JOURNAL OF ARTS OF SOCIAL SCIENCES, KONTAGORA (JASSK)
FACULTY OF ARTS AND SOCIAL SCIENCES
FEDERAL UNIVERSITY OF EDUCATION, KONTAGORA, NIGER STATE-NIGERIA
Vol. 1, No 2 September, 2026
E ISSN: 3156-5336

Integrating Science and Technology in Teaching Hausa Language in Nigeria

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DOI: https://doi.org/10.5281/zenodo.22833645

Abstract

Science and technology have become indispensable tools for improving the quality of education worldwide. In Nigeria, the integration of technological innovations into language teaching has transformed instructional practices, enhanced learners' engagement and expanded access to educational resources. This position of this paper is to examines the role of science and technology in teaching the Hausa language in Nigeria. It argues that the effective integration of Information and Communication Technology (ICT), digital learning platforms, multimedia resources, artificial intelligence, mobile applications and online learning environments can significantly improve the teaching and learning of Hausa at all levels of education. The paper further identifies the opportunities and challenges associated with technology integration, including inadequate infrastructure, limited teacher competence, insufficient funding and poor internet connectivity. Drawing on contemporary literature, the paper maintains that science and technology should be strategically employed to preserve, promote and modernize the Hausa language while supporting Nigeria's educational development goals. This paper is anchored on the Technology Acceptance Model (TAM) developed by Davis (1989) as theoretical framework. It concludes that strengthening technological infrastructure, teacher capacity development and policy implementation will enhance Hausa language education and contribute to sustainable national development.

Keywords: Science, Technology, Hausa Language, ICT, Language Education.

Introduction

Language serves as one of the most powerful instruments for communication, cultural preservation, and national development. Indigenous languages such as Hausa play significant roles in transmitting cultural heritage, promoting national identity and facilitating effective communication among millions of speakers across Nigeria and West Africa. Hausa is not only one of the three major Nigerian languages but also functions as a regional lingua franca used in commerce, education, religion, media and governance (Bamgbose, 2000: p.20). The

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FEDERAL UNIVERSITY OF EDUCATION, KONTAGORA, NIGER STATE-NIGERIA
Vol. 1, No 2 September, 2026
E ISSN: 3156-5336

rapid advancement of science and technology has transformed educational systems worldwide. The introduction of digital technologies has changed traditional methods of teaching by creating interactive, learner-centred and flexible learning environments (UNESCO, 2023: p. 35.). Information and Communication Technology (ICT), multimedia applications, digital libraries, mobile devices, artificial intelligence and online learning platforms have improved access to educational resources and enhanced learning outcomes.

In Nigeria, integrating science and technology into Hausa language instruction provides opportunities to improve pronunciation, vocabulary development, reading comprehension, writing skills and cultural appreciation. Digital tools allow teachers to employ audio recordings, videos, animations, electronic dictionaries and language-learning applications that make instruction more engaging and effective (Federal Republic of Nigeria, 2022: p. 12.). Despite these opportunities, several challenges continue to hinder effective technology integration in Hausa language teaching. These include inadequate ICT infrastructure, unreliable electricity supply, insufficient funding, poor internet connectivity, limited teacher competence and inadequate digital instructional materials. Addressing these challenges requires collaborative efforts from governments, educational institutions, communities and development partners.

Concept of Science

Science refers to the systematic study of natural phenomena through observation, experimentation, measurement, and logical reasoning. It involves generating reliable knowledge that can be tested, verified and applied to solve human problems (Okebukola, 2015, p.10).Science contributes significantly to educational development through innovations that improve teaching methods, curriculum design, instructional materials and educational research. In language education, scientific findings from linguistics, psychology, cognitive science and educational technology provide evidence-based approaches for improving language teaching and learning.(Davis, 1989, p. 12)

Concept of Technology

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FEDERAL UNIVERSITY OF EDUCATION, KONTAGORA, NIGER STATE-NIGERIA
Vol. 1, No 2 September, 2026
E ISSN: 3156-5336

Technology refers to the practical application of scientific knowledge for solving problems and improving human activities. Educational technology includes digital devices, software applications, communication systems, multimedia resources and internet-based platforms used to facilitate teaching and learning (UNESCO, 2023, p. 71). Modern educational technologies include:

- Computers and laptops
- Smart phones and tablets
- Interactive whiteboards
- Learning Management Systems (LMS)
- Artificial Intelligence (AI)
- Digital language laboratories
- Audio-visual instructional materials
- Internet-based learning platforms
- Electronic dictionaries
- Digital libraries

These technologies improve learners' participation, motivation, collaboration and academic achievement.

