ISRG Journal of Arts, Humanities and Social Sciences (ISRGJAHSS)

ISRG PUBLISHERS
Abbreviated Key Title: ISRG J Arts Humanit Soc Sci
ISSN: 2583-7672 (Online)
Journal homepage: https://isrgpublishers.com/isrgjahss
Volume – III Issue –IV (July-August) 2025
Frequency: Bimonthly

Effect of Arabic Language As Medium of Instruction on Scientific & Technological Advancement In Nigeria and the Need for Mother-Tongue in Teaching and Learning

Dr. Aminu Umar Gummi

Department of Arabic Studies, Zamfara State University Talata Mafara.

| **Received:** 10.08.2025 | **Accepted:** 16.08.2025 | **Published:** 18.08.2025

*__Corresponding author:__ Dr. Aminu Umar Gummi

Department of Arabic Studies, Zamfara State University Talata Mafara.

Abstract

This article examines how using Arabic as a medium of instruction affects Nigeria's scientific and technological progress, and argues for the importance of mother-tongue education. Nigeria is highly multilingual, and historically Arabic played a key role in education and administration. However, today Arabic is largely confined to religious schools and is treated as a foreign subject. We review literature on language policy and educational outcomes, finding that teaching science in languages students understand enhances learning. Studies show that science taught in indigenous languages improves comprehension and engagement, whereas instruction in a non-native language can hinder understanding. In contrast, Arabic-medium programs in Nigeria still rely on English for general subjects, limiting their impact on STEM advancement. We conclude that emphasizing mother-tongue instruction in early science education (while maintaining English for advanced levels) could boost Nigeria's innovation.

Keywords: *Arabic Language, Medium of Instruction, Mother Tongue.*

Introduction

Nigeria is extraordinarily linguistically diverse (over 500 languages spoken). Its official language is English, but the National Policy on Education mandates mother-tongue instruction in the early grades. Arabic is recognized as a foreign language subject in the curriculum, reflecting its historical influence. Indeed, before colonial rule, regions of Nigeria used Arabic as the primary medium of formal education. Arabic served as the language of scholarship, law, and commerce in some parts of northern Nigeria.

For example, Ayuba (2013) notes that Arabic was long the language of administration, literature and trade in Nigeria's north, contributing greatly to the nation's development. Islamic scholars in Nigeria wrote on sciences, history, and medicine in Arabic, and Islamic schools (madrassas) thrived on Arabic literacy.

After independence, Nigeria's education system prioritized English, but still offers Arabic in religious education and special

DOI: 10.5281/zenodo.16892567

programs. As Baba (2011) reports, the NCE Arabic-Medium teacher-training program in the north uses Arabic to teach Islamic and professional courses, but still teaches general subjects (English, social studies) in English. In practice, Arabic-medium schools remain marginal to mainstream STEM education. This raises the question: if Nigeria were to adopt Arabic as the medium of instruction for science and technology subjects, what would be the impact on innovation and progress? Conversely, what benefits arise from using indigenous mother tongues in teaching? We explore these issues by reviewing policy documents and empirical studies.

Methodology

This paper is a qualitative literature review. We examined official documents (education policies) and peer-reviewed studies on language-of-instruction in Nigeria and comparable contexts. Sources include Nigerian policy statements, UNESCO reports, and academic articles on bilingual/multilingual education in Africa. We extracted findings on how instruction in Arabic, English, or native languages influences science learning and technological outcomes. By synthesizing these findings, we draw conclusions about the role of language in educational achievement and innovation.

Discussion of Key Findings

Arabic's historical role vs. current use:

Historically, Arabic enriched Nigeria's intellectual traditions. Islamic universities and tsangaya schools taught subjects like mathematics, astronomy and medicine in Arabic centuries ago. Yeqeen (2024) emphasizes that "the first medium of formal education was Arabic" in parts of Nigeria. Arabic facilitated early literacy and was considered essential for religious and cultural learning.

Today, however, Arabic's influence on scientific and technological advancement is limited. It is mostly taught in Islamic contexts, and as a subject, not as the primary language for science. Nigeria's education policy lists Arabic as one of several foreign languages but designates it only as an optional subject at various levels. In fact, Baba (2011) notes that even in dedicated Arabic-medium teacher colleges, secular courses are still taught in English. Thus, Arabic-medium streams have little contact with mainstream curricula or scientific discourse. No major Nigerian universities or research institutes use Arabic as their instructional language for science or engineering.

