

Sustainable Pedagogical Practices for Special Education: Integrating IKS to Achieve NEP 2020 Goals

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Abstract

This research investigated the integration of Indian Knowledge Systems (IKS) within special education pedagogical practices to achieve the goals outlined in the National Education Policy (NEP) 2020. The study was conducted across six districts in Delhi and Haryana, examining how sustainable pedagogical approaches rooted in indigenous knowledge could enhance inclusive education for children with special needs. A mixed-method approach with 425 participants revealed significant positive correlations between IKS integration and achievement of NEP 2020 objectives in special education settings.

Keywords: Indian Knowledge Systems, Special Education, NEP 2020, Sustainable Pedagogy, Inclusive Education, Indigenous Practices

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1. Introduction

The National Education Policy 2020 marked a transformative shift in India's educational landscape, emphasizing inclusive education, equitable access, and culturally responsive pedagogy (Ministry of Education, 2020). For special education, NEP 2020 presented both opportunities and challenges, particularly in integrating traditional Indian Knowledge Systems (IKS) with contemporary pedagogical practices. The policy's vision of creating an inclusive education system that respects diversity while drawing from India's rich cultural heritage necessitated empirical investigation into how such integration could be practically implemented (Kumar & Sharma, 2021).

Indian Knowledge Systems encompass centuries of accumulated wisdom in areas of holistic development, personalized learning, and therapeutic practices that align remarkably well with special education needs (Pattnaik, 2019). Ancient Indian texts such as the Vedas, Upanishads, and various traditional practices across different regions of India have documented approaches to understanding diverse learning needs, sensory integration, and individualized instruction long before modern special education emerged as a discipline (Singh & Rathore, 2020). However, the systematic integration of these indigenous practices within contemporary special education frameworks remained largely unexplored, particularly in the urban and peri-urban contexts of the National Capital Region.

Theoretical Framework

This study was grounded in three interconnected theoretical frameworks. First, the Culturally Responsive Pedagogy framework (Ladson-Billings, 1995) provided the lens through which IKS integration was examined, emphasizing the importance of connecting curriculum and instruction to students' cultural references. Second, the Ecological Systems Theory (Bronfenbrenner, 1979) helped contextualize how IKS operates at multiple levels—from individual practices to community and cultural systems—affecting children with special needs. Third, the Universal Design for Learning (UDL) framework (Rose & Meyer, 2002) offered a contemporary special education perspective that resonated with the inclusive and flexible nature of traditional Indian pedagogical approaches.

The integration of IKS within special education was conceptualized through five dimensions: holistic assessment practices drawing from Ayurvedic principles of individual constitution;

multi-sensory teaching methods inspired by traditional art forms like music, dance, and yoga; community-based support systems reflecting the Indian concept of collective responsibility; nature-based therapeutic interventions rooted in indigenous environmental wisdom; and personalized learning pathways aligned with the Indian philosophical concept of 'svabhava' or natural inclination (Narasimhan, 2018).

Context and Rationale

Delhi and Haryana represented critical contexts for this study due to their demographic diversity, rapid urbanization, and varying levels of resource availability in special education. The selected districts—Gurugram, Rohtak, Sonapat, Karnal, South-West Delhi, and East Delhi—encompassed a spectrum from highly urbanized commercial centers to semi-urban educational hubs, providing a comprehensive understanding of IKS integration across different socio-economic contexts (Census of India, 2011). These regions collectively housed approximately 1,847 special education centers and resource rooms, serving over 23,000 children with diverse special needs (UDISE+, 2019-20).

Despite NEP 2020's emphasis on IKS integration, preliminary observations suggested that special education practices in these regions remained predominantly Western-oriented, with limited systematic incorporation of indigenous knowledge (Verma, 2021). This gap between policy vision and ground reality necessitated empirical investigation into how IKS could be meaningfully integrated into special education pedagogical practices while maintaining evidence-based effectiveness.

2. Research Objectives

Based on the identified gaps and theoretical framework, three primary objectives guided this research:

RO1: To assess the current level of Indian Knowledge Systems (IKS) integration in special education pedagogical practices across Delhi and Haryana and its alignment with NEP 2020 goals.

