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Reclaiming Indigenous Knowledge Systems in the Age of Technological Modernity: A Critical Analysis of Cultural Westernization and Epistemic Erosion in India

(Prof) Dr. Mandeep Kaur Kochar[1]*, Sahibpreet Singh Kochar[2], Prashant Dixit[3]

[1]Vice Principal, Bombay Teachers' Training College, Mumbai, India

[2]Education Consultant for Emerging Technologies, The Kalgidhar Society, India

[3]Department of Science, The Kalgidhar Society, India

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ABSTRACT

This paper critically examines the relationship between technological modernity and the gradual erosion of Indigenous Knowledge Systems (IKS), with specific reference to the Indian context. It argues that contemporary digital infrastructures—while offering unprecedented global connectivity and operational efficiency—simultaneously accelerate epistemic homogenization, digital colonialism, and cultural Westernization. Drawing on decolonial theory, Science and Technology Studies (STS), and recent scholarship on data sovereignty, the study situates the marginalization of IKS within a broader socio-technical framework. Employing a critical-interpretive methodology that triangulates documentary policy analysis with three India-specific case studies—the National Education Policy (NEP) 2020 and the EdTech sector, generative artificial intelligence (AI) and linguistic marginalization, and Adivasi agricultural-data extraction—the paper demonstrates how digital systems restructure cognition, commodify cultural memory, and displace indigenous epistemologies. The analysis identifies four structural mechanisms of erosion—epistemic standardization, algorithmic bias, data dispossession, and cognitive restructuring—which together produce a condition of epistemic dependency in which interpretive authority shifts from communities to privately owned platforms. Empirical indicators are integrated throughout: India recorded 19,569 raw mother-tongue returns in the 2011 Census yet officially recognizes only 121 languages, while English constitutes roughly 46% of the most recent Common Crawl corpus and over 90% of the training data underpinning large language models. The paper advances two conceptual models—a comparative epistemological paradigm and an epistemic erosion–revitalization framework—and argues for a paradigm of technological sovereignty that critically engages digital advancement while safeguarding pluralistic knowledge ecosystems. The findings carry implications for education policy, AI governance, and indigenous data rights, suggesting that hybrid pedagogies, collective-consent data protocols, and decolonial AI design can convert digital infrastructure from a vector of erosion into an instrument of epistemic revitalization.

Keywords: ndigenous knowledge systems; digital colonialism; epistemic erosion; generative AI; NEP 2020

INTRODUCTION

The rapid expansion of global digital infrastructures has fundamentally reconfigured human cognition, social organization, and the paradigms through which knowledge is produced and legitimized. Although technological advancement is frequently framed through a lens of neutrality or universal progress, a substantial body of decolonial and Science and Technology Studies (STS) scholarship demonstrates that these systems carry deeply embedded cultural assumptions that are predominantly Western, industrial, and reductionist [5, 17]. In postcolonial and rapidly developing societies such as India, the uncritical adoption of such technologies has

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produced a subtle yet profound displacement of Indigenous Knowledge Systems (IKS)—frameworks that historically provided holistic, context-sensitive lenses for interpreting reality [1, 20].

The scale of India's digital transition lends urgency to this inquiry. At the start of 2024, India had approximately 751.5 million internet users, equivalent to an internet-penetration rate of 52.4% of the total population, meaning that roughly 683.7 million people remained offline [11]. This uneven and accelerating diffusion of digital infrastructure does not occur on neutral terrain; it interacts with one of the most linguistically and epistemically diverse societies on earth. Recent advances, particularly in generative AI and global data-extraction networks, have intensified this dynamic, giving rise to what contemporary scholars describe as "digital colonialism" [5, 21].

