



Decolonizing Educational Design in Pakistan: Indigenous Knowledge Systems as Educational Technology-A Systematic Literature Synthesis

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Abstract

Colonial and post-colonial educational systems in Pakistan have largely privileged Western epistemologies, standardized assessment forms, and formal curricula, while marginalizing Indigenous Knowledge Systems (IKS) oral histories, ecological wisdom, spiritual traditions, languages, and intergenerational pedagogies. This paper synthesizes empirical literature from all five provinces (Punjab, Sindh, Khyber Pakhtunkhwa, Balochistan, and Gilgit-Baltistan), alongside policy documents, NGO reports, and case studies, to map the current state of IKS integration, identify structural constraints, and propose a theoretically grounded and practically actionable framework for decolonial educational design. Drawing on decolonial theory, Indigenous science perspectives, and critical multilingualism, this work argues that educational reform must treat IKS not as marginal add-ons but as central technologies of pedagogy and curriculum. The paper concludes with a comprehensive pilot model, an assessment redesign protocol, a teacher development strategy, and policy recommendations aimed at transforming the educational landscape toward greater cultural relevance, ecological awareness, and epistemic justice.

Keywords: Indigenous Knowledge Systems; decolonial pedagogy; mother-tongue education; oral traditions; ecological learning; Pakistan; educational design; critical multilingualism.

1. Introduction

The epistemic hierarchies that have been passed down by education systems in former colonized societies tend to favor Western ways of knowing written knowledge, standardised textbooks, set curricula, formal assessments, and colonising languages over local, oral, ecological, spiritual, and embodied ways of knowing. In Pakistan, although various laws and occasional reform efforts have been promulgated the impact of colonial education has taken deep roots. The national and official language of instruction is urdu and english; the curricula completely ignore



the local knowledge and context; narrow cognitive output is rewarded in assessment systems, while the holistic or relational is not; and teacher training programs do not use indigenous pedagogies.

This paper argues that Indigenous Knowledge Systems (IKS) function as educational technologies structured, rigorous, and locally anchored systems of meaning, pedagogy, and epistemology that are fully capable of transforming how education is designed, delivered, assessed, and evaluated. A decolonial lens frames the recognition of IKS as a matter of epistemic justice: legitimizing local languages and knowledges, rebalancing power in knowledge production, and enabling students to learn in ways rooted in their cultures, ecologies, and communities.¹

The paper proceeds as follows. Section 2 outlines the theoretical framework. Section 3 positions the study in relation to existing scholarship. Section 4 details the methodology. Section 5 presents province-by-province empirical findings. Section 6 is a synthesis of cross-provincial themes. Stakes, tensions and design implications are discussed in section 7. Section 8 presents a framework of educational design that is decolonial. A pilot and scaling strategy are described in section 9. Problems and ethical issues are covered in Section 10. Section 11 ends with suggestions for policy.

1.1 Research Questions

- How is the situation with regard to integration of IKS in formal education in the five provinces of Pakistan? culture, are more diverse Provinces are more diversified in terms of language, ecology, spiritual and oral traditions, and culture. intergenerational learning?
- What are the barriers and enabling conditions for IKS integration—across policy, teacher training, curriculum, assessment, and community engagement?
- How can a decolonial educational design framework be articulated that is sensitive to Pakistan's provincial diversity and practically viable for pilot implementation?

2. Theoretical Framework

This analysis is based on three intersecting theoretical perspectives which are used in dialogue and not in isolation.

Decolonial theory Walter Mignolo's and Gloria Anzaldúa's decolonial theory is based on the epistemological firepower of epistemic disobedience, which in turn involves a conscious and conscious contestation of the Western knowledge system and the need to maintain plural epistemologies. For Mignolo, the “colonial matrix of power” is a structure that continues to linger long after formal political independence, most powerfully in the systems of instruction, in curricula, and in the most common languages of instruction.² In Anzaldúa's interpretation of the concept of borderlands epistemology, the struggle against the dominant knowledge regime is found in the daily lives of communities situated on the margins.³

Indigenous science and ecocultural knowledge perspectives developed by Gregory Cajete and Vandana Shiva, emphasize holistic, relational, and place-based knowledge: learning mediated through land, seasonal cycles, and ecological relationships; intimate familiarity with local flora, fauna, and environmental systems; and an understanding of knowledge as inseparable

¹Walter D. Mignolo, *The Darker Side of Western Modernity: Global Futures, Decolonial Options* (Durham, NC: Duke University Press, 2011), 2–18.

²Mignolo, *Darker Side of Western Modernity*, 8–12.