Arabic as a science MOI: Challenges and Limitations:

If one attempted to use Arabic to teach science in Nigeria, significant barriers would arise. First, most Nigerian students are native speakers of languages like Hausa, Yoruba, Igbo or other local tongues, not Arabic. They typically learn Arabic only as a second language for religious studies. Learning complex scientific concepts in a foreign tongue would likely impede comprehension. As one education expert notes, interference from a student's first language is common when learning a new language. In other words, students mixing their mother tongue and English often make errors in Arabic, and the reverse scenario could apply: students might struggle to grasp biology or physics in Arabic due to lack of vocabulary and practice.

Second, there is a scarcity of educational resources.

Nearly all science textbooks, journals, and research in Nigeria are in English. Very few science texts have been translated into Arabic for Nigerian audiences. The absence of an Arabic science curriculum means teachers would have to translate on the fly or develop materials from scratch. This was highlighted in teacher surveys: many language instructors in Nigeria lack appropriate textbooks and must improvise. Without standardized terminology for scientific concepts in Arabic, instruction would be inconsistent. Adeosun (2024) found that Nigerian teachers face "difficulty in teaching scientific words in the local language" and by extension any non-native medium.

Third, adopting Arabic as MOI could isolate Nigerian students from global scientific collaboration. Today, global science is dominated by English publications. Nigerian scientists who learned in Arabic-only classrooms might need extra effort to transition to English-language research. Historically, when Egypt and other Arab countries led in science, knowledge still spread broadly because scholars communicated across languages. In Nigeria's case, promoting Arabic might inadvertently create a silo.

Benefits of Mother-Tongue Instruction in STEM:

By contrast, substantial evidence supports teaching science in students' first language. When learners encounter math or science in a language they know well, they grasp concepts more naturally. A recent Nigerian study found that using Yoruba (a major local language) in science classes significantly improved students' understanding of abstract topics. Yusuf and Kaoje (2025) report that mother-tongue science instruction "enhances understanding" and makes science concepts "more accessible" to Nigerian pupils. Similarly, Ororho (2025) surveyed parents and teachers in Delta State and found that using indigenous languages in STEM improved academic performance, comprehension, and classroom participation. These findings echo UNESCO's global guidance: learners "excel" in subjects including math and science when taught in a language they understand. For example, UNESCO notes that children learning in their mother tongue have better reading and comprehension skills, which facilitates learning mathematics and science.

Studies also demonstrate long-term benefits of early mother-tongue education. Bamgbose (1984) showed that Nigerian students taught for six years in Yoruba outperformed those switched to English after three years. Cummins' interdependence hypothesis suggests that cognitive skills developed in one language transfer to another. In practice, strong science foundations built in a native language can support later learning of technical English terms. Moreover, bilingual instruction (mixing English and local language) has proven effective. Asiyanbola & Ademilokun (2015) found that code-switching between English and Yoruba in teaching integrated science yielded better comprehension than using either language alone. This indicates that strategic use of mother tongue (even if not sole MOI) can enhance science learning.

Implementation Issues:

Nigeria's experience also highlights challenges. Despite policy backing mother-tongue instruction in primary schools, implementation has been inconsistent. Obiakor (2024) found that many schools, especially in urban areas, switch to English early on, sometimes for economic or administrative reasons. Surprisingly, that study also reported that children taught in English had higher literacy scores than those in mother tongue instruction, suggesting that poor implementation (lack of resources, poor teacher training) can negate the expected advantages. Teachers in Nigeria often receive little preparation for mother-tongue STEM teaching. Adeosun (2024) emphasizes that many teachers lack training in local-language pedagogy, and schools lack orthographies (written

DOI: 10.5281/zenodo.16892567

forms) for scientific terminology. These gaps can lead to mixed outcomes if not addressed.

In summary, the literature suggests that exclusively using Arabic as the medium for science in Nigeria would likely have a neutral or negative impact on scientific advancement, because it is not widely spoken and lacks infrastructure. In contrast, mother-tongue or bilingual approaches appear to facilitate STEM understanding and could support Nigeria's educational goals. However, any language strategy must be accompanied by materials development and teacher training.

Theoretical Framework

Linguistic Relativity Edward Sapir, B. Whorf Language shapes thought and perception; different languages foster different worldviews. Suggests that learners understand concepts better in their native language. UNESCO (1953) found that children "excel" when taught in local languages, supporting use of mother tongue in science education.

