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Generative Artificial Intelligence and Linguistic Epistemic Justice for isiZulu and African Languages in Multilingual Education

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Systematic Review

Keywords: Generative AI, ChatGPT, isiZulu, African languages, multilingual education, language policy, epistemic justice, decolonial AI, AI literacy, integrative review

Posted Date: August 19th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-10263110/v1

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Additional Declarations: No competing interests reported.

Abstract

Generative artificial intelligence is rapidly entering educational practice, yet its implications for African languages remain unevenly understood. This article presents a critical integrative review and conceptual synthesis of 44 substantive scholarly and policy sources spanning generative AI, African-language technologies, multilingual education, language policy, decolonial AI and epistemic justice. Using South Africa and isiZulu as a critical case, the review asks how AI-mediated education may recognise, marginalise or reconfigure historically minoritised languages as vehicles of knowledge. The synthesis connects evidence from AI in education, African-language natural language processing, translanguaging, data justice, teacher agency and responsible AI governance. It argues that the central issue is not whether ChatGPT can generate isiZulu text, but whether AI systems, institutional policies and pedagogical practices can sustain African languages as infrastructures of reasoning, identity, pedagogy, cultural memory and intellectual authority. The article develops linguistic-epistemic AI justice as a concept that links language equity to data representation, model performance, teacher mediation, and institutional accountability. It then proposes a process-based framework for language-equitable AI governance in multilingual education. By linking digital infrastructure, pedagogy and language policy, the review reframes low-resource language support as a core problem of educational justice and AI governance. It offers a governance agenda for more inclusive and equitable AI-supported education.

1. Introduction

The question “Can ChatGPT speak isiZulu?” appears, at first, to be a question about linguistic performance: can a large language model produce intelligible text in one of South Africa’s official African languages? In the context of education, however, the question is more demanding. It asks whether generative artificial intelligence can support African languages as languages of reasoning, curriculum, pedagogy and intellectual authority, or whether it will reproduce older hierarchies in which English remains the default infrastructure of legitimate knowledge. The answer cannot be supplied by fluency alone. A generative model may produce recognisable isiZulu sentences and still fail to carry cultural nuance, disciplinary meaning, idiomatic depth or pedagogical adequacy. For multilingual education systems, this distinction is decisive.

Generative AI has moved rapidly from experimental technology into educational discussion and everyday use. Students use chatbots for explanation, drafting, summarising, translation, coding and assessment preparation, while lecturers are exploring them for lesson planning, feedback design, research support and administrative work [1–4]. However, the educational value of AI is not evenly distributed. Large language models draw on unequal corpora, unevenly documented languages, platform-specific training choices and commercial priorities. They are not neutral multilingual tools; they are socio-technical systems whose outputs are shaped by data availability, benchmark visibility, language standardisation and the politics of digital representation.

South Africa offers a critical site for examining these issues. The country formally recognises linguistic diversity and has a higher education language policy that seeks to strengthen indigenous official languages in teaching, learning, scholarship and communication [5]. Nevertheless, English continues to hold disproportionate value in academic mobility, assessment, publication and institutional prestige [6–8]. Generative AI enters this unfinished field of language policy not as a passive tool but as a new language-policy actor. It may assist multilingual explanation and translation; it may also privilege English when its outputs are richer, more reliable or more readily evaluated in high-resource languages.

This article, therefore, reframes the original question as a problem of AI-mediated language justice. The concern is not only whether ChatGPT or any other model can translate into isiZulu. Translation is a limited test. The more important issue is whether AI-supported education can recognise African languages as knowledge-bearing systems rather than secondary channels through which English knowledge is merely transferred. This problem links AI in education to low-resource language technologies, decolonial AI, translanguaging, epistemic injustice, teacher agency, data justice and institutional governance.

The article adopts a structured critical integrative review with conceptual synthesis. This approach is appropriate because the literature is emerging and distributed across AI in education, computational linguistics, African-language natural language processing, multilingual education, language policy, responsible AI and decolonial technology studies. Rather than estimating an intervention effect, the review brings heterogeneous bodies of scholarship into analytical conversation, identifies recurring tensions and develops a framework for language-equitable AI governance.

The article makes four contributions. First, it positions South Africa and isiZulu as a critical case for a wider global problem: low-resource languages in AI-mediated education. Second, it synthesises evidence from AI education, African-language NLP, translanguaging and AI governance to show that language inequality is not peripheral to responsible AI. Third, it develops the concept of linguistic-epistemic AI justice. Fourth, it proposes a process-based framework that links AI language infrastructure, African-language data representation, model output quality, teacher mediation, epistemic recognition and institutional accountability. The central claim is that educational AI governance must move beyond access, ethics and acceptable-use rules toward explicit responsibility for language equity and epistemic dignity.

In doing so, the article offers a bridge between technical evaluation and policy transformation. It treats model performance as important, but not sufficient; it treats language policy as necessary, but not sufficient; and it treats teacher agency as the mediating condition through which AI outputs become educationally consequential.

The urgency of this question has grown because generative AI is being adopted faster than most education systems can regulate it. UNESCO’s guidance on generative AI in education calls for human-centred governance, age-appropriate use, teacher capacity and public oversight [9]. However, global guidance often travels into multilingual settings through broad categories such as equity, inclusion,

competence and safety. These categories are valuable, but they can leave unresolved the more specific question of which languages are treated as credible vehicles of academic knowledge. In other words, AI governance can be formally inclusive while remaining linguistically thin.

The article's intervention is therefore both methodological and conceptual. It does not simply add African languages to an existing AI-in-education debate. It reorganises the debate by treating language as AI infrastructure. When language is understood as infrastructure, it becomes clear that African languages are affected by decisions made in data collection, model training, benchmark design, platform deployment, classroom use and institutional policy. This wider view allows the article to move beyond a deficit narrative of African languages and toward an accountability-oriented understanding of AI governance.

