

NEP 2020 & Teacher Training for IKS Integration: Foundations, Classroom Practice and Reflective Portfolios

Dr. Atal Bihari Tripathy¹, Mrs. Subhashree Mishra²

¹Assistant Professor and Head (SS), Pt. L M S Campus, Rishikesh, Sri Dev Suman Uttarakhand University

²Assistant Professor (TE) in Political Science, D P I Am S E, Berhampur, Ganjam, Odisha

Abstract—The National Education Policy (NEP) 2020 emphasizes the integration of India’s rich Indigenous Knowledge Systems (IKS) into school education to promote cultural rootedness, interdisciplinarity and holistic learning. Effective implementation, however, depends significantly on teachers’ competence, orientation and preparedness. This article discusses a comprehensive model of teacher training for IKS integration at the secondary school level, grounded in national curricular frameworks, sociocultural learning theory and reflective practice. It outlines essential training content, competency requirements, pedagogical approaches and assessment strategies aligned with NEP 2020 principles. Additionally, it proposes detailed templates for reflective teacher portfolios, enabling practitioners to document, evaluate, and refine their IKS-integrated classroom practices. The article argues that teacher professional development must balance academic rigor with cultural sensitivity and structured reflection with creative pedagogy, to ensure that IKS becomes a dynamic pedagogical resource rather than a token curricular addition. The proposed model has implications for policy planners, teacher education institutions and school leaders committed to transforming classroom learning through India’s invaluable knowledge heritage.

Index Terms—Indigenous Knowledge Systems, NEP 2020, Teacher Training, Secondary Education, Reflective Portfolios

I. INTRODUCTION

The National Education Policy (NEP) 2020 marks a paradigmatic shift in India’s educational discourse by advocating for a curriculum that is rooted in the country’s cultural and intellectual traditions while embracing global competencies. One of its key

directives is the integration of Indigenous Knowledge Systems (IKS) including traditional sciences, mathematics, environmental knowledge, arts, languages, philosophies and community practices into school education. The aim is to nurture learners who are both globally competitive and locally grounded, capable of drawing from India’s vast knowledge heritage to solve contemporary problems.

However, the effective realization of this vision depends on teachers. Secondary school teachers, in particular, occupy a crucial space: they shape adolescents’ intellectual frameworks, influence career choices, and mentor learners at a stage where conceptual understanding deepens and critical thinking matures. To enable teachers to carry out the integration of IKS meaningfully, well-designed professional development programmes are essential. This article presents a structured approach to teacher training for IKS integration at the secondary level. It begins by outlining the conceptual foundations underpinning focus of NEP 2020 on IKS, followed by a detailed discussion of the pedagogical and curricular practices required in the classroom. It then proposes a competency-based training framework and provides practical templates for reflective teacher portfolios that capture growth, challenges and pedagogical evolution. Together, these elements offer teacher educators, policymakers, and practitioners a concrete roadmap to strengthen secondary-level instruction through IKS-informed pedagogy.

II. CONCEPTUAL FOUNDATIONS OF IKS INTEGRATION UNDER NEP 2020

2.1 Understanding Indigenous Knowledge Systems
Indigenous Knowledge Systems are bodies of knowledge, skills, innovations, and cultural practices developed by communities over generations through close interaction with their environments. In India, such knowledge includes agricultural techniques suited to local ecology, traditional water harvesting systems, indigenous mathematical and architectural reasoning, classical and regional languages, philosophical traditions such as Nyaya or Vedanta, performing arts, wellness systems such as Ayurveda and yoga and local governance practices. IKS is dynamic rather than static; it continuously evolves through observation, experimentation, and intergenerational transmission. By recognizing its scientific, artistic, ecological and philosophical contributions, schools can help students appreciate the depth and diversity of India's knowledge heritage.

2.2 NEP 2020 Rationale for IKS Integration
NEP 2020 emphasizes IKS integration to cultivate learners who are rooted in local culture while equipped with global competencies. The policy views IKS as a means for strengthening national identity, enhancing interdisciplinary and experiential learning, promoting environmental awareness and encouraging values such as cooperation, sustainability and ethical reasoning. It proposes that students should learn not merely through abstract concepts or textbook information but through contextual knowledge that reflects India's cultural and environmental realities. Integrating IKS into mainstream subjects helps students understand scientific and mathematical ideas through culturally meaningful examples and encourages them to connect school learning with lived experience. NEP 2020 therefore positions IKS not as an optional add-on but as an essential element in achieving holistic and purposeful education.

2.3 Theoretical Foundations for Teacher Training
The integration of IKS in classrooms draws upon several theoretical perspectives, including constructivism, sociocultural learning theory and reflective practice. Constructivism posits that learners make meaning by connecting new information with prior experiences; therefore, using culturally familiar IKS examples can enrich conceptual understanding. Vygotsky's sociocultural theory (1978) underscores

the role of cultural tools, language and community practices in shaping cognition, which makes IKS-based instruction inherently aligned with natural learning processes. The reflective practice framework, particularly grounded in **Schon's work (1983)**, supports the notion that teachers improve their craft through systematic reflection on their actions, thereby becoming better equipped to navigate the complexities of integrating traditional knowledge responsibly and meaningfully. These theoretical foundations justify the need for teacher training programmes that are interactive, culturally sensitive and reflective in nature.