This paper contends that technological modernity does not merely coexist alongside indigenous traditions; rather, it actively restructures, absorbs, or marginalizes them. Three research questions guide the analysis: (a) Through what structural mechanisms do contemporary digital systems erode Indigenous Knowledge Systems in India? (b) How do specific Indian policy and technological developments—NEP 2020, generative AI, and agricultural data platforms—manifest these mechanisms empirically? (c) What design and governance interventions could enable a transition from epistemic erosion toward epistemic revitalization? By integrating decolonial theory with empirical indicators and India-specific case studies, the study offers a structured framework for understanding and resisting epistemic erosion while preserving the analytic value of critical technology scholarship.

METHODOLOGY

This study adopts a qualitative, critical-interpretive design situated within decolonial theory and STS. Rather than testing a hypothesis through primary data collection, it synthesizes secondary evidence to build and illustrate a conceptual framework, a strategy appropriate for theory-oriented work on socio-technical change [20]. The analysis proceeds in three stages. First, a documentary analysis of policy texts and scholarly literature establishes the theoretical scaffolding, drawing on foundational works in decolonial epistemology, philosophy of technology, and algorithmic-bias research. Second, the study triangulates this scaffolding against three purposively selected India-specific case studies—education policy and EdTech, generative AI and language, and indigenous agricultural data—chosen because each illuminates a distinct mechanism of epistemic erosion while sharing a common national context. Third, publicly available quantitative indicators from governmental, intergovernmental, and peer-reviewed sources (e.g., the Census of India, national survey data, and computational-linguistics corpora) are integrated to ground the interpretive claims in measurable trends.

Sources were selected according to relevance, recency, and credibility, prioritizing peer-reviewed publications, official statistical releases, and reputable industry analyses. The approach is interpretive rather than predictive; its aim is conceptual clarification and the generation of testable propositions rather than statistical generalization. Limitations arising from this design are addressed explicitly in the penultimate section.

Conceptualizing Indigenous Knowledge Systems

Indigenous Knowledge Systems refer to the cumulative, context-specific, and dynamic bodies of knowledge embedded within cultural traditions, localized practices, and ecological interactions [1, 20]. In the Indian context, IKS is not a monolith but a pluralistic amalgamation of traditions. Its significance is partly demographic: the 2011 Census enumerated more than 104.2 million people belonging to Scheduled Tribes—approximately 8.6% of the national population—distributed across some 705 notified ethnic groups, the overwhelming majority of whom reside in rural and forest regions and remain custodians of distinct ecological and cultural knowledge [3, 14]. Indian IKS encompasses several interrelated domains:

- **Traditional Ecological Knowledge (TEK):** agricultural practices, biodiversity conservation, and localized climate-resilience strategies, including those of Adivasi communities.
- **Health and wellness systems:** Ayurveda, Siddha, and localized ethnobotanical healing practices.

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- **Cognitive and scientific frameworks:** Vedic mathematics, ancient metallurgical techniques, and astronomical observation.
- **Cultural memory:** oral traditions, folklore, and community-based governance models.

Unlike Cartesian dualism—which separates mind from matter and humanity from nature—Indian IKS is characterized by a holistic epistemology, intergenerational transmission, and the integration of ethics, spirituality, and practical utility [20]. To formalize this divergence, Table 1 outlines the fundamental epistemological differences between IKS and technological modernity.

Table 1. Comparative Epistemological Paradigm: Indigenous Knowledge Systems and Technological Modernity

Dimension	**Indigenous Knowledge Systems (IKS)**	**Technological Modernity**
Epistemology	Holistic, relational, and context-dependent	Reductionist, abstract, and standardized
Transmission	Oral traditions, experiential learning, and intergenerational storytelling	Codification, algorithmic indexing, and digital databases
View of nature	Synergistic and sacred; humans embedded within the ecosystem	Resource-centric; nature as quantifiable, extractable data
Locus of power	Decentralized, community-held, and ethically bound	Centralized (Big Tech), privatized, and market-driven
Value metric	Wisdom, sustainability, and communal harmony	Efficiency, scalability, and algorithmic optimization

Note. Adapted from the conceptual distinctions developed in [1], [20], and [5].