³Gloria Anzaldúa, *Borderlands/La Frontera: The New Mestiza* (San Francisco: Aunt Lute Books, 1987), 77–91.



from ecological practice and from ethical and spiritual relations to the natural world.⁴ Shiva's critique of the displacement of subsistence knowledge by monocultures of science is particularly salient in contexts where colonial education has systematically devalued agricultural, medicinal, and ecological knowledge held by rural and Indigenous communities.⁵

Critical multilingualism and language-policy scholarship as developed by Tove Skutnabb-Kangas and Jim Cummins, treats language as a primary site of power and of epistemic inclusion or exclusion. Skutnabb-Kangas's framework of "linguicidism" documents how the imposition of dominant languages of instruction contributes, systematically, to the erosion of minority languages and the cultural knowledge encoded within them.⁶ Cummins's distinction between conversational and academic language proficiency provides an empirically grounded account of why early mother-tongue instruction is cognitively foundational, particularly for linguistically marginalized learners.⁷

In combination, these perspectives inform the interpretation of empirical findings from Pakistan: how language policies produce inclusion or exclusion; how ecological knowledge is preserved or lost; how spiritual and oral traditions function as durable pedagogical forms; and what systemic reforms are required to address the epistemic marginalization embedded in the current educational order.

3. Literature Review

There is much scholarship on the conflict between the formal curricula of the colonially derived educational system and the living knowledge systems of the diverse communities of Pakistan. The tension is not only cultural – it is structural; the structures of policy (language), assessment, teacher education and curriculum have been relatively stable, epistemologically, since the colonial period.⁸

Studies of mother-tongue instruction form the most empirically developed strand of this literature. Research in Khyber Pakhtunkhwa links mother-tongue instruction to substantially stronger conceptual clarity among primary-school students and to overwhelming teacher and parental preference for first-language pedagogy.⁹ Complementary qualitative work in Malakand documents strongly positive learner attitudes toward first-language integration in English instruction, particularly for tasks placing high cognitive demands on linguistic precision.¹⁰

⁴Gregory Cajete and Leroy Little Bear, *Native Science: Natural Laws of Interdependence* (Santa Fe, NM: Clear Light Books, 2001), 25–42.

⁵Vandana Shiva, *Staying Alive: Women, Ecology and Survival in India* (London: Zed Books, 1988), 41–55.

⁶Tove Skutnabb-Kangas, *Linguistic Genocide in Education—or Worldwide Diversity and Human Rights?* (Mahwah, NJ: Lawrence Erlbaum Associates, 2000), 175–204.

⁷Jim Cummins, *Language, Power, and Pedagogy: Bilingual Children in the Crossfire* (Clevedon, UK: Multilingual Matters, 2000), 15–39.

⁸Imdad Hussain Siraj and Mehtab Dashti, "Unveiling the Coloniality of Education: A Post-Colonial Critique and Decolonizing of Education in Pakistan," *Annals of Arts and Social Sciences Research* 5, no. 3 (2024), <https://www.ajar.org.pk/index.php/home/article/view/2024-vol-05-issue-3-unveiling-the-coloniality-of-education>.

⁹Shah Nawaz Khan et al., "The Efficacy of the Application of Mother Tongue Education in Pakistan: A Case Study of District Bannu," *Sir Syed Journal of Education & Social Research* 3, no. 2 (2020), <https://www.sjesr.org.pk/ojs/index.php/ojs/article/view/465>.

¹⁰"The Role of Mother Tongue in Learning English at the Intermediate Level: A Case Study of Government Degree College Batkhela, Malakand," *Pakistan Journal of Society, Education and Language* 9, no. 2 (2023), <https://pjsel.jehanf.com/index.php/journal/article/view/1575>.



A parallel body of literature documents the depth and pedagogical richness of ecological and ethnobotanical knowledge across the provinces. Seminal ethnopharmacological research in Khyber Pakhtunkhwa identifies 127 medicinal plant species in active community use, transmitted through gendered, intergenerational, and largely oral pedagogical channels, constituting in effect a living curriculum of ecological and medical science.¹¹

Institutional and civil-society interventions provide an emerging evidence base for IKS-informed practice. The Citizens Foundation's mother tongue-based multilingual education model in Tharparkar, and the Institute for Development Studies and Practices' Academic Development Program in Balochistan, both demonstrate that community-engaged, IKS-informed pedagogy can improve comprehension, reduce dropout, and strengthen learner agency.^{12 13}

Critical scholarship on the coloniality of Pakistani education argues persuasively that post-independence curricula have largely reproduced, rather than dismantled, colonial epistemic hierarchies, and that incremental reform is insufficient to address this structural condition.¹⁴ The present study extends this literature by undertaking the first systematic, cross-provincial synthesis of IKS evidence and translating it into an actionable decolonial design framework.