Concept of Hausa Language

Hausa is one of the largest indigenous languages spoken in Africa. It belongs to the Chadic branch of the Afro-Asiatic language family and serves as the first language of millions of people in Northern Nigeria and neighbouring countries including Niger, Ghana, Cameroon, Chad and Sudan (Newman, 2000, p. 307).

The language occupies an important position in Nigeria's educational system. The National Policy on Education recognizes Hausa as one of the major Nigerian languages to be used as a

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FEDERAL UNIVERSITY OF EDUCATION, KONTAGORA, NIGER STATE-NIGERIA
Vol. 1, No 2 September, 2026
E ISSN: 3156-5336

medium of instruction during the early years of primary education (Federal Republic of Nigeria, 2022, p. 65).

Apart from formal education, Hausa plays important roles in:

- Cultural preservation

- Religious instruction

- Political communication

- Mass media

- Trade and commerce

- National integration

- Literary development

Consequently, improving Hausa language teaching contributes significantly to literacy development, national cohesion and sustainable development.

Theoretical Framework

This paper is anchored on the Technology Acceptance Model (TAM) developed by Davis (1989). The model explains that individuals are more likely to adopt technological innovations when they perceive them as useful and easy to use.

Applied to Hausa language teaching, the model suggests that teachers and learners will embrace educational technologies when they believe such technologies improve lesson delivery, enhance learning outcomes, simplify classroom activities and increase instructional effectiveness. The model further emphasizes that institutional support, adequate training, infrastructure and positive attitudes significantly influence technology adoption in educational settings.

The Role of Science and Technology in Teaching Hausa Language in Nigeria

Science and technology have fundamentally transformed language education by providing innovative instructional approaches that enhance teaching effectiveness and improve learners'

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FEDERAL UNIVERSITY OF EDUCATION, KONTAGORA, NIGER STATE-NIGERIA
Vol. 1, No 2 September, 2026
E ISSN: 3156-5336

achievement. In Nigeria, the integration of technology into Hausa language education has created opportunities for teachers to adopt learner-centred pedagogies, enrich classroom experiences and preserve indigenous linguistic heritage (UNESCO, 2023, p. 82). Science contributes theories and research on language acquisition, while technology provides digital tools for implementing these theories in classroom practice.

Improving Access to Hausa Language Learning

Technology has made Hausa language education more accessible to learners regardless of geographical location. Through online learning platforms, digital classrooms, educational websites and mobile applications, learners can study Hausa without being physically present in a classroom. Distance education and virtual learning environments have particularly benefited students in rural and underserved communities where qualified Hausa language teachers are scarce (Federal Republic of Nigeria (FRN, 2022, p. 32).

Online platforms also provide opportunities for lifelong learning, allowing adults and non-native speakers to acquire Hausa language skills for education, business and cultural interaction.

Enhancing Classroom Instruction through Multimedia

Multimedia technology combines text, sound, graphics, animation and video to create interactive learning experiences. In Hausa language teaching, multimedia enables teachers to demonstrate correct pronunciation, sentence construction, storytelling, drama, songs, poems and cultural practices. Audio recordings expose learners to accurate pronunciation and intonation, while educational videos improve comprehension by providing visual context. Multimedia presentations make lessons more engaging and increase learners' motivation and retention (Mayer, 2021, p. 72).

Examples include:

i. Hausa alphabet pronunciation videos.
ii. Digital storytelling.
iii. Animated grammar lessons.
iv. Interactive vocabulary presentations.
v. Audio recordings of traditional Hausa folktales.

