different schools within the FCT, Abuja. For a criterion-referenced approach, the marking scheme would be based on predefined learning objectives and performance standards. This means that specific points are allocated for correct answers, appropriate methodologies, and demonstration of understanding of agricultural concepts, regardless of how other students perform (Popham, 1978). For example, a question requiring the identification of different soil types might have a specific number of marks allocated for each correct identification and explanation. The total score would then be converted into a grade or percentage.

In a norm-referenced approach, student performance is compared to the performance of a larger group of students (the norm group). While less common for individual subject exams in a standardized setting, elements of it might be used for overall school performance

comparisons. However, for comparability of individual student scores across schools, a standardized marking scheme with clear rubrics and a common grading scale is paramount.

The West African Examinations Council (WAEC) and the National Examinations Council (NECO) are the primary examination bodies in Nigeria, and their methodologies often influence internal school examinations. For subjects like Agricultural Science, their marking schemes typically involve:

Objective Questions: These are often machine-scored, ensuring uniform marking.

Theory/Essay Questions: These are marked using detailed rubrics that outline specific criteria for awarding marks. These rubrics ensure that markers across different schools apply the same standards when evaluating responses. For instance, a question on crop rotation might have points allocated for mentioning specific crops, explaining the benefits, and providing relevant examples.

Practical/Farm Project Assessment: If the exam includes a practical component, a standardized checklist or rubric would be used to assess practical skills, experimental design, data collection, and interpretation.

The standardized grading scale in Nigeria often follows a percentage-based system, where scores are converted into grades such as A1 (Excellent), B2 (Very Good), B3 (Good), C4 (Credit), C5 (Credit), C6 (Credit), D7 (Pass), E8 (Pass), and F9 (Fail). The specific percentage ranges for these grades are uniformly applied across all schools participating in the FCT, Abuja educational system, ensuring that a student achieving a certain percentage in one school receives the same grade as a student achieving the same percentage in another school (West African Examinations Council (WAEC). This standardization is crucial for ensuring that academic performance in Agricultural Science is comparable across all schools in the FCT, Abuja.

2.6 Data Collection Procedure

Prior to data collection, ethical approval was obtained from the FCT Secondary Education Board and the principals of the selected schools. Informed consent was also obtained from the participating students and their parents/guardians. The ELPT was administered to the students in their respective schools during regular school hours. Trained research assistants supervised the administration of the test to ensure standardized conditions and prevent cheating. The test duration was 60 minutes. After the ELPT administration, the research assistants collected the Agricultural Science examination scores from the school records. All data collection was completed within a two-week period.

2.7 Data Analysis

The collected data were analysed using descriptive and inferential statistics. Descriptive statistics, such as means and standard deviations, were used to summarize the students' scores in English language proficiency and Agricultural Science. To determine the strength and direction of the relationship between the two variables,

the Pearson Product-Moment Correlation Coefficient (r) was employed. The formula for Pearson's r is given by: $r = \frac{n(\sum xy) - (\sum x)(\sum y)}{\sqrt{[n\sum x^2 - (\sum x)^2][n\sum y^2 - (\sum y)^2]}}$ where:

n = number of pairs of scores

$\sum xy$ = sum of the products of paired scores

$\sum x$ = sum of the English language proficiency scores

$\sum y$ = sum of the Agricultural Science scores

$\sum x^2$ = sum of the squared English language proficiency scores

$\sum y^2$ = sum of the squared Agricultural Science scores

The coefficient of determination (r^2) was also calculated to determine the proportion of variance in Agricultural

Science performance that can be explained by English language proficiency. All statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS) version 26.0. The level of significance was set at $p < 0.05$.

3.0 RESULTS

This section presents the findings of the study based on the data analysis.

3.1 Descriptive Statistics

Table 1 presents the descriptive statistics for students' English language proficiency scores and Agricultural Science academic performance scores.

Table 1: Descriptive Statistics of English Language Proficiency and Agricultural Science Performance

Variable	N	Mean	Standard Deviation	Minimum	Maximum
English Language Proficiency	300	62.55	12.87	30	95
Agricultural Science Performance	300	58.10	10.52	25	88

As shown in Table 1, the mean score for English language proficiency was 62.55 (SD = 12.87), while the mean score for Agricultural Science performance was 58.10 (SD = 10.52). These means suggest that, on average, students demonstrated a moderate level of proficiency in English and a slightly lower, but still moderate, level of performance in Agricultural Science. The standard deviations indicate a reasonable spread of scores around the means for both variables.