4. Methodology

4.1 Search Strategy and Inclusion Criteria

This study employs a systematic literature synthesis drawing on peer-reviewed journals in education, ethnobiology, and applied linguistics, alongside NGO and civil-society reports, provincial and federal government policy documents, and graduate theses. Databases searched were Google Scholar, JSTOR, PubMed and institutional repositories. The search terms were used in conjunction with the name of each province and relevant localities of the districts, namely, "Indigenous knowledge," "Oral tradition," "Mother tongue," "Curriculum Pakistan," "Ecological learning" and "Intergenerational pedagogy," along with "Language policy."

Inclusion criteria: Sources were included if they (a) included empirical data or systematic documentation of observations instead of theoretical statements; (b) concerned pedagogic, curricular, assessment or community-based educational practice; and (c) included some aspects of one or more of the four IKS domains, namely: language and identity, ecology, spiritual and oral tradition, or intergenerational learning.

Exclusion criteria: Sources without empirical basis, opinion pieces (which are not formal policy documents) and publications not relating to education in Pakistan were not included.

4.2 Data Extraction and Synthesis

For each included source, data were extracted on: province(s) covered; type of Indigenous knowledge addressed; pedagogical or curricular implications; evidence of successful integration

¹¹Muhammad Hamayun et al., "Indigenous Knowledge of Folk Medicines among Tribal Minorities of Khyber Pakhtunkhwa, Pakistan," *Journal of Ethnopharmacology* 166 (2015): 157–167, <https://pubmed.ncbi.nlm.nih.gov/25792019/>.

¹²The Citizens Foundation, "Mother Tongue-Based Multilingual Education," research report (Karachi: TCF, 2020), <https://www.tcf.org.pk/mother-tongue-based-multilingual-education/>.

¹³Nazia Bano, "Toward Epistemic Empowerment of Indigenous Youth: A Case Study of the Academic Development Program, Institute for Development Studies and Practices, Balochistan" (master's thesis, University of Western Ontario, 2016), <https://ir.lib.uwo.ca/etd/2821/>.



or pilot programming; barriers and enabling factors identified; and outcome measures reported, including student engagement, comprehension, identity formation, and ecological literacy. Thematic analysis was used to identify cross-provincial patterns and provincial particularities. Comparative logic was used to compare and contrast provinces in terms of linguistic ecology, remoteness, resources, and policy environment, following existing methodology in qualitative evidence synthesis in education.

5. Empirical Findings: Provincial Analyses

The province-by-province results are organized around the four IKS domains and presented in the next section, with the exception of the policy documentation, which is only included where it is relevant.

5.1 Punjab

5.1.1 Language, Identity, and Mother-Tongue Education

In May 2025 a bill was introduced into the Punjab Assembly that would require mother-tongue (including Punjabi and Seraiki) to be made compulsory subjects in primary schools, public and private, to be adapted by district, textbook to be provided, and teachers to be trained.¹⁵ The intent of this piece of legislation is an acknowledgment of what previous studies had revealed: while many children in Punjab are multilingual in their households, there is a significant shift in the language of instruction in early grades that leaves the majority of children unable to comprehend and engage with the educational material if the language used is not their native language.¹⁶

Another community case study from Murree, where children speak the Pahari language, confirms these results at the community level, revealing high levels of parental and teacher preferences for mother-tongue instruction and a sense that the lack of a Pahari-medium school poses a direct threat to the language's intergenerational transmission.¹⁷

5.1.2 Ecological and Oral Traditions

The knowledge of the wild plants and their medicinal uses is very well documented in the ethnobotanical research of Chhachh region of District Attock, Punjab wherein wild plants are used as a resource for health, nutrition and ecological management, that is passed orally from generation to generation, and is also a cultural heritage.¹⁸ This knowledge constitutes a living pedagogical resource amenable to integration into science, health, and environmental-studies curricula.

5.1.3 Policy and Teacher Capacity Challenges

Despite the 2025 legislative initiative, structured language-transition planning, teacher preparation in multilingual pedagogy, and the availability of Punjabi- and Seraiki-medium textbooks remain limited. Survey evidence indicates that parents and students frequently associate

¹⁵"New Punjab Legislation Seeks to Enforce Mother-Tongue Education at Primary Level," Pakistan Today, May 25, 2025, <https://www.pakistantoday.com.pk/2025/05/25/new-punjab-legislation-seeks-to-enforce-mother-tongue-education-at-primary-level/>.

¹⁶"Role of Mother Tongue in Primary Schooling of Young Learners in Punjab," International Journal of Linguistics 5, no. 1 (2013), <https://www.macrothink.org/journal/index.php/ijl/article/viewFile/4441/3630>.