III. CURRICULUM AND PEDAGOGICAL APPROACHES FOR IKS INTEGRATION

3.1 Designing IKS-Enriched Lessons
Integrating IKS within secondary-level instruction requires teachers to embed indigenous examples, case studies, and community practices into regular lesson plans. Teachers can contextualize abstract scientific or mathematical concepts by linking them to Indian architectural designs, traditional ecological knowledge, or classical reasoning frameworks. For example, geometry lessons may draw on temple architecture or textile design patterns, while environmental science classes may explore indigenous water management systems. These integrations enrich students' understanding by showing real-world relevance and cultural continuity. Teachers must ensure academic accuracy and avoid oversimplification, thereby maintaining a balance between cultural context and scientific rigor.

3.2 Interdisciplinary Approaches
Because Indigenous Knowledge Systems naturally span multiple domains, teachers can design interdisciplinary activities that bridge subjects such as science and environmental studies, mathematics and art, history and political science, or languages and performing arts. For instance, studying the ecological significance of sacred groves may combine biology with cultural history, while exploring fractal designs in tribal paintings may integrate mathematical concepts with visual arts. Interdisciplinary approaches foster holistic learning, encourage creativity and enable students to connect different forms of knowledge meaningfully. This approach also reflects the inherently interconnected nature of IKS.

3.3 Inquiry-Based and Experiential Learning

IKS integration aligns closely with inquiry-based and experiential pedagogies. Field visits, interactions with community knowledge holders, hands-on projects, laboratory validation of traditional claim and digital storytelling are effective ways to facilitate learning. Students may investigate local medicinal plants, document oral narratives, or construct models inspired by indigenous technologies. Through such activities, students actively participate in knowledge creation rather than passively receiving information. This approach strengthens conceptual understanding, enhances critical thinking and stimulates curiosity about cultural heritage.

3.4 Ethical and Scientific Considerations

Teachers must be mindful of ethical considerations when integrating IKS. They should avoid romanticizing cultural practices or perpetuating stereotypes. IKS should not be presented as a monolithic or infallible body of knowledge; instead, teachers should help students understand the interplay of empirical validation, cultural practices and historical context. It is also essential to respect intellectual property rights and acknowledge the contributions of community knowledge holders. By balancing cultural appreciation with scientific reasoning, teachers ensure that students develop an informed and respectful understanding of IKS.

IV. TEACHER TRAINING MODEL: CONTENT AND STRUCTURE

4.1 Training Content

An effective teacher training programme for IKS integration must begin with a clear understanding of NEP 2020's policy vision, India's knowledge traditions, and the global significance of indigenous knowledge. Teachers should be introduced to the breadth of IKS across subjects, including traditional ecological knowledge, ancient mathematical systems, philosophical frameworks, classical languages and wellness systems. Training should then move toward subject-specific applications, such as using indigenous navigation techniques in mathematics or traditional iron-smelting history in science. Pedagogical strategies form the next layer of training, focusing on constructivist approaches, project-based learning, fieldwork, and digital documentation. Assessment practices must also be addressed, with emphasis on

formative assessment, portfolio evaluation and performance tasks that reflect both cognitive and cultural learning outcomes. Ethical considerations, cultural sensitivity, and community engagement should be central throughout the training.

V. COMPETENCY REQUIREMENTS FOR TEACHERS

Teachers must demonstrate a set of knowledge, pedagogical, professional, and technical competencies to integrate IKS effectively. Knowledge competencies involve understanding IKS relevant to their subject areas and distinguishing validated knowledge from myths or misconceptions. Pedagogical competencies require the ability to design lessons that meaningfully embed IKS, facilitate inquiry-driven learning and use appropriate assessment tools. Professional competencies involve cultural sensitivity, ethical engagement with indigenous communities and an openness to continuous learning. Technical competencies involve skills in using digital tools to create educational content, document classroom processes, and maintain reflective portfolios. These competencies help ensure that teachers can implement mandate of NEP 2020 with integrity, creativity and academic rigor.

VI. CLASSROOM PRACTICES FOR IKS INTEGRATION AT SECONDARY LEVEL

6.1 Illustrative Examples across Subjects

Classroom integration of IKS can take various forms across subjects. In science, students can explore thermodynamic principles using earthen pots, study agricultural biodiversity through local farming methods, or scientifically examine the properties of medicinal plants. In mathematics, teachers might engage students with geometric patterns in textiles or temple architecture, examining ratios and symmetry in culturally meaningful contexts. Social science classes may analyse community forest management systems or explore indigenous political structures that predate modern governance. Language classes can draw upon folk stories, classical literature, and oral narratives to strengthen language skills and cultural appreciation. These examples demonstrate the breadth of possibilities available when integrating IKS into the secondary curriculum.