JOURNAL OF ARTS OF SOCIAL SCIENCES, KONTAGORA (JASSK)
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FEDERAL UNIVERSITY OF EDUCATION, KONTAGORA, NIGER STATE-NIGERIA
Vol. 1, No 2 September, 2026
E ISSN: 3156-5336

vi. Video demonstrations of cultural ceremonies.

vii. Promoting Learner-Centred Teaching.

Modern educational technology encourages active participation rather than passive listening. Teachers can organise collaborative learning activities where learners work together using computers, tablets, or smart phones to solve language-related tasks. Interactive quizzes, educational games, online discussions and collaborative writing exercises encourage critical thinking, creativity, communication and problem-solving skills. These instructional strategies align with contemporary educational theories that emphasize active learning and learner autonomy (Vygotsky, 1978, p. 23).

Supporting Reading and Writing Skills

Digital technologies significantly improve learners' literacy skills. Word-processing software allows learners to practise writing in Hausa while receiving immediate feedback on spelling and grammar. Electronic dictionaries and digital reference materials help students understand unfamiliar words and improve vocabulary. Reading applications expose learners to a wide variety of Hausa texts, including newspapers, stories, poems, novelsand academic materials. Digital reading promotes independent learning and increases learners' exposure to authentic language use.(Yusuf, 2025, p. 57)

Improving Pronunciation and Listening Skills

One of the major challenges in language learning is mastering pronunciation. Audio technologies provide learners with repeated exposure to correct Hausa pronunciation through recorded conversations, speeches, radio programmes, and podcasts.

Language-learning applications also enable learners to listen repeatedly until they achieve acceptable pronunciation. This repeated practice improves listening comprehension, speaking fluency and oral communication skills.

Digital Preservation of Hausa Language and Culture contribute significantly to preserving indigenous languages. Thousands of Hausa books, dictionaries, manuscripts, proverbs, folktales and historical documents have been digitized and stored in electronic databases.

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FEDERAL UNIVERSITY OF EDUCATION, KONTAGORA, NIGER STATE-NIGERIA
Vol. 1, No 2 September, 2026
E ISSN: 3156-5336

Digital archiving ensures that valuable cultural materials remain available for future generations. Online repositories also promote research and facilitate global access to Hausa language resources.

Furthermore, social media platforms such as YouTube, Facebook, WhatsApp and podcasts have become important channels for promoting Hausa language, literature and cultural heritage.

Artificial Intelligence (AI) in Hausa Language Teaching

Artificial Intelligence has introduced new possibilities for language instruction. AI-powered applications can personalize learning by adapting lessons to individual learners' needs and providing immediate feedback.

Examples of AI applications include:

i. Intelligent tutoring systems.
ii. Speech recognition software.
iii. Automatic translation tools.
iv. Chatbots for conversational practice.
v. Adaptive learning platforms.
vi. AI-assisted pronunciation assessment.

These technologies help learners practise Hausa independently while supporting teachers with lesson planning and assessment. Examples are BBC Hausa, Google classrooms, YouTube Hausa learning channels and Hausa Wikipedia.

Mobile Learning (M-Learning)

The increasing use of smart phones has made mobile learning one of the fastest-growing educational innovations. Mobile applications enable learners to study Hausa language anytime and anywhere.

Educational mobile applications provide:

i. Vocabulary exercises.
ii. Grammar lessons.

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FACULTY OF ARTS AND SOCIAL SCIENCES
FEDERAL UNIVERSITY OF EDUCATION, KONTAGORA, NIGER STATE-NIGERIA
Vol. 1, No 2 September, 2026
E ISSN: 3156-5336

iii. Listening activities.
iv. Pronunciation practice.
v. Reading comprehension.
vi. Interactive quizzes.

Because smart phones are widely available in Nigeria, mobile learning provides an affordable means of expanding access to Hausa language education. Examples, Blackboard Learning System, online quiz and lexical resources.

Digital Language Laboratories

Language laboratories equipped with computers, headphones, microphones and language software provide learners with opportunities to develop speaking and listening skills.

Students can:

- Listen to native speakers.

- Record their own voices.

- Compare pronunciation.

- Receive immediate feedback.

- Practise conversations repeatedly.

Research indicates that language laboratories significantly improve oral communication competence among language learners.