This interdisciplinary orientation brings together debates that are often separated: educational technology scholarship tends to discuss adoption and pedagogy; natural language processing scholarship tends to discuss data and benchmarks; language-policy scholarship tends to discuss institutional recognition; and decolonial AI scholarship tends to discuss power and extraction. Reading this literature together is necessary because AI-mediated education is simultaneously technical, linguistic, pedagogical, cultural and political.

2. South Africa and isiZulu as a critical case

South Africa is not used here as a narrow national example, but as an analytically rich critical case. It combines formal multilingual recognition, deep colonial and apartheid-era language histories, debates over higher education transformation, and persistent English dominance in academic life. This combination makes it a productive site for examining how AI systems may interact with existing language-policy tensions. The question of isiZulu matters because isiZulu is one of South Africa's official languages and one of the most widely spoken home languages in the country. Yet, the symbolic visibility of African languages does not automatically translate into equal status within digital, academic or algorithmic infrastructures.

The DHET Language Policy Framework for Public Higher Education Institutions places responsibility on institutions to promote and strengthen indigenous official languages as languages of scholarship, teaching, learning and communication [5]. That policy commitment is significant because it moves beyond symbolic recognition. It frames language as part of transformation, access and institutional responsibility. However, the rise of generative AI creates a new policy challenge: educational language policy can no longer be confined to curriculum, terminology development, institutional communication and language services. It must also address the AI systems increasingly used to generate explanations, learning materials, translations, feedback and academic writing support.

The South African case also reveals why language policy is not only a matter of communication. Language shapes who can participate as a knower. Translanguaging scholarship has shown that multilingual learners do not merely switch between separate languages; they draw on integrated

repertoires to interpret, reason and communicate [10, 11]. In South African classrooms, this insight is tied to epistemic justice because multilingual pedagogies can either recognise learners' repertoires as intellectual resources or treat them as deficits to be overcome [6, 7]. Generative AI complicates this issue because AI systems may reward standardised, high-resource, English-dominant modes of expression while inadequately supporting fluid multilingual reasoning.

Using isiZulu as the entry point, therefore, clarifies a wider problem. Similar concerns arise for isiXhosa, Sesotho, Setswana, Sepedi, Tshivenda, Xitsonga, and other African languages, as well as for low-resource or minoritised languages globally. The article does not claim that isiZulu is the only or even the most technically under-supported language. Rather, isiZulu helps make visible the difference between language generation and epistemic recognition. If AI can produce isiZulu but cannot sustain it as a language of conceptual explanation, scholarly reasoning, cultural memory and pedagogical authority, then "speaking" the language remains a shallow achievement.

The choice of isiZulu also helps avoid treating African languages as a single homogeneous category. African languages differ in orthography, morphology, standardisation, digital representation, educational status and public visibility. isiZulu has greater demographic and symbolic visibility than many other African languages, but it is still affected by the structural constraints that characterise low-resource language technologies. This makes it a useful critical case: if a relatively visible African language still encounters limits in AI-mediated educational contexts, the implications are even more serious for languages with weaker institutional or digital support.

South Africa also matters because its language-policy architecture contains a tension that is highly relevant to AI governance. On the one hand, multilingual recognition is constitutionally and educationally affirmed. On the other hand, English retains disproportionate institutional value. Generative AI may either help institutions operationalise multilingual policy or deepen this tension by making English-dependent AI assistance more convenient than African-language academic development. The case, therefore, allows the article to examine the gap between recognition and infrastructure.

3. Conceptual framing

The conceptual framing of this review draws together six bodies of scholarship. The first is epistemic injustice. Fricker [12] defines epistemic injustice as a wrong done to persons in their capacity as knowers. In education, such wrongs occur when learners' languages, histories or interpretive resources are treated as less credible or less suited to formal knowledge. In AI-mediated education, epistemic injustice may occur when a system produces authoritative English explanations but shallow, literal or culturally distorted outputs in African languages. The harm is not only a factual error. It is the unequal recognition of languages as media of reasoning and intellectual authority.

The second strand is translanguaging. Translanguaging challenges the assumption that learning happens through neatly separated linguistic systems. It foregrounds the dynamic movement across repertoires through which multilingual learners make meaning [10, 11]. For AI governance, this means

that language-equitable systems cannot be judged only by whether they translate from English into an African language. They must also support multilingual meaning-making, code movement, conceptual negotiation and the pedagogical judgement of teachers who work in linguistically complex classrooms.

The third strand is decolonial AI and data colonialism. Mohamed et al. [13] argue that AI must be understood through colonial histories and contemporary power asymmetries. Birhane [14] warns that algorithmic systems in Africa can reproduce colonial patterns when technological solutions are imported without centring local needs and epistemologies. Couldry and Mejias [15] describe data colonialism as the appropriation of human life and social knowledge for digital capitalism. These arguments matter for African languages because the scarcity of digitised language data is not accidental. It reflects historical underinvestment, unequal publishing infrastructures, colonial language hierarchies and global platform economies.

The fourth strand is low-resource language technology. African-language NLP has made important advances through projects such as MasakhaNER, MasakhaNER 2.0, FLORES-101, No Language Left Behind and IrokoBench [16–20]. These initiatives have expanded datasets, benchmarks and multilingual translation coverage. At the same time, broader African-language LLM evaluations continue to show uneven performance across languages and tasks, particularly where data availability is sparse, or evaluation moves beyond narrow translation settings [18, 21]. This literature is crucial because it prevents educational debate from assuming that multilingual AI support is already solved.

