

# Integrating Indian Knowledge Systems (IKS) in Middle-Level NCERT Textbooks: A Pedagogical Review and Research Paper Framework

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## Abstract

The National Education Policy (NEP) 2020 marked a paradigm shift in India's educational scenario by advocating for the systematic integration of Indian Knowledge Systems (IKS) across all school levels. In alignment with this mandate, the National Council of Educational Research and Training (NCERT) has released revised middle-school curricula and textbooks (such as *Exploring Society: India and Beyond* and *Curiosity* science textbooks). This paper explores how IKS reflections are included at the middle level (Classes 6 to 8), analysing their thematic distribution across subjects, evaluating pedagogical strategies, and discussing the challenges and opportunities of balancing a judicious mix of indigenous wisdom with modern scientific temperament.

## Introduction and Rationale

For decades, mainstream Indian education relied heavily on Eurocentric epistemological frameworks, often treating local history, traditional sciences, and indigenous philosophies as peripheral or marginal. The NEP 2020 conceptualises IKS not merely as a study of the past, but as a living, dynamic body of knowledge encompassing tribal practices, mathematical systems, metallurgy, health, linguistics, and ecological conservation.

The middle school stage (ages 11–14) is a critical developmental window where students transition from concrete to abstract thinking. Introducing IKS at this juncture aids in cultivating cognitive flexibility, cultural rootedness, and interdisciplinary problem-solving skills without relying purely on rote memorisation.

## Thematic Mapping of IKS in Middle-Level NCERT Textbooks

Recent NCERT revisions structure IKS across various domains rather than confining it to history or social science. Key thematic reflections include:

- **Science and Environmental Stewardship (*Curiosity* Series):**
  - Integration of traditional agriculture, indigenous water harvesting techniques (e.g., *tankas*, *stepwells*), and local biodiversity classification.
  - Foundational insights into metallurgy, health, and metallurgy drawn from historical texts, connected alongside modern chemical and physical principles.
- **Social Sciences and Geography (*Exploring Society: India and Beyond*):**
  - Exploration of early farming communities, trade routes, ancient town planning (Indus-Sarasvati civilization), and governance structures.

- Emphasis on pluralism, indigenous mapping traditions, and community-centred resource management.
- **Mathematics and Logic:**
  - Introduction to geometric patterns, Vedic mathematics techniques for mental calculation, and historical contributions of mathematicians like Āryabhaṭa, Brahmagupta, and Bhāskara II.
- **Linguistics and Arts:**
  - Highlighting linguistic structures inspired by Pāṇini's *Aṣṭādhyāyī*, alongside traditional crafts, oral storytelling traditions, and classical/folk aesthetic frameworks.

## Comprehensive Subject-Wise Matrix & Science Curriculum Deep-Dive

To operationalise the integration of Indian Knowledge Systems (IKS) mandated by NEP 2020, the new NCERT middle-stage textbooks distribute indigenous concepts systematically across disciplines.

**Table 1: Subject-Wise Matrix of IKS Themes in Middle-Level NCERT Textbooks**

| Subject Domain                                        | Key IKS Theme / Traditional Domain                                                  | Textbook Grade / Level Focus                                | Pedagogical Objective                                                                                  |
|-------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
| <b>Science</b><br>( <i>Curiosity</i> )                | Ethno-botany, local ecology, material sciences, and indigenous metallurgy           | Classes 6–8<br>( <i>Curiosity</i> textbooks)                | Bridge empirical traditional observations with modern chemical, physical, and biological laws.         |
| <b>Social Science</b><br>( <i>Exploring Society</i> ) | Town planning, agrarian systems, indigenous resource governance, and trade networks | Class 6–8<br>( <i>Exploring Society: India and Beyond</i> ) | Cultivate historical empathy, spatial awareness, and socio-cultural rootedness.                        |
| <b>Mathematics</b>                                    | Geometric symmetry, Vedic arithmetic principles, and historical astronomical models | Integrated modules across middle-stage math                 | Foster mental agility, spatial visualization, and appreciation of historical algorithmic developments. |
| <b>Arts &amp; Languages</b>                           | Classical/folk aesthetics, oral storytelling structures, and linguistic phonetics   | <i>Kṛiti</i> (Class 8) and language readers                 | Understand structural grammar (e.g., Pāṇinian traditions) and traditional craft-making techniques.     |