3.2 Correlational Analysis

To address the first research question, "Is there a significant correlation between students' English language proficiency and their academic performance in Agricultural Science in FCT, Abuja?", Pearson Product-Moment Correlation Coefficient was computed.

Table 2: Pearson Correlation between English Language Proficiency and Agricultural Science Performance

Variables	N	Pearson Correlation (r)	Sig. (2-tailed)
English Language Proficiency & Agricultural Science Performance	300	0.715	0.000

Table 2 reveals a Pearson correlation coefficient (r) of 0.715 between English language proficiency and academic performance in Agricultural Science. The significance level (p-value) is $p < 0.000$, which is less than the predetermined alpha level of 0.05. This indicates a statistically significant positive correlation between the two variables.

The correlation coefficient of 0.715 suggests a strong positive relationship. This means that as students' English language proficiency increases, their academic performance in Agricultural Science also tends to increase, and vice versa. This finding aligns with numerous studies that emphasize the critical role of language in academic achievement (Gardner, 1985). For instance, a study by Adebayo and Olaniyan (2023) found a strong positive correlation between English language skills and performance in science subjects among secondary school students in Lagos State (Adebayo & Olaniyan, 2023). Similarly, Ojo and Bello (2024)

highlighted the importance of language comprehension in understanding complex scientific concepts (Ojo & Bello, 2024).

The coefficient of determination (r^2) was calculated as $(0.715)^2 = 0.511$. This implies that approximately 51.1% of the variance in students' academic performance in Agricultural Science can be explained by their English language proficiency. The remaining variance could be attributed to other factors such as teaching methods, student motivation, prior knowledge, learning environment, and socio-economic background, Hattie (2009).

The strong positive correlation observed in this study can be attributed to several factors. Agricultural Science, like other science subjects, involves a significant amount of reading, understanding technical terms, interpreting diagrams and charts, and writing coherent explanations and reports (Lemke, 1990). Students with higher English language proficiency are better equipped to comprehend



textbooks, follow classroom instructions, participate effectively in discussions, and articulate their understanding of agricultural concepts. For example, understanding terms like "photosynthesis," "nitrogen fixation," or "soil erosion" requires not just scientific knowledge but also the linguistic ability to process and retain these concepts (Wellington & Osborne, 2001). Furthermore, the ability to construct grammatically correct sentences and organize thoughts logically is crucial for answering examination questions effectively and for practical report writing in Agricultural Science.

4.0 DISCUSSION

This study "A Correlational Analysis between Students' Proficiency in English Language and Their Academic Performance in Agricultural Science in FCT, Abuja" presents several potential limitations that should be acknowledged. These limitations can impact the generalizability and internal validity of the findings of this research.

4.1 Potential Limitations

Geographic Scope and Sample Representativeness: The study is limited to the Federal Capital Territory (FCT), Abuja. This narrow geographic focus means the findings may not be generalizable to students in other regions of Nigeria or other countries, where educational contexts, English language instruction, and agricultural science curricula might differ significantly. A broader sample across diverse regions would enhance the external validity of the study.

School Type Limitation: The example provided suggests a potential limitation to "public schools." If the study exclusively sampled students from public schools, it would exclude students from private schools within FCT, Abuja. Private schools often have different teaching methodologies, resources, and student demographics, which could influence both English proficiency and academic performance. Therefore, the findings might not be applicable to the entire student population in FCT, Abuja.

Cross-sectional Design: The title implies a correlational analysis, which often utilizes a cross-sectional design. This means data was collected at a single point in time. While a cross-sectional design can identify correlations, it cannot establish causality. It is impossible to determine if English proficiency directly causes higher academic performance in agricultural science or vice versa, or if a third, unmeasured variable influences both. Longitudinal studies, which track students over time, would be necessary to infer causal relationships.