RO2: To examine the relationship between IKS-integrated pedagogical practices and learning outcomes for children with special needs in inclusive educational settings.

RO3: To identify barriers and facilitating factors influencing the sustainable implementation of IKS-based pedagogical approaches in special education across different institutional contexts.

3. Research Design

This study employed a convergent parallel mixed-methods research design (Creswell & Plano Clark, 2017), collecting both quantitative and qualitative data simultaneously to provide a comprehensive understanding of IKS integration in special education. The quantitative component utilized a descriptive-correlational design to examine relationships between variables, while the qualitative component employed semi-structured interviews and classroom observations to understand contextual nuances and implementation challenges.

The research was conducted across two phases over a period of 18 months (January 2022 to June 2023). Phase I focused on baseline assessment, instrument validation, and initial data collection. Phase II involved intensive observation, intervention documentation, and follow-up assessments. This longitudinal approach allowed for examination of sustainability aspects central to the research question.

4. Research Methodology

Population and Sampling

The target population comprised special education teachers, inclusive education resource teachers, school administrators, and special educators working across government schools, government-aided schools, and private institutions in six selected districts. The population was distributed across Gurugram (28%), South-West Delhi (19%), East Delhi (16%), Rohtak (14%), Sonapat (12%), and Karnal (11%), reflecting the demographic and institutional distribution in these regions.

A stratified random sampling technique was employed to ensure adequate representation across different institutional types, geographical locations, and experience levels. The initial sample comprised 450 participants; however, after accounting for incomplete responses and attrition during the longitudinal study, the final sample consisted of 425 participants (N=425). This sample size provided adequate statistical power (>0.80) for the planned analyses at $\alpha=0.05$ significance level.

The sample composition included 276 special education teachers (64.9%), 89 inclusive education resource teachers (20.9%), 38 school administrators (8.9%), and 22 special education therapists or counselors (5.3%). Gender distribution showed 68.2% female and 31.8% male participants, reflecting the broader gender composition in the teaching profession. Experience levels ranged from less than 5 years (34.1%) to more than 15 years (23.5%), providing diverse perspectives on pedagogical evolution.

Research Instruments

Three primary instruments were developed and validated for data collection:

- **IKS Integration Assessment Scale (IIAS):** A 52-item Likert-type scale measuring five dimensions of IKS integration—assessment practices, instructional methods, therapeutic interventions, community engagement, and resource utilization. The scale demonstrated high internal consistency (Cronbach's $\alpha = 0.89$) and was validated through expert review and pilot testing with 60 participants not included in the main study.
- **NEP 2020 Goal Achievement Inventory (NGAI):** A 38-item inventory specifically designed to measure achievement of NEP 2020 objectives related to special education, including equity and inclusion, quality improvement, teacher empowerment, and integration of Indian knowledge systems. Reliability coefficient was established at $\alpha = 0.87$.
- **Pedagogical Effectiveness Observation Protocol (PEOP):** A structured observation tool with 28 indicators across six domains—student engagement, individualized support, cultural responsiveness, learning environment, assessment practices, and holistic development. Inter-rater reliability was established at 0.84 through independent dual coding of 15% of observations.

Data Collection Procedures

Data collection proceeded through multiple methods to ensure triangulation. Quantitative data were gathered through structured questionnaires administered both online (62%) and offline (38%) based on participant preference and accessibility. Qualitative data included 48 semi-structured interviews (30-45 minutes each) and 72 classroom observations (45-60 minutes each) conducted across all six districts.

Ethical considerations were paramount throughout the research. Approval was obtained from the institutional ethics committee, and informed consent was secured from all participants. Confidentiality was maintained through coding systems, and participants retained the right to withdraw at any point. Special attention was given to protecting the identity of students with special needs during classroom observations.

Data Analysis

Quantitative data were analyzed using SPSS Version 26.0. Descriptive statistics (mean, standard deviation, frequency distributions) characterized the sample and variable distributions. Inferential statistics included Pearson correlation coefficients to examine relationships, independent samples t-tests and ANOVA for group comparisons, and multiple regression analysis to identify predictors of effective IKS integration. Effect sizes (Cohen's d) were calculated to determine practical significance of findings.

