



“Harnessing Indian Knowledge Systems for Education: A Pathway to Sustainable Development Goals”

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Abstract:

Purpose: this study aims to know the importance of Indian knowledge system (IKS) in education for achieving sustainable development goals (SDGs). The study also examines the barriers and strategies of incorporating IKS into the present education system with the help of new education policy 2020.

Methodology: the study employed mixed method approach, quantitative as well as qualitative data to analyze results. Firstly, I used a structured questionnaire to know perception of students about IKS integration in education. Secondly, conduct semi-structured interviews with teachers and students about knowledge of our traditions.

Findings: the authors found that IKS in education significantly supports the achievement of SDGs by enhancing students' awareness of cultural values and self-learning with responsible practices. However, its impact remains partially realized due to limited proper strategic framework.

Originality: As far as authors knowledge, the study is uniquely combined NEP 2020 analysis with teachers and students' insights to examine IKS integration in curriculum. It highlights both its impact on achieving SDGs and the existing implementation gaps.

Keywords: Indian knowledge system, new education policy 2020, strategies, sustainable development goals, self-learning

1. Introduction

Education is essential to the advancement of society, and the laws that regulate it have a big impact on the development of a country. The National Education Policy (NEP) 2020 seeks to establish an inclusive and interdisciplinary education system in accordance with India's cultural legacy and international educational trends. Reviving and integrating the Indian Knowledge System (IKS), which includes ancient Indian

sciences, philosophy, mathematics, Ayurveda, yoga, and more, is one of NEP 2020's main recommendations [19]. The methodical passing down of information from one generation to the next is known as the IKS [28]. It is a systematic approach to information transfer rather than a custom. The IKS is based on the Vedic literature, which includes the Vedas, Upanishads, and Upvedas [17]. Because Indian knowledge is deeply rooted in local ecologies, traditions, and cultural practices, it provides context-specific insights into ecological balance, health, agriculture, and social cohesion [4;29]. Despite this intellectual wealth, conventional education in India has long been criticized for its heavy reliance on western epistemological frameworks and disdain for country's intellectual heritage. This has resulted in curricula that are often viewed as disconnected from India's cultural ethos and incapable of fostering holistic learning [3].

The NEP-2020 acknowledges this rich legacy of timeless Indian knowledge and philosophy. The three components of the IKS, Jnan (Knowledge), Vignan (Science), and Jeevan Darshan (Philosophy of Life) have developed via experimentation, observation, experience, and thorough analysis [26]. Our education, arts, administration, law, justice, health, manufacturing, and commerce have all been touched by this legacy of validating and putting into practice [8]. IKS is offered as a tool for developing interdisciplinary thinking, ethical reasoning, and environmental awareness rather than as a sentimental trip back in time [10]. The policy expands the use of IKS beyond religious or spiritual knowledge by citing disciplines like philosophy, mathematics, medicine, linguistics, architecture, and government. NEP 2020 makes a significant connection between IKS and the concept of holistic and multidisciplinary education, contending that indigenous customs have traditionally opposed strict disciplinary boundaries [9]. Instead of placing IKS in opposition to current scientific knowledge, this framing brings it into line with current educational discussions on integration, critical thinking, and value-based learning [3].

IKS encourages creativity, critical thinking, and a more comprehensive, integrative worldview. By incorporating IKS into contemporary education, teachers may provide students with the skills needed to negotiate and deal with complicated global issues including social justice, environmental sustainability, and ethical governance [24]. Many teachers appear to have difficulties while attempting to integrate IKS into their classrooms, even though the integration of education and IKS has usually been praised and has demonstrated favorable benefits for students [13]. Therefore, it is crucial to understand how to effectively encourage and support teachers as well as students' self-learning for adopting our rooted knowledge. This gap can be filled by an informed pedagogy, which encourages teachers and students to freely express their experiences and perspectives also combining techniques including employing experiential learning, working with indigenous elders, and involving students in debate [24]. By linking these two knowledge domains and offering a toolkit for inexperienced teachers, these approaches assist students in placing scientific ideas within their cultural reality. By incorporating IKS within the structure of education system, this research study aims to investigate how IKS incorporation in education may help achieve the SDGs. The study attempts to explore how students might be trained through self-learning to appreciate natural processes and adopt sustainable behaviors by incorporating traditional wisdom

and nature-centric practices into academic learning. Additionally, this research seeks to find barriers and valuable strategies to incorporate IKS in education.

