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Innovative and Interdisciplinary Digital Education: Discourse in Computational Linguistics in Nigeria Exemplified

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Abstract: *The rapid convergence of artificial intelligence, digital education, and computational linguistics has reshaped pedagogical practice, research paradigms, and language technology development in Nigeria. Despite the country's growing digital ecosystem, the integration of computational linguistics into teacher-education institutions remains uneven. Using Adeyemi Federal University of Education as a policy case model, this article investigates the dynamics, gaps, and prospects of integrating computational linguistics within Nigeria's digital-education transformation. Drawing on recent empirical, policy, and technological studies - including work on multilingual NLP for Nigerian languages, named-entity recognition systems, digital lexicons, AI-enabled pedagogies, and teacher digital competencies - this article presents a discourse analysis of how interdisciplinary digital education can bridge national challenges in language policy implementation, AI adoption, and indigenous-language revitalisation. The study argues that computational linguistics offers one of the most sustainable frameworks for expanding digital inclusion, enhancing teacher capacities, strengthening multilingual education, and positioning Nigeria within global AI futures.*

Keywords: computational linguistics, digital education, digital humanities and interdisciplinarity, Nigerian higher education, Adeyemi Federal University of Education

INTRODUCTION

In recent years, Nigeria has witnessed a remarkable acceleration in digital transformation across education, banking, governance, media, and cultural production. While digitalisation in education has become a national aspiration, its implementation remains uneven, inconsistent, and often technologically under-resourced. Yet, the emergence of new natural-language-processing (NLP)

research focusing on Nigerian and other African low-resource languages has opened innovative possibilities for interdisciplinary digital education (Inuwa-Dutse, 2025). Computational linguistics (traditionally positioned within linguistics and computer science) now intersects significantly with educational technology, teacher training, digital literacy, and national language policy (Emedem, Onyenwe, and Onyedinma, 2025.).

As multiple studies on Nigerian NLP have emphasised, the country's multilingual context provides a natural laboratory for computational linguistics. Recent research efforts such as Kalèjaiye et al. (2025) include surveys of Nigeria's low-resource languages, experimental models for WAZOBIA named-entity recognition, advancements in sentiment classification for Nigerian movie data, foundational models covering multiple indigenous languages, and digital lexicons for minority languages (Shode et al, 2023). Parallel studies in teacher-education and digital pedagogy, Mahuta and Abubakar (2025), for instance, have highlighted the urgent need for improved teacher digital competencies, AI-integrated instruction, and modernised curriculum design.

Against this background, this article explores how computational linguistics can serve as a central pillar of innovative digital education in Nigeria. Adeyemi Federal University of Education is selected as a model institution because of its strategic mandate as a teacher-education centre. This choice is also largely informed by the fact that teacher-training institutions often determine the trajectory of national classroom practice. The study, therefore, aims to investigate the relational symbiosis of computational linguistics and digital pedagogy with a view to examining how language technology can converge to strengthen Nigeria's broader educational system.

Nigeria's Digital-Education Landscape: Facts on File

Progress and Opportunities

Studies across Nigerian universities show growing interest in integrating digital tools into teaching. Teacher educators increasingly use e-learning platforms, digital grammar-learning tools, virtual classrooms, AI chatbots, and learning-management systems. Research such as Birma et al. (2025) on digital competencies demonstrates that university teachers who possess 21st-century digital skills are more effective in classroom innovation. Furthermore, national analyses reveal that AI is transforming higher education by enabling personalised learning, predictive analytics, and adaptive assessment.

Persistent Challenges

Nigeria's teacher-education sector continues to face systemic obstacles that slow digital transformation. Unstable power supply, inconsistent internet connectivity, and limited funding undermine institutions' ability to sustain digital innovation. As found by Ossai et al. (2024), even when tools are available, many teachers lack the confidence to adopt emerging technologies, compounded by institutional reluctance to embed AI-enabled pedagogy into routine practice. Resistance to change and the absence of specialised digital-education policies in teacher-training

institutions further widen the gap between aspiration and implementation, making inadequate professional development the most critical bottleneck.

