
Digital Humanities Tools and Methodologies for the Study and Preservation of Nigerian Linguistics and Dialects

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ABSTRACT

Nigeria is a populous country with a rich linguistic tapestry of over 500 languages and dialects (Ethnologue, 2023). A good number of these autochthonous languages and dialects are on the brink of extinction due to depletion from lack of use and neglects of certain original lexis and structure by the indigenes. This situation stems from sociocultural, historical and linguistic factors such as colonialism and historical displacement, globalization, economic pressures, language dominance in media and technology, cultural assimilation, loss of intergenerational transmission, language stigma, loss of traditional knowledge, amongst others. This study explores the application of digital humanities tools for the analysis and preservation of autochthonous languages and dialects in Nigeria. The paper reviews a range of digital tools and methodologies, including digital corpora, text analysis software, and online linguistic databases in use and appraises their effectiveness in preserving, managing and analysing data from Nigerian languages. The capabilities of these tools in facilitating comprehensive data collection, revealing linguistic patterns, and in supporting the documentation of endangered dialects are also interrogated. The paper proposes strategies for improving the integration of digital humanities tools and methodologies in the study and preservation of Nigerian linguistics by advocating for the creation of digital archives for all Nigerian languages, endangered or not, through the development of educational resources and engagement with indigenous communities physically and through online platforms. These strategies when implemented would contribute to the development of customised digital tools that will more competently address the complexities involved in the preservation of Nigerian languages and dialects as well as ultimately support the advancement of Nigeria's linguistic heritage.

Keywords: Digital Humanities, Tailored tools, Digital methodologies, Autochthonous languages and dialects, language preservation, Natural language processing

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1. BACKGROUND

Every society is differentiated from another on the basis of linguistic difference and their language use. This implies that language is not just a means of communication but a fundamental aspect of social identity. (Bamgbose 1991, Gumperz 1982, Labov 1972, Makoni & Pennycook 2007).

The use of language in any society is a reflection of their values, traditions, and historical experiences. This factor distinguishes insiders from outsiders (Tajfel & Turner 1986) and the ways a language convey meaning, through metaphors, idioms, and domesticated expressions are also unique to each society as observed in their intragroup variation such as ethnic dialects, sociolects and registers. (Obi 2011, Tajfel & Turner 1986). In Nigeria, the indigenous languages coexist with the language of colonization - the English language. This coexistence due to language contact situation brought about varieties of languages and linguistic diversity (Bamgbose 1991) and like a coin with two sides, many of the indigenous languages benefitted from this contact situation and also suffered in equal measure.

Many Nigerians became bilinguals or multilinguals, using English alongside their indigenous languages (Ayeomoni 2006, Obi (2011). This multilingual situation enriches communication but also raises questions about language preservation and the potential decline of indigenous languages (Crystal, 2000). This has continued to attract scholarly attention, previously, through traditional linguistic research methods that have provided valuable insights into these languages and recently, through advancements in digital technology which have introduced new possibilities for the study and preservation of linguistic heritage (Fitzpatrick 2012). Researchers, particularly in a multilingual nation like Nigeria, need to fully embrace these new digital technologies in order to preserve in its original state both those languages in use and those endangered. However, there is also the need to investigate the potential of these digital tools to support sustainable efforts in the study and preservation of natural linguistics and dialects (Drucker 2013).

Digital Humanities (DH) is an interdisciplinary field that applies digital tools and methods to humanities research. (Ketchum 2015, Liu 2013). In recent years, DH tools have increasingly been utilised to address complex linguistic questions, manage large datasets, and analyse language patterns with greater precision (Jockers 2013). In the context of Nigerian linguistics research, the integration of digital humanities tools into linguistics research offers several significant benefits. Digital tools can facilitate the creation of comprehensive linguistic databases, enhance the analysis of linguistic structures and variations, and provide innovative methods for preserving endangered languages and dialects (Mavhandu-Mudzusi 2019).