Research Objective

1. To identify the role of IKS in achieving sustainable development goals.
2. To develop strategy to incorporate IKS in Indian education curriculum.
3. To address the key challenges of implementing IKS in Indian education system.

2. Literature Review

Indian knowledge provides a comprehensive view of the world since it encompasses a wide range of topics, including astronomy, medicine, ecology, agriculture, storytelling, and social organization [5]. Included are interrelated viewpoints on human nature, relationships, and spirituality. Previous research by [11; 27] explains this knowledge as a system of interconnected knowledge, abilities, and representations that direct human societies in their interactions with the natural world. Through rituals, storytelling, songs, and ceremonies, elders verbally impart Indian knowledge, and indigenous peoples have developed and passed down a wide range of knowledge, skills, innovations, and customs that make up IKS [12]. The best way to transmit it is via the generations [6].

The Indian educational system has historically placed a strong emphasis on logical thinking and employable abilities. Ancient Indian literature support vocational education, which is in line with modern education practice. For example, the sacred Veda emphasizes "Arth Sa Vidhya," means "Education that enables Livelihood," which promotes the development of a sustainable society [21; 28]. This knowledge is explained by various studies, some studies which are related to IKS, and education system is mentioned in table 1. Which shows the importance of IKS in Morden education system.

Table 1. Summarizes the past studies on IKS, presenting their objective methodology findings and identified limitations.

Author	Title	Objective	Methodology	Findings	Limitation
[25]	IKS in Indian Education: A Transformative Framework for Cultural Continuity and Academic Innovation	To investigate IKS, look at government programs, emphasize the roles of teachers, pinpoint problems, offer solutions, and evaluate the advantages of incorporating IKS in the classroom.	To investigate IKS integration in Rajasthan schools, the study employed a mixed-method approach, utilizing PLS-SEM for student data and teacher interviews for implementation and challenge insights.	Strong teacher support and understanding of IKS were discovered in the study, but its implementation is hampered by a lack of resources and training, even though teacher knowledge increases student involvement and efficacy.	The study was limited to selected schools in Rajasthan; therefore, findings cannot be generalized countrywide. Self-reported data, short sample size, and disparities in infrastructure and teacher readiness may alter outcomes.

[20]	Incorporating indigenous knowledge perspectives in integrated STEM education: a systematic review	The review assessed how IKS is integrated into STEM education, focusing on culturally sensitive curricula to promote indigenous learners' engagement and confidence in STEM.	After a thorough screening process, 22 publications from 2018 to 2023 were chosen from Google Scholar, ResearchGate, ERIC, and other education databases.	Four major themes surfaced, demonstrating how STEM education largely ignores the wealth of indigenous knowledge in communities. Students find STEM education more meaningful and interesting when local contexts and artifacts are used.	This study was limited by its time frame; future research may include a wider range of databases and sources for more comprehensive analysis.
[19]	Implementing NEP 2020 Recommendations: Promoting the Indian Knowledge System	To examine NEP 2020's vision of integrating IKS into education and identify strategies, challenges, and benefits of implementation.	The study used a qualitative review of literature, policy documents, and published research to analyze NEP 2020's approach to IKS integration.	The study found that IKS can enhance holistic education, cultural identity, and sustainability. However, challenges include teacher unpreparedness, lack of resources, and epistemological resistance.	The study was based on secondary data only and limited literature sources; future research may include more databases and empirical analysis.
[15]	Ancient Wisdom for Modern Stress: Integrating IKS in Education for Mental Wellbeing	To examine how IKS can improve mental wellbeing, cultural identity, and holistic education in higher education.	The study used a qualitative review of literature, policy documents, and empirical research to analyze the role of IKS practices such as yoga, Ayurveda, arts, and Vedic studies in education.	The study found that IKS improves mental health, emotional balance, academic engagement, and value-based education, but highlights challenges like lack of teacher training, resources, and infrastructure.	The research relies on secondary data and literature review; future studies may include primary data and wider databases for deeper analysis.
[24]	Analysis of Teachers' Perspectives Towards the Use of IKS to Improve STEM Education for Sustainable Development	To examine teachers' views on integrating IKS into STEM education for promoting sustainable development.	A mixed-method pre-post design was used with questionnaires and interviews before and after a 6-month dialogic workshop for STEM teachers.	Teachers initially showed mixed views, but the workshop improved acceptance of IKS and its role in sustainability and problem-solving	The study had a small sample and was limited to one region; results may not be widely generalized.