Mechanisms of Epistemic Erosion: Technology as a Vector of Westernization

The displacement of IKS operates through several structural mechanisms embedded within modern technological architectures. These mechanisms are largely invisible because they are framed as efficiency, inclusion, or progress.

Epistemic Standardization and Quantifiability

Digital technologies depend inherently on codification, quantification, and abstraction. These processes privilege knowledge that can be digitized, measured, and standardized into machine-readable formats. Consequently, tacit, experiential, and oral knowledge forms—which define much of India's indigenous heritage—are systematically excluded or distorted in translation [16]. When traditional knowledge is forced into digital repositories such as the Traditional Knowledge Digital Library, it is often stripped of its localized, sacred, or communal context, converting living wisdom into static data [21].

Algorithmic Bias and Generative Imperialism

Algorithms embedded within global platforms reflect Western linguistic, cultural, and epistemological assumptions [15]. In the era of generative AI, this threat has become more insidious, because generative systems do not merely disseminate culture but actively rewrite it [12]. Large language models (LLMs) are trained on corpora that are overwhelmingly English-centric: English constitutes roughly 46% of the most recent Common Crawl web archive [7], and by several estimates more than 90% of the training data used for prevailing LLMs is in English [23]. Hundreds of lower-resource languages each account for less than 0.01% of the Common Crawl corpus, reflecting a steep long tail of digital invisibility [10]. As a result, models frequently generate exoticized, stereotypical, or erased representations of Global South epistemologies [18].

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Data Dispossession and Digital Colonialism

The extraction of data from indigenous populations without equitable benefit-sharing mirrors historical colonial extraction [5]. Corporations headquartered in the Global North frequently mine Traditional Ecological Knowledge to train AI systems or to identify patentable resources, often circumventing the principles of Free, Prior, and Informed Consent. This dynamic reduces indigenous communities to data subjects rather than knowledge sovereigns, reproducing colonial asymmetries in digital form [21].

Psychological and Cognitive Impacts

Technological systems do not merely change what is known; they alter how knowing occurs. Research indicates that sustained digital immersion restructures human attention, memory, and cognitive processing [2]. Two effects are particularly consequential for IKS. First, cognitive offloading—the reliance on search engines and AI for information retrieval—diminishes the internalized memorization central to oral IKS traditions, such as the mnemonic and recitational practices associated with śruti and smṛti in Indian intellectual history [2, 16]. Second, algorithmic conditioning, whereby continuous exposure to algorithmically curated feeds shapes perception and cultural preferences, drives younger generations toward homogenized, globalized content [15].

Together these effects contribute to what may be termed epistemic dependency: a condition in which individuals increasingly rely on external, privately owned technological systems to mediate their understanding of the world, progressively abandoning internalized cultural knowledge. Epistemic dependency is not merely an individual cognitive shift but a structural reallocation of interpretive authority from communities to platforms [5].

Critical Perspectives on Technological Determinism

A rigorous critique of technological modernity requires engagement with the philosophical tradition that interrogates how large-scale technical systems reduce human autonomy and cultural diversity. While radical anti-industrial polemics sometimes advocate the wholesale dismantling of technology, a scholarly perspective extracts their analytic value without endorsing technological regression or harmful ideologies.

Ellul [6] and Heidegger [9] argued that technology is not merely a set of tools but an overarching framework—technique, or Gestell—that compels all human experience to be calculated and optimized. Three propositions follow from this tradition. Technological systems tend to prioritize efficiency over cultural meaning; industrial-technological structures naturally centralize power in the hands of those who control the infrastructure, exemplified today by large technology firms; and human behavior becomes increasingly system-dependent, eroding local resilience. These classical critiques align with contemporary analyses of surveillance capitalism and data colonialism [5], suggesting that the loss of indigenous agency is a structural feature of unregulated technological expansion rather than an incidental flaw.

India-Specific Case Studies

To contextualize the theoretical account of erosion, the following case studies examine the friction between IKS and technological modernity in contemporary India. Each foregrounds a distinct mechanism: infrastructural determinism in education, linguistic erasure in AI, and data dispossession in agriculture.