The Need for Discipline-Integrated Digital Pedagogy

Ogunbodede et al. (2023) find the treatment of technology as a superficial add-on rather than a discipline-driven necessity as one central weakness of Nigeria's digital-education strategy. Computational linguistics provides a corrective pathway by naturally blending language theory, sociolinguistics, AI, digital humanities, software development, and educational technology. Its foundation in the cognitive theory of learning makes it ideal for transforming pedagogical practice because it aligns technology with the epistemology of language education. As an interdisciplinary field, it offers a holistic framework that equips teachers not only to use digital tools but to understand the linguistic and cognitive principles behind them.

Growth of NLP Research

The last five years have witnessed an unprecedented expansion in Nigerian-focused NLP research, marking a shift from conceptual advocacy to practical innovation. Scholars increasingly highlight the stark under-representation of many Nigerian languages and have launched diverse data-collection initiatives to address the gap. Benchmarking efforts and the development of foundational models now cover multiple language families, reflecting a maturing research ecosystem. Bali, Garba and Ahmadu (2024) reveal that collaborative work among universities, research labs, and international partners further strengthens the infrastructure for long-term NLP development.

Digital Resources for Indigenous Languages

Catherine Dupe et al. (2024) point out recent innovations yielding digital lexicons, foundational language models, Named Entity Recognition (NER) systems, and text-generation tools that respond directly to Nigeria's linguistic complexity. These digital resources extend beyond English and major languages, offering computational support to minority and under-documented languages. Speech-technology prototypes and machine-translation datasets have been tailored to reflect local grammatical and sociocultural patterns, enhancing accuracy and usability. Collectively, these initiatives advance digital inclusion, support multilingual education, and promote the preservation of cultural heritage.

Conceptual review and Theoretical Framework

Digital-Education Paradigm

The concept of digital education in Nigeria has evolved from simple ICT adoption to a holistic model that includes digital literacy, e-learning, AI-supported instruction, and multimodal learning (Muhammad et al, 2025). Contemporary studies such as Ahmed (2024) have emphasised that digital education is not merely about devices but about competencies, digital ethics, adaptive learning, and

data-driven instructional design. The study suggests harnessing digital transformation with AI to improve teaching and learning of English as second language in Nigeria. Nafiu and Olaitan (2025) exemplify teacher educators in multiple Nigerian universities who have reported both optimism and concern: optimism regarding the educational possibilities of new technologies, and concern over infrastructural deficits, training gaps, and uneven digital skills.

Post-COVID-19 research further underscores the necessity of digital literacy among teachers and students. Enakrire (2024), Ibrahim and Jibia (2024), and Dangaji and Unigwe (2025) are amongst studies on open-distance-learning institutions showing that lecturers who possess computer skills demonstrate stronger instructional outcomes. Research also shows that emerging AI trends in Nigerian education such as intelligent tutoring systems, automated assessment tools, and computer-assisted grammar learning, can significantly improve learning, provided teachers are adequately trained.

Computational Linguistics and Nigerian Languages

Computational linguistics involves the computational modelling of human language. In the Nigerian context, recent scholarship has contributed significantly to NLP resource development:

i. Surveys of Low-Resource Languages

One of the most significant developments in Nigerian computational linguistics found in Osumah's (2025) study on the development of digital dexicon for Etsako Language is the emergence of large-scale surveys documenting the linguistic characteristics, digital status, and computational potential of the country's low-resource languages (John et al., 2025). These surveys go beyond simple classification; they provide linguistic descriptions, orthographic assessments, phonological inventories, and sociolinguistic vitality indices necessary for computational modelling. Their importance lies in the fact that Nigeria's often celebrated cultural-linguistic diversity of about 500 languages poses a technological challenge because most languages lack sufficient annotated data for modern NLP methods (Jimoh, 2025). Survey projects therefore serve as the first step toward digital inclusion: they identify which languages require urgent documentation, highlight gaps in existing corpora, and offer roadmaps for future resource development. The availability of such surveys, according to Orji and Korie (2024) would enable researchers to prioritise languages with high speaker populations but low computational presence, thereby laying the foundation for more equitable NLP innovation in an AI World.