[1]	Developing a Framework for Integrating IKS in Technology Education with Sustainable Development Principles	To develop a framework for integrating IKS into Technology Education to promote sustainable development.	A qualitative case study using interviews and classroom observations of Technology teachers guided the framework development.	Teachers value IKS for sustainability but struggle to integrate it due to reliance on Western methods and lack of training; the study proposes a practical framework	The study involved a small sample from one district, limiting generalizability.
[14]	Forging Connections: Integrating Indian Knowledge Systems in Higher Education	To highlight the importance of integrating IKS into higher education to promote innovation, sustainability, and holistic learning.	The study is based on a qualitative editorial analysis of policies, practices, and institutional initiatives supporting IKS integration	The paper finds that IKS strengthens sustainability, healthcare, agriculture, and innovation, and is increasingly adopted by universities through curriculum reforms and faculty training.	It is based on conceptual discussion without empirical data; future research may include field-based evidence.
[7]	Special Issue of the African Journal of Research in Mathematics, Science and Technology Education (AJRMSTE): The Role of IKS in STEM Education for Addressing the Sustainable Development Goals	To explore how Indigenous Knowledge Systems (IKS) can strengthen STEM education and support the achievement of Sustainable Development Goals (SDGs).	The paper is an editorial review synthesizing findings from eight research studies on IKS integration across STEM disciplines.	The study finds that IKS improves relevance, student engagement, sustainability awareness, and problem-solving skills, but highlights challenges like lack of teacher training and resources.	The issue is based on selected studies from African contexts; therefore findings may not be universally generalized.

After reviewed all these papers we find out that Several studies demonstrate how IKS can used practically in education system, providing examples of how indigenous knowledge can be included into curricula to increase relevance and promote sustainable development. [23] investigate how IKS is used in technology education, specifically in relation to mechanical and electrical systems. According to their research, students are more engaged and better able to apply problem-solving techniques to real-world, community-specific difficulties when educators acknowledge Indian approaches as signifi-

cant knowledge systems. They contend that IKS inclusion increases learning’s contextual relevance and develops abilities that support sustainable development objectives. Nonetheless, there is currently a dearth of research on the actual application of Indian Knowledge Systems in education to improve sustainability. To do this, the study offers evidence-based viewpoints on how Indian resources and the epistemic knowledge that students acquire from their cultural surroundings might help IKS restore its proper position within the education curriculum. Integrating such knowledge is still a challenging task since it necessitates bridging the gap between theoretical and applied knowledge, coordinating cultural knowledge with scientific research, and fortifying significant relationships between local communities and educational institutions. The main question this study attempts to answer is how to successfully integrate IKS into education. The study also looks at how education institutes might use community-based knowledge to help students in education fields become more engaged, comprehend, and succeed academically.

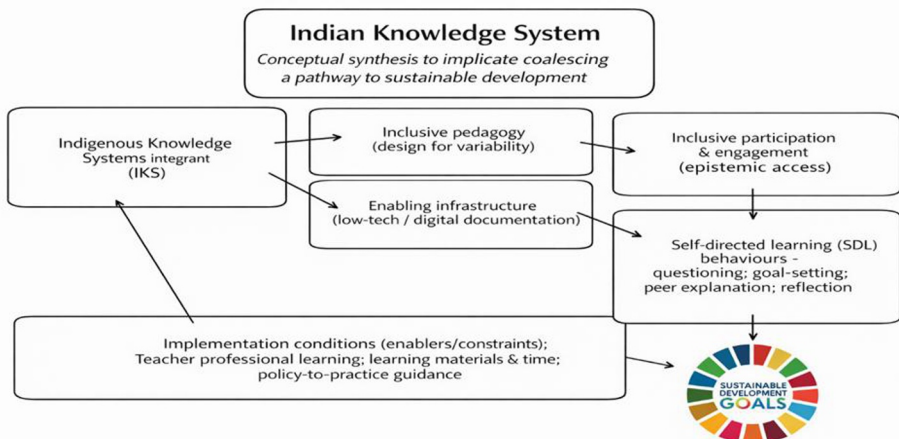


Fig. 1. Conceptual framework

Source: Authors Own

3. Methodology

This research adopts a mixed method research design, quantitative as well as qualitative data to analyze the results. First, we collect data from school students through questionnaire to know the perception of students about IKS in their day-to-day life, after that we conduct a face-to-face interview with teachers and some students and parents about knowledge of our tradition, also the challenges and benefits of adding IKS in their education curriculum. By examining the prospects of several stakeholders, this design strengthened the validity of the findings and assisted in triangulating the results.