Case Study 1: The NEP 2020 Paradox and the EdTech Boom

The National Education Policy (NEP) 2020 represents a paradigmatic shift, explicitly mandating the integration of Indian Knowledge Systems into mainstream curricula in order to decolonize education [13]. Yet this mandate coincides with a large-scale, state-supported integration of global EdTech platforms and the establishment of the National Educational Technology Forum. The Indian EdTech market generated revenues of approximately US$6.26 billion in 2024, having grown at a compound annual rate of about 20.3% between 2019 and 2024, with the pre-K-12 and K-12 segment alone accounting for roughly 44% of value [8].

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The paradox is structural. While the policy champions IKS, the dominant medium of delivery—standardized, screen-based EdTech—is itself reductionist. Traditional learning paradigms such as the gurukula ethos, which emphasizes holistic, localized, and ethical mentorship, are displaced by hyper-individualized modules, risking the commodification of IKS into superficial "content" rather than a lived epistemological reality. The volatility of the sector underscores the risk of subordinating pedagogy to market logic: the once-dominant platform BYJU'S collapsed from a peak valuation of approximately US$22 billion into insolvency proceedings, even as the hybrid provider Physics Wallah achieved a public listing valued at roughly US$5.2 billion [19]. An education system that anchors IKS to such infrastructure inherits its instability.

Case Study 2: Generative AI and Linguistic Marginalization

India is among the most linguistically diverse societies in the world. The 2011 Census recorded 19,569 raw mother-tongue returns, which official classification rationalized into 1,369 mother tongues and ultimately grouped into 121 languages—of which only 22 are listed in the Eighth Schedule of the Constitution, alongside 99 non-scheduled languages [3, 22]. Approximately 97% of the population reports a scheduled language as its mother tongue, leaving the remaining 3% linguistically peripheral to official recognition [3]. Crucially, the classification regime itself renders diversity invisible: widely spoken tongues such as Bhili (around 10.4 million speakers) and Gondi (around 2.98 million speakers) are subsumed under broader categories and denied the status of "language" [22].

Generative AI compounds this marginalization. Because foundational models are trained overwhelmingly on English and a handful of dominant global languages—with English alone comprising roughly 46% of the latest Common Crawl corpus and over 90% of typical LLM training data [7, 23]—the sociolinguistic nuance of regional Indian dialects is poorly captured. State initiatives such as Bhashini seek to digitize and translate Indic languages, but the underlying generative logic tends to default to hegemonic tropes or to hallucinate when representing minority cultures, enacting a form of epistemic erasure that renders localized narratives invisible to the machine [12, 18].

Case Study 3: Adivasi Data Extraction and Agricultural Technology

In regions such as Andhra Pradesh and Odisha, digital platforms introduced under the rubric of "agribusiness inclusion" have increasingly monitored Adivasi farmers. Given that roughly 93% of India's 104.2 million Scheduled Tribe members reside in rural areas and depend on agriculture and allied activities [3, 14], the stakes of such monitoring are considerable. While marketed as developmental technology, these top-down systems frequently bypass traditional village councils and customary governance structures.

The asymmetry is sharpened by an underlying digital divide. As of early 2025, internet access reached 91.6% of urban households but only 83.3% of rural households, and only 3.8% of rural households had high-speed fiber connections, compared with 15.3% in urban areas; the single most commonly reported barrier to adoption was low digital readiness rather than absent infrastructure [4]. Communities that are least equipped to negotiate data terms are thus most exposed to extraction. As indigenous biodiverse farming data is mapped and absorbed into corporate databases, local data sovereignty is undermined and collective rights are disrespected, converting indigenous agricultural wisdom into an exploitable commodity [21].