¹⁷Muhammad Gulfranz Abbasi et al., "Education Through Mother Tongue in Pakistan: A Case Study of Pahari Language," PalArch's Journal of Archaeology of Egypt/Egyptology 18, no. 10 (2021): 595–600.

¹⁸R. A. Qureshi, M. Ahmed, and M. A. Ghufra, "Indigenous Knowledge of Some Important Wild Plants of Folk Medicines in Area of Chhachh (District Attock) Punjab, Pakistan," Electronic Journal of Environmental, Agricultural and Food Chemistry 6, no. 10 (2007): 2500–2511.



English-medium schooling with improved employment outcomes, even when comprehension suffers, producing a market-prestige dynamic that policy alone cannot resolve without complementary community engagement and material provision.

5.2 Khyber Pakhtunkhwa

5.2.1 Ecology and Indigenous Medicinal Practices

A historical survey of folk medicinal knowledge among the tribal communities of Upper Swat, Buner and Chitral, records 127 plant species that are used on regular basis in preparation of medicines, using traditional methods, with distinct gendered domains of knowledge between men and women.¹⁹ These practices are pedagogical content that is directly related to ecological cycles and can be integrated into lessons of science and environmental studies: plant identification, harvesting, storage, preparation, ecological seasonality, and cross-community exchange.

5.2.2 Language and Medium of Instruction

In Bannu, the quantitative study at the district level reveals that students who learn in their mother tongue perform significantly better in terms of their conceptual understanding; about 80 percent of the students who are performing well in conceptual understanding receive first language teaching, and about 85 percent of the teachers are in favour of mother tongue instruction while 85 percent parents are also in favour of the mother tongue instruction. Positive Learner Attitudes (90 percent) in the complementary case study of Batkhela, Malakand indicate that learners have positive attitudes towards using Pashto as a scaffolding resource in the learning of English, especially for cognitively demanding tasks of using grammar and vocabulary. The factors that hinder and facilitate implementation. Factors that impede and support implementation.

5.2.3 Barriers and Enabling Conditions

The challenges are the lack of official approval of local-language teaching materials, insufficient teacher training in multilingual teaching and learning, and the examination system which is centralized and poorly suited for mother-tongue teaching in early grades. Robust community and parental support, policy debate at the provincial level, significant NGO programming, a growing repository of folk literature and traditional cultural practices, and traditional knowledge-holders (healers, elders, herbalists) as pedagogical resources in the community.

5.3 Sindh

5.3.1 Oral, Spiritual, and Cultural Knowledge

In Oral culture such as Sufi poetry, folk narrative and the literary legacy of Shah Abdul Latif Bhittai are integral parts of the provincial cultural life in Sindh. The University of Sufism and Modern Sciences, Bhit Shah, are at the forefront of formalizing the inclusion of Sufi spiritual and ethical knowledge into higher educational frameworks as a model to be replicated in the lower levels of formal education, where spiritual and ethical narrative traditions can be structured. Despite all the efforts made to implement mother-tongue instruction in public and private schools, there is a gap between policy and practice, with urban private schools showing more resistance to mother-tongue than their public-school counterparts.

The model of multilingual education that Citizens Foundation has implemented in Tharparkar is done through the mother tongue language, using a ladder of language progression



starting from the home language of the learners to English, Urdu and Sindhi, and is proven to have increased comprehension, lowered dropouts and enhanced parental involvement in the program as reported during the early stages of the program.²⁰

5.3.2 Language Policy and Institutional Measures

The Sindh (Teaching, Promotion and Use of Sindhi Language) Act, 1972, as amended in 1990, and a provincial assembly resolution of February 17, 2010, together mandate Sindhi as a compulsory subject from Class III to Class IX in all government and private schools operating under the provincial examination system. Schools affiliated with international examination boards have been formally directed by the Sindh Education Department to comply.²¹ Nonetheless, English-medium and Urdu-medium instruction remain dominant in urban and elite schools, shaping the perceived social and economic value of Sindhi and other regional languages.