For instance, digital corpora allow researchers to compile and analyse extensive linguistic data that might be challenging to manage through traditional methods (Jocker 2013). Similarly, text analysis software can be used to identify patterns and trends across different dialects, offering new insights into language use and variation (O’Keeffe et al. 2011). These tools encompass a wide range of technologies, including language modelling algorithms, and online linguistic databases, although, there are unique challenges when it come to the application of digital humanities tools to Nigerian linguistics. One reason for these challenges is the lack of standardised orthographies and comprehensive linguistic resources for many Nigerian languages which can complicate the application of digital tools. Additionally, there is need for tools that are specifically designed to accommodate the linguistic diversity and complexity of Nigerian languages.

This paper investigates the use of digital humanities tools for advancing research in Nigerian linguistics and dialects by examining the current state of digital tools used in linguistic studies, appraising their effectiveness in the context of Nigerian languages, and identifying areas where these tools can be further developed or adapted. By addressing these issues, the study contributes to the broader goal of enhancing the study and preservation of Nigeria's linguistic heritage through innovative digital methodologies.

2. REVIEW OF RELATED LITERATURE

Developed nations across the world employ their languages in almost, if not all day-to-day activities, however, same cannot be said of African indigenous languages, and in this case Nigeria. There is no gainsaying that preserving and using the mother tongue ensures that valuable indigenous knowledge and practices, including technological innovations and methodologies developed over generations, are maintained (Makalani 2018, Khamis 2015, Eze 2010, Nettle & Romaine 2000, Cummins 2000, Bamgbose 2000, Heugh 2000). Language preservation efforts lead to the documentation and revitalization of traditional technologies and practices which can be integrated into modern technological solutions thereby creating a fusion of traditional and contemporary innovations (Meyer 2014, Shizha & Kariwo 2011, Harris 2002, Maffi 2001, Bamgbose 1991) as observed with digital humanities.

Digital Humanities (DH) is an interdisciplinary field that combines computational tools with traditional humanities research to enhance the analysis and interpretation of cultural and linguistic data (Ogundipe and Adetunji 2020, Aruwa 2019, Mbiti 2019, Brown and Williams 2015). DH tools have been used to analyse large corpora, develop language technologies, and document endangered languages (Oloyede 2023, Shapiro 2022, Adediran 2021, Benner 2020). The application of these tools to Nigerian languages needs to be re-appraised, with existing literature highlighting both progress and gaps. In the area of progress, the existing literature documents various advancements and successes in applying digital humanities tools to Nigerian languages.

These include case studies, project reports, and academic papers that present successful implementations and innovations. Examples include Muhammad, Aliyu and Zimit (2019) study in the development of Hausa language corpus and some basic tools, which are fundamental resources for academic and research in NLP as well as the building block for other NLP applications such as machine translation. Umar, Moussa and Muhammed (2022) created the Hausa language read-speech dataset by recording native Hausa speakers from selected nine Hausa literature books. The dataset can be used for automatic speech recognition, speech synthesis, Text-to-Speech and speech-to-text application.

Another case study of note is the Hausa corpus project, "Hausa digital corpus: Challenges and innovations" put together by Ahmed and Alabi (2020). It focuses on creating a comprehensive digital corpus of the Hausa language, including both written and spoken texts. The tools used are corpus creation tools, text analysis software and speech processing tools. The outcome was the development of a robust digital corpus and advancements in NLP for Hausa. There are other initiatives and projects that have applied digital humanities tools to Nigerian languages.

These projects include the creation of digital corpora, developing language processing tools, or archiving linguistic data. One of such is the Igbo language project known as "Digitizing the Igbo language: A case study of digital archiving and language learning resources" put together by Ezeani (2019) which involved documenting and preserving the Igbo language through the development of digital archives, language learning tools, and resources for linguistic research. The outcome is improved access to Igbo linguistic resources, and the support for language learning and preservation. In the same vein, Ogunleye and Adetunji (2021) in their paper explore digital annotation tools for Yorùbá Language Documentation focusing on challenges and solutions.

