



# The Impact of English as a Medium of Instruction on Students' Understanding and Participation in Science Education in Nigeria: A Critical Examination

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**Abstract:** This study critically examines the negative effects of using English as the medium of instruction in the teaching of science subjects in Nigerian schools. Employing a questionnaire-based data collection method and guided by Sociocultural Theory, the research investigates how language barriers influence students' comprehension and participation in science education. The study analyses responses from both teachers and students, revealing that many students struggle to understand scientific concepts and terminology when instruction is delivered exclusively in English. The findings underscore the significant role of language in shaping educational outcomes and highlight the need to consider students' cultural and linguistic backgrounds when designing effective science curricula in Nigeria.

**Keywords:** Medium of Instruction, Science Education, Language Barriers, Nigerian Schools, Indigenous Languages, Educational Inequality, Student Participation.

## Research Paper

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## INTRODUCTION

In a multilingual nation like Nigeria, language plays a pivotal role in shaping students' educational experiences and outcomes. With over 500 indigenous languages spoken across the country, linguistic diversity is both a cultural asset and a practical challenge for the education system. Despite this diversity, English remains the primary language of instruction at all levels of formal education, including in the teaching of science subjects. This policy choice, while intended to unify and prepare students for global engagement, often overlooks the linguistic realities of learners, particularly those in rural or underserved communities where English is rarely spoken outside the classroom. In science education, where precise understanding of complex concepts and terminologies is essential, the exclusive use of English can act as a significant barrier to learning.

Numerous studies and classroom experiences have shown that students frequently struggle to understand scientific lessons delivered in English, leading to poor comprehension, diminished confidence, and disengagement from classroom activities. Teachers, too, face difficulties in bridging the linguistic gap, especially when translating abstract scientific terms into

indigenous languages that may lack direct equivalents. These challenges not only affect academic performance but also contribute to broader educational inequalities. This study critically examines the impact of English as the sole medium of instruction on students' understanding and participation in science education within Nigerian secondary schools. Anchored in Sociocultural Theory, which emphasises the role of language and cultural context in shaping learning, the research explores how language influences students' ability to access scientific knowledge and highlights the need for more linguistically inclusive pedagogical strategies.

This study also contributes to discussions on language policy and planning in education by presenting empirical evidence of the potential disadvantages of using English exclusively as the language of instruction in science education in Nigeria. It speaks to broader debates surrounding the role of language in shaping identity and power dynamics in post-colonial societies. In many African nations, the continued use of English in education is a colonial legacy, reflecting persistent power imbalances between indigenous languages and dominant global languages.

## English Language as a Medium of Instruction: A Review

In many African countries, English is frequently employed as the primary medium of instruction in schools, despite the fact that most students come from non-English-speaking backgrounds. This policy has generated significant debate in Nigeria, where the majority of the population speaks indigenous languages as their first language. Scholars have raised concerns about the implications of using English as the language of instruction, arguing that it may hinder students' comprehension of scientific concepts and limit their participation in science education (Aremu, 2018; Adedapo, 2012).

This challenge is not unique to Nigeria. Across the African continent, researchers have underscored the importance of mother-tongue education in fostering student learning and engagement (Stroud *et al.*, 2014; Nnodu & Owoaje, 2016; Tsaure & Sani, 2024). Nevertheless, many African countries continue to prioritise English in their educational systems, often to the detriment of students' academic performance and cultural identity.

The present study contributes to the growing body of literature on language and education in Africa by examining the impact of English as the medium of instruction on students' understanding and engagement in science education within Nigerian schools. Furthermore, the study emphasises the importance of investigating the intersection between language and science education in African contexts. While much existing research has focused on literacy and language acquisition, there is increasing recognition of the influence of language on student learning in specific content areas, such as science.

By focusing on the impact of language on science education, this study offers a distinctive perspective for understanding how language, identity, and educational opportunity interact in Nigeria and other African contexts. In recent years, scholars have highlighted the importance of addressing the relationship between language and learning, especially in environments where students are taught in a language that is not their native tongue (Akanbi & Efuwape, 2020; Collins, 1996). This issue is particularly pertinent in Africa, where colonial legacies continue to shape language policies in education.