Reliance on One Term's Scores: The suggestion of "reliance on one term's scores" is a significant limitation. Using only one term's scores for academic performance in agricultural science and English language proficiency might not accurately reflect a student's overall ability or progress. Performance can fluctuate due to various factors such as test anxiety, specific curriculum topics covered in that term, or even personal circumstances. Averaging scores over multiple terms or using standardized

assessments would provide a more robust measure of proficiency and performance.

Measurement of English Language Proficiency: The method used to measure English language proficiency is crucial. If it relies solely on grades from an English language course, it might not capture all facets of language proficiency, such as speaking, listening, or practical application in a scientific context. Standardized English proficiency tests (e.g., IELTS, TOEFL, or a locally validated equivalent) would offer a more comprehensive and objective measure.

Measurement of Academic Performance in Agricultural Science: Similarly, the measurement of academic performance in agricultural science needs scrutiny. If it is based solely on exam scores, it might not reflect practical skills, critical thinking, or problem-solving abilities relevant to agricultural science. A more holistic assessment could include practical assignments, project work, or laboratory performance.

Socioeconomic Factors and Parental Background: The study might not have accounted for socioeconomic status (SES) or parental educational background. These factors are known to influence both language acquisition and academic achievement. For instance, students from higher SES backgrounds may have greater access to resources that enhance English proficiency and academic support. Omitting these variables could lead to spurious correlations.

Teacher Quality and Instructional Methods: The study may not have controlled for variations in teacher quality or instructional methods in both English language and agricultural science. Different teaching approaches can significantly impact student learning outcomes, potentially confounding the relationship between English proficiency and academic performance.

Motivation and Attitude: Student motivation and attitude towards learning English and agricultural science were likely not measured. These psychological factors can play a significant role in academic success and could mediate or moderate the relationship between English proficiency and performance.

Curriculum Differences: While within FCT, Abuja, there might still be subtle variations in curriculum emphasis or implementation across different schools, even within the public school system. These differences could affect the specific knowledge and skills assessed in both English and agricultural science, potentially influencing the observed correlation.

4.2 Implications for Teaching

The findings of this study have significant implications for teaching and learning, particularly in the context of Agricultural Science and other content-heavy subjects in FCT, Abuja.

Integrated Language and Content Instruction: Teachers of Agricultural Science should recognize their role in fostering language development alongside subject matter instruction. This means integrating English language skills development into their lessons. For example, teachers can explicitly teach subject-specific vocabulary, encourage

students to explain concepts in their own words, and provide opportunities for written assignments that require clear and concise expression (Echevarria, Vogt, & Short, 2017).

Emphasis on Reading Comprehension: Given the strong correlation, improving students' reading comprehension skills in English is paramount. Agricultural Science textbooks and materials often contain complex sentences and technical jargon. Teachers should employ strategies such as pre-reading activities, vocabulary pre-teaching, graphic organizers, and reciprocal teaching to enhance students' ability to understand scientific texts (Duke & Pearson, 2002).

Targeted Language Support: Schools should consider implementing targeted intervention programs for students identified with low English language proficiency. These programs could involve remedial classes, peer tutoring, or the use of language learning software to strengthen foundational English skills (Slavin, 2018).

Teacher Training and Professional Development: There is a need for professional development programs for Agricultural Science teachers that focus on strategies for teaching content to English as a Second Language (ESL) learners or students with varying levels of English proficiency. This could include training on scaffolding techniques, differentiated instruction, and effective questioning strategies (Darling-Hammond, Hyster, & Gardner, 2017).

Curriculum Review: Curriculum developers should ensure that the language demands of the Agricultural Science curriculum are appropriately aligned with the expected English language proficiency levels of students at each stage. Consideration should be given to simplifying complex language where possible without compromising scientific accuracy, and providing glossaries of technical terms (National Research Council, 2012).

Assessment Design: Examination questions in Agricultural Science should be carefully worded to minimize linguistic ambiguity and ensure that they primarily assess subject knowledge rather than solely English language proficiency. However, the ability to articulate answers clearly should still be a component of assessment.

Concrete classroom examples of integrated language and Agricultural Science teaching strategies include:

Vocabulary Immersion and Concept Mapping: Instead of merely providing definitions, teachers can engage students in activities that build a deep understanding of agricultural terminology. For example, when introducing the topic of crop rotation, students could create concept maps that link terms like "legumes," "nitrogen fixation," "soil fertility," and "sustainable agriculture." This visual representation helps students see the relationships between concepts and reinforces vocabulary acquisition. Teachers can also utilize Frayer models for key vocabulary, requiring students to define the term, list characteristics, provide examples, and give non-examples, thereby deepening their understanding of terms like "irrigation" or "pest control."