3.1 Population and sample

The targeted sample for the study includes six schoolteachers, four parents and ten students in Jaipur Rajasthan. To guarantee representation from all sectors, a stratified and purposive sampling strategy was employed.

Teachers were chosen based on their involvement in curriculum delivery and knowledge with IKS- related subjects, comprised students from upper primary to secondary level.

3.3 Data Generation

Three complementary tools were used to generate the data. Teachers, parents, and elders were first interviewed in a semi-structured manner to learn about their opinions of IKS, their experiences implementing it, and their impressions of its impact on learning. Second, a learner focus group investigated how students perceived inclusion, relevance, and learning agency in IKS-based lessons. Third, participants' opinions on obstacles, favorable circumstances, and perceived learning outcomes were recorded using standardized questionnaires with descriptive indicators.

3.3 Data analysis

Quantitative questionnaire responses were analyzed descriptively to identify patterns in perceived barriers and outcomes. Qualitative data from teacher interviews were analyzed using thematic analysis. The interview was transcribed and coded to identify recurring themes related to knowledge, benefits, challenges, and recommendations for IKS implementation [2].

3.4 Ethics and trustworthiness

To increase trustworthiness, the study used triangulation across participant groups and instruments, to give priority to thorough descriptions of context and practice and maintained an auditable analytic trail. These strategies satisfy naturalistic inquiry's quality requirements of credibility, dependability, and confirmability [16]. Ethical methods included informed consent for adult participants, confidentiality through anonymization, voluntary participation, student assent procedures, and consideration of power relations in teacher-student interactions throughout data creation.

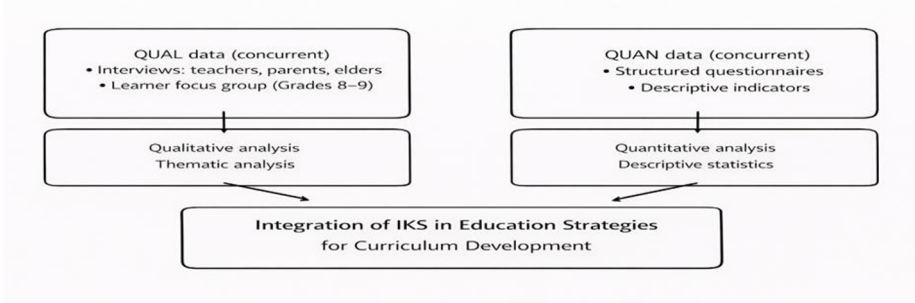


Fig. 2. Convergent mixed-methods single-case design: concurrent qualitative and quantitative data generation, separate analyses, and triangulated meta-inferences.

Source: Authors Own

4. Result

4.1 Constraints on IKS Integration in Classroom Practice

Participants in the study concurred that IKS integration is conceptually significant and aligns well with the NEP 2020's objective. Nonetheless, institutional and pedagogical constraints hinder their actual use. A lack of clear curriculum guidelines for classroom execution (about 68%), a lack of context-specific teaching-learning materials (about 75%), and inadequate teacher training (nearly 80% of respondents) were the most fre-

quent obstacles, according to the questionnaire results. Furthermore, some educators (about 55%) reported that they were reluctant to apply IKS because they did not know how to balance traditional knowledge with Modern academic frameworks. A teacher considered this issue and stated, “we understand the importance of IKS, but without proper training, it becomes difficult to integrate it effectively in daily teaching”. Another respondent emphasized resource limitations by saying, “incorporating Indian knowledge requires time, examples, and materials, which are not always readily available in our current system”.

Barrier theme	Indicative proportion reporting barrier	Illustrative meaning for implementation
Teacher training and pedagogical capacity	80%	Inadequate training in designing and delivering IKS-integrated lessons, limiting effective classroom application
Teaching and learning resources	75%	Limited availability of locally relevant materials, examples, and time for developing IKS-based activities
Policy-to-practice guidance gaps	68%	Lack of clarity in curriculum frameworks, assessment methods, and structured implementation guidelines
Time constraints and workload	72%	Heavy syllabus and workload restrict time for integrating IKS components effectively
Curriculum rigidity	65%	Fixed curriculum structures provide limited flexibility for incorporating indigenous knowledge
Assessment-related challenges	58%	Difficulty in evaluating IKS-based learning outcomes within existing assessment systems

4.2 Learner Engagement, Inclusion, And Participation

Increased student engagement and more inclusive classroom involvement were consistently associated with the implementation of IKS across data source. Teachers and students reported that IKS-based course were more relatable and simpler to understand since they connected academic concepts to everyday activities, Indian culture, and lived experiences. According to the questionnaire results, there was an increase in classroom involvement (about 88%), enthusiasm for learning activities (about 84%), and positive student evaluation of the lesson's effectiveness (about 86%) when IKS components were employed. As one educator put it, "Students show more interest and actively participate in discussions when we relate topics to local traditions and practices." Another student who emphasized this relationship said, "Learning becomes easier when examples are from our own culture and surroundings, as we can understand them better."