5.4 Balochistan

5.4.1 Policy and Indigenous Youth Programming

The Balochistan Mother Languages as Compulsory Additional Subject at Primary Level Act, 2014, provides the legal foundation for teaching native languages—Brahui, Balochi, and Pashto—as subjects in provincial schools, accompanied by formal efforts to develop corresponding instructional materials.²²

A detailed study of the Institute for Development Studies and Practices' Academic Development Program, which draws on critical pedagogy and Indigenous-knowledge frameworks, finds that both students and teachers report the program substantially strengthens the connection between schooling and community life, deepens engagement with local ecological and cultural practice, and enhances learners' sense of intellectual agency and identity. It is important that the programme deliberately involves community knowledge-holders in pedagogical practice, and presents a model for intergenerational knowledge transfer in institutions.²³

5.4.2 Barriers

In general, the infrastructure in much of rural and remote Balochistan is still weak, with the availability of teachers who can speak the regional languages still very limited; materials in the three regional languages – Brahui, Pashto, Balochi – are still scarce; standardized assessment is still largely conducted in Urdu or English, and the social prestige of centralised-language schooling is still disproportionate and supported by perceived economic advantages which are hard to separate from language choice.

5.5 Gilgit-Baltistan

5.5.1 Ecological and Craft Knowledge

Gilgit-Baltistan's mountain agro-ecological systems, seasonal pastoral practices, traditional irrigation systems, and craft traditions constitute rich pedagogical resources for place-based science, ecological literacy, and land-based learning. Research on traditional knowledge

²¹Government of Sindh, Sindh (Teaching, Promotion and Use of Sindhi Language) Act, 1972 (as amended 1990), and Provincial Assembly Resolution of February 17, 2010; see also "Cambridge Schools Asked to Include Sindhi as Compulsory Subject," *The Express Tribune*, August 19, 2022, <https://tribune.com.pk/story/2371919/cambridge-schools-asked-to-include-sindhi-as-compulsory-subject>.

²²Government of Balochistan, The Balochistan Mother Languages as Compulsory Additional Subject at Primary Level Act, 2014; summarized in The Citizens Foundation, "Mother Tongue-Based Multilingual Education," <https://www.tcf.org.pk/mother-tongue-based-multilingual-education-2/>.

²³Bano, "Toward Epistemic Empowerment of Indigenous Youth," 88–95.



retention in the region's six districts—conducted with over 300 community members including 8th to 12th grade students—finds that trade in medicinal plants has served as an active mechanism for sustaining and transmitting traditional botanical knowledge across communities and generations, and identifies significant scope for integrating this knowledge into formal science and environmental curricula.²⁴

5.5.2 Language and Identity

Gilgit-Baltistan's considerable linguistic diversity—encompassing Shina, Balti, Burushaski, Khowar, and several other languages—sustains strong mother-tongue identities. Nevertheless, formal education in higher grades increasingly aligns with Urdu- or English-medium instruction; local languages remain severely under-resourced in textbooks; and teacher training in regional languages is inconsistent and rarely formally supported.²⁵

6. Cross-Provincial Thematic Synthesis

6.1 Mother-Tongue Early Instruction and Language-Ladder Models

Based on converging evidence from KP, Sindh, and Balochistan, early language learning that occurs in the family's native language results in better comprehension, stronger foundations in literacy, and higher engagement levels as compared to early language learning in a foreign language.²⁶ NGO models for language-ladder development (most fully documented in the Tharparkar program of TCF) have shown that graduated sequenced transitions to the national and international languages are doable without compromising the benefits of understanding gained from early instruction in the mother tongue.²⁷

6.2 Oral and Spiritual Knowledge as Pedagogical Forms

Oral traditions—folk tales, proverbs, Sufi poetry and ethical narrative—fulfil at the same time the culturally preserving, mnemonic, ethical forming and identity constituting function. Community elders and teachers remain the primary custodians of this knowledge in many districts. Spiritual and ethical narrative, even where not formally labeled as such in curricula, continues to inform character and values education in informal classroom practice across all provinces.

6.3 Ecological and Environmental Knowledge Integration

Indigenous knowledge of medicinal plants, wild foods, agro-ecological practice, and environmental management remains vital and empirically rich across all five provinces.²⁸ This knowledge is directly amenable to integration into science, environmental-studies, geography, and health curricula. Place-based ecological learning grounds instruction in learners' immediate environments rather than in abstraction—a pedagogical advantage particularly pronounced in mountainous, rural, desert, and pastoral settings where learners interact daily with ecologies that formal curricula typically ignore.²⁹

6.4 Intergenerational Learning and Community Involvement

Elders, healers, craftspeople, and community knowledge-holders function as irreplaceable pedagogical resources, transmitting knowledge through apprenticeship and oral instruction largely

²⁴Muhammad Asad Salim et al., "Regional Trade of Medicinal Plants Has Facilitated the Retention of Traditional Knowledge: Case Study in Gilgit-Baltistan Pakistan," *Journal of Ethnobiology and Ethnomedicine* 15, no. 1 (2019): 7, <https://doi.org/10.1186/s13002-018-0281-0>.

²⁶Khan et al., "Efficacy of Mother Tongue Education," 45–48.