Online Assessment and Evaluation

Technology has improved assessment methods through computer-based testing and online quizzes. Teachers can administer objective tests, essays, pronunciation tasks and oral presentations electronically.

Digital assessment provides immediate results, facilitates record keeping and enables teachers to monitor learners' progress over time. Learning analytics generated from online platforms also help teachers identify students who require additional support. Give examples. Online

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FACULTY OF ARTS AND SOCIAL SCIENCES
FEDERAL UNIVERSITY OF EDUCATION, KONTAGORA, NIGER STATE-NIGERIA
Vol. 1, No 2 September, 2026
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writing assessment, digital vocabulary test, electronic portfolios and digital listening assessment.

Benefits of Integrating Science and Technology into Hausa Language Teaching

The integration of science and technology into Hausa language instruction offers several benefits:

- Improves learners' academic achievement.

- Increases motivation and classroom participation.

- Enhances pronunciation and communication skills.

- Expands access to quality instructional materials.

- Supports inclusive education.

- Promotes independent and lifelong learning.

- Preserves Hausa language and cultural heritage through digital archiving.

- Strengthens teachers' instructional effectiveness.

- Encourages collaboration among learners.

- Prepares students with digital literacy skills needed in the twenty-first century.

These benefits demonstrate that technology is not merely a teaching aid but a strategic resource for improving the quality and relevance of Hausa language education in Nigeria.

Challenges of Science and Technology in Teaching Hausa Language

Challenges Affecting the Integration of Science and Technology in Teaching Hausa Language Despite the numerous benefits of science and technology in language education, several challenges hinder their effective integration into the teaching of the Hausa language in Nigeria.

Inadequate ICT Infrastructure

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FEDERAL UNIVERSITY OF EDUCATION, KONTAGORA, NIGER STATE-NIGERIA
Vol. 1, No 2 September, 2026
E ISSN: 3156-5336

Many primary, secondary, and tertiary institutions lack adequate ICT facilities such as computers, projectors, internet connectivity, digital language laboratories, and multimedia equipment. In many rural schools, technology-supported instruction is almost impossible because these facilities are either unavailable or insufficient (Federal Republic of Nigeria (FRN, 2022).

Unreliable Electricity Supply

The irregular supply of electricity in many parts of Nigeria limits the effective use of technological devices during classroom instruction. Frequent power outages discourage teachers from relying on digital instructional resources.

Inadequate Teacher Competence

Many Hausa language teachers have limited knowledge and skills in the use of educational technologies. Some teachers have not received adequate professional training in computer literacy, multimedia instruction, online teaching or digital content development, reducing their confidence and willingness to integrate technology into classroom practice (UNESCO, 2023,Pg 306).

Insufficient Digital Learning Resources

Compared with English and some other major world languages, there is a shortage of high-quality digital instructional materials for teaching Hausa. Interactive software, e-books, mobile applications, online dictionaries and educational videos in Hausa remain limited.

Poor Internet Connectivity

Many schools, especially in rural communities, experience slow or unreliable internet services. This restricts access to online learning platforms, digital librariesand cloud-based educational resources.

Financial Constraints

The acquisition, installation, maintenance, and upgrading of ICT facilities require substantial financial investment. Many schools operate with limited budgets and therefore struggle to provide modern technological resources.

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FEDERAL UNIVERSITY OF EDUCATION, KONTAGORA, NIGER STATE-NIGERIA
Vol. 1, No 2 September, 2026
E ISSN: 3156-5336

Resistance to Change

Some teachers and school administrators are reluctant to adopt new instructional technologies because they are accustomed to traditional teaching methods or perceive technology as difficult to use. This resistance slows the integration of innovative practices into Hausa language education.

Strategies for Enhancing the Integration of Science and Technology

To maximize the benefits of science and technology in Hausa language teaching, the following strategies should be adopted:

Government Investment in ICT Infrastructure Federal, state, and local governments should provide schools with adequate computers, internet facilities, multimedia projectors, digital language laboratories and reliable electricity. Public-private partnerships can also help expand technological infrastructure.