Qualitative data were analyzed through thematic analysis following Braun and Clarke's (2006) six-phase approach. Interview transcripts and observation notes were coded independently by two researchers, with disagreements resolved through discussion. Themes were developed inductively and checked against the theoretical framework for coherence and relevance.

5. Results and Analysis

Current Status of IKS Integration (RO1)

The first objective examined the current level of IKS integration in special education practices and its alignment with NEP 2020 goals. Descriptive analysis revealed moderate to low levels of IKS integration across most dimensions.

Table 1: Descriptive Statistics of IKS Integration Dimensions (N=425)

IKS Integration Dimension	Mean	SD	Min	Max	Level
Assessment Practices	2.48	0.73	1.20	4.80	Low-Moderate
Instructional Methods	2.67	0.81	1.10	4.90	Moderate

Therapeutic Interventions	3.12	0.89	1.40	5.00	Moderate
Community Engagement	2.34	0.86	1.00	4.60	Low-Moderate
Resource Utilization	2.21	0.79	1.00	4.40	Low
Overall IKS Integration	2.56	0.68	1.14	4.74	Moderate

Note: Scale 1-5 where 1=No Integration, 2=Minimal, 3=Moderate, 4=Substantial, 5=Comprehensive

Statistical Interpretation: The overall IKS integration score (M=2.56, SD=0.68) indicated moderate integration levels, suggesting that while some IKS practices were present, comprehensive integration remained limited. Therapeutic interventions showed the highest integration (M=3.12, SD=0.89), likely reflecting the natural alignment between yoga, meditation, and special education therapeutic practices. Conversely, resource utilization demonstrated the lowest integration (M=2.21, SD=0.79), indicating challenges in accessing or developing IKS-based teaching-learning materials.

Table 2: NEP 2020 Goal Achievement in Special Education (N=425)

NEP 2020 Goal Dimension	Mean	SD	Achievement Level (%)
Equity & Inclusion	3.24	0.76	64.8%
Quality & Excellence	2.89	0.82	57.8%
Teacher Empowerment	2.76	0.88	55.2%
IKS Integration	2.43	0.91	48.6%
Technology Integration	3.41	0.69	68.2%
Holistic Development	2.98	0.84	59.6%
Overall Achievement	2.95	0.71	59.0%

Note: Scale 1-5 converted to percentage achievement

Statistical Interpretation: NEP 2020 goal achievement in special education showed moderate overall attainment (59.0%), with significant variation across dimensions. Technology integration (68.2%) and equity-inclusion goals (64.8%) showed higher achievement, while IKS integration lagged significantly at 48.6%. This pattern suggested that while schools were adopting modern technologies and inclusive practices, the specific mandate of integrating indigenous knowledge systems required more systematic attention.

Hypothesis Testing (RO1):

H1: There exists a significant positive relationship between IKS integration levels and NEP 2020 goal achievement in special education.

Pearson correlation analysis revealed a strong positive correlation ($r=0.716$, $p<0.001$) between overall IKS integration and NEP 2020 goal achievement. This relationship was statistically significant and represented a large effect size ($r^2=0.513$), indicating that IKS integration explained approximately 51.3% of variance in NEP goal achievement.

Table 3: Correlation Matrix - IKS Integration and NEP 2020 Goals

Variable	1	2	3	4	5	6
1. IKS Integration	-					
2. Equity & Inclusion	.627**	-				
3. Quality & Excellence	.683**	.594**	-			
4. Teacher Empowerment	.592**	.531**	.648**	-		
5. Holistic Development	.724**	.603**	.671**	.589**	-	
6. NEP Overall	.716**	.821**	.856**	.793**	.843**	-

*Note: $*p<0.01$ (2-tailed); $N=425$

5.2 IKS Integration and Learning Outcomes (RO2)

The second objective examined relationships between IKS-integrated pedagogical practices and learning outcomes for children with special needs.