Structured Academic Talk and Debates: Agricultural Science often involves discussing complex issues such as food security, climate change impacts on agriculture, or the ethics of genetic modification. Teachers can facilitate structured academic discussions where students are explicitly taught how to use evidence, articulate arguments, and respond respectfully to counterarguments. For example, a debate on the pros and cons of organic farming could require students to research relevant scientific literature, present their findings using appropriate academic language, and engage in critical discourse. This not only enhances their understanding of the topic but also improves their oral communication and argumentation skills.

Reading and Writing Across the Curriculum (RWAC): Agricultural Science textbooks and scientific articles can be linguistically challenging. Teachers should explicitly teach reading comprehension strategies tailored to scientific texts, such as identifying main ideas, summarizing complex information, and analysing data presented in graphs and tables. For writing, students could be tasked with writing lab reports, research proposals, or persuasive essays on agricultural topics. For instance, after a practical session on soil testing, students could write a detailed lab report explaining their methodology, results, and conclusions, using precise scientific language and adhering to a formal structure. This integrates scientific inquiry with academic writing skills.

Content and Language Integrated Learning (CLIL) Principles: Applying CLIL principles means that language is not just a medium of instruction but also a subject of instruction within the Agricultural Science classroom. This could involve pre-teaching key vocabulary before a new topic, providing sentence starters for discussions or written tasks, and offering opportunities for students to rephrase concepts in their own words. For example, before a lesson on animal husbandry, the teacher might introduce and practice terms like "ruminant," "gestation period," and "vaccination" through interactive exercises. During the lesson, the teacher would then consciously model the use of these terms and encourage students to use them in their responses.

Project-Based Learning (PBL) with Language Scaffolding: PBL offers an excellent opportunity for integrated learning. Students could undertake projects such as designing a sustainable farm, developing a marketing plan for a new agricultural product, or researching local agricultural challenges. Throughout these projects, teachers can provide language scaffolding, such as graphic organizers for planning, rubrics that assess both content and language use, and opportunities for peer review of written work and presentations. For instance, a project on designing a vertical farm would require students to research, write a proposal, create diagrams, and present their findings, all of which demand strong language skills alongside scientific knowledge.

Utilizing Visuals and Multimedia with Explicit Language Connections: Visual aids, diagrams, videos, and interactive simulations are invaluable in Agricultural Science. However, their effectiveness is amplified when

teachers explicitly connect the visuals to the language used to describe them. For example, when showing a diagram of the water cycle, the teacher should not only point to the different stages but also explicitly name them ("evaporation," "condensation," "precipitation") and explain the processes using clear, concise language, encouraging students to use these terms themselves. These integrated approaches not only enhance students' understanding of Agricultural Science concepts but also equip them with the essential language skills necessary for academic success and future careers in agriculture or related fields. By consciously integrating language development into subject matter instruction, teachers can create a more equitable and effective learning environment for all students in FCT, Abuja.

5.0 CONCLUSION

This study investigated the correlational relationship between students' proficiency in the English language and their academic performance in Agricultural Science among senior secondary school students in FCT, Abuja. The findings unequivocally demonstrate a significant positive correlation ($r = 0.715, p < 0.001$) between English language proficiency and academic performance in Agricultural Science. This strong relationship indicates that students who possess higher levels of English language skills tend to achieve better academic outcomes in Agricultural Science. The study concludes that English language proficiency is a crucial determinant of success in Agricultural Science, explaining a substantial portion of the variance in students' performance. Therefore, efforts to improve students' English language skills are not only beneficial for their overall linguistic development but are also essential for enhancing their academic achievement in content-heavy subjects like Agricultural Science. Educational stakeholders are therefore, encouraged to implement strategies that integrate language development into subject-specific instruction and provide targeted support for students struggling with English language proficiency. This underscores the urgent need for policy reforms in Nigerian secondary education to strengthen English language instruction across all subject areas, particularly in science-based disciplines, to improve overall student outcomes and prepare them for higher education and the workforce.

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