4.3 Evidence of Self-Directed Learning Behaviors

Participants in the study also connected the implementation of IKS with the development of students' self-directed learning (SDL) habits. Students reported feeling more at ease asking questions, voicing their ideas, and taking control of learning activities

when courses were connected to well-known cultural contexts. After IKS integration sessions, teachers noticed a noticeable rise in student led discussions, peer explanations, and inquiry-based engagement. Additionally, questionnaire findings indicated that roughly 78% of students felt more comfortable expressing issues. These patterns highlight key components of SDL, including learner autonomy, active engagement, and reflective comprehension. One student summed up this shift by saying, “when topics are linked to what we already known from our surroundings, I feel more confident asking questions and sharing my understanding with others”.

4.4 IKS, education and SDGs achievement

The study also found that integrating IKS into school significantly advances the SDGs, particularly those related to sustainable communities, responsible consumption, and high-quality education. About 76% of respondents said that incorporating learner-centered and context-based IKS strategies enhances students’ understanding of sustainability concepts and promotes moral principles and environmental awareness. Furthermore, about 68% of educators noted increased awareness of cultural preservation and community well-being, and about 71% of educators said that utilizing local knowledge and customs promotes responsible behavior toward natural resources. The contribution of IKS to sustainability goals frequently stays implicit rather than systematically structured within the curriculum, as seen by roughly 60% of respondents who reported difficulties in explicitly linking IKS content with formal SDG frameworks and measurable learning outcomes.

4.5 Effective Integration Strategies

The study found several useful strategies that are thought to be the best for incorporating IKS into the current educational system. About 76% of respondents thought learner-centered strategies like group discussions, inquiry-based learning, and activity-based demonstrations were successful, while about 70% thought storytelling and the use of cultural narratives were beneficial. About 68% of participants agreed that adding local context and real-world examples, especially those derived from community practices, would significantly improve comprehension. Furthermore, about 64% of respondents said that experiential learning techniques including field-based activities and observation were useful in connecting theory to practice. However, nearly 60% of respondents having trouble connecting IKS concepts to modern scientific frameworks and academic terminology, indicating that integration often remains surface-level in the absence of structured instructional alignment.

Important strategies for integrating IKS:

S. No.	Strategy	Description
1.	Inquiry-based and learner-centered approaches	Encouraging active participation, critical thinking, and student-led exploration of concepts
2.	Use of culturally appropriate narratives	Incorporating stories, traditions, and folklore to make learning more relatable and engaging

S. No.	Strategy	Description
3.	Inclusion of local and community knowledge	Integrating examples and practices from students' immediate socio-cultural environment
4.	Activity-based and experiential learning	Promoting hands-on activities, fieldwork, and practical demonstrations for deeper understanding
5.	Linking IKS with modern academic disciplines	Establishing clear conceptual connections between traditional knowledge and contemporary subjects

5. Conclusion

According to NEP 2020, the study highlights how incorporating IKS into the educational system has lot of promises to enhance student engagement, inclusivity, and self-directed learning. Although IKS makes learning more relatable, contextual, and participatory, its adoption is still limited by issues with teacher preparation, resource availability, and curriculum clarity, according to results from teacher interviews and questionnaire responses.

The study also identifies effective integration strategies, such as learner-centered approaches, experiential learning, community-based knowledge integration, and storytelling. However, the lack of formal linkages between IKS and modern academic institutions limits its deeper instructional influence. The gap between policy intent and classroom practice must be closed via systematic efforts in curriculum modification, capacity training, and institutional support to successfully integrate IKS.

6. Limitation and Future Scope

1. This study focuses on one city's future research that can test the proposed pathway through design-based curriculum or intervention studies across multiple schools and districts.
2. Also evaluate models of teacher professional development and district support for IKS integration. Longitudinal research would also be valuable to determine whether SDL-related behaviors persist and transfer across subjects and grades.

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