Their work involves creating a digital corpus of Yorùbá texts and developing tools for linguistic analysis. The researchers collected, annotated, and analysed the data using digital tools such as the digital corpora and text analysis software. The outcome is enhanced linguistic resources for Yorùbá, development of annotated corpora, and improved tools for text analysis. The relevance of their study is that it provides a case study on Yorùbá by highlighting practical issues and solutions in digital annotation for Nigerian languages. The above success stories are not without challenges.

Kambona and Modisha (2022) survey various DH projects across Africa, focusing on linguistic data and digital archiving including the presentation of challenges and successes relevant to Nigerian context. Other studies point to the need for more inclusive and comprehensive digital resources, improved language processing tools, and better support for underrepresented languages. Hassan and Sheikh (2019) review existing digital resources and tools for Nigerian languages, including corpora and language technologies. They identify some key resources and tools but note the need for more comprehensive and language-specific resources such as each language's specific peculiarities being fashioned into the creation of digital tools.

In the area of developing language processing tools, a significant challenge in this area is the shortage of digitised linguistic data for many Nigerian languages. This scarcity limits the ability to develop and test digital tools effectively. Efforts to collect and digitize linguistic data are ongoing but have not yet fully addressed the needs of all Nigerian languages. Nwachukwu (2020) examines the state of NLP for African languages, including Nigerian languages and the specific challenges faced.

The paper Highlights gaps in NLP resources and models for African languages, including the need for more data and customised tools. Akinbo and Taiwo (2018) appeal for the use of digital tools for documenting the endangered Ekiti dialect, thus providing a practical example of DH application to endangered dialects within Nigeria and offering insights into best practices and challenges. In the same vein regarding Ekiti dialect, Nwachukwu (2018) also, using digital tools, including audio recordings, transcriptions, and linguistic annotations attempted the preservation of the endangered dialect and the development of digital resources for linguistic research. There are other advanced studies like the multilingual Nigerian language resources project discussed in section 2.1.

2.1 The Multilingual Nigerian Language Resources Project

This case study involves the creation of a digital corpora with a digital dictionary, an online language resource and automated translation systems. This project was put together by Olufemi and Madu (2021) with the aim of developing dictionaries, grammatical resources, and language learning tools for Nigerian languages. Tools used were the multilingual databases, language learning platforms and digital dictionaries. The outcome is the creation of comprehensive multilingual resources and support for language education and research. From the above review of existing literature and case studies, certain gaps could be clearly identified.

Firstly, is the issue of limited scope and specificity. While there are studies on digital resources and tools for Nigerian languages, their focus is often on specific languages or limited aspects of digital humanities. There appears to be a lack of comprehensive research that addresses a broad range of Nigerian languages and dialects using a unified DH approach. On the other hand, the proposed research aims to provide a holistic review of digital tools applicable to Nigerian languages by exploring their effectiveness across different linguistic contexts and identifying gaps that need to be addressed.

Secondly, in the area of insufficient customisation of tools, existing digital tools may sometimes lack customisation for the unique linguistic features of Nigerian languages due to complex tonal systems (syllable-timed, tone diacritics), diverse grammatical structures and inflection, and diverse orthographies and limited standardised orthographies. Addressing these challenges in digital tools require specialised knowledge and sophisticated algorithms, which are most times lacking. Most studies focus on general applications without addressing the need for tailored tools. This paper highlights the need for customised digital tools and proposes solutions for adapting existing tools to better fit the linguistic characteristics of Nigerian languages. The existing literature points to a fragmented landscape of digital resources, with limited integration and accessibility. Many projects and resources are isolated, making it difficult to access and utilise comprehensive data. This paper suggests strategies for centralising and integrating digital resources by creating a more cohesive and accessible repository for Nigerian linguistic data.

There is also a notable lack of advanced NLP models and resources for Nigerian languages, which limits the effectiveness of language technologies. By focusing on NLP challenges and opportunities, this paper advocates for the development of more robust language models and tools tailored to Nigerian languages. The paper contributes in literature to existing research that have explored how digital humanities tools can be integrated into educational and community initiatives for language preservation and promotion, thereby supporting language learning and preservation efforts.