6.2 Classroom Learning Cycle

A classroom learning cycle grounded in IKS typically begins with exploration, where students are exposed to indigenous practices, tools, or examples. Teachers then facilitate conceptualization by helping students connect these examples with formal curriculum content. Investigation follows, where students conduct field studies, experiments, or interviews. Reflection is an important stage in which learners evaluate their experiences, record observations and deepen their understanding. The cycle concludes with creation, where students produce projects, models, digital content, or performances that demonstrate their learning. Evaluation is carried out through rubrics, portfolios, or performance tasks that measure not only academic understanding but also cultural insight and creative application.

6.3 Collaborative Teaching Strategies

Collaborative teaching plays a key role in IKS integration, as it allows teachers from different subject areas to pool their expertise and design interdisciplinary lessons. Teachers can co-plan and co-teach modules that involve multiple perspectives, such as environmental sustainability or cultural heritage studies. Collaboration with community knowledge holders brings authenticity and depth to learning experiences. Furthermore, teacher peer-learning groups within schools can support professional dialogue, exchange of successful practices, and collective problem-solving.

VII. REFLECTIVE PORTFOLIOS FOR TEACHERS

7.1 Purpose of Reflective Portfolios

Reflective portfolios serve as essential tools for documenting and evaluating teachers' progress in integrating IKS. They help teachers capture their instructional decisions, reflect on challenges and successes, and align their practices with NEP 2020 goals. Portfolios also provide evidence of student engagement, highlight ethical considerations in working with indigenous communities and support professional discussions among peers or mentors. By engaging in structured reflection, teachers develop greater clarity, confidence and competence in IKS-based pedagogy.

7.2 Components of an Effective Portfolio

A comprehensive reflective portfolio begins with a professional profile in which teachers describe their background, subject specializations and personal philosophy of IKS integration. This is followed by training reflections, where teachers document insights gained from workshops and evaluate shifts in pedagogical beliefs. IKS-integrated lesson plans form an important part of the portfolio, demonstrating how teachers design learning objectives, activities and assessments. Classroom evidence, such as student work samples, field visit observations and multimedia documentation, helps substantiate teaching practices. A community engagement log captures interactions with artisans, farmers, healers, or storytellers who contribute to classroom experiences. Reflective essays allow teachers to analyse what worked well, what challenges emerged and how their professional dispositions evolved. The portfolio concludes with a future action plan that outlines goals for continued improvement.

7.3 Sample Reflection Template

Reflection templates help teachers articulate their thoughts in a structured manner. A reflection on pedagogical integration may prompt teachers to explain which IKS element was used, why it was relevant to the curriculum, and how students responded. A cultural sensitivity reflection invites teachers to examine whether the representation of community knowledge was accurate, respectful, and free from bias. Assessment reflections encourage analysis of which tools were effective, what evidence demonstrated conceptual understanding and how assessment could be improved. Professional growth reflections prompt teachers to identify competencies that developed and areas where further learning is needed. These structured reflections promote thoughtful and purposeful teaching.

VIII. CHALLENGES AND RECOMMENDATIONS

Implementing IKS integration within secondary education presents several challenges. Teachers may lack familiarity with IKS content or may fear misrepresentation or oversimplification. They may struggle to find reliable resource persons or community partners. Curriculum time constraints and examination pressures can limit opportunities for interdisciplinary or experiential learning. There may also be challenges in designing appropriate assessment

tools that capture both cultural and academic learning outcomes. To address these challenges, regular high-quality teacher training programmes are essential, combining theoretical instruction with practical and community-based learning. Developing accessible resource repositories, including curated lesson plans and audiovisual materials, can support teachers in classroom implementation. School leaders must create enabling environments that encourage pedagogical experimentation and cross-disciplinary collaboration. Building partnerships with local communities can enrich classroom experiences and strengthen cultural authenticity. Finally, ongoing research on the impact of IKS-integrated pedagogy is necessary to refine practices and inform policy decisions.

IX. CONCLUSION

NEP 2020 presents an inspiring vision for an education system that is culturally rooted, globally relevant and intellectually transformative. Integrating Indigenous Knowledge Systems at the secondary level is a powerful strategy to bring this vision to life, ensuring learners develop a sense of identity, scientific temper, creativity and social responsibility.

However, the success of this integration rests squarely on teachers. They need structured professional development, appropriate resources and continuous reflective practice. This article has offered a comprehensive framework combining conceptual foundations, classroom pedagogies, competency requirements and reflective portfolio tools to guide teacher educators and practitioners in this endeavour.

A culturally responsive and reflective teacher workforce will not only enhance learning outcomes but also help preserve India's diverse knowledge heritage for future generations. In doing so, teachers become catalysts in transforming aspirations of NEP 2020 into meaningful classroom realities.

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