The fifth strand is AI literacy and teacher agency. AI literacy is commonly framed as the ability to understand, use, evaluate and ethically engage with AI systems [22, 23]. UNESCO's teacher AI competency framework extends this concern by foregrounding human-centred values, ethics, AI foundations, AI pedagogy and professional learning [24]. In multilingual African education, however, AI literacy must also be linguistic-epistemic. Teachers and learners must be able to ask how a model performs across languages, whether its outputs are culturally grounded, whether translations preserve disciplinary meaning, and whether the use of AI strengthens or weakens African-language authority.

The sixth strand is responsible for AI. AI ethics literature has converged on principles such as transparency, fairness, non-maleficence, responsibility, and privacy, but their implementation remains difficult and politically contested [25–28]. This review argues that language must be treated as a core dimension of responsible AI in education. A system cannot be fully inclusive if it provides weak support for the languages through which learners understand themselves, their communities and their knowledge worlds.

A further conceptual concern is the distinction between linguistic presence and linguistic authority. A language may be present in a system through translation menus, keyboard support or generated sentences without being authorised as a language of disciplinary reasoning. In education, authority is evident when language can be used to explain difficult concepts, formulate arguments, produce assessment responses, develop terminology, and support scholarly identity. The literature on epistemic access and translanguaging suggests that such authority cannot be reduced to lexical equivalence. It

depends on whether learners can draw on their full linguistic repertoires to engage in knowledge practices and be recognised as legitimate participants.

This is why the review treats AI literacy as more than technical competence. A teacher may know how to use a chatbot and still fail to recognise when the chatbot has produced a culturally inappropriate analogy, a weak translation of a scientific concept, a misleading explanation of a proverb, or an English-shaped answer disguised as isiZulu. Linguistic-epistemic AI literacy, therefore, includes evaluation, contextualisation and refusal. Teachers must be able to decide when AI support is useful, when it requires adaptation, and when it should not be used.

Responsible AI literature also helps clarify the implementation problem. Jobin et al. [27] show convergence around broad ethical principles, but Mittelstadt [28] warns that principles alone do not guarantee ethical AI. The same problem appears in education. A university may adopt principles of fairness and inclusion while failing to specify how those principles apply to African-language support, multilingual assessment or data governance. Linguistic-epistemic AI justice is therefore designed to operationalise one dimension of responsible AI: the responsibility to protect languages as infrastructures of knowledge.

4. Methodology: critical integrative review and conceptual synthesis

This study adopted a structured critical integrative review with conceptual synthesis. Integrative reviews are useful when a problem spans heterogeneous empirical, technical, conceptual and policy literatures and the objective is to generate a theoretically informed account rather than estimate a pooled intervention effect [29, 30]. That logic fits the present problem because generative AI, African-language natural language processing, multilingual education, language policy, epistemic justice and decolonial AI are usually discussed in separate disciplinary conversations. The review was therefore designed to map the major evidence streams, compare their assumptions and integrate them around the question of language equity in AI-mediated education.

Four questions guided the review. First, how does existing scholarship frame the relationship between generative AI, African languages and multilingual education? Second, what evidence exists on the performance, limitations and risks of AI systems for African and other low-resource languages? Third, how are language policy, epistemic justice, data justice and decolonial AI connected in the literature? Fourth, what governance principles are proposed or implied for language-equitable AI in South African education?

Sources were identified through structured iterative searching undertaken during manuscript development through July 2026. The search covered major scholarly repositories and publisher databases used across the relevant fields, including ACL Anthology, ACM Digital Library, IEEE Xplore, ERIC-indexed literature, Google Scholar, SpringerLink, ScienceDirect, Taylor & Francis Online and Nature Portfolio pages. Official policy and institutional documents were identified through UNESCO, the South African government, and the DHET repositories. The review focused primarily on literature published

from 2019 to 2026, while earlier foundational works on epistemic injustice, translanguaging, teacher knowledge and review methodology were retained when conceptually indispensable. The final analytical corpus comprised 44 substantive scholarly and policy sources; two additional methodology sources guided the review design.

The search logic used three concept blocks. The primary combination was: ("generative AI" OR "large language model" OR ChatGPT OR "artificial intelligence" OR "natural language processing") AND ("African language" OR isiZulu OR isiXhosa OR Sesotho OR "low-resource language" OR multilingual OR translanguaging) AND (education OR teaching OR learning OR "language policy" OR "epistemic justice" OR "decolonial AI" OR "AI governance"). A second combination focused on governance: ("African languages" OR isiZulu OR multilingualism OR translanguaging OR "low-resource languages") AND ("AI ethics" OR "AI governance" OR "data justice" OR "algorithmic bias" OR "language technology" OR "epistemic justice"). A third combination focused on education: (ChatGPT OR "generative AI" OR "large language models") AND (education OR "higher education" OR "teacher education" OR "AI literacy" OR "teacher agency") AND (multilingual OR "language learning" OR "language policy" OR "low-resource languages").

Sources were considered for inclusion when they made a direct analytical contribution to at least one of six evidence streams: (1) African-language or low-resource language technology; (2) generative AI or AI in education; (3) multilingual education and translanguaging; (4) language policy and epistemic justice; (5) data justice, decolonial AI or responsible AI; and (6) AI literacy, teacher agency or institutional governance. Peer-reviewed journal articles and conference papers formed the core scholarly corpus. Scholarly books and official policy or guidance documents were retained where they supplied foundational theory or governance mandates.

Sources were excluded from the analytical synthesis when AI, multilingualism or Africa appeared only incidentally; when the source was promotional or opinion-based without a scholarly or policy contribution; when it duplicated a more authoritative publication; or when it did not illuminate language inequality, educational mediation, data representation, governance or epistemic justice. Citation chaining from highly relevant sources was used to identify influential work not captured by the initial term combinations. The aim was conceptual coverage across evidence streams rather than an exhaustive enumeration of every publication on AI and language.