2.2 Theoretical Framework

The paper adopts an eclectic approach in its theoretical framework. Firstly, is the Digital Humanities (DH) Theory, specifically, the computational humanities by Matthew Jockers (2013). Jockers demonstrates how a variety of cutting-edge digital computational methods and models can bring new insights into humanities research, including text analysis, data visualisation, and algorithmic analysis.

The theory, therefore, provides a framework for evaluating how computational tools and methods can be adapted and applied to the study of Nigerian languages and dialects to enhance the analysis, visualisation, and interpretation of cultural and linguistic data. This involves an integration of computational methods into traditional humanities research methods, as a typical digital humanities project uses both digital and non-digital methods in its research design. DH tools are used for examining how digital resources contribute to knowledge creation and preservation in the humanities.

The paper also draws from the Sociolinguistic theory of language change whose proponent is Charles A. Ferguson (1968). This theory explores how languages change over time and how social factors drive these changes. Adopting this theory helps analyse how Nigerian dialects are evolving and how digital tools can document and track these changes. Uriel Weinreich (1968) Language Contact Theory is another supportive theory which examines the effects of language contact on linguistic features and language change, including borrowing, code-switching, and language convergence. Ferguson and Uriel's theories take care of the social aspects of language use, including dialectal variation and language change. The essence is to show that linguistic digital tools can capture and analyse linguistic variations and dialectal features in Nigerian languages.

Additionally, the engagement of the community is required for the successful documentation and revitalisation of endangered dialects. Digital tools can be used to garner such support in the achievement of a robust documentation. Projects like the Nigerian Languages and Culture Project leverage social media and mobile apps to engage young people in learning their indigenous languages (Adebayo 2019). Lastly, the Technology Adoption Theory, specifically the Technology Acceptance Model (TAM) by Fred Davis (1989), is drawn to explain how users come to accept and use new technologies. In this paper, the focus is on evaluating researchers and practitioners perceived ease of use and perceived usefulness of digital tools. The essence is to identify and address factors that influence the adoption, adaptation and perceived ease of use of digital tools in linguistic research in relation to Nigerian linguistics and dialects. The next section explains the methods and methodology.

3. METHODS AND METHODOLOGY

The methods and methodology provide a comprehensive approach for evaluating the digital humanities tools and methodologies used for the study and preservation Nigerian linguistics and dialects. The methodology is qualitative. Case Studies of specific instances where digital tools have been applied to Nigerian languages for data collection, documentation and records are reviewed. Review of relevant literature and project reports are part of the methods utilised to get information and data for the paper. Data analysis is thematic, involving identifying patterns and themes. A comparison of different tools and case studies to highlight best practices and gaps is also accomplished through comparative analysis. ChatGPT is part of the method used to source for information and structure for the paper.

Ultimately, the insights gained will contribute to the development of more effective tools and methodologies for supporting the study, preservation, and documentation of Nigerian linguistic heritage. The next section analyses existing digital tools and methodologies, and their effectiveness for preservation and revitalization of Nigerian Linguistics and dialects.

3.1 Digital Tools and Methodologies for Nigerian Linguistics

Digital tools are electronic devices and technologies; cutting-edge technology tools (hardware and software) and resources (online and offline), that may or may not be portable e.g. computers, laptops, tablet, IPads, programmes, applications, virtual reality, varieties of services and platforms including those that are language, audio or visually based, among others. These tools can be explored in different ways for language studies preservations. They facilitate communication, learning, and information processing. Digital tools play a pivotal role in preserving endangered languages. Various projects leverage technology to document and revitalize languages at risk of extinction. A variety of digital tools that can be harnessed for Nigerian linguistics are considered as follows:

1. Digital Corpora

Digital corpora are extensive collections of texts that are analysed for linguistic patterns and variations in order to study language use and structure. Tools such as the Sketch Engine and the Corpus of Contemporary American English (COCA) have been adapted for various researches in languages. For Nigerian languages, lack of intergenerational transmission of autochthonous languages have hindered extensive collections of indigenous language data. The younger generations are not encouraged or required to speak their native languages because parents and grandparents use dominant languages for the sake of their children's future prospects. As the pressure to assimilate into dominant cultures increases for economic, social, or educational advancement, the children lose proficiency and the languages suffer depletion in lexis and structure, with loanwords coming to the rescue; the list is simply endless. Another notable setback is that Nigerian languages often have multiple orthographic systems or lack standardised spelling conventions, which complicates the creation of consistent digital corpora.