ii. Named-Entity Recognition Systems for Major and Minority Languages

The development of Named-Entity Recognition (NER) systems for Nigerian languages represents a landmark achievement in local NLP research. NER is a critical task because it enables machines to identify and classify proper names such as persons, locations, and organisations within texts. For Nigerian languages, NER presents unique challenges: tonal variation, agglutinative morphology, code-mixing with English, and orthographic inconsistencies all affect system accuracy. Despite

these complexities, studies like Emedem et al. (2025) have successfully created NER systems tailored to both major languages (such as Hausa, Igbo, and Yoruba) and minority languages found across various regions. These systems demonstrate that Nigerian languages can support sophisticated NLP applications when linguistically informed annotation and modelling strategies are used. More importantly, the expansion of NER to minority languages signals a shift from focusing solely on WAZOBIA languages to embracing Nigeria's broader linguistic ecology, thus advancing linguistic equity in digital spaces.

iii. Transformer-Based Models for Nigerian Pidgin Text Generation

Transformer-based models, according to Garba et al. (2024), have revolutionised global NLP, and their application to Nigerian Pidgin marks a major step forward in recognising the language's digital relevance. Nigerian Pidgin, widely spoken across urban and rural contexts, is a lingua franca of popular culture, media, and everyday communication. Yet its hybrid structure—mixing English lexical roots with indigenous grammatical patterns—poses significant modelling challenges. Recent transformer-driven research has demonstrated that Nigerian Pidgin can be computationally learned when sufficient training data and domain-specific linguistic rules are applied. Text-generation systems now produce coherent Pidgin sentences, enable conversational agents, and support creative applications such as scripting and translation. These models are not merely technological experiments; they validate Nigerian Pidgin as a language worthy of digital preservation and computational respect. In a multilingual nation, the ability of machines to generate and understand Pidgin expands the accessibility of digital education, entertainment, and communication.

iv. Advances in Yoruba NLP

Yoruba has emerged as one of the most extensively studied Nigerian languages in computational linguistics, largely due to its complex tone system and rich morphological structure. Recent advancements include improved morphological analysers, tonal diacritic restoration systems, part-of-speech taggers, and Yoruba-specific text-normalisation tools. Researchers have also experimented with speech-recognition prototypes that account for pitch variations inherent in Yoruba phonology. These advancements have opened pathways for developing Yoruba virtual assistants, digital learning tools, and AI-supported grammar-instruction platforms. They also demonstrate that even tonal languages—traditionally difficult for NLP—can achieve high accuracy when linguistic principles inform computational design. Jimoh (2025) particularly raises advocacy for bridging gaps in Natural Language Processing for Yorùbá. This is due to the fact that in educational contexts, Yoruba NLP tools make it possible for teachers and learners to engage with language content in digital formats that preserve linguistic authenticity, marking an essential step toward multilingual AI-driven pedagogy.

v. Sentiment-Analysis Tools Built Through Transfer Learning

Sentiment-analysis tools adapted for Nigerian languages, particularly through transfer learning, represent another breakthrough. Transfer learning allows models trained on high-resource

languages (like English) to be fine-tuned on smaller datasets in Nigerian languages or culturally specific domains. For example, sentiment tools developed using Nigerian film commentary and social-media data reveal how emotions, evaluations, and opinions are expressed within local cultural frameworks. These models demonstrate strong performance despite limited training resources because they leverage pre-existing deep-learning architectures. The success of transfer learning in this context confirms that Nigeria does not need massive datasets to participate meaningfully in global NLP; instead, well-curated domain-specific corpora can produce effective models. Sentiment analysis, according to Shode et al. (2025), has significant applications for digital education as well: it can help evaluate student feedback, monitor online learning engagement, and support mental-health analytics in virtual classrooms.