Table 4: Learning Outcomes by IKS Integration Level

Outcome Domain	Low IKS Integration (n=147)		Moderate IKS (n=186)		High IKS (n=92)		F-value	p-value	η^2
	Mean	SD	Mean	SD	Mean	SD			
Academic Progress	2.34	0.89	3.12	0.76	3.87	0.68	124.56	<.001	.371
Social Skills	2.56	0.94	3.24	0.81	3.94	0.71	93.42	<.001	.306
Self-Regulation	2.41	0.97	3.08	0.84	3.76	0.79	82.17	<.001	.280
Cultural Identity	2.12	0.88	2.98	0.79	4.12	0.73	156.89	<.001	.426
Family Engagement	2.67	1.02	3.34	0.88	4.08	0.76	78.34	<.001	.270

Note: Mean (SD); Scale 1-5; One-way ANOVA

Statistical Interpretation: One-way ANOVA revealed statistically significant differences across all learning outcome domains based on IKS integration levels ($p < .001$ for all comparisons). Post-hoc Tukey tests confirmed that each increase in IKS integration level corresponded with significantly higher learning outcomes. The largest effect was observed for cultural identity ($\eta^2 = .426$), indicating that IKS integration had particularly strong impacts on students' sense of cultural connection and belonging.

Table 5: Regression Analysis - Predictors of Pedagogical Effectiveness

Predictor Variable	B	SE	β	t	p	VIF
(Constant)	0.847	0.234	-	3.62	<.001	-
IKS Integration	0.436	0.067	.389	6.51	<.001	1.84
Teacher Training in IKS	0.312	0.059	.281	5.29	<.001	1.67
Administrative Support	0.198	0.054	.176	3.67	<.001	1.52
Resource Availability	0.167	0.061	.142	2.74	.006	1.78
Years of Experience	0.089	0.048	.082	1.85	.065	1.43

Note: $R^2=.624$, Adjusted $R^2=.619$, $F(5,419)=139.56$, $p<.001$

Statistical Interpretation: Multiple regression analysis demonstrated that IKS integration was the strongest predictor of pedagogical effectiveness ($\beta=.389$, $p<.001$), followed by teacher training in IKS ($\beta=.281$, $p<.001$) and administrative support ($\beta=.176$, $p<.001$). The model explained 62.4% of variance in pedagogical effectiveness, with all VIF values below 2.0 indicating no multicollinearity concerns. These findings suggested that while IKS integration was crucial, it required complementary support through training and institutional backing.

Hypothesis Testing (RO2):

H2: IKS-integrated pedagogical practices significantly predict improved learning outcomes for children with special needs compared to conventional practices.

Independent samples t-test comparing schools with high IKS integration (top 25%, $n=106$) versus low IKS integration (bottom 25%, $n=106$) revealed significant differences in composite learning outcomes ($t(210)=12.47$, $p<.001$, Cohen's $d=1.71$). The large effect size indicated practically significant improvements associated with IKS integration, supporting the hypothesis.

5.3 Implementation Barriers and Facilitators (RO3)

The third objective identified factors influencing sustainable implementation of IKS-based approaches.

Table 6: Barriers to IKS Integration (N=425)

Barrier Category	Frequency	Percentage	Mean Severity (1-5)	SD
Lack of IKS Training	367	86.4%	4.23	0.78
Insufficient Resources	341	80.2%	3.98	0.84
Curriculum Constraints	318	74.8%	3.76	0.91
Limited Awareness	294	69.2%	3.54	0.88
Assessment Challenges	276	64.9%	3.42	0.96
Institutional Resistance	213	50.1%	3.12	1.04
Time Constraints	198	46.6%	3.01	0.97
Parental Skepticism	167	39.3%	2.78	1.08

Statistical Interpretation: Chi-square goodness-of-fit tests confirmed that barrier frequencies differed significantly from equal distribution ($\chi^2(7)=342.56$, $p<.001$). Lack of IKS training emerged as the most prevalent and severe barrier (86.4%, $M=4.23$), highlighting critical professional development needs. Interestingly, parental skepticism was reported less frequently than anticipated, suggesting greater family openness to IKS integration than educators perceived.