In addition, there is a scarcity of published and publicly available texts in many Nigerian languages, meanwhile, the effectiveness of this tool lies in the availability of large-scale, representative text collections corpora or comprehensive linguistic databases from various sources, including written texts, transcripts, and digital media. When these are in place, they enable digital corpora provide insights into dialectal differences and language use in different contexts. Analysis would equally reveal common linguistic patterns and trends of word associations and contexts. Findings can be regularly updated as new data emerge. Digital corpora can archive texts from endangered dialects, preserving them for future research and linguistic analysis. By digitising texts, researchers make endangered dialects more accessible to scholars and language communities, thereby facilitating further study and preservation as well as revitalisation efforts.

Other strategies for better integration and application of digital tools to support the preservation and study of Nigeria's rich linguistic diversity include the initiation of projects such as annotating texts and spoken language recordings. Due to inadequate funding from government, achieving all these would require securing funding and support from grants organisations and collaborating with local communities, linguists and institutions, so as to gather large-scale authentic data and digitise linguistic materials.

2. Text Analysis Software

These are tools used by researchers to study materials on language use in written form (large volumes of text data) that could be gathered from social media, and transcriptions of spoken language. Examples of these tools include, AntConc and Voyant, WordSmith 9, Flourish, KnightLab. These software can identify patterns in text data, for word frequency distributions, sentence structures and thematic content, and process them efficiently. Researchers can perform keyword analysis to determine significant terms and concepts within a text and also provide insights into linguistic and cultural trends. Text analysis software often include features for annotating texts with linguistic information, which is crucial for documenting and analysing endangered dialects. This tool can generate visual representations of linguistic data, such as word clouds and frequency charts, aiding in the study of less-documented dialects.

However, adapting these tools to Nigerian languages may require customisation for the handling of specific linguistic features, such as tone and inflection discussed under digital corpora, and like with digital corpora, the software's effectiveness depends on the quality and quantity of the input data. Nigerian languages have limited digitised texts, with some incomplete or may contain errors from transcription, translation or transliteration thereby affecting the reliability of the analysis. Aside these internal challenges, a noticeable challenge is that most text analysis tools are designed with major languages like English, French or Chinese in mind. Adapting these tools for the analysis and concordancing of Nigerian languages, (with their unique linguistic features) often requires significant customisation which may not be well-supported by generic text analysis algorithms.

Without adequate customisation, the accuracy and utility of these tools for Nigerian languages are compromised. Proposed strategies for the improved integration and application of text analysis software to support the preservation and study of Nigeria's rich linguistic diversity remains the need for adaptation and customisation of existing software to accommodate the linguistic features of Nigerian languages. The development of language-specific modules and algorithms in collaboration with computational linguists and language experts will aid the customisation process.

3. Language Modeling and Natural Language Processing (NLP)

Natural Language Processing (NLP) tools, include part-of-speech taggers, syntactic parsers, and machine translation systems. They are used for analysing and processing natural language data. Tools like spaCy, Natural Language Toolkit (NLTK), Gensim, MonkeyLearn, IBM Watson and TextBlob are commonly used for these purposes. NLP tools can facilitate complex linguistic analyses, and assist in developing language resources like spell checkers and translation systems.

Like with other tools, many NLP tools are also designed with major languages in mind and may not perform well with Nigerian languages due to limited annotated training data and lack of language-specific resources such as lexicons, annotated corpora, or syntactic trees, which are crucial for developing robust NLP applications. Nigeria's multilingual environment means that NLP tools need to handle loanwords, code-switching and mixed-language contexts, adding complexity to language processing tasks. Developing NLP tools for Nigerian languages require creating specialised language models and adapting algorithms.