Common Underlying Proficiency (CUP) Jim Cummins Skills acquired in the first language create a shared cognitive foundation that transfers to second-language learning. Implies that learning science in mother tongue builds cognitive skills (analytical, reasoning) that will help later English learning. If concepts are solidified in L1, students can more easily learn scientific English terms later.

Sociocultural Theory (ZPD) Lev Vygotsky Learning is mediated by language and social interaction; instruction should scaffold on students' cultural background. Highlights using the learner's own language and context as a "cultural tool" to develop complex concepts. Teaching science in familiar language acts as scaffolding for understanding.

Language Policy/Planning Various (e.g. Spolsky) Official language policies and planning decisions shape educational outcomes; policy must consider community needs. Nigeria's NPE mandates mother-tongue instruction in early grades. Evaluating such policies is crucial: if well-implemented, policy-driven mother-tongue teaching can improve STEM literacy; if not, policy changes may be needed.

Recommendations

Implement and Strengthen Mother-Tongue STEM Education:

Governments and schools should fulfill the National Policy on Education by using local languages as MOI in early science classes. This includes creating science curricula and textbooks in major indigenous languages (Hausa, Yoruba, Igbo, etc.) and training teachers accordingly.

Develop Bilingual Science Instruction:

Combine mother tongue with English in a planned way. For example, teach core concepts in the local language while gradually introducing English terminology. Research suggests that bilingual or code-switched lessons (e.g. English with Yoruba) enhance understanding. Teacher-training programs should model and support this dual approach.

Improve Teacher Training and Resources:

Allocate funds to train teachers in local-language pedagogy for science. As Adeosun (2024) found, many teachers have no training for mother-tongue instruction and lack teaching materials. Investing in workshops, guides, and digital resources will build capacity.

Promote Arabic Complementarily, Not Exclusively

Arabic can remain part of the curriculum (especially in Islamic education) but should not replace English or local languages for science instruction. If Arabic-medium schools exist, incorporate science in Arabic only if adequate materials and trained teachers are provided; otherwise use English or local language to teach STEM. Any emphasis on Arabic should be accompanied by bridging English so students can access global science.

Leverage Technology and Multilingual Content:

Use ICT tools (e-learning platforms, mobile apps) to provide science content in multiple languages. For instance, online videos or interactive lessons can be produced in local languages to supplement classrooms. This will help address the lack of textbooks and engage students using their familiar language context.

Engage communities and policymakers:

Communicate to parents and leaders that mother-tongue science instruction has proven benefits (as noted by parents and educators in Delta State). Garner support by demonstrating improved test results. Encourage education authorities to monitor language policy implementation, ensuring that rural and urban schools alike adhere to LOI guidelines.

Contribution to Knowledge

This article synthesizes interdisciplinary research on language and science education in Nigeria, bridging sociolinguistics and STEM pedagogy. While many studies focus on English-medium instruction, our analysis highlights the often-overlooked role of Arabic in Nigeria's education system and contrasts it with mother-tongue education. We contribute a nuanced perspective: showing that though Arabic has historical importance, its current role in science education is minimal and potentially counterproductive if expanded uncritically. Conversely, we underscore how mother-tongue instruction can be a strategic advantage for Nigeria's scientific development. This work informs educators and policymakers by linking language policy to technological innovation goals. By detailing these connections, we provide guidance for educational reforms that could bolster Nigeria's future scientists and engineers.

Conclusion

In conclusion, medium of instruction matters deeply for Nigeria's science and technology advancement. Using Arabic as the primary instructional language for science offers few benefits under current conditions: it is not widely spoken by students, lacks resources, and is not integrated with global scientific discourse. On the other hand, teaching science in students' own languages (or through effective bilingual methods) consistently improves understanding and engagement. Nigeria should therefore prioritize mother-tongue-based instruction in early STEM education, while ensuring students also learn English for higher studies. Policymakers must supply materials, standardize scientific vocabulary in local tongues, and train teachers for multilingual classrooms. By doing so, Nigeria can build a stronger foundation for innovation: children learn core concepts in familiar language, then transition to English for advanced study. Balancing local and global languages – rather than a wholesale shift to Arabic – will best support Nigeria's scientific and technological progress.