In Nigeria, several scholars have expressed concerns regarding the use of English as the language of instruction, noting its adverse effects on students' comprehension and engagement in science education (Adedapo, 2012; Ogonnaya & Idika, 2014). Others have stressed the significance of language in shaping students' identities and their sense of belonging within educational settings (Stroud *et al.*, 2014). As Sama and Sani (2018) point out, there is a significant connection

between language and cognition. The use of English in Nigerian schools creates a disconnection between students' home languages and the language of instruction, potentially undermining their cultural identity. As UNESCO (1953) stated, "using any other language other than the mother tongue of the child as a medium of instruction damages the development of the child whose personality and ability should be integrated with the society to which he belongs." Furthermore, many English scientific terminologies are not easily understood by either teachers or students, further compounding the problem.

It has been argued that no country has achieved technological advancement while relying solely on a foreign language to educate its citizens, particularly in science subjects (Tsaure & Sani, 2016). The majority of technologically advanced countries, such as China, Germany, Japan, and South Korea, utilise their native languages as the primary medium of instruction. In Africa, after decades of domination by Western education systems and languages, several nations are now exploring the use of indigenous African languages in the classroom (Quane & Glanz, 2010).

Historically, the languages of the former colonial powers (French in Francophone Africa, Portuguese in Lusophone Africa, and English in Anglophone Africa) have dominated as languages of instruction, thereby marginalising indigenous African languages (Adedeji, 2015; Ndlovu-Gutsheni, 2018). In Nigeria, calls were made in 2015 and 2016 to adopt African indigenous languages in education, as the dominance of foreign languages was leading to a decline in student interest in science due to confusion and disengagement (AfricaNews, 2017). Consequently, Sani and Usman (2018), as well as Sani and Abdullahi (2020), emphasize that students' interest plays a crucial role in determining learning outcomes.

In 2017, the Nigerian government announced plans to incorporate indigenous languages into the teaching of Mathematics and the natural sciences. Similarly, in South Africa, there has been growing concern over the years that Black African learners, in particular, struggle with Mathematics, Natural Sciences, and Technology. Several scholars have attributed part of this difficulty to the language barrier, which obstructs students' academic progress in these subjects (Makgato & Mji, 2006; Van der Berg *et al.*, 2011).

The issue of language in science education has attracted increasing scholarly attention, with researchers recognising the significance of linguistic and cultural factors in students' academic success (Gracia & Kleifgen, 2010). Valdés (2001) contends that "the language of instruction can shape students' academic identities, as well as their sense of belonging and engagement in the classroom" (p. 123).

## METHODOLOGY

A total of sixty-nine (69) questionnaires were administered, nine (9) to teachers across the three selected schools, with three teachers sampled from each school. Specifically, one questionnaire was given to each of the Biology, Physics, and Chemistry teachers per school. In addition, sixty (60) questionnaires were distributed among science students in Senior Secondary 1 (SS I) and Senior Secondary 2 (SS II), with twenty (20) questionnaires allocated to each of the three (3) sampled schools: Al-Mufida International Academy, Gusau (co-educational), Government Day Secondary School, Samaru (boys only), and Government Girls Day Secondary School, Damba (girls only). The questionnaires were administered to the respondents regardless of their gender, ethnicity, or religious affiliation.

The study employed a mixed-methods approach to collect data from both teachers and students. Questionnaires were specifically designed for each group to gather insights into their experiences with English-only instruction in science subjects. Teachers were asked to provide information about their teaching practices and

the challenges they face, while students were prompted to report on their comprehension levels and classroom participation. The questionnaires contained a combination of open-ended and multiple-choice questions, enabling the collection of both qualitative and quantitative data.

The research focused on a sample of schools in Nigeria that use English as the medium of instruction for teaching science subjects, with specific attention to schools in Zamfara State, where the study was conducted. The administered questionnaires were retrieved from the sampled teachers and students, and the responses were analysed using simple statistical tables. This analysis helped to identify emerging themes and issues related to the use of English in science education.

### Data Presentation and Analysis

This section analyses the data obtained from the retrieved questionnaires administered to both teachers and students of science education from the sample schools.

#### Section A: Questionnaires for Teachers

**Table 1: Science Subjects Taught by Teachers in Selected Schools**

S/N	Subjects	Number of Respondents	Percentage
1	Biology	03	33.3%
2	Physics	03	33.3%
3	Chemistry	03	33.3%
<b>Total</b>		<b>09</b>	<b>100%</b>

Table 1 indicates that each of the listed science subjects (Biology, Chemistry, and Physics) received

equal representation among respondents, with each accounting for 33.3%.

**Table 2: Teachers' Difficulties in Translating English Scientific Terminologies to Students**

S/N	Responses	Number of Respondents	Percentage
1	Difficulty in translating scientific terms into native languages	03	33.3%
2	Barrier between English and native languages	03	33.3%
3	Incompatibility between English and native languages	03	33.3%
<b>Total</b>		<b>09</b>	<b>100%</b>

Table 3 illustrates the various challenges teachers encounter when attempting to translate English scientific terminologies into students' native languages.