Data extraction was organised through a structured charting framework covering author and year, source type, geographical or institutional context, language focus, AI or technology focus, education context, theoretical lens, methodology or evidence type, main contribution, relevance to linguistic-epistemic AI justice, governance implications and limitations. The review distinguished technical benchmarking evidence, empirical educational studies, conceptual scholarship and policy guidance so that claims were not treated as evidentially equivalent.

Analysis proceeded in three stages. First, sources were grouped by evidence stream and read for their explicit claims about language representation, model performance, pedagogy, teacher agency, data

governance and institutional responsibility. Second, recurrent patterns and tensions were compared across streams through thematic synthesis. Third, a critical conceptual synthesis examined how these themes interacted across the AI-education chain, from data and model design to classroom mediation and institutional governance. This third stage generated the construct of linguistic-epistemic AI justice and the process-based framework proposed later in the article.

The review is interpretive and concept-driven and does not claim exhaustive database coverage or effect estimation associated with a systematic review or meta-analysis. This methodological boundary is deliberate. The contribution lies in integrating bodies of scholarship that are normally separated and making the analytical route visible through explicit review questions, search logic, eligibility criteria, evidence-stream mapping and structured charting. The synthesis should therefore be read as a critical integrative review rather than as a quantitative statement about the frequency or prevalence of particular findings.

Quality and relevance were assessed in relation to source type. Empirical studies were considered for clarity of research purpose, methodological transparency and evidentiary contribution. Technical papers were assessed for language coverage, task type and benchmark contribution. Conceptual works were evaluated for theoretical relevance, and policy documents for authority, scope and language specificity. Sources making broad claims without a discernible evidentiary or conceptual basis were not used to support substantive conclusions. This approach allowed heterogeneous evidence to inform the review without collapsing technical benchmarks, classroom studies and policy texts into a single hierarchy of evidence. Table 1 summarises the six evidence streams and their analytical functions.

Table 1
Review architecture and analytical evidence streams

Evidence stream	Illustrative source types	Analytical purpose
African-language and low-resource language technology	NLP benchmarks, corpora, machine translation and LLM evaluation	Examine data representation, performance gaps and resource asymmetry
AI in education and generative AI	Reviews, empirical studies and generative-AI analyses	Identify educational affordances, risks and conditions of mediation
Multilingual education, translanguaging and epistemic justice	Applied linguistics, language education and epistemic-justice scholarship	Conceptualise language as a resource for knowledge, participation and academic authority
Decolonial AI, data justice and algorithmic accountability	Critical AI, data studies and auditing literature	Analyse extraction, representation, power and accountability
AI literacy, teacher agency and teacher knowledge	AI-literacy, TPACK and teacher-readiness scholarship	Examine professional judgement, capacity and classroom mediation
Language policy and institutional governance	DHET, UNESCO and AI-governance scholarship	Connect language mandates to procurement, oversight and institutional responsibility.

5. Thematic synthesis of the literature

The integrative synthesis generated six interrelated themes. They are analytical patterns across the mapped evidence streams rather than statistical frequencies. Their purpose is to show how current scholarship connects AI, African languages, multilingual education and justice, and where the field remains conceptually or institutionally incomplete.

The first theme concerns African languages as low-resource AI infrastructures. Scholarship in African-language NLP repeatedly shows that African languages remain underrepresented in datasets, benchmarks, language models and evaluation systems [16–18, 21, 31, 32]. The term low-resource should therefore be handled carefully. It does not mean that African languages are linguistically poor. It means that the digital infrastructures used by contemporary AI systems contain insufficient, uneven or poorly standardised resources for these languages. The low-resource condition is historical, institutional and political, not linguistic.

This distinction matters for education. Translation benchmarks such as FLORES-101 and No Language Left Behind have expanded multilingual coverage and made low-resource translation more visible [19, 20]. Broader LLM benchmarks such as IrokoBench and Sahara, however, show that performance remains uneven across African languages and across knowledge, reasoning, generation and other task types [18, 21]. For multilingual education, the question is therefore not only whether AI can translate words, but whether it can support disciplinary explanation, cultural nuance and classroom meaning-making. Data

quantity alone is insufficient; annotation quality, domain coverage, dialectal variation and community participation also shape the educational usefulness of language technologies.

The second theme is English dominance and the politics of AI-generated knowledge. AI language models are developed within global data ecologies in which English has disproportionate visibility. Recent African-language evaluations associate sparse and uneven language data with marked disparities in model performance [18, 21]. In educational contexts, this may produce a hierarchy of AI-supported knowledge in which English outputs appear more detailed, stable or authoritative than outputs in African languages. Students and teachers may then gravitate towards English because it is the route of least technical resistance rather than because it is pedagogically preferable. The risk is not that every user will abandon African languages, but that repeated English-first use may normalise English as the default language of serious AI-supported academic work.

South African multilingual education already faces this problem outside AI. African languages have formal recognition, while English continues to hold disproportionate academic and institutional value [6–8]. AI may intensify this tension when students and teachers rely on English for explanations, assignment support or translation because multilingual performance is uneven. In this sense, language hierarchy is not merely reflected in the classroom; it may also be mediated through everyday interactions with digital systems. Institutional language policy must therefore consider the behavioural incentives created by AI tools as well as their stated multilingual capabilities.

The third theme concerns generative AI in multilingual teaching and learning. AI-in-education scholarship identifies potential benefits such as personalised feedback, adaptive support, automated explanation, assessment assistance and learning analytics [1, 2, 4, 33]. Generative AI extends these possibilities by producing natural-language responses that students and teachers can use immediately [3, 34, 35]. Language-education reviews identify writing support, feedback, learner interaction and language practice as prominent areas of investigation [36]. At the same time, African and Nigerian scholarship has begun to connect AI with multiliteracies and pre-service teachers' use of ChatGPT [37, 38]. However, evidence focused specifically on African-language pedagogy remains limited.