Reintegrating IKS: A Framework for Technological Sovereignty

The relationship between technology and culture is asymmetrical; absent deliberate intervention, technological systems persistently privilege dominant epistemologies. Preserving IKS therefore requires active, systemic resistance rather than passive coexistence. Table 2 outlines a structured framework for transitioning from epistemic erosion to revitalization across four domains.

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Table 2. The Epistemic Erosion and Revitalization Framework

Domain	Current State (Epistemic Erosion)	Proposed Strategy (Epistemic Revitalization)
Data governance	Extractive data colonialism; individual-consent models (e.g., DPDP Act 2023) inadequate for collective indigenous rights	Data sovereignty: collective-consent protocols (Free, Prior, and Informed Consent) and indigenous-owned data trusts
Education	Standardized, Western-centric EdTech platforms; learning decoupled from local ecology	Hybrid pedagogies: organic integration of IKS into curricula; experiential, land-based learning alongside digital literacy
AI and algorithms	Algorithmic bias; erasure of non-dominant languages and oral traditions	Decolonial AI: localized, community-trained models that respect cultural nuance and indigenous linguistic datasets
Cultural heritage	Commodification of IKS; knowledge stripped of sacred and ethical context	Contextual digital archiving: community-governed repositories that retain provenance, protocol, and meaning

Note. Framework synthesized by the authors from [5], [20], and [21]. DPDP Act = Digital Personal Data Protection Act.

DISCUSSION

The case studies illuminate a consistent asymmetry: technological systems, although transformative, are not culturally neutral. In India, the tension between NEP 2020's aspirational decolonization rhetoric and the reality of a multibillion-dollar, Western-influenced EdTech market exemplifies how progressive intentions can be undermined by infrastructural determinism [8, 13]. Similarly, the algorithmic marginalization of Indic languages and the extraction of data from Adivasi communities reveal the continuity of colonial dynamics in digital form [5, 18].

These findings cohere into a single argument: erosion is mediated less by overt hostility to IKS than by the default settings of digital infrastructure—its preference for the quantifiable, the English-language, and the centrally controlled. This is precisely why good-faith policy can coexist with epistemic loss. Yet the framework proposed in Table 2 indicates that erosion is not inevitable. Where technology is designed for amplification rather than assimilation—through collective data rights, hybrid pedagogy, and decolonial AI—it can extend rather than displace indigenous epistemologies. Realizing this potential requires political will, community leadership, and interdisciplinary collaboration.

Limitations and Future Research

Three limitations qualify these conclusions. First, the study is conceptual and interpretive; its propositions are illustrative rather than statistically generalizable, and the secondary indicators it integrates derive from heterogeneous sources with differing methodologies. Second, the treatment of IKS necessarily aggregates highly diverse traditions, and some nuance is lost in synthesis. Third, the case studies are purposively rather than randomly selected. Future research should empirically test the revitalization strategies through longitudinal studies of hybrid education models, participatory evaluations of community-trained language models, and field assessments of indigenous data trusts. Comparative work across other postcolonial contexts would further clarify which mechanisms of erosion are India-specific and which are general features of digital modernity.

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CONCLUSION

Technological modernity, while offering transformative potential, has accelerated the marginalization of Indigenous Knowledge Systems in India through epistemic standardization, algorithmic bias, cognitive restructuring, and digital colonialism. The cases of NEP 2020 and EdTech, generative-AI linguistic erasure, and Adivasi data extraction reveal how these processes manifest locally, displacing holistic, relational epistemologies in favor of reductionist, market-driven paradigms. A balanced reclamation demands technological sovereignty: deliberate design and governance choices that integrate IKS without subsuming it. By operationalizing hybrid models, enforcing collective data rights, and fostering decolonial AI, India can pioneer a pluralistic digital future that preserves cultural sovereignty while enriching global knowledge ecosystems with diverse perspectives. The imperative is clear—without critical intervention, the promise of technological progress risks becoming a new vector of epistemic erosion.