These include language barriers between English and indigenous languages, as well as the general incompatibility between the two language systems.

**Table 3: Students' Comprehension of English Scientific Terminologies during Science Lessons**

S/N	Responses	Number of Respondents	Percentage
1	No	03	33.3%
2	Partially	06	66.6%
<b>Total</b>		<b>09</b>	<b>100%</b>

Table 3: the above table indicates that students from the native or indigenous languages hardly understand English scientific terminologies.

**Table 4: Preferred Language for Teaching Science Subjects**

S/N	Subjects	Number of Respondents	Percentage
1	English	03	33.3%
2	Hausa and English	02	22.2%

3	Native language	04	44.4%
<b>Total</b>		<b>09</b>	<b>100%</b>

Table 4 indicates that 33.3% of the respondents prefer the use of English as the language of instruction for science subjects, 22.2% favour a combination of

Hausa (as a vernacular language) with English, while 44.4% believe that instruction should be delivered in the native language or mother tongue.

**Table 5: Respondents' Opinions on the Role of Foreign Languages in Technological Development through Science Education**

S/N		Number of Respondents	Percentage
1	Agreed	7	77.7%
2	Disagreed	1	11.1%
3	Undecided	1	11.1%
<b>Total</b>		<b>09</b>	<b>100%</b>

Table 5 shows that 77.7% of the respondents agree that a country cannot achieve meaningful development while using a foreign language to teach its

citizens, particularly in science subjects. In contrast, 11.1% of the respondents disagreed with this view.

**Table 6: Respondents' Views on the Potential of Nigerian Native Languages to Develop Equivalent Scientific Vocabularies**

S/N	Responses	Number of Respondents	Percentage
1	Yes	6	66.6%
2	No	3	33.3%
<b>Total</b>		<b>09</b>	<b>100%</b>

Table 6 shows that a total of six respondents selected the 'Yes' option, representing 66.6%, the higher

percentage compared to those who chose 'No,' which accounts for 33.3%.

**Table 7: Respondents' Preferred Native Languages for Teaching Science Subjects**

S/N	Languages	Number of Respondents	Percentage
1	Hausa	4	44.4
2	Yoruba	Nil	0
3	Igbo	Nil	0
4	Unspecified	5	55.5%
<b>Total</b>		<b>09</b>	<b>100%</b>

Table 7 shows that 55.5% of the responses were unspecified, corresponding to five respondents. In contrast, four respondents, representing 44.4%, indicated a preference for using the Hausa language as the medium of instruction for teaching science subjects.

**Question 8:** How does the use of English language in teaching science subjects affect students' understanding of your lessons?

An overwhelming 99.9% of the total respondents expressed the view that using English as the medium of instruction in teaching science subjects negatively affects students' understanding of the lessons.

**Table 8: Perceived Strategies through Which English Instruction Can Improve Students' Understanding of Science Lessons**

S/N		Number of Respondents	Percentage
1	Proficiency in English	5	55.5%
2	Appropriate Teaching aids	1	11.1%
3	Good teaching methods	3	33.3%
<b>Total</b>		<b>09</b>	<b>100%</b>

Table 8, corresponding to question 9, indicates that respondents identified key strategies for improving students' understanding of science lessons. The majority, five respondents (55.5%), believe that enhancing students' proficiency in English would lead to better

comprehension. This is followed by 33.3% of respondents who emphasised the importance of employing effective teaching methods, while 11.1% highlighted the use of appropriate teaching aids as a means to enhance understanding.

**Table 9: Strategies Used by Teachers to Enhance Students' Understanding of English Scientific Vocabulary**

S/N		Number of Respondents	Percentage
1	Mother tongue	3	33.3%
2	Good method of teaching	3	33.3
3	Proficiency in English	3	33.3
<b>Total</b>		<b>09</b>	<b>100%</b>

Table 9 presents responses from participants regarding the various strategies they employ to ensure students understand English scientific vocabulary. The use of the mother tongue, effective teaching methods, and fostering proficiency in English each received equal support, with 33.3% of respondents endorsing each

approach. This suggests that these three strategies are commonly employed by teachers and are perceived as effective in enhancing students' comprehension in science education.