For multilingual classrooms, the central challenge is not simply whether AI should be used, but how its outputs are pedagogically mediated. Generative AI may support bilingual explanations, vocabulary development, lesson preparation, and multilingual feedback, but large language models can also produce false, overconfident, or generic responses [3, 39, 40]. African-language evaluation adds a further concern: uneven performance can make a linguistically fluent response appear more reliable than it is [18, 21]. AI output is therefore not automatically pedagogy. It becomes educationally meaningful only when it is connected to curriculum goals, learners' prior knowledge, language repertoires and classroom interaction. This makes teacher judgment central rather than residual.

The fourth theme links data justice, cultural protection and decolonial AI. Language data are not neutral raw material. They carry histories, identities, idioms, proverbs, spiritual concepts, place names, oral traditions and cultural memory. Decolonial AI scholarship warns that AI development can reproduce

colonial relations when it extracts data from communities without recognising local agency, epistemology or benefit [13, 14]. Data colonialism similarly highlights the appropriation of human life and knowledge through digital infrastructures [15]. African-language AI must therefore be discussed not only in terms of data scarcity but also in terms of provenance, consent, validation, ownership, community benefit and cultural protection.

This issue is especially important when generative AI produces content about indigenous knowledge. Such content can appear plausible while flattening or decontextualising local knowledge systems. A model trained on web-scale data may reproduce stereotypes, simplify cultural concepts or present fragments of knowledge as authoritative. In educational settings, this can mislead learners and weaken the epistemic status of community knowledge. Data feminism and algorithmic-accountability scholarship reinforce the need to examine technical systems through the lens of power, representation, and accountability [41, 42]. The labour of speakers, translators, teachers and annotators also matters: language inclusion becomes ethically thin when local contributors generate resources but receive little recognition, capacity building or benefit from their incorporation into commercial systems.

The fifth theme concerns teacher agency and AI literacy in multilingual classrooms. AI literacy scholarship emphasises that learners and educators need to understand, use, evaluate and ethically engage with AI [22, 23]. UNESCO's teacher AI competency framework similarly foregrounds human-centred values, ethics, AI pedagogy and professional development [24]. For multilingual African education, this competence must be expanded. Teachers need linguistic-epistemic AI literacy: the ability to evaluate AI outputs across languages, identify mistranslation, judge cultural adequacy, correct conceptual weakness and support learners' movement across linguistic repertoires.

Research on teacher knowledge further shows that technology integration depends on the interaction among technological, pedagogical, and content knowledge rather than on access to tools alone [43]. Nigerian scholarship on TPACK and teacher digital readiness similarly identifies professional knowledge, training, infrastructure and institutional support as conditions of meaningful technology integration [44, 45]. Emerging work on multiliteracies and pre-service teachers' use of ChatGPT also points to the need for critical AI literacy and pedagogical judgement [37, 38]. These studies are not direct evidence about South African classrooms, but they strengthen the wider African argument that teacher capacity mediates the educational consequences of AI.

The sixth theme is the policy gap in language-equitable AI governance. Global AI-in-education guidance gives necessary attention to data protection, human agency, skills, ethical use and institutional oversight [9, 46]. Language policy, by contrast, foregrounds recognition, access and institutional responsibility but has not always been extended into AI-mediated learning environments. The result is a governance gap: multilingual policy may recognise African languages, while institutional AI policy treats language as a secondary matter, grouped under broad categories such as access or inclusion.

This gap is visible in the South African case. The DHET language policy framework mandates the strengthening of indigenous official languages in higher education [5]. However, institutional responses

to generative AI can easily narrow towards academic integrity, privacy and tool approval while overlooking African-language data, multilingual pedagogy and language services. This review therefore proposes that language-equitable AI governance should connect language policy to multilingual resource development, teacher AI literacy, procurement criteria, accountability reviews, and collaboration between language units and digital learning offices. It also proposes an AI language-impact assessment as a diagnostic mechanism to examine whether institutional AI adoption supports or undermines multilingual commitments. Table 2 summarises the six themes and their governance implications.

Table 2
Thematic synthesis matrix

Theme	Core insight	Governance implication
African languages as low-resource AI infrastructures	The low-resource condition reflects uneven digital representation rather than linguistic weakness.	Invest in African-language corpora, benchmarks, terminology and evaluation.
English dominance and AI-generated knowledge	LLM performance may reinforce English as the default language of academic authority.	Make language equity part of AI procurement, use and evaluation.
Generative AI in multilingual teaching and learning	AI can support multilingual pedagogy but requires teacher mediation and verification.	Embed linguistic-epistemic AI literacy in teacher education.
Data justice, cultural protection and decolonial AI	African-language data carries identity, history and cultural memory.	Govern ownership, consent, benefit sharing and cultural sensitivity.
Teacher agency and AI literacy	Pedagogical value depends on educators' ability to evaluate and adapt outputs.	Provide professional development across AI ethics, language and pedagogy.
Policy gaps in language-equitable AI governance	Language policy and AI governance are often treated separately.	Integrate language policy, AI guidelines, language services and digital-learning units.

6. Discussion: Toward linguistic-epistemic AI justice

The integrative synthesis shows that generative AI, African languages and multilingual education cannot be adequately understood through the language of access alone. Access asks whether learners and teachers can use AI tools; language access asks whether content can be translated or presented in multiple languages; responsible AI asks whether systems are fair, transparent, safe and accountable. These questions remain necessary, but AI ethics scholarship has repeatedly shown that broad principles become weak when they are detached from contextual and institutional mechanisms of accountability [25, 27, 28]. They do not fully capture what is at stake when historically marginalised languages are mediated by AI systems built within unequal data ecologies.