²⁷The Citizens Foundation, "Mother Tongue–Based Multilingual Education."

²⁸Hamayun et al., "Indigenous Knowledge of Folk Medicines," 159–163.

²⁹Cajete and Little Bear, *Native Science*, 32–38.



outside formal schooling. Programs that deliberately incorporate these actors into school-based practice—most notably the IDSP Academic Development Program in Balochistan—demonstrate that doing so enhances curricular relevance, strengthens student identity and agency, and creates feedback loops between school and community.

6.5 Policy, Teacher Capacity, and Assessment Alignment

Legal and policy frameworks supporting mother-tongue or regional-language education exist in all five provinces, yet implementation remains consistently uneven. Teacher training in multilingual, ecological, oral, and spiritual pedagogy is severely limited across the country. Standardized, centralized assessment systems continue to privilege written, colonially derived language forms, systematically disadvantaging students whose capabilities are demonstrated through oral, ecological, relational, or craft-based performance.^{30 31}

6.6 Identity, Cultural Relevance, and Equity

Instruction in the mother tongue, paired with engagement with familiar cultural, spiritual, and ecological knowledge, is consistently associated with stronger self-esteem, a deeper sense of belonging, and higher learner engagement. Conversely, instruction in unfamiliar languages within curricula that denigrate or ignore local culture and environment is associated with alienation, dropout, and persistently weaker educational outcomes. This pattern constitutes an equity issue as much as a pedagogical one: the communities whose knowledge is excluded from formal education are precisely those already most marginalized by socioeconomic and geographic factors.

7. Discussion

7.1 The Stakes of Failing to Integrate Indigenous Knowledge Systems

- **Cognitive Development and Learning Outcomes:** Comprehension, concept formation, and foundational literacy improve when instruction occurs in a language the learner understands. Without this alignment, children risk a “double burden” of simultaneously failing to grasp content and the language in which it is conveyed—a documented phenomenon in Pakistan’s multilingual educational landscape.
- **Cultural and Identity Consequences:** Education conducted in foreign or dominant languages, with curricula that systematically ignore or devalue local culture and environment, produces documented effects of alienation, internalized linguistic inferiority, and weakened community cohesion—effects that persist into adulthood.
- **Ecological and Sustainability Implications:** As communities across Pakistan’s provinces confront accelerating climate change and environmental degradation, Indigenous ecological knowledge—rich in adaptive practice, biodiversity literacy, and sustainable land management—represents an underutilized resource for both environmental education and community resilience.
- **Equity and Social Justice:** Instruction in foreign or centralized languages disproportionately advantages urban, elite, and well-resourced communities, while doubly disadvantaging marginalized linguistic and rural populations: first in comprehension, and second in cultural recognition and dignity.

³⁰Skutnabb-Kangas, *Linguistic Genocide in Education*, 201–209.

³¹Cummins, *Language, Power, and Pedagogy*, 22–28.



7.2 Structural Tensions and Trade-Offs

- **Prestige, Market Value, and Comprehensibility:** English and Urdu carry perceived prestige and real economic value in Pakistan's employment market, creating a structural tension between the demonstrated pedagogical benefits of mother-tongue instruction and community aspirations for proficiency in dominant languages. A language-ladder model acknowledges this tension rather than denying it, offering both.
- **Resource and Capacity Constraints:** Producing quality instructional materials across dozens of local languages, training sufficient teachers in multilingual and ecological pedagogy, and sustaining community engagement require financial, institutional, and human-resource commitments that exceed current provincial education budgets, particularly in Balochistan and Gilgit-Baltistan.
- **Assessment and Certification:** National and provincial examinations remain predominantly written, in Urdu or English, and oriented toward a narrow cognitive register. Reforming high-stakes assessment is administratively demanding and politically sensitive, given its downstream implications for university admissions and formal credentials.
- **Heterogeneity and Scale:** Pakistan's linguistic ecology spans hundreds of dialects and minority languages across ecologically distinct provinces. This diversity makes uniform national policy impractical and necessitates frameworks that are principled in their commitments but flexible in their local application.

7.3 Implications for Educational Design

- Early-years education (pre-kindergarten through Grade 3) should be conducted in the mother tongue or most familiar language to secure comprehension and strong foundational literacy, with structured, evidence-based transitions to additional languages in subsequent grades.
- Curriculum design should systematically embed local knowledge—medicinal plants, regional ecologies, folk tales, spiritual and ethical traditions, seasonal calendars, craft knowledge, and oral histories—validating learners' lived experience while also constituting substantive disciplinary content.
- Assessment should extend beyond written examinations to include oral assessment, portfolios, community-validated projects, ecological inquiry tasks, and reflective journals, aligned with the competencies that IKS-integrated curricula develop.
- Teacher education must incorporate multilingual pedagogy, place-based ecological instruction, and oral and community-based pedagogical approaches as core rather than elective competencies.
- Policy frameworks must enable and actively support decentralized adaptation, granting provinces and districts real authority to tailor language policy and curriculum to local sociolinguistic and ecological contexts.
- Pilot programs are essential for generating the evidentiary base necessary to refine frameworks and make the case for systemic reform.