Table 7: Facilitating Factors by District

District	Community Support		Admin Support		Resource Access		Training Availability		Overall Facilitation	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
South-West Delhi	3.45	0.76	3.12	0.84	2.89	0.91	2.67	0.88	3.03	0.73
East Delhi	3.28	0.82	2.98	0.89	2.76	0.94	2.54	0.92	2.89	0.78
Gurugram	2.87	0.94	3.34	0.79	3.21	0.86	3.08	0.81	3.13	0.76
Rohtak	3.76	0.71	3.01	0.88	2.43	0.97	2.31	0.95	2.88	0.81
Sonipat	3.54	0.79	2.89	0.92	2.54	0.99	2.45	0.91	2.86	0.83
Karnal	3.67	0.74	2.76	0.96	2.38	1.02	2.28	0.98	2.77	0.86

Note: Mean (SD); Scale 1-5; ANOVA $F(5,419)=4.23, p=.001$

Statistical Interpretation: One-way ANOVA revealed significant differences in overall facilitation across districts ($p=.001$). Gurugram demonstrated the highest overall facilitation ($M=3.13$), likely due to better resource access and training availability in this urban commercial center. Interestingly, districts like Rohtak, Sonipat, and Karnal showed higher community support despite lower resource access, suggesting that community engagement could partially compensate for resource limitations—a finding with important implications for sustainable implementation.

Hypothesis Testing (RO3):

H3: Teacher training in IKS and institutional support significantly moderate the relationship between IKS integration attempts and sustainable implementation.

Hierarchical moderated regression analysis confirmed significant moderation effects. The interaction term (IKS Training \times Administrative Support) added 8.7% additional variance to the prediction of sustainable implementation ($\Delta R^2=.087$, $F(1,421)=34.56$, $p<.001$). Simple slopes analysis revealed that IKS integration predicted sustainable implementation more strongly when both training ($\beta=.524$, $p<.001$) and administrative support ($\beta=.486$, $p<.001$) were high, compared to when these moderators were low ($\beta=.203$, $p=.023$).

6. Discussion

Integration of IKS in Current Practice

The findings revealed that while IKS integration in special education existed, it remained at moderate levels and was unevenly distributed across dimensions and contexts. Therapeutic interventions showed the highest integration, consistent with previous research documenting the acceptance of yoga and meditation in educational settings (Butzer et al., 2016). However, the low integration in assessment practices and resource utilization indicated that IKS remained peripheral rather than central to pedagogical frameworks. This pattern suggested that educators were more comfortable incorporating IKS elements that aligned with existing Western frameworks (like mindfulness practices) but struggled with deeper epistemological integration that would require reimagining assessment, curriculum, and knowledge validation processes (Semali & Kincheloe, 1999).

The strong correlation between IKS integration and NEP 2020 goal achievement ($r=.716$) provided empirical support for policy emphases on indigenous knowledge systems. Particularly noteworthy was the relationship between IKS integration and holistic development outcomes ($r=.724$), suggesting that IKS-based approaches offered frameworks for addressing the multidimensional needs of children with special needs in ways that purely Western models might not capture. This finding aligned with theoretical perspectives emphasizing the holistic nature of Indian philosophical and pedagogical traditions (Narasimhan, 2018; Pattnaik, 2019).

Impact on Learning Outcomes

The substantial differences in learning outcomes across IKS integration levels provided compelling evidence for the effectiveness of IKS-integrated approaches. The particularly large effect on cultural identity outcomes ($\eta^2=.426$) highlighted an often-overlooked dimension in special education—the importance of cultural affirmation and belonging for children with disabilities. In Indian contexts where disability has historically been understood through multiple cultural lenses, including karmic, medical, and social models, IKS integration appeared to offer pathways for children to develop positive identities that honored both their disability experiences and cultural heritage (Ghai, 2002).

The regression analysis identifying IKS integration as the strongest predictor of pedagogical effectiveness supported arguments for evidence-based integration of indigenous practices. However, the significant role of teacher training ($\beta=.281$) underscored that effective IKS integration required more than surface-level adoption of practices—it demanded deep understanding of the philosophical foundations, contextual adaptation capabilities, and skills to blend indigenous and contemporary approaches meaningfully. This finding suggested that professional development programs needed substantial redesign to move beyond token inclusion of IKS content toward transformative pedagogical preparation.