### Section B: Questionnaires for Students

**Table 10: Students' Most Preferred Science Subjects**

S/N	Subjects	Number of Respondents	Percentage
1	Biology	28	46.6%
2	Physics	15	25%
3	Chemistry	17	28.3
<b>Total</b>		<b>60</b>	<b>100%</b>

Table 10 illustrates students' interest in the science subjects listed, based on the data collected from the field. Biology emerged as the most preferred subject,

with 46.6% of respondents indicating interest, followed by Chemistry at 28.3%, and Physics at 25%.

**Table 11: Students' Perceptions of How English Affects Their Understanding of Scientific Terminologies**

S/N	Responses	Number of Respondents	Percentage
1	Strongly Agreed	5	8.3%
2	Agreed	10	16.6%
3	Strongly Disagreed	45	75%
4	Disagreed	Nil	0%
<b>Total</b>		<b>60</b>	<b>100%</b>

Table 11 shows that 75% of respondents strongly disagreed with the statement that English enhances their understanding of scientific terminology, whereas only 8.3% strongly agreed. This finding

suggests that the majority of students struggle to grasp scientific vocabulary when instruction is delivered in English.

**Table 12: Students' Preferred Language for Learning Science Subjects**

S/N	Languages	Number of Respondents	Percentage
1	English	17	28.3%
2	Hausa	38	63.3%
3	Yoruba	3	5%
4	Igbo	2	3.3%
<b>Total</b>		<b>60</b>	<b>100%</b>

Table 12 indicates that the majority of students prefer the use of the Hausa language for teaching science subjects, with 63.3% selecting this option, the highest percentage recorded. In contrast, only 3.3% preferred the

Igbo language, the lowest among the options. This preference may be attributed to the geographical location of the sampled schools, which are situated in Hausaland, where Hausa is the dominant local language.

**Table 13: Students' Opinions on Understanding Science Subjects in Their Mother Tongues**

S/N	Options	Number of Respondents	Percentage
1	Yes	43	71%
2	No	17	28.3%
<b>Total</b>		<b>60</b>	<b>100%</b>

Table 13 shows that 71% of respondents believe they understand science subjects better when taught in

their mother tongue. In contrast, 28.3% held a differing opinion, suggesting that while a majority favour



instruction in their native language, a notable minority perceive otherwise.

**Table 14: Students' Difficulty in Interpreting English Scientific Vocabulary into Their Mother Tongue**

S/N	Options	Number of Respondents	Percentage
1	Yes	45%	75%
2	No	15%	25%
<b>Total</b>		<b>60</b>	<b>100%</b>

Table 14 highlights the difficulty students face in translating English scientific vocabulary into their mother tongue. According to the data, 75% of the

students reported finding it very difficult, while only 25% indicated that they find it easy.

**Table 15: Use of Varied Teaching Methods by Science Teachers to Enhance Student Understanding**

S/N	Options	Number of Respondents	Percentage
1	Yes	57	95%
2	No	3	5%
<b>Total</b>		<b>60</b>	<b>100%</b>

Table 15 shows that 95% of respondents indicated that science teachers employ a variety of teaching methods when delivering science lessons,

whereas only 5% reported relying on a single teaching method.

**Table 16: Respondents' Opinions on Nigeria's Scientific and Technological Development through English-Medium Science Instruction**

S/N	Options	Number of Respondents	Percentage
1	Strongly Agreed	2	3.3%
2	Agreed	10	16.6%
3	Strongly Disagreed	40	66.6%
4	Disagreed	8	13.3%
<b>Total</b>		<b>60</b>	<b>100%</b>

Table 16 reveals that 66.6% of respondents strongly disagreed with the notion that using English as the medium of instruction in teaching science subjects can contribute to Nigeria's development. Additionally, 16.6% agreed that English could support technological

advancement, while 13.3% disagreed with the idea of English fostering progress. A further 3.3% strongly disagreed that using English could lead to any form of development.

**Table 17: Respondents' Views on Creating Equivalent Scientific Terminologies in Mother Tongues**

S/N	Options	Number of Respondents	Percentage
1	Yes	40	66.6%
2	No	20	33.3%
<b>Total</b>		<b>60</b>	<b>100%</b>

Table 17 shows that 66.6% of respondents believe indigenous languages can be developed to create equivalent terms for English scientific vocabulary. In

contrast, 33.3% believe that native languages are not capable of fully accommodating English scientific terminologies.