8. Proposed Framework for Decolonial Educational Design in Pakistan

Synthesizing the foregoing theoretical perspectives and empirical findings, the following seven-component framework is proposed for integrating Indigenous Knowledge Systems as



QUALITATIVE RESEARCH JOURNAL FOR SOCIAL STUDIES

ISSN Online: 3006-4686, ISSN Print: 3006-4678

Volume No: 03 Issue No: 01 (2026)

educational technology within Pakistan's formal school system. Each component is grounded in documented evidence from the provincial analyses presented above.

Component	Goals	Key Features / Strategies
Mother-Tongue and Multilingual Instruction	Ensure comprehension; reduce dropout; strengthen identity	Early-years (PreK–Grade 3) instruction in local/familiar language(s); graduated language ladders transitioning through regional, national, and foreign languages; district linguistic mapping; free textbooks; teacher training in local languages.
Oral, Spiritual and Cultural Traditions	Ethical formation; identity; historical memory; relational knowing	Story circles; oral histories and elder participation; folk literature and Sufi poetry in language arts; moral and ethical reflection; festivals and cultural events as pedagogical spaces.
Ecological and Land-Based Learning	Ecological literacy; environmental stewardship; place-based learning	School gardens with indigenous plants; field trips; seasonal calendars; local agriculture and ecology projects; integration into science and geography curricula.
Intergenerational and Community Pedagogies	Knowledge transmission; mentorship; relational learning	Elders and local knowledge-holders as co-teachers; apprenticeships; community-based tasks; explicit linkage between school and home/community learning.
Assessment Redesign	Valid assessment of broader competencies; recognition of plural epistemologies	Portfolios; oral examinations; ecological project grading; community and peer evaluation; reflective journals; assessment of ethical, relational, and ecological understanding.
Teacher Professional Development	Capacity to implement IKS pedagogies; awareness of epistemic justice	Workshops with local knowledge-holders; training in multilingual, oral, and ecological pedagogy; peer observation; reflective practice; supportive supervision.
Policy, Curriculum and Institutional Support	Enabling environment for sustainable integration	Provincial mother-tongue MOI legislation; dedicated resource allocation; textbook development; institutional mandates; inclusion of IKS content in national and provincial curricula; alignment with examination boards.



The seven components are designed as an integrated system rather than a menu of options: their efficacy depends on mutual reinforcement. Mother-tongue instruction, for example, is pedagogically most effective when it is paired with ecologically and culturally grounded content (Components 3 and 4), assessed through appropriate instruments (Component 5), delivered by trained teachers (Component 6), and enabled by supportive policy (Component 7).

9. Pilot Design and Scaling Strategy

9.1 Pilot Implementation Model

- **Selection of Pilot Sites:** Approximately six to eight schools, selected to represent the full range of provincial, linguistic, and ecological contexts: Tharparkar (Sindh), a Kohistan district (KP), a mountainous locality in Gilgit-Baltistan, rural Balochistan, and rural Punjab. Selection should prioritize communities with active involvement of traditional knowledge-holders.
- **Target Grade Levels:** Early grades (pre-kindergarten to Grade 3), with deliberate follow-through into mid-primary grades (4–6) to assess transition effects.
- **Duration:** Two full academic years, to allow for baseline, midline, and endline measurement.
- **Curriculum Modules:** Four to six modules per site, covering: mother-tongue literacy; local ecology; oral and spiritual narrative; and community-elder apprenticeship. Each pilot concludes with a community showcase as a participatory assessment event.
- **Teacher Development:** Pre-pilot residential training, ongoing in-school coaching, inter-site learning visits, and participatory materials development with local knowledge-holders.
- **Assessment and Monitoring:** A mixed-methods design combining standardized literacy and comprehension assessments at baseline, midline, and endline with qualitative instruments: structured interviews with students, teachers, parents, and elders; classroom observation protocols; and documentation of material use and community engagement.
- **Community Engagement Protocol:** Co-design of all curricula with local stakeholders, elders, and language specialists; formal recognition and remuneration of community knowledge-holders; parental involvement mechanisms; translation and community review of all materials.