This article, therefore, develops linguistic-epistemic AI justice as its central conceptual contribution. It refers to the obligation to ensure that AI-mediated education recognises historically marginalised

languages not merely as translation channels but as legitimate infrastructures of knowledge, reasoning, pedagogy, identity, cultural memory and intellectual authority. The concept draws together linguistic justice, epistemic justice, data justice and AI governance, but it is not reducible to any one of these traditions. Fricker's [12] account of epistemic injustice clarifies the wrong done to people in their capacity as knowers. At the same time, multilingual education scholarship shows how language practices shape learners' opportunities to participate as legitimate knowers [6, 7]. Linguistic-epistemic AI justice asks a more specific question: how do AI-mediated educational systems recognise or deny the status of marginalised languages as infrastructures of knowledge production?

The concept matters because linguistic presence is not the same as epistemic authority. A chatbot may generate isiZulu text and still provide a stronger conceptual explanation in English. A translation system may render words accurately while losing cultural meaning or disciplinary nuance. A teacher may prepare multilingual resources but remain dependent on English prompts because the model performs more reliably in English. African-language NLP research provides a technical basis for this concern: advances such as MasakhaNER, MasakhaNER 2.0, and IrokoBench have expanded resources and evaluation, but they also document the ongoing asymmetries that confront African languages in contemporary NLP and LLM systems [16–18, 21]. The problem is therefore not simply a model limitation; it is a language-governance problem embedded in data, platforms, institutions and pedagogy.

Linguistic-epistemic AI justice also shifts responsibility from individual users to institutions. Students and lecturers may choose English because AI systems provide more reliable support in English. Such choices are shaped by infrastructural conditions rather than preference alone. This institutional framing is consistent with decolonial AI scholarship, which locates technological inequality within histories of extraction, uneven participation and imported technical priorities [13, 14]. In South African higher education, the issue is especially significant because the DHET [5] framework already places responsibility on institutions to strengthen indigenous official languages in teaching, learning, scholarship and communication. AI governance, therefore, cannot be separated from language-policy implementation.

The title question, therefore, cannot be answered by a simple yes or no. Can ChatGPT speak isiZulu? At the level of text generation, perhaps increasingly yes. At the level of pedagogical adequacy, cultural grounding, disciplinary explanation and epistemic dignity, the answer remains conditional. It depends on data representation, model quality, teacher mediation, language policy, classroom practice and institutional accountability. A consequential AI-governance agenda must therefore move from multilingual capability to multilingual responsibility.

The concept also avoids two inadequate responses. The first is technological optimism: the assumption that improved models will automatically deliver language justice. This underestimates the political and institutional nature of language hierarchy. The second is technological pessimism: the assumption that AI necessarily harms African languages. This overlooks the possibilities created by participatory language-resource development, local expertise and teacher-mediated multilingual pedagogy [32].

Linguistic-epistemic AI justice takes a conditional position. AI can support language justice, but only when infrastructures, policies and pedagogies are designed and governed to do so.

The concept also changes how evidence should be produced. Computational benchmarks are indispensable for identifying performance gaps, but education requires additional judgments about conceptual accuracy, cultural appropriateness, pedagogical usefulness and risk of distortion. Translation benchmarks and African-language LLM evaluations provide essential technical evidence [18–21], yet educational evaluation should also involve language specialists, subject teachers and learners' contexts. Future rubrics should therefore combine computational measures with expert human judgement and classroom-relevant criteria. For isiZulu, this would mean assessing not only whether a model produces fluent text but also whether it can sustain disciplinary explanation, culturally grounded meaning, and pedagogically responsible use.

7. Language-equitable AI governance framework

The framework proposed in this article is process-based rather than a simple list of principles. It begins with AI language infrastructure: the datasets, corpora, benchmarks, tokenisation systems, model architectures and evaluation practices that shape multilingual performance. African-language NLP research shows that resource availability and benchmark visibility materially shape what can be evaluated and improved [16, 18, 19]. If African languages are underrepresented at this level, later educational uses will inherit that underrepresentation. Language equity, therefore, begins before the classroom, in the infrastructures through which AI systems learn and are evaluated.

The second stage is African-language data representation. Representation is not merely the presence of text. It includes quality, diversity, provenance, dialectal range, genre coverage, cultural sensitivity and community legitimacy. Data colonialism and decolonial AI scholarship caution against treating cultural and linguistic data as free raw material for external systems [13, 15]. Participatory African-language work further shows the importance of local contributors and community-centred resource development [32]. Universities and public institutions should therefore support ethically governed corpora, terminology databases, open educational resources and community-approved language repositories.

The third stage is model performance and output quality. Educational AI must be evaluated not only for grammatical fluency but also for conceptual accuracy, cultural appropriateness and pedagogical usefulness. Evaluation of African-language LLMs demonstrates that multilingual capability remains uneven across tasks and languages [18, 21]. A model that produces fluent but shallow explanations can still distort learning. For isiZulu and other African languages, output evaluation should include language experts, teachers and subject specialists, and it should form part of procurement and institutional AI governance.

The fourth stage is teacher mediation and translanguaging pedagogy. AI outputs become educationally meaningful only through interpretation. Teachers decide how to adapt, correct, contextualise or reject AI-generated material. Translanguaging scholarship emphasises learners' dynamic use of integrated

linguistic repertoires for meaning-making [10, 11], while AI-literacy research stresses critical understanding and evaluation rather than tool operation alone [22, 23]. Teacher education should therefore integrate AI literacy with multilingual pedagogy, language-policy awareness and the human-centred competencies identified by Miao and Cukurova [24].