Continuous Professional Development

Teachers should receive regular training through workshops, seminars, conferences, and in-service programmes on ICT integration, digital pedagogy, artificial intelligence tools, and multimedia instructional design. Such programmes will improve teachers' confidence and competence.

Development of Digital Hausa Learning Resources

Government agencies, universities, language experts, publishers, and software developers should collaborate to produce more digital textbooks, e-books, educational videos, online dictionaries, mobile applications, podcasts and interactive learning platforms in Hausa.

Curriculum Review

Teacher education institutions should incorporate educational technology, digital literacyand AI-assisted language teaching into Hausa language curricula so that future teachers graduate with the competencies required for technology-supported instruction.

JOURNAL OF ARTS OF SOCIAL SCIENCES, KONTAGORA (JASSK)
FACULTY OF ARTS AND SOCIAL SCIENCES
FEDERAL UNIVERSITY OF EDUCATION, KONTAGORA, NIGER STATE-NIGERIA
Vol. 1, No 2 September, 2026
E ISSN: 3156-5336

Improved Internet Connectivity

Educational institutions should be provided with affordable and reliable broadband internet services. Expanding internet access will support online teaching, research, collaboration and access to digital learning materials.

Monitoring and Evaluation

Educational authorities should establish mechanisms to monitor the implementation of technology-based teaching programmes, evaluate their effectiveness and provide continuous support for improvement.

Strengthening Research and Innovation

Universities and research institutes should encourage research on innovative approaches to Hausa language teaching using artificial intelligence, virtual learning environments, mobile learning, speech recognition and digital assessment technologies.

Position Statement

This paper strongly maintains that science and technology should be fully integrated into Hausa language teaching in Nigeria because they improve instructional quality, learner participation, language proficiency and access to educational opportunities. Technology should not replace teachers but rather serve as a complementary tool that enhances teaching effectiveness and enriches the learning experience. Furthermore, preserving and promoting the Hausa language in the digital age requires deliberate investment in technological innovations. Indigenous languages can only remain relevant in the twenty-first century if they are supported by modern digital resources, online platforms, electronic publishing and artificial intelligence applications.

Therefore, governments, educational institutions, teachers, communities, and development partners should collaborate to ensure that science and technology become central components of Hausa language education across all levels of Nigeria's educational system.

Conclusion

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FACULTY OF ARTS AND SOCIAL SCIENCES
FEDERAL UNIVERSITY OF EDUCATION, KONTAGORA, NIGER STATE-NIGERIA
Vol. 1, No 2 September, 2026
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Science and technology have become indispensable instruments for improving language education globally. In Nigeria, their integration into Hausa language teaching has the potential to transform traditional instructional practices into more interactive, learner-centred and effective educational experiences.

Technological innovations such as computers, multimedia resources, digital libraries, mobile learning applications, artificial intelligence, online learning platforms, and language laboratories can significantly improve learners' listening, speaking, reading and writing skills while preserving the rich linguistic and cultural heritage of the Hausa people.

Although several challenges including inadequate infrastructure, limited funding, poor internet connectivity, insufficient teacher competence and inadequate digital instructional resources continue to hinder effective implementation, these obstacles can be overcome through strategic planning, sustained investment, policy implementation and continuous professional development.

The successful integration of science and technology into Hausa language education will contribute not only to improved learning outcomes but also to national development, cultural preservation, digital inclusion and the achievement of sustainable educational goals.

Recommendations

The following recommendations are proposed:

1. Governments should increase funding for ICT facilities in educational institutions.
2. Schools should establish functional digital language laboratories for Hausa language instruction.
3. Regular ICT training should be provided for Hausa language teachers.
4. Universities and educational technology experts should develop more digital instructional materials in Hausa.
5. Internet access should be improved in schools, particularly in rural communities.
6. Artificial intelligence and mobile learning technologies should be incorporated into Hausa language teaching.
7. Educational policies should promote the integration of indigenous languages into digital learning environments.

8. Public-private partnerships should support technological innovation in language education.
9. Continuous monitoring and evaluation should guide the implementation of technology-based instructional programmes.
10. More research should be conducted on emerging technologies and their effectiveness in teaching indigenous Nigerian languages.

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