vi. Foundational Language Models Covering Several Indigenous Languages

The emergence of foundational language models designed specifically for Nigerian languages marks a transformative phase in local NLP development. Unlike single-task models, foundational models are pretrained on large multilingual corpora and can be adapted for various downstream tasks such as summarisation, translation, NER, speech recognition, and question answering. These models cover multiple indigenous languages simultaneously, enabling a unified approach to resource development across linguistic families. Their design reflects inclusion: languages traditionally overlooked in computational research now appear alongside more widely spoken ones, reinforcing equitable digital representation. Foundational models also reduce the cost of future NLP research by providing adaptable baselines for researchers, students, and developers. For digital education, such models make it feasible to build multi-language learning platforms, intelligent tutoring systems, and culturally relevant ed-tech applications that speak to learners in their own languages (John, et al. 2025).

vii. Digital Lexicon Creation for Languages such as Etsako

The creation of digital lexicons for minority languages like Etsako exemplifies the deepening interest in language-technology work beyond the major national languages (Osumah, 2025). Digital lexicons serve as essential computational resources because they provide structured wordlists, morphological rules, semantic fields, and grammatical annotations necessary for building NLP tools. For languages with limited documentation, lexicons represent both preservation and innovation: they help capture linguistic knowledge for future generations while enabling computational tasks such as automated translation, spell-checking, and part-of-speech tagging. The development of digital lexicons for minority languages is particularly important in Nigeria, where many languages face endangerment due to urbanisation and intergenerational shift. By digitising vocabulary and grammatical information, lexicon developers contribute to cultural preservation and facilitate the entry of underserved languages into the digital world. In educational settings, digital lexicons enable the development of learning materials that reflect the linguistic diversity of Nigerian classrooms. These developments demonstrate that computational linguistics has matured beyond experimental stages and is becoming central to Nigeria's digital-language future.

Language Technology, Digital Inclusion, and Policy

Gathered from Nafiu and Olaitan (2025) and other related literature, it is argued that language technologies are essential for digital inclusion in multilingual societies. Nigerian scholars contend that the integration of NLP into national digital strategies can bridge the digital divide, provide equitable access to digital resources, and preserve minority languages. Studies assessing Nigeria's national language policy also reveal persistent gaps in teacher readiness, insufficient training in multilingual digital pedagogy, and inadequate institutional support. Collectively, these frameworks justify the selection of computational linguistics as a foundational element of Nigeria's educational digitalisation.

Digital Education Implications: Viewpoints from Adeyemi Federal University of Education

Olajuyigbe and Oduola (2025) foreground 'digital semiotic practices', particularly the interplay of images and dialogue on WhatsApp, as a critical pedagogical and research frontier for contemporary digital education. By demonstrating how everyday digital interactions encode power relations, gender politics, existential anxieties, and boundary negotiations, the authors reposition informal digital platforms as legitimate sites of scholarly inquiry with direct implications for teacher education and curriculum development. From a digital communication standpoint, the findings reveal that meaning-making in online spaces is no longer text-bound but multimodal, requiring pedagogical models that equip learners to interpret, critique, and ethically engage with images, emojis, ellipses, and dialogic fragments. This necessitates curricular attention to multimodal literacy, enabling future educators to guide learners in decoding implicit ideologies and power structures embedded in digital exchanges.

In the domain of digital semiotics, the study advances the argument that WhatsApp images and chats function as structured sign systems governed by semiotic grammar - particularly through *semiotic nominals* and *contextual ellipsis*. These insights call for the formal integration of digital semiotics into language and education programmes, moving beyond traditional semiotic analyses of print and broadcast media to include mobile-mediated and platform-specific discourse.