The fifth stage is epistemic recognition or misrecognition. AI-mediated education recognises African languages by supporting them as languages of explanation, inquiry, cultural meaning, and academic voice. It misrecognises them when it treats them as derivative translations, thin cultural symbols or low-quality substitutes for English. This distinction extends Fricker's [12] concern with people as knowers to the language infrastructures through which knowing is educationally recognised. It also resonates with South African scholarship showing that multilingual pedagogies can construct learners as legitimate knowers rather than peripheral participants [6, 7].

The final stage is institutional accountability and language-equitable AI governance. Institutions need mechanisms for reviewing how AI tools affect language equity. Broad AI principles do not implement themselves [28]; accountability requires auditable processes and institutional responsibility [42]. This article, therefore, proposes AI language-impact assessment, multilingual procurement criteria, collaboration between ICT units and language services, professional development for staff, student guidance on multilingual AI use and periodic audits of AI-supported resources. These mechanisms connect responsible AI guidance [9] with language-development obligations already articulated in South African higher education policy [5].

As shown in Fig. 1, the framework is intended for diagnostic use rather than as a linear implementation recipe. Institutions can ask, "Which AI systems are being used?" Which languages do they support well? What forms of African-language data were used to build or adapt them? Who has evaluated their outputs? How are teachers trained to mediate them? What happens when outputs distort cultural or disciplinary meaning? These questions turn language equity into an operational matter rather than a moral slogan.

The framework also makes clear that accountability cannot be placed solely on teachers. Teachers need institutional support, policy clarity, language resources and time for professional learning. If universities adopt AI tools while leaving teachers to manage multilingual risk alone, governance has failed. Conversely, when institutions integrate AI procurement, language policy, teacher education, student guidance, and language resource development, generative AI can become part of a more ambitious multilingual transformation agenda [5, 24].

8. Implications for AI governance, language policy and teacher education

For AI governance, the implication is direct: language must become an explicit governance category. Policies that address privacy, transparency and academic integrity but ignore language may appear

inclusive while leaving English dominance untouched. AI governance frameworks in multilingual societies should specify how official and historically marginalised languages will be supported, evaluated and protected. This includes model selection, data governance, procurement, staff training, student guidance and redress mechanisms when AI systems produce harmful or distorted outputs.

For language policy, the implication is that multilingual commitments must extend into digital and algorithmic infrastructures. South African higher education policy already affirms the importance of indigenous languages [5]. The AI era requires a second generation of language-policy implementation: one that connects language development to AI literacy, language datasets, digital repositories, terminology development, translation technologies and platform accountability. Language units should not be peripheral to institutional AI governance. They should be central partners.

For teacher education, the implication is that AI literacy must be linguistic-epistemic. Teachers need to know not only how to prompt an AI tool, but also how to evaluate multilingual outputs, identify cultural distortion, support translanguaging, and explain to learners why AI fluency is not the same as knowledge. Teacher education programmes should include practical tasks in which pre-service teachers compare AI outputs across languages, assess their conceptual adequacy, and adapt them for local classrooms.

For university leadership, a practical implication is the need for a practical AI language impact assessment before institutional adoption of AI tools. Such an assessment would ask whether the tool supports the institution's official languages, whether outputs have been reviewed by language experts, whether the vendor provides transparency about language performance, and whether there are procedures for reporting linguistic harm. This is particularly relevant for institutions that have formal multilingual commitments but rely on imported digital platforms.

For policy-makers, the article suggests that AI and language policy should no longer be developed in parallel silos. National and institutional AI strategies should explicitly address low-resource language data, African-language technology development, ethical language-data governance and multilingual teacher competence. Language policy should also be updated to address AI-mediated learning spaces, including chatbots, translation tools, automated feedback systems and learning analytics platforms.

9. Limitations and future research

This article has three limitations. First, it is a critical integrative review and conceptual synthesis, not a technical audit of ChatGPT or another AI model; it therefore does not measure actual model performance in isiZulu. Second, the review is concept-driven rather than exhaustive. Its structured search and citation-chaining strategy was designed to secure coverage across six evidence streams, not to enumerate every publication or estimate the prevalence of findings. The corpus also privileges English-accessible scholarly and policy sources, which may itself reproduce some of the visibility inequalities examined in the article. Third, South Africa and isiZulu are used as a critical case. The argument has

relevance to wider multilingual and postcolonial contexts, but institutional and linguistic patterns will differ across languages, education systems and countries.

Future research should extend the review through three designs. The first is an expert-rated output audit comparing generative AI responses in English and African languages. The second is qualitative research with lecturers, students, language practitioners, and digital learning staff on how AI is actually used in multilingual education. The third is policy analysis of institutional AI guidelines to examine whether language equity, African-language data and teacher mediation are explicitly addressed. Together, these studies would provide the empirical foundation needed to refine linguistic-epistemic AI justice as both a concept and a governance practice.

A further area for future work is methodological. Researchers need to develop evaluation designs that sit between computational benchmarking and classroom research. Conventional NLP metrics can show whether a model performs better or worse on a defined task. However, they do not fully capture whether an output is pedagogically useful, culturally appropriate or epistemically respectful. Conversely, classroom studies can show how teachers and learners use AI but may not isolate the model's linguistic quality. A mixed evaluation ecology is therefore needed: benchmark studies, expert-rated output audits, classroom observation and policy analysis should be combined to understand how AI systems affect African languages across the full educational chain.

10. Conclusion

This article began with a deliberately simple question: Can ChatGPT speak isiZulu? The critical integrative review shows that the more consequential question is not whether generative AI can produce isiZulu text, but whether AI-mediated education can sustain African languages as languages of knowledge, thought, pedagogy and future-making. In multilingual postcolonial education systems, language is not a neutral medium. It is tied to identity, access, cultural memory, epistemic authority and institutional power.