REFERENCES

1. Agrawal, A. (1995). Dismantling the divide between indigenous and scientific knowledge. Development and Change, 26(3), 413–439. https://doi.org/10.1111/j.1467-7660.1995.tb00544.x
2. Carr, N. (2010). The shallows: What the Internet is doing to our brains. W. W. Norton.
3. Census of India. (2013). Primary census abstract and language data, Census of India 2011. Office of the Registrar General & Census Commissioner, Ministry of Home Affairs, Government of India. https://censusindia.gov.in
4. Centre for Economic Data and Analysis. (2025). One nation, many disconnects: Mapping India's home internet gaps. Ashoka University. https://ceda.ashoka.edu.in
5. Couldry, N., & Mejias, U. A. (2020). The costs of connection: How data is colonizing human life and appropriating it for capitalism. Stanford University Press.
6. Ellul, J. (1964). The technological society (J. Wilkinson, Trans.). Vintage Books. (Original work published 1954)
7. Etxaniz, J., Sainz, O., Perez, N., Aldabe, I., Rigau, G., Agirre, E., Ormazabal, A., Artetxe, M., & Soroa, A. (2024). Latxa: An open language model and evaluation suite for Basque. In Proceedings of the 62nd Annual Meeting of the Association for Computational Linguistics (pp. 14952–14972). Association for Computational Linguistics. https://doi.org/10.18653/v1/2024.acl-long.799
8. GlobalData. (2024). India EdTech market summary, competitive analysis and forecast to 2029. GlobalData Plc. https://www.globaldata.com
9. Heidegger, M. (1977). The question concerning technology and other essays (W. Lovitt, Trans.). Harper & Row.
10. Joshi, P., Santy, S., Budhiraja, A., Bali, K., & Choudhury, M. (2020). The state and fate of linguistic diversity and inclusion in the NLP world. In Proceedings of the 58th Annual Meeting of the Association for Computational Linguistics (pp. 6282–6293). Association for Computational Linguistics. https://doi.org/10.18653/v1/2020.acl-main.560
11. Kemp, S. (2024). Digital 2024: India. DataReportal. https://datareportal.com/reports/digital-2024-india
12. Lakshmi, S. (2025). Rebranding empire in the age of generative AI. Frontiers in Communication, 10, Article 1604361. https://doi.org/10.3389/fcomm.2025.1604361
13. Ministry of Education, Government of India. (2020). National Education Policy 2020. https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf
14. Ministry of Tribal Affairs, Government of India. (2013). Statistical profile of Scheduled Tribes in India 2013. https://tribal.nic.in

ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XV, Issue VI, June 2026

15. Noble, S. U. (2018). Algorithms of oppression: How search engines reinforce racism. NYU Press.

16. Ong, W. J. (1982). Orality and literacy: The technologizing of the word. Routledge.

17. Postman, N. (1992). Technopoly: The surrender of culture to technology. Vintage Books.

18. Qadri, M., Gillespie, T., & Peters, J. (2024). Digital marginalisation, AI bias, and cultural erasure in South Asia. Journal of Underrepresented & Minority Progress. https://ojed.org/jump

19. RAYSolute. (2026). Indian EdTech market 2026: BYJU'S collapse, Physics Wallah's rise, and the 2035 forecast [Industry report]. RAYSolute Consultants. https://www.raysolute.com/indian-edtech-analysis-2026.html

20. Santos, B. de S. (2014). Epistemologies of the South: Justice against epistemicide. Routledge.

21. Suhaiu, S. (2025, September 3). Digital colonialism: How Big Tech marginalizes indigenous rights. Kautilya Society, NUSRL Blog. https://kautilyasocietynusrl.in/2025/09/03/digital-colonialism-how-big-techs-marginalize-indigenous-rights/

22. The India Forum. (2021, December 19). What the census obscures about India's linguistic diversity. https://www.theindiaforum.in/article/what-census-obscures

23. Tilde.ai. (2025, November 27). The LLM data dilemma: Why data quality matters for multilingual models. https://tilde.ai/blog/the-llm-data-dilemma/