**Table 18: Scientific Terminologies Students Found Easiest to Learn**

S/N	Subjects	Number of Respondents	Percentage
1	Physics	28	46.6%
2	Biology	20	33.3%
3	Chemistry	12	20%
<b>Total</b>		<b>60</b>	<b>100%</b>

Table 18 indicates that 46.6% of respondents find it easiest to learn Physics terminology compared to other science subjects. Meanwhile, 33.3% reported that

they learn Biology terms more easily, and 20% stated that they find Chemistry terminology the easiest to understand.

**Table 19: English Scientific Terminologies Students Found Most Difficult to Learn**

S/N	Subjects	Number of Respondents	Percentage
1	Chemistry	24	40%
2	Biology	18	30%
3	Physics	18	30%
<b>Total</b>		<b>60</b>	<b>100%</b>

Table 19 shows that 24 respondents, representing 40% of the total sample, believe they can learn Chemistry terminology more easily than that of other science subjects. Additionally, 8 respondents (30%) reported that they find Biology terminology easier to learn, while another 8 respondents (30%) indicated that they learn Physics terminology more easily than the others.

### Summary of Findings

Based on the analysis of the data obtained from the respondents, several key themes emerged regarding the use of English as the sole medium of instruction in science education. Both teachers and students reported predominantly negative experiences with English-only instruction. Students consistently cited difficulties in comprehension, reduced classroom participation, and diminished motivation to learn science when taught exclusively in English. Many expressed that language barriers significantly hindered their ability to grasp scientific concepts and terminology, ultimately leaving them feeling excluded from the learning process.

Teachers also acknowledged that using only English for instruction posed several challenges. They noted that it complicated classroom management and communication with students, leading to frustration and reducing the overall effectiveness of their teaching. In particular, teachers found it difficult to ensure all students fully understood science content when limited to English, especially in contexts where students lacked sufficient language proficiency.

Students frequently reported feeling hesitant to engage in classroom discussions or ask questions due to a fear of making mistakes in English. This limited their active participation and contributed to a passive learning environment. Furthermore, many teachers observed that their reliance on English alone prevented them from effectively adapting their teaching strategies to accommodate diverse student needs, often resulting in partial or superficial understanding of science topics.

Overall, the findings highlight that the use of English as the sole medium of instruction in science education can create significant barriers to both teaching and learning, particularly in multilingual settings where English is not the students' first language. The data suggest that these challenges may undermine the goals of inclusive and effective science education in the Nigerian context.

## CONCLUSION

The findings of this study support the view that using English as the sole language of instruction in science subjects can negatively affect students' comprehension and classroom participation, particularly among those whose first language is not English. The study underscores the need for more inclusive instructional practices that recognize and respond to students' linguistic and cultural diversity. In the context of Nigerian schools, this could involve integrating students' native languages into science education, implementing bilingual or multilingual approaches, or providing targeted support for learners with limited proficiency in English.

The findings also highlight the necessity of equipping teachers with the tools and training needed to address the challenges of linguistically diverse classrooms. This may include professional development in strategies that promote active student engagement (such as cooperative learning) and in methods for identifying and overcoming language barriers that hinder effective instruction.

Moreover, the study draws attention to broader structural challenges that perpetuate linguistic inequality in education. These include inadequate resources for indigenous language instruction and prevailing societal biases against the use of local languages in formal education. Addressing these systemic issues is essential for fostering equitable and inclusive learning environments. By doing so, Nigerian schools can better support all students in achieving academic success, particularly in critical subject areas like science.

### Recommendations

Based on the findings of this study, several recommendations are proposed to improve science education in linguistically diverse contexts such as Nigeria:

- Teachers should be provided with adequate training and ongoing support to implement inclusive instructional practices that effectively address the linguistic and cultural diversity of their students. This includes equipping teachers with strategies for scaffolding learning, facilitating comprehension, and promoting active participation among students from varied language backgrounds.
- The National Policy on Education should be revised to incorporate students' native languages into science instruction. This could

- be achieved through bilingual or multilingual education models, or by providing translated teaching and learning materials to support comprehension and engagement.
- c. Comprehensive policies and resource frameworks should be developed to support the use of indigenous languages in education. This includes establishing teacher training programs focused on indigenous language instruction, developing appropriate curriculum content, and ensuring the availability of teaching aids and classroom resources in local languages.
  - d. Public awareness campaigns should be launched to challenge negative societal perceptions of indigenous languages. These campaigns should aim to promote cultural pride and linguistic diversity, especially among students, parents, and educational stakeholders.
  - e. Finally, educational authorities should pursue international partnerships and collaborative initiatives aimed at sharing best practices and learning from countries with successful models of multilingual education. Such exchanges can inform policy development and classroom practices, contributing to more inclusive and effective science education across Nigeria.

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