3.1 Application of Natural Language Processing (NLP)

Presently, NLP techniques are used for tasks such as machine translation and text classification, though often with a focus on more widely spoken languages. Machine learning models can identify and predict linguistic trends and variations within the data. Some Nigerian languages, for instance, Hausa, Igbo and Yorùbá have basic NLP applications, but they are limited in scope and often require further development. One of the ways to improve integration and application of NLP to support the preservation and study of Nigeria's rich linguistic diversity and to support documentation of endangered dialects is language resource development and the enhancement of NLP Models. There is need to build and train NLP models specifically for Nigerian languages using annotated datasets and language-specific resources. To achieve this, partnership with research institutions and technological companies that will develop and test NLP models, and explore crowd-sourcing and community-driven approaches for data collection is key. Websites like Viki are crowdsourcing platforms that allow users to contribute subtitles in various languages, helping to preserve minority languages through global collaboration (Rama, 2015).

4. ONLINE LINGUISTIC DATABASES AND REPOSITORIES

Online databases, such as Ethnologue and Glottolog, provide centralised access to linguistic information including language descriptions, grammatical features, language status, and dialectal variation. These databases offer valuable resources for researchers to obtain background information on Nigerian languages, including data on language distribution and classification as well as facilitate collaboration among researchers, enabling the sharing and updating of linguistic data from various sources.

Databases and Repositories support researchers in understanding linguistic diversity and in planning fieldwork. The importance of online linguistic databases and repositories tools is that they can facilitate comprehensive data collection, reveal linguistic patterns, and support the documentation of endangered dialects. They also allow for the comparison of linguistic features across different languages and dialects, revealing patterns and relationships. Researchers can analyse metadata associated with language entries, such as geographic and social context, to identify patterns in language distribution and use. A major challenge in this direction is that online databases often lack comprehensive up-to-date information on Nigerian languages. Many databases may not also cover less-documented languages or dialects and if at all, in detail. The completeness and accuracy of information in these databases can vary leading to unreliable conclusions about language features. Some linguistic databases may not be easily accessible or well-known to researchers into Nigerian languages thereby limiting their utility and impact.

There is also the challenge of data on Nigerian languages occurring in fragments across different projects and platforms, which impedes comprehensive research and the development of unified linguistic resources. This often leads to difficulties in accessing and integrating information. One of the ways for improved integration, application and the support of documentation of endangered dialects is data archiving. Online repositories can archive documentation and research on all Nigerian languages especially endangered dialects, ensuring their preservation for future study. Additionally, these platforms increase the visibility of endangered dialects, making information accessible to a wider audience, thereby supporting revitalisation efforts.

5. DIGITAL ANNOTATION TOOLS

Digital annotation tools are used for annotating and analysing spoken language data. Annotations create structured datasets that are easier to analyse and compare, leading to improved quality of data collection. Annotations help identify linguistic trends and variations within and across dialects, revealing important patterns such as intonation patterns, which are crucial for all languages particularly the endangered dialects. They allow researchers to label and markup linguistic features such as phonetic details and phonological analysis, detailed semantic annotations and syntactic structures of spoken languages, Nigerian inclusive. Examples of annotated tools are, ELAN, Dialogue Annotation and Research Tool (DART), Dexter, EXMARaIDA, Kura, TATOE and Praat. Importantly, annotated texts can serve as reference materials for future research and language teaching, thereby supporting the preservation of languages and revitalisation of endangered dialects.

However, the process of annotating data is time-consuming and requires expertise. For Nigerian languages, there may be limited resources and standardised guidelines for their annotation due to factors such as limited trained personnel, which can affect the consistency and quality of annotations. The high level of linguistic diversity within Nigerian languages means that annotation tools must accommodate a wide range of linguistic phenomena, which can be difficult to manage and standardise. There is also the challenge of funding and infrastructure which limits their scope and sustainability and affects the ability to develop and maintain high-quality digital tools and resources. Funding from NGOs and training of qualified personnel remain the solution.