The research further opens a pathway for computational linguistics, suggesting that the patterned nature of digital signifiers lends itself to corpus-based and algorithmic analysis. The recurrent semiotic fragments identified in the study provide fertile ground for developing annotated digital corpora, sentiment and stance detection models, and tools for identifying discourses of violence, exclusion, or domination in online communication—an area of growing relevance in both education and digital citizenship.

Within educational technology, the study underscores how digital platforms actively shape learning identities, social relations, and ethical boundaries. It thus advocates pedagogical innovation that leverages students' lived digital experiences while fostering critical awareness of power, gender, and representation in online environments. Digital education, as implied by the findings, must therefore be both technologically responsive and critically grounded.

In the light of this, Adeyemi Federal University of Education is strategically positioned to assume a leadership role. The institution's mandate in teacher education aligns with the study's call for interdisciplinary scholarship that bridges linguistics, digital humanities, educational technology, and critical discourse studies. By advancing research and pedagogy in these intersecting areas, the university can emerge as a national hub for innovative, inclusive, and socially responsive digital education, contributing meaningfully to Nigeria's evolving educational and technological landscape (IOSR Journals).

Digital semiotic phenomena are not just analysed; a compelling vision of digital education in which critical semiotic awareness, computational insight, and pedagogical innovation converge is articulated as an agenda that Adeyemi Federal University of Education is well placed to champion.

METHODOLOGICAL ORIENTATIONS

This article adopts a qualitative discourse-analytic and policy-analytic designs. It synthesises insights from empirical studies, technological evaluations, surveys of teacher readiness, policy documents, and current research in Nigerian NLP. The study does not generate primary data but, following Usman et al.'s (2025) model, integrates cross-disciplinary research to construct an interpretive model for integrating computational linguistics into teacher-education curriculum and institutional digital policy. In the process, the major matter of methodological concern rests solely on literature and observations.

Adeyemi Federal University of Education serves as an exemplary institutional model because of:

1. its statutory mandate as a key teacher-training institution;
2. its diverse linguistic environment;
3. its curricular orientation toward applied language studies;
4. its capacity to influence national classroom practice through graduate teachers.

RESULTS

Adeyemi Federal University of Education: A Policy Case Model

Institutional Orientation

Adeyemi Federal University of Education is strategically positioned to lead digital transformation in Nigeria's teacher-education landscape. With strong programmes in linguistics, language education, and educational technology, it already possesses the disciplinary foundations required for computational-linguistics integration. Its mandate to prepare teachers for all educational levels and to promote culturally grounded pedagogy aligns naturally with national digital-education priorities. This makes the institution a viable model for demonstrating how teacher-education universities or colleges can adopt interdisciplinary digital innovation.

Existing Digital-Education Infrastructure

Although the university has invested in ICT training, digital literacy, and blended learning, a structured policy framework remains necessary to systematise these efforts. Its existing facilities (such as e-learning units, digital resource centres, and computer-literacy programmes) offer a solid foundation for expansion into AI-supported pedagogy. Occasional workshops on emerging technologies indicate institutional interest but also reveal the need for more consistent, curriculum-driven integration. Strengthening the policy framework would allow the university to move from ad-hoc initiatives to sustained, discipline-aligned digital transformation. However, computational linguistics remains largely outside formal policy and curricular design.

Proposed Integration of Computational Linguistics

To align with national and global digital transformations, Adeyemi Federal University of Education can adopt a three-pillar integration model:

Pillar 1: Curriculum Embedding

Embedding computational linguistics and digital-language pedagogy into the curriculum enables Adeyemi Federal University of Education to prepare future teachers for 21st-century language-technology demands. Modules such as *Introduction to NLP for Educators*, *Digital Grammar Tools*, *Speech Technology*, and *Computational Morphology and Syntax* expose pre-service teachers to the theoretical and applied dimensions of language technologies. This curricular expansion ensures that teachers understand how AI-driven tools, such as corpora, automated feedback systems, and speech-recognition platforms, can enhance classroom instruction, assessment, and learner engagement. By incorporating corpus design for indigenous languages, the university also positions educators as contributors to national NLP resource development rather than passive consumers of imported technologies.