The broader contribution is to insist that the future of AI in education cannot be assessed solely by efficiency, productivity, or personalised learning. Those questions matter, but in multilingual societies, they are incomplete. The quality of AI-supported education must also be judged by whose languages become usable for advanced learning, whose cultural meanings are preserved, whose knowledge traditions are represented, and whose teachers are supported to mediate technology responsibly. This shifts the debate from tool adoption to educational justice.

The article has argued that generative AI introduces a new frontier for language policy. AI systems increasingly mediate explanation, translation, writing, feedback, and access to knowledge. If those systems are governed without attention to African-language data representation, teacher mediation and institutional accountability, they may reproduce English-dominant knowledge hierarchies while appearing to promote innovation. Conversely, if governed responsibly, AI could support multilingual pedagogy, strengthen language resources and widen participation in knowledge production.

The proposed concept of linguistic-epistemic AI justice offers a way to name this challenge. It insists that historically marginalised languages must not be treated as secondary channels for the transmission of knowledge. They must be recognised as infrastructures of reasoning, pedagogy, identity and intellectual authority. For South Africa, where isiZulu and other African languages are spoken, this is not a peripheral issue. It is central to whether AI-supported educational futures will be equitable, multilingual and epistemically just.

Declarations

Clinical trial number

Clinical trial number: not applicable.

Ethics, Consent to Participate, and Consent to Publish declarations

Ethics, Consent to Participate, and Consent to Publish declarations: not applicable.

Funding

The authors received no specific funding for this work.

Author Contribution

Author contributionsStella Bolanle Apata conceptualised the study, designed and conducted the critical integrative review and conceptual synthesis, developed the linguistic-epistemic AI justice framework, and prepared the original manuscript. Itumeleng I. Setlhodi contributed to the study's conceptual refinement and critically reviewed the manuscript for intellectual content. Both authors reviewed and approved the final manuscript.

Data availability

Not applicable.

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Figures

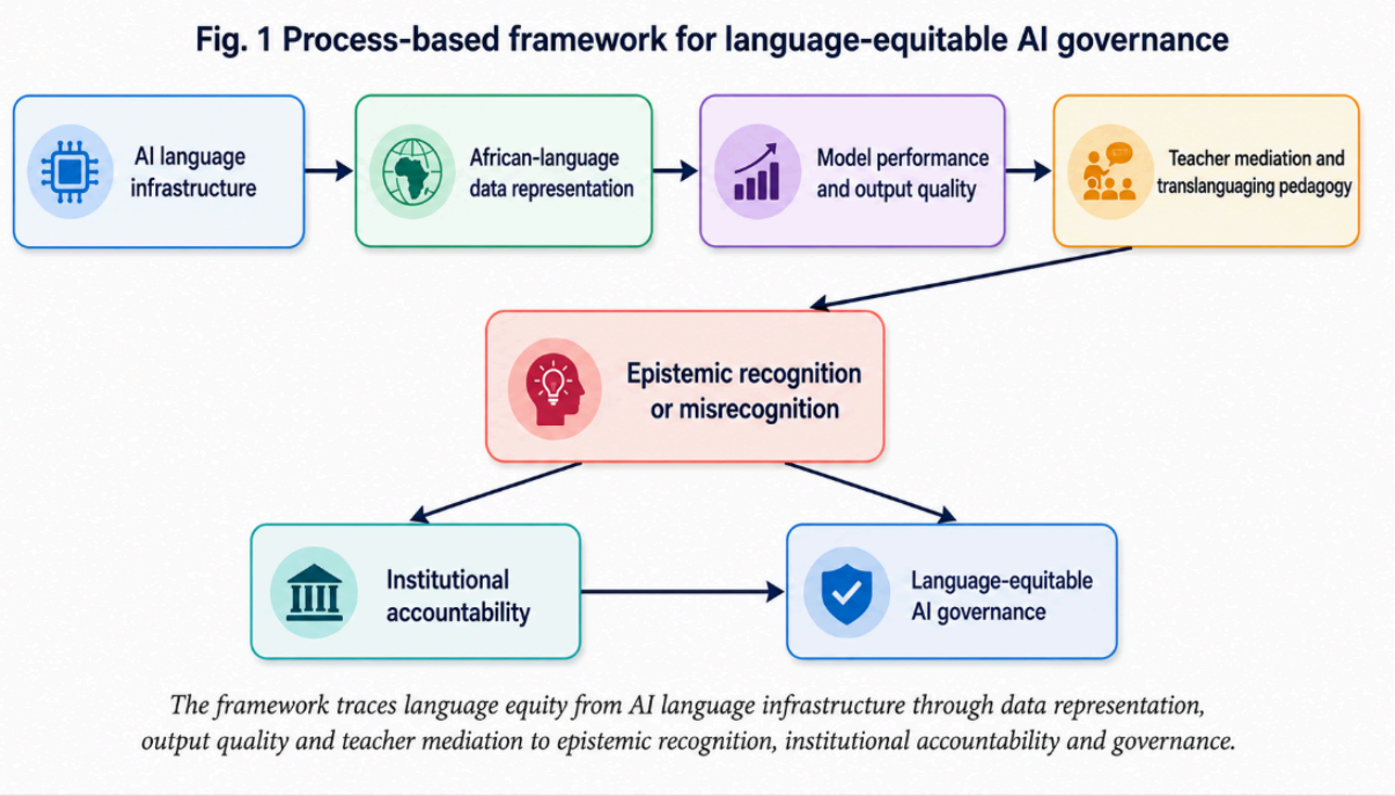


Figure 1

See image above for figure legend.