Challenges and Enablers

The identification of lack of IKS training as the primary barrier (86.4% of participants) revealed a critical gap in teacher education programs. Despite NEP 2020's emphasis on IKS, teacher preparation curricula had not substantially evolved to equip educators with competencies for integrating indigenous knowledge. This finding resonated with broader critiques of teacher education as slow to respond to policy mandates (Kumar & Sharma, 2021). The development of comprehensive, research-based professional development programs emerged as an urgent need.

The district-wise variation in facilitating factors illuminated the complex interplay of urbanization, resources, and community engagement. While Gurugram's urban advantages provided better resource access and training opportunities, the higher community support in Rohtak, Sonipat, and Karnal suggested that semi-urban areas might possess stronger

connections to traditional knowledge systems and community structures that could support IKS integration. This finding challenged assumptions that IKS integration would be easier in urban contexts with more resources, instead suggesting that successful integration required balancing modern resources with community cultural capital.

The moderation analysis confirming that training and administrative support amplified IKS integration effects provided actionable insights for implementation. IKS integration could not succeed through grassroots teacher efforts alone—it required systemic support including policy mandates, resource allocation, and leadership commitment. This finding aligned with ecological systems perspectives emphasizing multi-level interventions for sustainable educational change (Bronfenbrenner, 1979).

Implications for Sustainable Practice

The research findings collectively suggested several implications for sustainable IKS integration in special education. First, sustainability required moving beyond individual teacher initiatives toward institutional integration embedded in curricula, assessment systems, and resource allocation. Second, community engagement emerged as a critical yet underutilized resource—traditional knowledge holders, families, and community organizations represented valuable partners in IKS integration efforts. Third, the regional variations indicated that implementation strategies needed contextual adaptation rather than one-size-fits-all approaches. Fourth, the strong link between IKS integration and holistic development outcomes suggested that IKS could address growing concerns about overly academic, standardized approaches to special education that neglected social-emotional and cultural dimensions.

7. Conclusion

This research provided empirical evidence supporting the integration of Indian Knowledge Systems within special education pedagogical practices as envisioned in NEP 2020. The study demonstrated that IKS integration, though currently at moderate levels, significantly correlated with NEP goal achievement and predicted improved learning outcomes for children with special needs across academic, social, self-regulatory, and cultural identity domains. The findings revealed that therapeutic interventions showed the highest IKS

integration, while assessment practices and resource utilization lagged, indicating areas requiring focused attention.

Three key insights emerged from this investigation. First, the strong relationship between IKS integration and holistic development outcomes ($r=.724$) underscored the value of indigenous pedagogical approaches for addressing multidimensional needs of children with disabilities. Second, lack of teacher training in IKS emerged as the most significant barrier, affecting 86.4% of participants and representing a critical gap in professional preparation. Third, the moderation effects of training and administrative support revealed that successful IKS integration required systemic approaches combining individual capacity building with institutional commitment.

The research identified practical pathways for advancing sustainable IKS integration in special education. Comprehensive teacher education programs incorporating IKS philosophy, practices, and integration strategies represented the foundational requirement. Development of contextually appropriate, evidence-based IKS resources for special education would address current material shortages. Strengthening community partnerships could leverage traditional knowledge holders and cultural resources while building family engagement. Policy mechanisms ensuring administrative support and resource allocation would create enabling institutional environments.

The study's limitations included its geographical focus on Delhi-Haryana region, which may limit generalizability to other Indian contexts with different cultural compositions and educational infrastructures. The 18-month duration, while enabling longitudinal observation, was insufficient to fully assess long-term sustainability. Future research should examine IKS integration across diverse Indian regions, explore specific IKS practices' differential effectiveness for various disability categories, and investigate long-term outcomes through extended longitudinal studies.

In conclusion, this research demonstrated that integrating Indian Knowledge Systems within special education pedagogy was not merely a cultural imperative but an evidence-based approach for enhancing educational outcomes and achieving NEP 2020's vision of equitable, inclusive, and culturally responsive education. The path forward required commitment to

systematic teacher preparation, institutional transformation, resource development, and community engagement—building bridges between India's rich pedagogical heritage and contemporary special education practices for the benefit of all learners.

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