Pillar 2: Institutional Capacity Development

Institutional capacity is essential for sustaining any digital-education reform. Establishing a dedicated language-technology innovation hub allows the university to function as a centre for experimentation, research incubation, and the development of local NLP solutions. Collaboration with national and international NLP consortia expands technical expertise and grants access to shared datasets, models, and mentorship networks. Furthermore, developing corpora for languages spoken in Ondo and neighbouring states, alongside providing AI-based pedagogical training for lecturers, ensures that digital transformation is not superficial but structurally embedded in the institution's long-term academic culture.

Pillar 3: Community and National Impact

The third pillar emphasises the university's role in advancing public-good outcomes through digital-language innovation. Producing digital resources for multilingual classrooms directly supports

equitable learning, particularly in linguistically diverse and underserved communities. By aligning activities with Nigeria's national language policy, the university strengthens policy implementation, especially in teacher preparation and indigenous-language pedagogy. In addition, leading research on language digitisation enables Adeyemi Federal University of Education to emerge as a national thought-leader, shaping discourse and practice in Nigeria's rapidly evolving computational-linguistics ecosystem.

DISCUSSION

Interdisciplinarity, Innovation, and National Transformation

Why Computational Linguistics Matters for Nigeria

i. Digital Inclusion

Computational linguistics plays a critical role in advancing digital inclusion by ensuring that Nigeria's diverse linguistic communities can access digital platforms in their own languages. When NLP tools such as machine translation, speech recognition, and text-to-speech systems are developed for local languages, they make digital services usable for populations who may not be fluent in English. This reduces barriers to participation in e-learning, e-governance, and digital commerce, thereby narrowing the digital divide. Ultimately, linguistic accessibility becomes a catalyst for social equity, enabling broader civic and economic engagement.

ii. Teacher Digital Competence

Training teachers in computational linguistics enhances their capacity to integrate digital-language tools into classroom instruction. Educators familiar with NLP applications can use automated feedback systems, speech-technology tools, and corpus-based resources to support literacy and language development. This competence translates to more interactive, data-informed, and learner-centred teaching practices, especially in multilingual classrooms. As teachers gain confidence with digital tools, they become change agents who model the effective use of technology for their students.

iii. National Language Policy

Long before the current hard-to-implement policy-summersault which has generated hot debates within the polity, indigenous-language technologies had directly supported Nigeria's National Policy on Education by facilitating the use of mother tongues and major Nigerian languages in early-grade instruction. Tools such as digital dictionaries, spell-checkers, text analysers, and speech-resources can assist teachers to teach in the prescribed languages with greater ease and accuracy. They can also provide learners with culturally relevant digital content that strengthens literacy foundations. In this way, computational linguistics becomes an instrument for making the policy's multilingual aspirations not only feasible but sustainable.

iv. AI Integration

A basic understanding of language technologies equips both teachers and students to participate responsibly in an AI-driven world. Knowledge of NLP, machine learning, and automated decision systems helps users recognise ethical issues such as bias, misinformation, and data privacy. It also empowers educators to teach digital citizenship, guiding learners to engage critically with AI tools. Thus, computational linguistics supports not only technological adoption but also the cultivation of ethical awareness in Nigeria's evolving digital society.

Interdisciplinary Synergy

Interdisciplinary Value of Computational Linguistics in Teacher Education

Computational linguistics naturally blends Science, Technology, Engineering, and Mathematics (STEM) fields such as computer science, data analysis, and artificial intelligence with humanities disciplines like linguistics, cultural studies, and communication, breaking traditional academic boundaries. This interdisciplinarity strengthens problem-solving skills by training teachers to approach language issues with both analytical and creative strategies. It also enhances data-driven decision-making, as trainee educators learn to interpret learner-generated data, classroom analytics, and digital assessment outputs. Moreover, the combination of technical creativity, deep linguistic awareness, and sensitivity to cultural relevance equips teachers to design inclusive, technology-supported lessons that reflect the realities of multilingual Nigerian classrooms.