### Focus Deep-Dive: The Science Curriculum (*Curiosity* Series)

The inclusion of IKS within the middle-school science curriculum (*Curiosity*) avoids superficial mythologising, instead framing traditional practices as early forms of scientific inquiry, observation, and sustainable engineering.

#### 1. **Material Science and Metallurgy**

- **Traditional Context:** Historical texts document advanced metal extraction, smelting techniques, and corrosion resistance (exemplified by historical artifacts like the Iron Pillar of Delhi or ancient zinc smelting in Zawar).
- **Curriculum Connection:** Modern chemistry units addressing metals, non-metals, and separation techniques are contextualised using historical metallurgical workflows. Students evaluate how early artisans manipulated temperature and purity empirically before modern atomic theories were established.

#### 2. **Environmental Science and Ecological Stewardship (Paryavaran)**

- **Traditional Context:** Indigenous water management systems—such as *tankas* in Rajasthan, *johads*, and stepwells—alongside sacred groves (*dev vanas*) that served as informal biodiversity conservation zones.
- **Curriculum Connection:** Plant and ecosystem chapters utilize local ethno-botanical classifications. Instead of learning abstract biomes alone, students examine how communities tracked seasonal indicators through indigenous calendars (*panchang*) and managed watersheds sustainably.

#### 3. **Health, Nutrition, and Human Body Systems**

- **Traditional Context:** Ayurvedic and folk insights on nutrition, seasonal diet cycles (*ritucharya*), and medicinal plants (*haldi*, *neem*, *tulsi*).
- **Curriculum Connection:** Biology modules on components of food and hygiene link modern nutrient profiles (vitamins, antioxidants) with traditional culinary combinations and herbal remedies, fostering critical thinking regarding holistic health.

### Pedagogical Strategies and Interdisciplinary Approach

The updated NCERT pedagogy shifts away from isolated factual recall toward experiential and competency-based learning. Key pedagogical tools utilised in the textbooks include:

1. **Contextualised Side-Boxes and Source Vignettes:** Use of primary excerpts, Sanskrit diacritical guides, and historical anecdotes to provoke curiosity.
2. **Activity-Driven Exploration:** Project-based learning where students map local flora using traditional names, study local artisanal practices, or test traditional ecological maxims.
3. **Cross-Curricular Threading:** Weaving philosophical concepts of harmony with nature into geography, science, and civic responsibility simultaneously.

### Challenges in Implementation

While the inclusion of IKS marks a progressive decolonisation of education, several operational hurdles persist:

- **Teacher Preparedness:** Many educators trained under legacy frameworks lack the cross-disciplinary orientation required to blend ancient frameworks with modern scientific paradigms seamlessly.

- **Risk of Dogmatism vs. Critical Inquiry:** Textbooks must frame IKS through an empirical and historical lens—treating traditional texts as human achievements in observation and experimentation rather than unquestionable dogma.
- **Resource Constraints:** Limited availability of supplementary multimedia tools, regional resource persons, and experiential toolkits at the middle-school level.

## Conclusion and Recommendations

Integrating Indian Knowledge Systems into middle-level NCERT textbooks serves as a vital bridge between traditional heritage and modern global competencies. To maximise its impact, future curriculum revisions should focus on:

- Developing interactive teacher-training modules.
- Encouraging inquiry-based student research projects centred around local community knowledge (ethnobotany, local architecture, regional crafts).
- Ensuring continuous feedback loops to keep the content inclusive, scientifically rigorous, and age-appropriate

## References

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