DOI: 10.5281/zenodo.16892567

References

1. Adeosun, M. (2024). “How can I teach when I was not taught how?”: Teacher education for mother tongue instruction for STEM in Southwest Nigeria (Doctoral dissertation). University of North Dakota.
2. Adegbile, A., & Okoro, N. (2010). Bilingual education and science literacy: A study from Nigeria. International Journal of Bilingual Education and Bilingualism, 13(3), 123–135.
3. Adeyemi, K. A. (2016). Trend of Arabic and Islamic education in Nigeria. Open Journal of Modern Linguistics, 6(2), 36–43.
4. Ado, H. M. (2017). Towards improvement of learning Arabic in Nigeria. International Journal of Language and Literature, 5(1), 150–157.
5. Asiyanbola, A. A., & Ademilokun, M. (2015). Literacy and language of instruction in Nigeria: A case study of integrated science teaching in primary schools. International Journal of Language and Culture Education, 4, 123–140.
6. Ayuba, M. A. (2013). The Arabic language: Its relevance to Nigerian development. European Scientific Journal, 8(26), 188–195.
7. Baba, N. M. (2011). Islamic schools, the Ulama, and the state in the educational development of Northern Nigeria. Bulletin de l’APAD, 33, 45–60.
8. Bamgbose, A. (1984). Mother-tongue medium and scholastic attainment in Nigeria. Prospects, XIV(4), 561–569.
9. Egwaoje, O. (2024). Impact of the mother tongue and culture of rural Nigeria on student achievement in English. International Journal of Recent Research in Thesis and Dissertation, 5(1), 91–100.
10. Greene, T. (2017). Education in Nigeria. World Education News & Reviews.
11. Musa, M. J. (2024). Policy provisions on language of instruction and curriculum implementation by language teachers in basic education schools in Nigeria. Social Education Research, 23(1), 76–86.
12. Nyitse, M., & Dzer, J. T. (2024). The role of the mother tongue in the teaching learning process: Emerging concerns. Nigerian Journal of Literacy and English Education, 2(2), 56–64.
13. Ojo, A. B. (1976). Preparation of the secondary school mother tongue teacher. West African Journal of Education, 20(1), 7–16.
14. Ojoo, S. Y., & Moyi, M. I. (2022). Using mother-tongue in teaching of science and technology: Reference to the North-East and North-West geo-political zones, Nigeria. Scholars International Journal of Linguistics and Literature, 5(4), 123–129.
15. Okebukola, P. A., Owolabi, O., & Okebukola, F. O. (2013). Mother tongue as default language of instruction in lower primary science classes: Tension between policy and practice in Nigeria. Journal of Research in Science Teaching, 50(1), 62–81.
16. Ororho, M. E. (2025). Perception of parents and educators on the use of indigenous languages in the teaching of STEM subjects in Delta State. Journal of Education Research and Library Practice, 7(8).
17. Pinxteren, B. v. (2021). Language of instruction in education in Africa: How new questions help generate new answers. International Journal of Educational Development, 88, 102524.
18. Trudell, B. (2005). The potential of African languages for science education. International Journal of Bilingual Education and Bilingualism, 8(5–6), 411–426.
19. UNESCO. (2022, February 18). Why mother language-based education is essential. UNESCO.
20. UNESCO. (2024, February 21). Unlocking education’s potential: First language as a key to accelerating foundational learning. UNESCO.
21. UNESCO. (2025, March 4). What you need to know about multilingual education. UNESCO.
22. WENR (World Education News & Reviews). (2017). Education in Nigeria. Retrieved from https://wenr.wes.org/2017/03/education-in-nigeria
23. Yeqeen, A. I. (2024). Factors influencing student enrolment in Arabic language education at Federal College of Education (Special), Oyo: Challenges and strategic intervention. COEASU Erudite Journal, 6(1), 521–530.
24. Yusuf, B., & Kaoje, H. I. (2025). Teaching science in indigenous languages: Feasibility and effectiveness in Nigerian schools. South Asian Research Journal of Arts, Language and Literature, 7(4), 117–123.
25. Zenodo. (2024). Oladeji Egwaoje, Impact of the Mother Tongue and Culture of Rural Nigeria on Student Achievement in English, International Journal of Recent Research in Thesis and Dissertation, 5(1), 91–100. (Retrieved from https://doi.org/10.5281/zenodo.10911493)

DOI: 10.5281/zenodo.16892567