The main idea is that the field combines the analytical rigour, traditionally associated with technical, quantitative, and problem-solving skills of STEM with the interpretive and cultural insights of language studies. Computational linguistics draws on computer science, artificial intelligence, mathematics, and engineering principles to build language technologies such as speech recognisers, machine-translation systems, and text analysers. At the same time, it depends on linguistics, sociolinguistics, cultural studies, and cognitive theory, which help interpret how humans use language in social and communicative contexts. This fusion breaks traditional academic divisions by showing that digital innovation in language requires both technical computation and deep humanistic understanding.

Nigeria's Global Positioning in AI and Language Technology

By investing intentionally in language-technology education, Nigeria positions itself as a meaningful contributor to global AI research, especially in the rapidly expanding domain of low-resource languages. The development and exportation of high-quality linguistic datasets allow Nigeria not only to supply valuable training materials to the international NLP community but also to influence research directions. Strengthening international collaboration - through multi-country projects, shared corpora, and academic exchanges - further integrates Nigeria into the global digital ecosystem. At the same time, digitising and preserving indigenous languages ensures that Nigeria's

linguistic heritage is safeguarded for future generations while contributing unique cultural and linguistic structures to global AI development. This aligns with the direction of recent Nigerian NLP initiatives focusing on inclusive language modelling.

Summary of Findings: NLP and Teacher-Education Curriculum in Nigeria

The study finds that, despite Nigeria's growing national engagement with Natural Language Processing (NLP) and related computational language technologies, teacher-education institutions are yet to fully meaningfully incorporate computational linguistics into their training curricula. This curricular gap constitutes a significant structural weakness in the implementation of Nigeria's multilingual language policy, particularly within early-grade instruction and linguistically diverse classroom contexts. The near absence of computational linguistics training limits teachers' linguistic sensitivity and reduces their capacity to engage productively with digital language tools. As a result, teachers are insufficiently prepared to deploy grammar-support technologies, facilitate effective instruction in indigenous languages, or integrate emerging AI-driven tools into pedagogical practice in an ethically and contextually responsible manner.

Furthermore, the study reveals that this omission constrains teachers' ability to develop culturally grounded digital learning resources that reflect local linguistic realities. This leaves serious responsibility burden on such Nigerian teacher educational institution as Adeyemi Federal University of Education.

Integrating computational linguistics into teacher education would, therefore, not only strengthen professional linguistic competence but also enhance curriculum relevance, support indigenous language instruction, and reinforce the practical realization of national language-policy objectives in digitally mediated learning environments. And, with good focus on implementation of Nigeria's multilingual language policy, and focus on pedagogical delivery, where teachers are expected to operationalise policy objectives, Adeyemi Federal University of Education is a fertile soil for these developments

CONCLUSION

This article has demonstrated that computational linguistics represents one of the most viable pathways for advancing interdisciplinary digital education in Nigeria. Evidence from recent technological, linguistic, and educational research shows that Nigeria's multilingual ecology demands an integrated digital policy that recognises AI-enabled language technologies as essential to national development. Adeyemi Federal University of Education, given its strategic role in teacher preparation, is particularly well positioned to lead this transformation. Building capacity in computational linguistics will enable the institution (AFUED) to contribute significantly to digital inclusion, language preservation, teacher digital competence, and national AI readiness.

Policy Recommendations

It is essential to provide a crisp, professionally structured policy brief based on the content of this study, not only to preserve the basic arguments but also to project orientation suitable for institutional, governmental, or donor-facing communication.

Policy Brief

Advancing Computational Linguistics in Nigerian Teacher-Education Institutions

Funding Schemes for Digital Humanities Projects
Beginning with AFUED, TETFund and NUC should fund:

(i) Digital humanities research clusters
(ii) Digital textbooks, linguistic corpora, and AI-based language tools
(iii) National workshops on digital semiotics and digital education

Curriculum Integration

(i) Modules in NLP for educators, computational morphology, speech technology, and AI-enabled language pedagogy should be introduced.
(ii) Corpus design and digital grammar tools into language-education courses can be embedded.