9.2 Scaling Strategy

- Use pilot data to produce evidence-based policy briefs and a practitioner-oriented compendium of adaptable best practices, submitted to provincial curriculum bureaus and the Federal Ministry of Education.
- Secure recurrent funding through provincial and federal education budgets, supplemented by international development partners active in Pakistan's education sector.
- Build provincial networks of trained IKS-pedagogy resource persons capable of supporting school-level implementation at scale.
- Work with provincial examination boards to pilot alternative assessment formats—oral examinations, portfolio assessment—alongside existing written examinations, building the evidentiary case for assessment reform.



10. Challenges, Risk Management, and Ethical Considerations

10.1 Principal Challenges

- **Financial and Infrastructure Constraints:** Quality instructional materials in many languages, the cost of training and deployment of specialist teacher educators, and the continued resourcing of remote schools are substantial costs which are not currently contemplable within provincial education budgets.
- **Resistance from Multiple Stakeholders:** Opposition could come from administrators who have vested interests in centralized systems; from employers and university admissions bodies that emphasize English or Urdu qualifications; from private school proprietors where English-medium education is a business opportunity; and from those parents who have valid expectations influenced by employment opportunities.
- **Assessment and Credentialing:** However, high stakes national and provincial tests (examinations) are a national enterprise and won't be solved by the school or district alone; there is a need for coordination among examination boards, curriculum authorities, and universities.
- **Managing Linguistic and Ecological Diversity:** The nation's several hundred languages and dialects, the ecological diversity of regions and the significant socioeconomic differences make a uniform implementation plan impossible. It is a truism that effective scaling of systems needs principled frameworks and real local flexibility.

10.2 Risk Mitigation

- **Phased, Evidence-Led Implementation:** Beginning with well-designed pilots, rigorously evaluated, before attempting provincial or national scaling reduces the risk of premature institutionalization of untested models.
- **Broad Stakeholder Engagement:** Sustained, structured engagement with parents, community organizations, religious and spiritual leaders, language activists, employers, and university representatives is essential both for building legitimacy and for surfacing concerns that purely bureaucratic implementation would miss.
- **Legislative and Policy Safeguards:** Provincial legislation protecting local languages and mandating resource allocation—of the type already enacted in Balochistan and proposed in Punjab—provides a degree of institutional durability that depends less on individual champions and more on structural commitment.
- **Ethical Protocols for Knowledge Documentation:** Any documentation of oral, spiritual, or ecological knowledge requires prior, informed community consent; protocols preventing appropriation or decontextualization; formal recognition and fair remuneration of knowledge-holders; and ongoing community oversight of how documented knowledge is used within and beyond the school.

11. Conclusion and Policy Implications

This paper has argued that Indigenous Knowledge Systems are not peripheral decorations on an otherwise unchanged educational structure, but central educational technologies capable of transforming how education is designed, delivered, and assessed in Pakistan. Empirical evidence drawn from all five provinces—Punjab, Khyber Pakhtunkhwa, Sindh, Balochistan, and Gilgit-Baltistan—demonstrates that mother-tongue instruction, ecological knowledge, oral and spiritual traditions, and community-mediated intergenerational pedagogy are alive, valued by learners and communities, and demonstrably associated with improved educational outcomes. They are,



simultaneously, structurally excluded from formal curricula, assessment systems, and teacher-education programs.

The decolonial educational design framework proposed here integrates language policy, curriculum content, pedagogical practice, assessment design, teacher development, and community participation into a coherent and mutually reinforcing system. The proposed pilot model provides a concrete mechanism for generating the evidence base necessary to move from framework to durable policy reform.

Principal policy recommendations:

- Provincial governments should enact and adequately fund legislation supporting mother-tongue early instruction, building on the Punjab initiative of 2025 and the Balochistan Mother Languages Act of 2014, and ensure that implementation funding accompanies legislative mandate.
- Provincial and federal examination boards should pilot and progressively institutionalize oral and portfolio-based assessment formats that allow learners' competencies in IKS domains to be formally recognized.
- Teacher-education institutions at all levels should embed multilingual pedagogy, place-based ecological instruction, and community-engaged practice as core requirements of initial and continuing teacher education.
- Provincial curriculum bureaus should revise curricula to include locally grounded content drawn from ecological, oral, and spiritual knowledge traditions, developed in co-design with community knowledge-holders.
- The Federal Ministry of Education should establish a coordinating framework that supports provincial diversity in language policy and curriculum design while ensuring national coherence in minimum standards.

Future research should pursue longitudinal, mixed-methods evaluation of pilot interventions, with particular attention to long-term outcomes in literacy, ecological competency, cultural identity, and learner agency, to build the robust evidentiary base that durable national education reform requires.



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