5.1 Proposed Strategies for Improvement

Strategies for improvement involve capacity building and training. Researchers and practitioners of Nigerian linguistics who use digital tools and methodologies need regular training and support, through organisation workshops, webinars, and programmes focused on digital humanities and computational linguistics. The need to encourage collaboration between researchers, technology developers, and local communities cannot be overemphasized. This is crucial in order to address linguistic and technological challenges. There is need to establish partnerships between academic institutions, government agencies and NGOs in order to support collaborative research and development projects.

The creation of a centre for advocacy that would campaign for increased funding and institutional support for digital humanities projects in Nigerian languages is key. By so doing, institutions can apply for grants, seek sponsorships, and build networks with organisations that support linguistic research and technology development.

5.2. Language Learning and Documentation Platforms

Platforms such as Duolingo, Rosetta Stone, Lingoda and the Global Language Online Support (GLOSAS) provide tools for language learning, documentation and facilitate the creation of digital language resources. Some of these platforms like Memrise use gamification to make language learning engaging (Culpeper et al., 2019) and can support language documentation efforts and promote language learning among speakers of Nigerian languages in Yorùbá, Hausa, Igbo. Other platform like italki, YouTube, Facebook group, Clozemaster and PODCASTS provide lessons covering basics, emphasize vocabulary in context, pronunciation and provide audio resources for listening and speaking practice as well as cultural insights. The effectiveness of these tools is contingent upon user engagement and the quality of the provided materials, having in mind that these tools should be designed with an understanding of the cultural and linguistic context of Nigerian languages. Tools that do not account for cultural nuances may produce inaccurate or biased results. Additionally, limited access to technology and internet connectivity in some regions may restrict the use and development of digital tools for Nigerian languages.

Enhancing learning resources will support language education and promote the use of Nigerian languages in educational settings. The Nigerian Universities Commission (NUC) recently reviewed universities' curricula to reflect the 21st Century realities and to function from a central point through the introduction of the Core Curriculum Minimum Academic Standards (CCMAS). A unique feature for the CCMAS is the introduction of digital based courses across all programmes in the universities. In light of these curriculum reforms, innovative educational resource materials for the learning of indigenous community-based languages can be introduced into the curricula so that there will not be a decline in their use and transmission. The Nigerian government integrated local languages into the curriculum of schools through e-learning platforms such as, LearnAfrica, WhizKids, Edu-Cloud, Tuteria, Minds of the Future (Federal Ministry of Education, Nigeria, 2020). Digital resources and media for many other indigenous languages not yet covered should be developed to further curb their marginalization and endangerment.

Policy changes and institutional support will help advance the field of digital humanities and ensure the continued development and preservation of Nigerian linguistic heritage. Government could provide incentives for the study of these languages. There is also the need for the strengthening of institutional collaboration between academic institutions, government agencies, and local communities in advancing digital humanities projects. Multidisciplinary teams can leverage each other's expertise to develop innovative tools and methodologies for indigenous language learning and linguistic research. This will foster a sense of ownership and involvement in linguistic preservation efforts amongst all stakeholders. Increased public awareness and engagement in this regard will support the promotion and preservation of linguistic diversity, in Nigeria and beyond.

6. CONCLUSION

Digital humanities tools provide remarkable opportunities for advancing the study of Nigerian linguistics and dialects because they enable large-scale data analysis, facilitate language documentation, and support linguistic research. However, their effectiveness is often constrained by the lack of availability of language-specific resources, large datasets and the need for customisation to handle the unique features of Nigerian languages. Addressing these gaps and enhancing the integration of digital humanities methodologies in Nigerian linguistic research requires a multifaceted approach. By developing comprehensive resources, customising tools, enhancing NLP models, centralising data, building capacity, fostering collaboration, and securing financial support, researchers can significantly advance the study, documentation, and preservation of Nigerian languages as well as contribute to their revitalisation.

The contributions of this paper extend into various domains, including linguistic research, language preservation, technology development, education, policy, and community engagement. By addressing the specific needs and challenges of Nigerian languages and dialects, the paper provides valuable insights and practical solutions for their preservation and documentation.

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