Institutional Capacity Development

(i) A Language-Technology Innovation Hub to coordinate research, training, and resource production should be established, linking universities with AFUED as a pilot node.
(ii) Partnering with national and global NLP research consortia, focusing on digital humanities should be encouraged.
(iii) Corpora for languages spoken in Ondo State and surrounding regions should be developed.
(iv) Continuous AI-based pedagogical training for lecturers should be provided.
(v) AFUED should open up more to visiting-scholar programmes in computational linguistics

Community and National Impact

(i) Digital resources for multilingual classrooms should be produced.
(ii) Implementation of Nigeria's national language policy through technology must be supported.
(iii) Research in indigenous-language digitisation and contribute datasets to global AI research should be a front-burner educational activity.

Digital Humanities and Language Technology Research Centres

AFUED serves as a model for:

(i) A Centre for Computational Linguistics and Digital Education
(ii) Collaborative labs linking English, Yoruba, Computer Science, and Communication Studies
(iii) Digital archives for local languages and semiotic materials

In precise term, integrating computational linguistics into teacher-education institutions is both a strategic necessity and a national opportunity. By adopting structured policies, strengthening institutional capacity, and embedding digital language technologies within teacher preparation, Nigeria can position itself as a regional leader in educational innovation and indigenous-language digitisation. Adeyemi Federal University of Education offers a practical model for demonstrating this transition.

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APENDIX

Table 1: Definition of key Terms

Term / Acronym	Definition
NLP (Natural Language Processing)	The computational study and modelling of human language, enabling machines to understand, interpret, generate, and respond to human text or speech.
NER (Named-Entity Recognition) Systems	A subfield of NLP focused on identifying and classifying proper nouns in text into categories such as persons, organisations, locations, dates, or quantities.
AI (Artificial Intelligence)	The development of machines capable of performing tasks that require human intelligence, including reasoning, learning, problem-solving, and language understanding.
Digital Lexicon	A structured digital database of words, meanings, morphological forms, grammatical rules, and usage examples, supporting NLP tasks like spell-checking, text generation, and machine translation.
Transformer-Based Models	Advanced deep-learning architectures for NLP that process sequences of text, handling long-range dependencies; foundational for machine translation and text generation.
Corpus (plural: Corpora)	A large and structured set of textual or spoken language data used for computational analysis, model training, and NLP research.
Foundational Language Models	Large pre-trained models providing general-purpose language understanding or generation, adaptable for low-resource languages or domain-specific tasks.
Digital Humanities	An interdisciplinary field combining computing technologies with humanities research, including linguistics, literature, history, and cultural studies.
Speech-Technology Applications	Computational tools that process spoken language, such as speech recognition, text-to-speech systems, and voice-enabled interfaces.
WAZOBIA Languages	A collective term for Nigeria's three major languages: Hausa, Igbo, and Yoruba, often referenced in NLP research and language-resource development.
Low-Resource Languages	Languages lacking sufficient digital or computational resources (e.g., annotated corpora, lexicons, or NLP models), common among Nigeria's minority languages.
Machine Translation (MT)	The automatic translation of text or speech from one language to another using computational models, facilitating cross-linguistic communication.

Term / Acronym	Definition
Sentiment Analysis	An NLP task that identifies and categorises emotions, opinions, or attitudes expressed in text, useful in education, social media, and learner feedback analysis.
Pidgin Text-Generation Models	AI models specifically trained to produce coherent written content in Nigerian Pidgin, reflecting its unique grammar and lexical mix.
Interdisciplinary Integration	The combination of multiple academic disciplines (STEM and humanities) to solve complex problems, exemplified in computational linguistics through technical and linguistic collaboration. STEM simply refers to Science, Technology, Engineering, and Mathematics